

ORIGINAL

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

In the matter of:

COMMONWEALTH EDISON COMPANY

(Byron Nuclear Power Station
Units 1 & 2)

Docket No. 50-454 OL
50-455 OL

VOLUME I

Location: Rockford, Illinois

Pages: 9226 - 9400

Date: Friday, July 27, 1984

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VOLUME I

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY & LICENSING BOARD

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In the matter of: :

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COMMONWEALTH EDISON COMPANY, :

Docket Nos. 50-454 OL

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(Byron Nuclear Power Station :

50-455 OL

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Units 1 and 2) :

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Main Courtroom
Federal Building
211 South Court Street
Rockford, Illinois

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Friday, 27 July 1984

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VOLUME I

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Hearing in the above-entitled matter was convened

16

at 9:05 a.m.,

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BEFORE:

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JUDGE IVAN W. SMITH, Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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JUDGE A. DIXON CALLIHAN, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission

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JUDGE RICHARD F. COLE, Member
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission

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mgc

1 APPEARANCES:

2 On behalf of the Applicant Commonwealth Edison Company:3 JOSEPH GALLO, ESQUIRE
4 Isham, Lincoln and Beale
5 Suite 840
6 1120 Connecticut Avenue, Northwest
7 Washington, D.C.

8 -and-

9 MICHAEL I. MILLER, ESQUIRE
10 BRUCE BECKER, ESQUIRE
11 MICHAEL GOLDFEIN, ESQUIRE
12 MARK FURSE, ESQUIRE
13 Isham, Lincoln and Beale
14 Three First National Plaza
15 Chicago, Illinois 6060316 On behalf of the Nuclear Regulatory Commission Staff:17 STEPHEN LEWIS, ESQUIRE
18 MICHAEL WILCOVE, ESQUIRE
19 Office of the Executive Legal Director
20 U.S. Nuclear Regulatory Commission
21 Washington, D.C. 2055522 On behalf of the Intervenor DAARE SAFE:23 DOUGLASS CASSEL, JR., ESQUIRE
24 TIMOTHY WRIGHT, ESQUIRE
25 VICKI JUDSON, ESQUIRE
Business and Professional People for the
Public Interest
109 North Dearborn Street
Chicago, Illinois 6060226 On behalf of the Intervenor Rockford League of
27 Women Voters:28 MS. BETTY JOHNSON
29 1907 Stratford Lane
30 Rockford, Illinois 61107

MM/
mml 1I N D E X

2	<u>WITNESSES:</u>	<u>BY:</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>BOARD</u>	<u>REDIRECT</u>	<u>RE CROSS</u>
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9	L.O.DelGeorge (resumed)						
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P R O C E E D I N G S

1
2 JUDGE SMITH: You may proceed.

3 Is there any preliminary business?

4 MS. JUDSON: Yes, there is, Your Honor.

5 I just want to state for the record that I had
6 a conversation with Mr. Gallo. At this point he's unsure
7 when he can have available the corrected version of
8 Interrogatories 11-C and 12-C, but he's advised me that he'll
9 let me know this afternoon. And at that point, I assume
10 that we will report to you on that matter.

11 JUDGE SMITH: Off the record.

12 (Discussion off the record.)

13 MS. JUDSON: We've one other preliminary matter.

14 MR. WRIGHT: Judge, I'd like to make a
15 representation of counsel. Yesterday there was quite a bit
16 of confusion about the introduction and identification of
17 certain exhibits. And we felt that the Board might have
18 been left with the impression that our expert witness,
19 Mr. Stokes, was provided and was reviewing information that
20 was not related to the reinspection program.

21 We checked, last night, the appendices which were
22 supplied to us by Sargent & Lundy and various other documents,
23 and we have found that the exhibits that we did introduce
24 yesterday were connected to the reinspection program and that,
25 in fact, the engineers that signed off those calculations

1 were in fact structural engineers working on the reinspection
2 program. And in the sense that the witnesses do not know
3 of the documents and have not seen the documents, there is
4 really no sense in going through it.

5 But we felt that we should clear it up for the
6 Court and we will make these points in Mr. Stokes' direct
7 testimony relating to these specific documents, Your Honor.
8 And we didn't want to leave the Court with the impression that
9 our expert witness was reviewing information not related to
10 these proceedings.

11 JUDGE SMITH: Thank you.

12 I think that Mr. Singh had made it clear also
13 that the code number on there was a reinspection code.

14 MR. WRIGHT: And at this time, Your Honor, I
15 would state that we have no further questions of the panel.

16 JUDGE SMITH: Mr. Lewis?

17 MR. GALLO: Mr. Chairman, Judge Smith, I would
18 like to also indicate, in response to comments by Mr. Wright,
19 that it should be clear that no implications should be drawn
20 from the fact that these witnesses couldn't recognize one
21 sheet from a calculational book and a calculation that
22 consisted of hundreds of pages, of hundreds of thousands of
23 calculations, that reside in Sargent & Lundy.

24 I think it was incumbent upon Intervenors to
25 properly identify the documentation they wanted to cross-examine

1 on and it was not to be expected that these witnesses should
2 recall and recognize every single sheet, such as what was
3 presented to them yesterday.

4 JUDGE SMITH: It would seem to me that the entire
5 episode with the two exhibits results in nothing. I just
6 don't see that it has any effect whatsoever. I think
7 every party agrees to that, the Intervenors, the Applicants,
8 and we see no basis for any inferences and certainly no
9 basis for any findings on the entire episode.

10 MR. GALLO: Thank you, Judge Smith.

11 I would like to, before Staff commences its
12 cross-examination, I would like to -- Mr. French was asked
13 a question late yesterday, before we recessed. And upon
14 reflection, he believes he has given an incorrect answer
15 and I would like to clarify for the record that particular
16 question. It appears on page 9221 of the transcript. And
17 it might be helpful for a clarification of the record if we
18 do it immediately, if I may.

19 It's yesterday's transcript, Your Honor.

20 (Pause.)

21 It begins at line 10 on page 9221. May I proceed?

22 JUDGE SMITH: Yes.
23
24
25

LB11b4

1 Whereupon,

2 ERNEST B. BRANCH

3 JOHN M. MC LAUGHLIN

4 RICHARD X. FRENCH

5 ANAND A. SINGH

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

8 REDIRECT EXAMINATION

9 BY MR. GALLO:

10 Q Mr. French, you were asked by counsel yesterday
11 why was all Hatfield A325 bolts retorqued. And in essence,
12 you answered that you didn't know. Is that your testimony?

13 A (Witness French) Mr. Gallo, I'd like to read the
14 actual answer that I gave and explain why it's inaccurate.
15 My response was "The reinspection program, first of all, I
16 really do not know firsthand why all of the 325 bolts were
17 retorqued. I had nothing to do with the reinspection or
18 the decision to retorque them."

19 My answer was more in line with saying that I
20 did not -- I was not involved in the decision. I do know why
21 they were retorqued, actually.

22 Q Can you answer the question?

23 A Yes, I can. The number of discrepancies, compared
24 to the number of bolts involved, was high enough that it
25 would be prudent to consider that they should all be

1 retorqued. As I recall, it was something on the order of
2 15 percent.

3 On the matter of 325 bolts in general, I'd like
4 to explain to the Board why they seemed to be an item. They
5 are used in the structural steel framework that holds up
6 what we call cable pan risers. If you will picture that
7 most cable pans are installed in a horizontal position and
8 they are supported to the ceiling or to structural steel
9 members by vertical supports. Where the cables have to go
10 from one floor to another, they go up a vertical section
11 of cable pan.

12 The entire weight of the cable, in the vertical
13 rise, is not supported from the cable pan itself, like it is
14 in a horizontal run. It's just too heavy. It's supported
15 by a special steel member that is mounted inside the cable
16 pan at the top of the riser. The cables are connected to
17 that support by wire basket clips. The support of that
18 member holding up all of the vertical weight has to be
19 significantly different in design than a typical cable pan
20 support. It is actually a structural steel framework.

21 Therefore, there is an entirely different design
22 process. It's more akin to structural steel design than it
23 is to cable tray support design.

24 In the design of structural steel, there is a
25 technique used which involves the use of high strength bolts

LB11b6

1 rather than normal strength bolts. A bolt can develop its
2 load or do its job by one of two methods. In the more
3 conventional method the bolt is placed between two pieces
4 of steel and the force on the bolt is in shear. The force
5 is placed across the bolt body and the strength of the steel
6 in the bolt holds the two pieces of steel together and keeps
7 them from moving.

8 The other design, the high strength design, the
9 bolts are tightened much more tightly. They are tightened
10 to the point where the friction develops between the two
11 pieces of steel and prevents the joint from moving.

12 So there are two different approaches and the
13 A325 bolting is basically this high strength bolting that
14 is normally used in structural steel design.

15 The analysis that was performed on the A325 bolts
16 in these cable pan riser supports was to determine whether
17 the bolts, while they did not have sufficient torque to
18 develop the friction strength that they normally would, they
19 did have enough strength in shear to support the load.
20 Therefore, all of them were determined to have no design
21 significance, even though they were properly reported
22 as discrepancies.

23 MR. GALLO: Thank you, Mr. French. Perhaps
24 counsel for Intervenors would like to cross-examine on that
25 testimony?

1 MS. JUDSON: No thank you, Your Honor.

2 MR. LEWIS: Staff just has a few questions.

3 CROSS EXAMINATION

4 BY MR. LEWIS:

5 Q The first question relates to very similar
6 testimony that was included in the testimony of both Mr.
7 French and Mr. Branch. It's in Mr. French's testimony as
8 question and answer 12. It also appears in Mr. Branch's
9 testimony.

10 A (Witness Branch) What number?

11 Q Question and answer 12 as it appears in Mr. Branch's
12 -- well, let me tell you what statement it is. It's the
13 statement that talks about two ways in which engineering
14 judgment evaluations are performed. And the wording that
15 is used is as follows: "Either a review of the component
16 design function to determine whether the function of the component
17 was affected by the discrepancy." That's the first method.

18 The second method is a comparison of the
19 discrepancy to the current design, to determine whether the
20 discrepancy had design significance.

21 After having read that, Staff was somewhat at a
22 loss to know what the distinction between those two methods
23 are. Perhaps someone could clarify that, either Mr. Branch
24 or Mr. French.

25 A (Witness French) You're right that they are quite

1 similar and in many cases a particular discrepancy, it was
2 rather difficult to decide which way it should go.

3 A design function, for instance, in the electrical area
4 would be a matter of wiring where a small discrepancy in
5 the way that wires were connected would not agree with the
6 drawings, and yet an analysis would show that the circuit
7 worked in the way that it was intended to work.

8 For instance, in the case of a jumper cable and
9 a terminal block. There were several cases where the
10 drawing showed the jumper cable on the incoming cable side
11 of the terminal block whereas the jumper was actually
12 installed on the internal panel wiring side. Well, the
13 functioning of the jumper, it connected two wires together
14 and there was really absolutely no difference as to whether
15 it's connected on the righthand side of the block or the
16 lefthand side.

17 The other point, as the other alternative, was
18 comparing the discrepancy to current design to determine
19 whether it had any significance. That would refer to more
20 physical things rather than functional things, such as wiring.
21 I can't, just now, come up with an example of it but in
22 the electrical area at least there are those two really
23 different approaches to it, the functioning of a circuit versus
24 a physical requirement.

25 Q Thank you.

LB11b9

1 Mr. French, the next two questions are on your
2 testimony. In question and answer 19, there is a reference
3 to -- I'll read the sentence. There were 778 inspections
4 associated with 50 pieces of equipment which identified
5 34 discrepancies. Were these 34 individual identified
6 discrepancies or were there 34 pieces of equipment out of
7 the 50 which had some discrepancy on them?

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1 A There were so many specific numbers and
2 subdivisions of numbers that I made a little tabulation
3 of it, just to try to not enter any further confusion
4 into it. I'd like to refer to it.

5 Q Please.

6 A That was the equipment setting.

7 MR. GALLO: Perhaps, Mr. French, the other
8 parties would like a copy of your tabulation to follow.

9 JUDGE SMITH: That would be fine. And perhaps
10 one could be given to the reporter and be bound in, too,
11 if it's of suitable quality.

12 MR. GALLO: I believe it is, Your Honor.

13 May I proceed to do that?

14 JUDGE SMITH: Yes, please.

15 MR. GALLO: Mr. French, are you looking at
16 a document entitled "Summary of Objective Discrepancy
17 Evaluation, Hatfield Electric"?

18 WITNESS FRENCH: Yes, sir, I am.

19 MR. GALLO: How many pages?

20 WITNESS FRENCH: It has two pages.

21 MR. GALLO: What is this document?

22 WITNESS FRENCH: This document is a
23 recompilation of many of the quantities of attributes and
24 the analysis methods used to evaluate them in the reinspection
25 program and in the supplementary program.

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MR. GALLO: Was it prepared by you?

WITNESS FRENCH: It was prepared by me from those documents.

(Document distributed to Board and parties.)

JUDGE SMITH: Would you bind the tabulation in, please.

(The document referred to, "Summary of Objective Discrepancy Evaluation, Hatfield Electric," follows.)

12

SUMMARY OF OBJECTIVE DISCREPANCY EVALUATION
HATFIELD ELECTRIC

<u>Type of Discrepancy By Attribute</u>	<u>Total Quantity</u>	<u>Category X No. Within Parameters</u>	<u>Category Y No. Accept. By Judgmt.</u>	<u>Category Z No. Accept. by Calc.</u>	<u>No. With Design Significance</u>
A. Conduit Installation					
1. Conduit Supports	3	1	2	0	0
2. Auxiliary Steel	1	0	0	1	0
3. Conduit	42	7	23	12	0
4. Junction Box	13	3	10	0	0
5. Other	7	0	7	0	0
B. Cable Termination					
1. Workmanship	7	0	7	0	0
2. Wiring	2	0	2	0	0
Cable Pan Hanger					
1. Configuration Change	8	2	4	2	0
2. Detail Substitution	15	1	13	1	0
3. Dimensions Out of Tolerance	18	1	5	12	0
4. Other	1	1	0	0	0
D. Conduit As-Built					
1. Supports	972	813	0	159	0
2. Auxiliary Steel	14	1	0	13	0
3. Conduit	298	178	0	120	0
4. Junction Box	247	209	0	38	0
5. Other	27	26	1	0	0
CEA's Inspected by PTL	38	1	6	31	0
TOTAL	1713	1244	80	389	0

<u>Type of Discrepancy By Attribute</u>	<u>Total Quantity</u>	<u>Category X No. Within Parameters</u>	<u>Category Y No. Accept. By Judgmt.</u>	<u>Category Z No. Accept. by Calc.</u>	<u>No. With Design Significance</u>
UPPLEMENTARY EINSPECTION					
Equipment Setting	34	0	15	19	0
Equipment Modifications	44	0	44	0	0
A-325 Bolting	46	0	20	26	0
Conduit Support Bolting	34	0	0	34	0

mgc2-3

1 MR. GALLO: I guess I would like to have this
2 marked as Applicant's Exhibit R-2.

3 JUDGE SMITH: Mr. Gallo, he's going to testify
4 on it. Why don't you just make it a part of his testimony.
5 That way you don't have to have a separate three; it's
6 going to be right in the transcript.

7 MR. GALLO: That's fine, Your Honor.

8 You can proceed, Mr. French. Do you have the
9 question from Staff?

10 WITNESS FRENCH: I do have the question.

11 JUDGE SMITH: Just for the record, do you
12 adopt this tabulation as your testimony, Mr French?

13 WITNESS FRENCH: Yes, I do.

14 The question was, what was the nature of the
15 supplemental reinspection program for equipment setting?
16 That was the question in my testimony. I believe the
17 question was, did that represent 34 discrepant pieces of
18 equipment or 34 things in the 50 pieces of equipment that
19 we inspected?

20 It actually represented 34 items that were
21 inspected in these 50 pieces of equipment. These items --
22 that is, equipment setting defines the placing of the
23 equipment on its foundation, connecting it, connecting
24 the cables, connecting the groundwires.
25

mgc2-4

1 BY MR. LEWIS:

2 Q Would that be the same answer -- we can go
3 through your numbers, and I think that would be helpful.

4 A (Witness French) The numbers on this
5 tabulation, each line is not an attribute, but it's basically
6 an element or a subelement of its attribute. And each of
7 these numbers represents evaluations that we made, so they
8 do not represent pieces of equipment inspected. They
9 represent specific discrepancies that were evaluated.

10 Q And this tabulation deals with more than just
11 the supplemental reinspection of equipment setting and
12 equipment modification?

13 A This tabulation deals with the entire
14 reinspection program and the supplementary program. The
15 supplementary program is on page 2. The reinspection program
16 information is on page 1.

17 JUDGE CALLIHAN: Mr. French, did you say the
18 Staff's, quote, "34" discrepancies, unquote, relate to
19 these two pieces of paper, or do they at all?

20 WITNESS FRENCH: Pardon? I didn't hear you.

21 JUDGE CALLIHAN: The Staff raised a question
22 about 34 discrepancies in your Answer 19, page 9, of
23 your prefiled testimony.

24 Does that 34 in that question relate to these
25 two pieces of paper, and if so, how?

mgc2-5

1 WITNESS FRENCH: Yes, sir. It's the first
2 line on the second page.

3 BY MR. LEWIS:

4 Q And similarly, does the equipment modification
5 number from Answer No. 20 on the next page, is that
6 reflected in the second line of your supplemental table
7 here?

8 A (Witness French) Yes, sir, it does.

9 MR. LEWIS: That's the only clarification Staff
10 was seeking. Thank you. That's all I have, sir.

11 JUDGE SMITH: Mr. Branch has been sitting here
12 much of the week, if not all of it. There were no
13 cross-examination questions put to him. Perhaps that's
14 a determination that could not be made until you had
15 examined the other three members of the panel. But I would
16 like the parties to be sensitive to the opportunity to
17 not keep witnesses sitting by. If it was clear to you
18 early on that you had no questions for Mr. Branch, that
19 fact could have been brought up, and perhaps if the
20 Board had no questions, he could have been excused.

21 MR. CASSEL: Judge, it was not clear to us
22 early on. It was only clear to us after the questions
23 that we put to the panel as a whole yesterday afternoon,
24 including Mr. Branch, who did provide some answers.

25 To the extent we have some additional issues

mgc2-6

1 we wanted to raise with him, they were dealt with by some
2 of the other witnesses. It was something we could not
3 foresee, and I certainly regret any personal inconvenience.

4 JUDGE SMITH: That's an adequate explanation.
5 It's perfectly adequate. There's no criticism intended
6 at all.

7 I just want you to be sensitive, if that
8 should come up.

9 MR. CASSEL: If we, in any case, with witnesses
10 coming up, Judge, foresee that we have no cross, we will
11 certainly so advise everyone.

12 JUDGE SMITH: Yes, including the Board, because
13 we might.

14 EXAMINATION BY THE BOARD

15 BY JUDGE CCLE:

16 Q Dr. Singh, I have one or two questions.

17 Dr. Sing, in response to several questions
18 concerning the possible bias of the sample in the use of
19 statistics for non-random samples, there are still some
20 questions in my mind about the significance or importance
21 of that.

22 Do you recall, sir, the questions about the
23 possible bias of the sample that you used when the
24 selection of the inspectors was not necessarily a truly
25 random sampling? Do you recall that, sir?

mgc2-7

1 A (Witness Singh) Yes.

2 Q Could you describe or explain to me why, under
3 those conditions, the validity of the statistical tests
4 that you used still applies?

5 A The selection of inspectors, even though it
6 was not done using a random number generator, but as it
7 was evidenced from Mr. Tuetken's and Mr. Del George's
8 testimony, the selection of every fifth inspector, who
9 were arranged in chronological order, is a random selection,
10 the way I see it. There were no biases exercised in
11 selection of these inspectors, except on the part of NRC,
12 which added one or two additional names of inspectors with,
13 quote/unquote, "suspected work quality." So that bias
14 was a conservative bias.

15 The other bias which was introduced into the
16 sampling was that only the first 90 days was sampled, and
17 again, in our opinion, it tends to give, again, this
18 conservative or negative bias whereby we're picking samples
19 which are likely to be discrepant, as opposed to being
20 likely to be good.

21 The third bias which we exercised and which
22 was at the evaluation stage, when we evaluated Hatfield,
23 we were looking for the worst connections to be evaluated.
24 We looked at connections which were highly stressed whereby
25 giving you the least margin of error.

mgc2-8

1 So effort has been made to bias the sample,
2 and when I refer to bias, I refer to these things as a
3 composite. But in terms of inspector selection, I would
4 consider it to be, for all practical purposes, a random
5 selection. They were not picked up by their names or
6 being friends of one or another. It was a random sample
7 for the contractor.

8 Q All right, sir. So in your view, it had no
9 effect on the application of your statistics.

10 A I did not get that.

11 Q In your view, any problem associated with the
12 selection of the inspectors, if any exists, had no effect
13 on the application of your statistics?

14 A So long as it is -- if there is any problem
15 found -- so long as overall the selection was still random,
16 like if we're saying every fifth, it could be every sixth,
17 what I'm saying is, so long as there were no bias exercised
18 in the selection of these inspectors and there was a
19 fairly uniform distribution of the selections, I consider
20 that to be, for all practical purposes, a random selection.

21 Q All right, sir. There were several assumptions
22 that were inherent in your use of the numbers, sir. Could
23 you describe some of the assumptions that you made in taking
24 the numbers that you used and applying them?

25 For example, is it so, sir, that you accepted

mgc2-9

1 all of the numbers presented in the tables as being
2 absolutely true?

3 A You mean correct?

4 Q Correct.

5 A That's correct.

End 2

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1 Q So that all the determinations that were
2 made that there was no design significance, you accepted
3 that as being correct and true?

4 A That is correct.

5 Q And these gentlemen are the gentlemen that
6 are backing up that that is true and correct, based upon
7 their observations of the work in their venue?

8 A Yes, sir.

9 Q And you accepted that?

10 A Yes, sir.

11 Q Mr. French, on page 6 of your testimony,
12 just a point of clarification, sir.

13 In response to Question 12, you indicated --
14 you stated that for the 2153 observed discrepancies, 1713
15 evaluations were performed.

16 Later on you say that the number of evaluations
17 was less than the total number, because some evaluations
18 covered more than one discrepancy.

19 Were all of the 2153 observed discrepancies
20 evaluated?

21 A (Witness French) Yes, sir. All of the
22 discrepancies were evaluated. And as I explained in my
23 testimony, the reason that the number of evaluations is
24 less is basically that many discrepancies came into us
25 as separate items, but they were all related to each other,

mgc3-2

1 and therefore we analyzed them under one evaluation.

2 I would like to further state that the numbers
3 on the document that I was using here are evaluations that
4 we made, not discrepancies. They are the number of
5 evaluations.

6 If you will notice, the title says "Evaluations,"
7 but just to make it clear, if you're trying to sort out
8 numbers, that these are evaluations, not discrepancies.

9 Q All right, sir. Thank you. That solves
10 my problem.

11 So that there were sufficient number of
12 mutiple discrepancies included in the evaluations, but
13 the total number was included.

14 A That's right. The total number of discrepancies
15 was included in the evaluations.

16 Q All right, sir.

17 JUDGE COLE: That's all I have.

18 BY JUDGE CALLIHAN:

19 Q Again, as usual, I would like to
20 address remarks to the group as a panel. Play them as you
21 wish.

22 I have delayed consideration of a concern
23 until you gentlemen were before us. I realize now that
24 might have been poor judgment. Nonetheless, I'm sure
25 you can contribute to my understanding of that concern.

XXXX

mgc3-3

1 Let me introduce it by asking what latitude
2 is given to inspectors -- and I guess we had better speak
3 of objective inspections in this context -- what latitude
4 is given to inspectors whereby the tolerances placed in
5 the design on a particular dimension, for example, can be
6 recognized by the inspector?

7 And let me elaborate a little bit by remarking
8 that at least in two places in the testimony of you and
9 your colleagues, there was a statement which I can't quite
10 quote, but it was to the effect that an inspector found
11 something off -- found a dimension off the specification
12 by, say, a sixteenth of an inch and he rejected it.

13 Let me illustrate my point a little further
14 by making a statement which I ask you to criticize.

15 Every quantity has an uncertainty in
16 measurement. Every specification, I presume, has a
17 tolerance. And let's say, for example, that a particular
18 dimension of something, no matter it's four inches plus
19 or minus a half inch. Now the four inches is thereby not
20 cast in concrete to ten significant figures. The inspector --
21 now I'll come to my question, which you may or may not
22 be able to really consider, since it's a little out of
23 your field, I recognize -- what latitude has the inspector
24 in recognizing or incorporating into his determination that
25 variance, that variance in the design?

mgc3-4
chain?

1 A (Witness Branch) I can speak to that from
2 the piping chain dimension.

3 Q Just an example.

4 A As an example, my understanding is that the
5 instructions to the inspector were that if the dimension
6 that he measured on the pipe, chain dimension -- now let's
7 try to understand what I'm talking about.

8 Let's say a leg of pipe, elbow, straight pipe,
9 elbow, how long is that from elbow to elbow centerline?
10 That's a difficult measurement to make in the field, because
11 on paper it's easy to lay it out and know where the
12 centerlines intersect, but in space, you don't have that
13 convenience. So you are estimating where to start your
14 scale and where to end it.

15 I believe the inspector's instructions were --
16 now I don't give the instructions to the inspectors, but
17 this is my understanding -- they were told that if that
18 dimension that they measured was exactly as the drawing
19 showed, they did not have to report that. If it did not
20 match the drawing, they were to report it, and it would
21 be resolved by Design as to whether or not the tolerance
22 on that dimension was exceeded.

23 Q I apologize for the interruption. But what
24 appears on the drawing? Just a dimension, or a dimension
25 with some bounds?

mgc3-5

1 A A dimension only.

2 Q Mr. French?

3 A (Witness French) I can add a different aspect
4 which is reported in the reinspection program.

5 The support of conduits, for instance, on a
6 vertical support from the ceiling, there is a dimension
7 on the drawing. However, the drawing also has a tolerance
8 of six inches, which means that that hanger can be located
9 anywhere within a radius of six inches from the point
10 dimension on the drawing. That is an acceptable tolerance
11 for conduit hangers, and for many other items there are
12 different tolerances. And as reported in the program, the
13 Edison Company wished to capture all of the marginal cases.
14 So in the reinspection program, they reduced the
15 reinspection tolerance by three inches, thereby we collected
16 a large number of discrepancies based on a three-inch
17 tolerance. Then we evaluated all those to make sure that
18 they were all acceptable.

19 So in some instances, as Mr. Branch has said,
20 there is just a dimension on the drawing. In other
21 instances, we have predetermined a proper tolerance.

22 Now the reason the conduit hangers have a
23 rather broad tolerance is that they tend to be the last
24 things installed in the plant, and there is a high probability
25 that many of them cannot be put exactly as shown on the

mgc3-6

1 drawings because some other item -- a duct, a pipe, things
2 like that -- would cause an interference. So the installer
3 has to have some leeway to move the hanger location to
4 allow them to go ahead with their work.

5 Q Would you judge that inspectors are made aware
6 of this latitude and exercise a prerogative in an
7 acceptance/rejection, go/no-go result?

8 A I'm certain that they do. Things that come in
9 out of tolerance are handled by other mechanisms to
10 determine whether it's necessary to rework it or to leave
11 it the way it is. There are many paperwork procedures in
12 which these out-of-tolerance items are noted and sent to
13 us for engineering review, that we decide whether, on
14 engineering evaluation, is acceptable as installed, or
15 whether it has to be reworked.

16 There's a tremendous effort in that area. So
17 I'm certain that they do receive the instructions, and
18 they do follow them, and it does generate a large amount
19 of review paper.

20 MR. GALLO: Mr. McLaughlin can perhaps provide
21 the Structural Department perspective on the same question.

22 WITNESS MC LAUGHLIN: Yes, sir.

23 We also provide tolerances, dimensional
24 tolerances, for items like bent plates. We are aware that
25 the inspector does have -- does know what the tolerances,

mgc3-7

1 dimensional tolerances -- he doesn't report it as a
2 deficiency unless it exceeds the dimensional tolerance.

3 Q It's obvious what I'm getting to. I guess
4 as one not active certainly in the fields of your
5 expertise, I was a little startled in reading the testimony
6 that so many -- practically all, I daresay -- of the
7 discrepancies were remedied or reconciled by an engineering
8 evaluation. And perhaps others as inexperienced as I feel
9 that an inspector comes up with something that isn't
10 quite to standard, to dimension, he reports it, and then --
11 you'll pardon this expression -- it gets sort of swept
12 under the rug by an engineering inspection.

13 This is a consequence of a number of things,
14 obviously, one you discussed. Certainly another
15 consequence -- it's also a consequence of what I will call
16 overdesign, because there have been your remarks that
17 you found that the load really isn't as great as it might
18 have been expected to be, or it's not as great, near as
19 great, as the ultimate strength member and so forth.

20 So I guess I come to this question: Is this
21 what I will perhaps in not very good words define as
22 overdesign, what I have characterized as overdesign, which
23 I think I have defined? Is this common to construction
24 in general, or has this been brought into the nuclear
25 business for at least, to me, an obvious reason? Is it a

mgc3-8

1 general practice in structural design and whatnot?

2 A (Witness French) The question is common to
3 all three of our disciplines. Your question of whether
4 this is unique to the nuclear industry has to be answered,
5 I believe it is more prevalent in nuclear plant design,
6 but it is not uncommon. It is philosophically a difference
7 between science and engineering.

8 The engineer has to come up with designs and
9 procedures that can be handled by a large group of other
10 people with a low degree of error, and also a low degree
11 of understanding what the engineering design involves.
12 The electricians cannot be expected to make judgments on
13 the engineering. Therefore, the information that we have
14 to give the electricians has to take that into account.

15 Now I can give an example, once again, from an
16 item in this particular hearing -- that is, the reinspection
17 program. When we design conduit supports, there are
18 something like 25,000 conduit supports in this particular
19 plant. Our design process -- these are basically a
20 structural member to hold up a electrical function, a
21 conduit with cables in it. In our terms, the fundamentals
22 of the function are determined by the Electrical Department.
23 It has cables in it to operate electrical equipment.
24 On consultation with our Structural Department, they establish
25 various standardized designs for hangers. It's not practical

mgc3-9

1 to design an individual hanger for an individual conduit,
2 then determine the cables in it and things like that,
3 one at a time; it's just not practical.

4 Therefore, they establish a family of hangers.
5 These then come back to us and we develop from that
6 family of hangers necessary procedures and standards in
7 our office for our designers to select the proper hanger
8 from the family. Our designers have to do a relatively
9 simple calculation to determine the weight that that hanger
10 will have to sustain. Then they can go to the standard
11 hanger body or group and select the proper one.

12 Now there is where the overdesign comes in.
13 We have taken what could be an infinite number of hanger
14 designs and have compressed it to possibly a dozen. They
15 do vary in length, but the shape and the size of the
16 member and the method of attachment are standardized. In
17 doing that, we have to assume the worst case, so that if
18 a man selects a hanger, we know that no matter if he puts
19 the heaviest cable with the longest span at the bottom
20 end of the hanger, that the hanger would work. Those
21 are three important elements.

22 We have established, again by judgment, that
23 the maximum span of a conduit should be nine feet. That
24 is based on a three-quarter-inch diameter conduit. It
25 has some conservatism in it. Actually it will go ten feet,

mgc3-10

1 but we cut it a little bit to be conservative.

2 Now we've decided that all conduits should
3 have a maximum span of nine feet. A particular hanger
4 can support different sizes of conduit, so again, it's
5 a practical decision to make that maximum span nine feet.

6 Now you can recognize that a three-quarter-inch
7 conduit, if it's good for a nine-foot span, a three-foot
8 conduit is good for twice or three times that span with
9 just the general beam dimension analogy, which would show
10 that a three-inch conduit is four times bigger in diameter,
11 so it would probably expand many, many times nine feet.
12 But as a practical matter, it is designed for a nine-foot
13 span.

14 The cables in the conduit, there are maximum
15 sizes of cable that can be installed in a conduit. Seldom
16 is a conduit -- does a conduit have that weight of cable
17 in it. The three-inch conduit is used for the range of
18 cable sizes. Only one of those cables is the maximum size.
19 All others would be less. So now we have two items of
20 conservatism in the design, span and the weight of the
21 conduit -- weight of the cable in the conduit.

22 Now we have a discrepancy -- there are other
23 things; I won't go on. But I use the term "granularity"
24 in the design. We don't have a ramp design of conduits --
25 of hangers. We have several steps. If a particular problem

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mgc3-11

1 arises, a discrepancy, then we go back and we look and
2 say, "How many feet span can this conduit actually span?
3 How many cables are actually in it?"

4 Going on into the structural area, there are
5 similar decisions made on the strength of the member, the
6 welding and things like that.

7 So what appears to be overdesign -- and it
8 truly is overdesign -- is a natural thing in engineering,
9 and that is what I'm sure bothers everyone, the panel and
10 the Staff and the general public. How can all of these
11 things become non-problems when they're analyzed?

12 That's the underlying reason, that there
13 are many granular steps in addition to just conservatism
14 that allow a particular case to be evaluated on actual
15 merits of its case and found to be completely -- to have
16 no design significance, to be completely good.

17 Now that's just an example, and it runs through
18 mechanical and structural engineering aspects, too.

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22
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End 3

1 A (Witness Branch) I can give you an example in the
2 mechanical area that is really common practice in both nuclear and
3 fossil plants. That is pipe wall thickness of small pipe
4 This is a one inch pipe here, a socket weld coupling joint.
5 You know, if you check what thickness is required here,
6 by code rules, if there is a low pressure system involved --
7 and most of these were low pressure systems -- the thickness
8 that you would derive from that would be several thousandths
9 of an inch. And it would be like taking a sheet of paper
10 and rolling it up and making a pipe out of it.

11 Obviously, you can't install that type of
12 flimsy device in a power plant, whether it's nuclear, fossil,
13 or something else. You have to have something substantial
14 just because of the loads that it's subjected to by people
15 climbing on it, using it for support for pulling a wrench,
16 and things like that. So you have to have something a little
17 more substantial than a piece of paper. (Demonstrating.)

18 So you select a Schedule 80 pipe which has much
19 more thickness than you need.

20 JUDGE SMITH: That was a rap-rap. We're demonstra-
21 ting with Applicant's Physical Exhibit C, I believe, a small
22 diameter socket weld demonstration.

23 WITNESS BRANCH: So that's just the point that
24 illustrates that it is a common practice in engineering,
25 particularly in that area.

1 BY JUDGE CALLIHAN:

2 Q Thank you. That's helpful. I will make some
3 sort of philosophic remark --

4 MR. GALLO: Excuse me, Dr. Callihan. Perhaps
5 for the sake of record, Mr. McLaughlin could add his
6 perspective on the structural side.

7 JUDGE CALLIHAN: I apologize. I'm sorry,
8 Mr. McLaughlin.

9 WITNESS MC LAUGHLIN: That's okay. I think in
10 structural design, whether it be a fossil plant or a nuclear
11 plant, you have built in conservatism. I would like to
12 explain the fossil a little, which would be more normal
13 structural design. When the structural design is performed,
14 it is usually before the mechanical and the electrical
15 designer are put in, so that you therefore have to assume
16 loadings, pipe loading, cable tray loading, to design your
17 structure.

18 You try to ride the middle ground between too
19 heavy or too light, but you do have so many pounds per square
20 foot to allow for piping and cable trays.

21 Now when you move over into the nuclear area, you
22 have the same problem, that the structural design is done
23 very early in the project, in relationship to the detailed
24 mechanical and electrical design. There's a preliminary
25 design done at the beginning of the project, to establish

1 the loading.

2 And we find in the nuclear area one, the loads are
3 much heavier than they are in they are in the fossil area,
4 the piping loads and the cable tray loads. And one of
5 the examples that we have here is the cable tray loading.
6 We start out the project, before any of the cables are routed.
7 In talking with electrical and working with electrical,
8 we establish a tray loading.

9 The tray loading is based on our previous experience.
10 We believe it to be a conservative loading. In dispositioning
11 some of the discrepancies in the cable trays, we actually went
12 back and saw -- we know what the actual loading of the trays
13 are now, so we're able to calculate what the actual loading
14 is, compared to the loading that we had in the beginning.

15 So I think, in the nuclear area, because of the
16 magnitude of especially the piping loads and the seismic
17 load, that we do have conservatism built in. But we also
18 have the opposite side. If you've been to the plant you'll
19 see there are a lot of members that are reinforced out there.
20 Our original assumptions, as to how much the loading would
21 be, are not always accurate and we are forced to go out
22 and reinforce members.

23 This is usually, when the piping -- the detailed
24 piping design is done -- and the seismic loading on the
25 piping is determined. So it goes both ways. But we have to

1 build conservatism into the structural design so you don't
2 have to repair an excessive number of members.

3 JUDGE CALLIHAN: Thank you.

4 BY JUDGE CALLIHAN:

5 Q The calculation to which you just alluded is
6 the sort of thing that made many of the discrepancies go
7 away, the results of the calculation?

8 A (Witness McLaughlin) Yes, sir.

9 Q Dr. Singh?

10 A (Witness Singh) One other point I wanted to add,
11 you asked in an earlier question, what was the instructions
12 given to the inspectors in terms of noting which of the
13 discrepancies should be or should not be noted. On page
14 39 of the report I think it's described in a fair amount of
15 detail. And it clearly says that the reinspector had to
16 report it even though it was within design tolerance.

17 The original inspector may have had more leeway
18 and this is described on page 39. There is an example
19 given. If the original inspector had said three feet two
20 inches and the new inspector had three and 1/15 or 1/16, it
21 was still noted as a discrepancy, even though everybody knows
22 that it's not of design significance. But it's described
23 on page 39.

24 Q Why was that extra restriction put on the
25 reinspector?

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1 A I think it's best answered by Mr. Tuetken, but
2 this was the criteria that was set up. The intent basically
3 was when you were checking the original inspector, you're
4 checking what he did, as opposed to checking what the
5 drawing says and what the tolerances were. But it does build
6 in a conservative bias, in terms of the number of
7 discrepancies because if I were an inspector and I knew
8 that I had a six inch tolerance, probably I'm not being
9 as accurate because I know the measurement to the last
10 sixteenth is not as significance if I had no tolerance.
11 Whereas on the reinspector level, he was instructed to
12 measure as close as possible and compare to the original
13 inspector's dimensions.

14 But this was part of the program, as set up.

15 Q I realize that wasn't a fair question. I apologize.
16 That leads me now, however, to my philosophic remark, to
17 which perhaps there is no response. And this is a morale
18 problem among inspectors.

19 Maybe inspectors have gotten used to the situations
20 that you describe, but I would be a bit concerned that if an
21 inspector makes a very careful evaluation of a particular
22 item only to find that his discrepancy disappeared by a wave
23 of the hand in the engineering department, he might feel a
24 little bit disturbed.

25 I'm sure there's no response to that. It's

1 certainly a feeling.

2 I had a few odds and ends, perhaps even
3 nit-picking. Let me check quickly and see if I want to cover
4 anything more.

5 You told me what an A325 bolt is, and I thank you.

6 Mr. Branch, just to bring you into this picture
7 a little bit more, I refer to -- well, like page 5. And
8 I'm sorry, but this is the original Mr. Leone testimony
9 in question 9 on the original on which I made my notes.
10 And I didn't bother to mark the revision of it. I'm sorry.

11 But there's an answer that begins "A total of
12 69,624 reinspections" and so forth.

13 A (Witness Branch) Yes, sir.

14 Q And then from that, picked up one percent, nearly
15 700 were discrepant. And then there is a recounting in the
16 successive paragraph of how those were met and how they
17 were judged. And my arithmetic, which really may be quite
18 simple-minded left me with a balance of over -- in your
19 original equation -- 814, original answer, 814.

20 JUDGE SMITH: Excuse me, I think at that point
21 the numbering is the same.

22 BY JUDGE CALLIHAN:

23 Q Mr. Branch and I are together, I think, and I'm
24 just talking about arithmetic. Is that related to the sheet
25 that came in this morning?

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1 A (Witness Branch) Are you having a problem with
2 the numbers of the discrepancies to get that total add up
3 properly? Is that where you're having a problem?

4 I have a sheet here similar to Mr. French's, that
5 I used to help myself to review this. It does list the
6 quantities in certain categories and it summarizes the totals.

7 MR. GALLO: I'd be glad to provide that to the
8 Board while Mr. Branch explains it.

9 (Document distributed to Board and parties.)
10 As you can see, we anticipated that question.

11 WITNESS BRANCH: These categories --

12 MR. GALLO: Excuse me, Mr. Branch. Let me
13 identify this, first.

14 What is the title of this document referring to?

15 WITNESS BRANCH: Summary of Objective Discrepancy
16 Evaluation, Hunter.

17 MR. GALLO: How many pages does it have?

18 WITNESS BRANCH: Three pages.

19 MR. GALLO: Would you explain again, for the
20 record, what it consists of, what it contains?

21 WITNESS BRANCH: It contains two major categories
22 of discrepancy evaluations, one entitled documentation of
23 which there are 14 categories; and a second entitled hardware,
24 of which there are 15 categories.

25 MR. GALLO: Did you prepare this document?

1

WITNESS BRANCH: Yes, I did.

2

3

MR. GALLO: Is it accurate and complete, to the best of your knowledge and belief?

4

WITNESS BRANCH: Yes, it is.

5

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MR. GALLO: If it's acceptable to the Board and to the parties, I'd like to have this bound into the transcript under the same rubric we used for Mr. French.

8

JUDGE SMITH: With no objections, we'll do that.

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(The document referred to as Summary of Objective Discrepancy Evaluation, Hunter follows:)

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SUMMARY OF OBJECTIVE DISCREPANCY EVALUATION
HUNTER

Type of Discrepancy By Attribute	Total Quantity	Category	Category	Category	No. With Design Significance
		X No. Within Parameters	Y No. Accept. By Judgmt.	Z No. Accept. by Calc.	
<u>Documentation</u>					
1. Controlled construction drawings not signed	94	94	0	0	0
2. Work process sheets -					
(a) Data entered incorrectly	85	85	0	0	0
(b) Boxes not checked	73	73	0	0	0
3. Weld material requisition date not initialed/ signed Line outs Write overs Missing marking nos.	40	40	0	0	0
Weld record not signed	35	35	0	0	0
5. Work process sheet not signed/ countersigned	29	29	0	0	0
6. Field inspection report not signed/ type 3 inspection performed	26	26	0	0	0
7. Concrete expansion anchor traveler entries not signed	21	21	0	0	0
8. Daily surveillance not signed	18	18	0	0	0
9. Discrepancy report not initiated	8	8	0	0	0
10. Nondestructive examination needed to be signed	5	5	0	0	0

Type of Discrepancy By Attribute	Total Quantity	Category X	Category Y	Category Z	No. With Design Significance
		No. Within Parameters	No. Accept. By Judgmt.	No. Accept. by Calc.	
11. Engineering entries missing	3	3	0	0	0
12. Hardware documentation incorrect	2	2	0	0	0
13. Equipment check-list not signed	1	1	0	0	0
14. Angle size incorrect	1	1	0	0	0
Documentation Subtotal	<u>441</u>	<u>441</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Hardware</u>					
1. Support as-built dimension/angle not recorded or incorrect	21	16	3	2	0
Support location or elev. missing or incorrect	16	14	1	1	0
3. Hardware configuration incorrect	8	5	3	0	0
4. Hardware substitution M4x13 for W4x13	3	0	3	0	0
5. Concrete expansion anchor	1	0	0	1	0
6. As-built pipe whip restraint dimension incorrect	21	0	21	0	0
7. Pipe whip restraint hardware discrepancy	3	0	0	3	0
8. Pipe bend ovality greater than 8%	11	0	0	11	0

Type of Discrepancy By Attribute	Total Quantity	Category X	Category Y	Category Z	No. With Design Significance
		No. Within Parameters	No. Accept. By Judgmt.	No. Accept. by Calc.	
9. As-built isometric drawing chain dimension incorrect location	138	133	5	0	0
10. Mechanical joint or joiner discrepancy	12	1	11	0	0
11. As-built hardware missing	3	0	3	0	0
12. As-built hardware malfunction	2	1	1	0	0
13. As-built isometric drawing configura- tion incorrect location	1	0	1	0	0
14. Pipe whip re- straint incorrect weld	3	3	0	0	0
15. CEA's by PTL	5	0	2	3	0
Hardware Subtotal	<u>248</u>	<u>173</u>	<u>54</u>	<u>21</u>	<u>0</u>
TOTAL	689	614	54	21	0

1 WITNESS BRANCH: This essentially shows the
2 441 total discrepancies of the documentation variety, and the
3 total of 248 in the hardware variety that were categorized
4 as objective discrepancies. And each of these sub-categories,
5 like the one, two, three, four, break them down into a
6 description that is helpful in understanding where they fit.

7 Does this help any?

8 BY JUDGE CALLIHAN:

9 Q Yes. You're telling me that your book really
10 does balance?

11 A (Witness Branch) Yes, sir.

12 Q So I have made some slip somewhere, but I can
13 resolve that.

14 Thank you very much.

15 JUDGE CALLIHAN: I think that's all I have for the
16 panel, again thank you.

17 JUDGE SMITH: I do have one question.

18 BY JUDGE SMITH:

19 Q The testimony of the group, particularly Mr. French,
20 describing the conservatisms and the granularity which
21 permits the evaluation finding that these were within the
22 design realm, this is very helpful and does explain how so
23 many of these things are all washed away.

24 However, at the same time, does it not reduce the
25 value of the design evaluation, in validating the qualifications

1 of the inspectors? That is, since you have so much latitude
2 that is built in, the fact that all of these things end up
3 by having no design significance does not go far in
4 demonstrating -- that fact standing alone -- does not go
5 far in demonstrating that the inspectors were qualified in
6 the first instance.

7 A (Witness French) I believe, from what you have
8 asked, that I would agree with you that the evaluations of
9 the discrepancies did not address the question of the
10 qualifications of the inspectors. Our involvement, Sargent
11 & Lundy's was, in the evaluation of the discrepancies to
12 determine the quality of the work.

13 Q Right. To the extent that the result demonstrates
14 that there is no design significance, these discrepancies,
15 perhaps we can draw a crude inference that the inspectors
16 were qualified. But that was not the purpose of it and
17 that is not a reliable indicator.

18 A I would agree with your logic on that, yes.

19 Q You didn't even seem to agree with the crude
20 inference.

21 A I say I do agree with your logic.

22 Q Okay, fine. Thank you.

23 A I might add that the overall question, to repeat
24 myself, of why the evaluations wash away the discrepancies,
25 there's two steps. One was the granularity, which most

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1 people don't understand. But in addition to that,
2 there's basic conservatism in all of the designs of things.
3 So even the worst case is still okay and it's conservative.

4 Q Yes.

5 A (Witness McLaughlin) Can I address that, Judge?

6 Q Please.

7 A I believe, and I believe I heard Mr. Hansel make
8 this point, that we had discrepancies. But I think the fact
9 that we are able to disposition the discrepancy speaks to
10 the types of things that the inspectors found. I believe
11 that they found the really bad things. We obviously have
12 human error, which we found. But our ability to
13 disposition all these things, I think, says to me that the
14 inspectors did know what was important and what wasn't
15 important. And I think they went after the important things.

16 And I think in 99 percent of the cases they found
17 them and they were corrected the first time. So I do think
18 you can draw an inference from our ability to disposition the
19 items, that the magnitude of the discrepancies were not
20 that great, usually, and we were able to disposition them
21 because the inspectors did find -- catch and find -- the
22 important items and had them fixed before the reinspection
23 program started.

24 JUDGE SMITH: Any cross of the Board's questions?

25 MR. CASSEL: No, Judge.

JUDGE SMITH: Mr. Gallo?

end4

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1 MR. GALLO: I have a few questions on redirect.

2 FURTHER REDIRECT EXAMINATION

3 BY MR. GALLO:

4 Q Mr. McLaughlin, I believe you were asked
5 yesterday, by counsel for the Interveners, questions with
6 respect to the Level III inspectors that were used to
7 overview the inspectors -- I should say the reinspector's
8 work. I believe you characterized them as Commonwealth
9 Edison Level III inspectors. Is that correct?

10 A [Witness McLaughlin] That's what I said, and it
11 is correct, but I should explain that a bit.

12 Edison had people doing Level III inspections
13 that were loan servants. They were under Edison's supervision
14 but they were employed by other firms. one -- I guess more
15 than one, I guess -- two of the Level III inspectors were
16 Sargent & Lundy employees who were on loan to Commonwealth
17 Edison, contract employees to Commonwealth Edison to do the
18 Level III inspection.

19 I'm also aware that they had Level III inspectors
20 from other firms. I believe Daniel was a firm that was
21 also doing Level III inspection work.

22 Q Are Level III inspectors that we're talking about
23 the ones that other witnesses have described as Sargent
24 & Lundy Level III inspectors?

25 A Yes.

1 Q I believe, in response to one of counsel's
2 questions, you are asked -- rather by one of counsel's
3 questions -- whether or not all of the weld evaluations were
4 dispositioned by the use of calculations.

5 And I think you answered in the affirmative. Is
6 that your testimony?

7 A Yes. It has been pointed out to me that I said
8 that. In my prepared testimony I indicated that five of
9 the 356 discrepancies were in the category that I described
10 as cosmetic, cosmetic being weld splatter, arc strikes,
11 and convexity. These three discrepancies do not diminish
12 the structural capacity of the welds, so that no calculations
13 were done on those five out of the 356.

14 For the Hunter AWS discrepancies, the 69 Hunter
15 AWS discrepancies, there were 19 of these what I call --
16 described as cosmetic before. So no calculations would have
17 been done on those 19 either. They would have been noted
18 as cosmetic discrepancies.

19 This is so noted in my testimony and also in the
20 report.

21 Q I have a question, Mr. McLaughlin. You were asked
22 some questions yesterday by Mr. Wright, with respect to what
23 the code allowable was for the fitup gap and whether or not
24 it was exceeded. Can you clarify that? I didn't quite
25 understand your answer.

51b3

1 A Yes, the AWS code is a maximum gap that you can
2 have before you have to start building up the weld. I
3 think the distinction I want to make is that we exceeded
4 that provision of the AWS code for inspection with the gap
5 size. In doing our evaluation of that discrepant condition,
6 we did not exceed the allowables for weld design. In other
7 words, the weld stresses were within allowable. It was only
8 that they exceeded the inspection provision of the AWS code
9 for the gap size.

10 Q Which parameter has significance for design
11 significance evaluation purposes? Is it for inspection
12 purposes or are the allowable stresses you described?

13 A I'm sorry. I didn't understand your question.

14 Q When you determined the design significance of
15 the weld discrepancies, what was your interest? The allowable
16 stresses provided by the code or that part of the code that
17 dealt with the inspection criteria?

18 A In evaluating the weld, we were looking at the
19 stresses. In our evaluation, we downgraded the welds
20 because of the gap. In other words, we penalized the weld.
21 We didn't use that part of the weld where we had the
22 gap. So we're looking at the stresses in determining design
23 significance and we did not exceed the allowable stresses
24 on the weld.

25 Q Is it still your testimony that none of the

51b4

1 discrepancies exceeded the code allowable?

2 A Yes.

3 Q Mr. McLaughlin, turn to the last page of your
4 testimony, page 17. On this page -- actually, in answer
5 24, it begins on page 16 -- did you offer an opinion with
6 respect to the adequacy of the Hatfield and Hunter work?

7 A Yes.

8 Q And does the last paragraph on page 17 refer to the
9 statistical work provided by Mr. Singh?

10 A Yes.

11 Q Now, Mr. McLaughlin, let's assume that the
12 confidence and reliability values provided by Mr. Singh were
13 not available to you, for purposes of answering my question
14 number 24. Assume they were not available to you and you
15 had no information, from a statistical standpoint. Would that
16 change your answer to my question 24?

17 A No.

18 Q Why not?

19 A Engineers are trained by a number of items. I
20 think, in an engineer's mind, he is subconsciously using
21 statistics without calculating numbers. In his mind, he's
22 looking at the loads that are on the structure, the method
23 that was used to analyze the structure, conservatism in the
24 design. He goes by his experience from other plants, nuclear
25 power plants he has seen, discrepancies he's seen, test results

51b5

1 he's seen, as to what happens when discrepant conditions are
2 tested. And I don't think an engineer calculates statistics
3 in his mind, but he has a feel for how much information he
4 needs to extrapolate information.

5 So it's nice, it's handy. I think it's more used
6 by lay people than I think it is -- the numbers themselves
7 I think are more used by lay people than they are by
8 engineers.

9 Q Mr. McLaughlin, in describing this thought process
10 that an engineer goes through, as you have been describing,
11 have you been describing the process called engineering
12 judgment?

13 A Yes.

14 Q And is that what you relied on for your conclusion
15 in your response to question 24?

16 A Yes.

17 Q Mr. French, turn to page 12 of your testimony.
18 The very last page. Do you see the answer to question 23?

19 A (Witness French) Yes.

20 Q Do you see the last sentence to the answer, that
21 says "The quality of the work reinspected is adequate?"

22 A Yes.

23 Q Is that judgment or conclusion based on a statisti-
24 cal basis, or engineering judgment?

25 A That statement is based principally on engineering

51b6

1 judgment. In line with your question, in reviewing the work,
2 I did look at Mr. Sing's probability calculations. They
3 appeared to be reasonable from my judgment and experience.
4 However, they were not a significant part of my analysis
5 of the discrepancies.

6 With regard to that, again, to get things in
7 focus, particularly for the Board, you note that there were
8 some over 60,000 things looked at. Now these are the
9 Hatfield objective attributes that I'm speaking of. Some
10 60,000 things were looked at.

11 Some 2,000 things were reported to be discrepant
12 and reported to us, and we evaluated them. Approximately
13 three-quarters of that 2,000 were found to be within design
14 requirements. The remainder were all found to have no
15 design significance.

16 Now we started with 60,000 and we ended up with
17 about 500 or 600 that were really worth looking into and none
18 of them appeared to be bad. It doesn't take a statistician
19 to recognize that that looks like entirely adequate work.
20 Now that's the basis of my engineering judgment summarized.

21 Q Thank you, Mr. French.

22 Mr. Branch, counsel for the NRC staff asked Mr.
23 French a question with respect to a question involving an
24 explanation on how Mr. French's list of discrepancies were
25 evaluated. The same question, in your testimony, I believe

51b7

1 appears on page 11. And for the clarity of the record, I'm
2 not sure that the explanation given by Mr. French necessarily
3 applies to your explanation of how your discrepancies
4 were evaluated. Could you explain the difference between,
5 as I recall counsel's question, the discrepancies that were
6 compared to current design parameters as opposed to
7 discrepancies evaluated by engineering judgment? The bottom
8 of page 7.

9 A (Witness Branch) You're referring to the
10 sentence, "Evaluations by engineering judgment consisted of the
11 review of a component design function?"

12 Q Yes. As I recall counsel's question, there was
13 some confusion over the understanding of the difference
14 between the first evaluation method -- that is, comparison --
15 with current design parameters tolerances. And the second
16 evaluation method was either using engineering judgment or
17 engineering calculations.

18 Can you provide a clearer demarcation of those
19 three approaches?

20 A There were three approaches. Is that what you're
21 asking me to describe?

22 Q Yes.

23 A The first approach was to compare with the current
24 design parameters and many of the discrepancies fell into that
25 category. I couldn't quite offhand tell you the number.

51b8

1 Q How does that one differ from the exercise of
2 engineering judgment, which I understand to be a second
3 method for disposing of discrepancies?

4 A That difference -- because in cases where there
5 were no tolerances to compare to, you had to make a judgment
6 as to the function of the device and whether or not it was
7 affected by that discrepancy.

8 Q Is it possible for you to give me an example?

9 A Yes.

10 In the connection of a strut, pipe support strut,
11 the upper connection, there is an eye. It has a pin through
12 it that goes through two bracket devices to hold this in
13 place. The pin has a keeper snap ring on each side.

14 Q What is the keeper snap ring?

15 A It's a half-moon little ring that slides into a
16 slot like that, at the end of a pin. Have you seen those?

17 (Indicating.)

18 MR. CASSEL: The record should reflect that
19 Mr. Gallo nodded yes.

20 (Laughter.)

21 end5
22
23
24
25

mgc6-1

1 WITNESS BRANCH: This particular one, the
2 snap ring had been damaged, so the question was, would
3 the support still function? And the purpose of the snap
4 ring is to prevent the pin from ever sliding out. There
5 are several things that lead you to believe that that would
6 not happen, even without the presence of a snap ring, but
7 the snap ring was present in part. But even if it wasn't
8 present, the pin is very tight, and it holds once you
9 snub up your strut so that has a proper tension in it.
10 The pin is very tight. So you go out in the field, and
11 you try to rotate one, and you can't.

12 The other thing is that the pin was horizontal
13 and not vertical, so it had no real possibility to come
14 loose. So the judgment is that that would not have
15 affected the support.

16 BY MR. GALLO:

17 Q I see. Turn to the last page, page 14, your
18 answer to Question 26.

19 Is your statement with respect to the quality
20 of work based on statistical principles or engineering
21 judgment?

22 A (Witness Branch) It was based on engineering
23 judgment. I think that the wide variety of aspects of
24 the piping that was covered by the reinspection program,
25 we had a small-bore pipe, large-bore pipe, we had butt welds,

mgc6-2

1 we had socket welds, we had supports on the piping -- all
2 aspects of the supports. So to me, enough parameters of
3 the whole design and installation were covered by the
4 reinspection program. Enough parameters of the installation
5 were covered by the reinspection program to lead me to feel
6 that the quality of the work is good, because so many varied
7 kinds of things were looked at.

8 Q Mr. McLaughlin, there has been a good deal
9 of testimony about the fact that some of the discrepancies
10 were repaired prior to evaluation by Sargent & Lundy.

11 In your area of responsibility, I believe you
12 testified that certain of the discrepant Hunter welds
13 were repaired prior to Sargent & Lundy's evaluation.

14 My question is, how were Sargent & Lundy able
15 to evaluate the discrepant welds, in view of the fact that
16 the repairs had already been made?

17 A (Witness McLaughlin) Sargent & Lundy had
18 the insepector's report that was made prior to the repair
19 of the support. The inspector's report was in sufficient
20 detail in the description of the discrepancy that we were
21 able to take the discrepancy into account.

22 As an example, the report would say there was
23 an inch and a half of undercut that was a sixteenth of
24 an inch deep, and that is the kind of information we need
25 to do a calculation on the acceptability of the deficiency,

mgc6-3

1 and that information was available to us.

2 Q So there was no need to actually go out and
3 look at the welds themselves; is that correct?

4 A No. That's correct.

5 Q Mr. French, what about in your area of
6 responsibility? First of all, are you aware whether
7 or not certain discrepancies were repaired prior to
8 evaluation by Sargent & Lundy

9 A (Witness French) Yes, I was aware of that.

10 Q How was it that in your area of responsibility
11 that Sargent & Lundy was able to evaluate the significance
12 of the discrepancies, in view of the fact that some had
13 been repaired in advance of the evaluation?

14 A In answering, I would like to have the record
15 state that my comments, again, are restricted to Hatfield
16 objective attributes, not welding.

17 The nature of the discrepancies in those areas
18 is such that it is possible to do an evaluation without
19 requiring any further information, whether the item has
20 been repaired or not.

21 As a simple example, if we have a wire on
22 the wrong terminal, and that's described in a discrepancy
23 report, well, that's a full description. If in the
24 meantime, someone went back and corrected the discrepancy,
25 it would not affect our evaluation. Our evaluation would

mgc6-4

1 be based on the fact that it was wrong on the discrepancy
2 report.

3 Many other things, but none of them in the
4 Hatfield objective area required any further investigation,
5 and therefore repairs were not considered to be significant
6 by us.

7 Q Mr. Branch, same question in your area of
8 responsibility -- that is, the Hunter objective attributes
9 and the ASME weld evaluations of the discrepancies.

10 A (Witness Branch) There was sufficient
11 information contained in the inspection reports to know
12 the characterization of the discrepancy to make an
13 evaluation.

14 Q In other words, your testimony is similar to
15 that of Mr. French and Mr. McLaughlin?

16 A Yes.

17 MR. GALLO: I have no further questions.

18 JUDGE CALLIHAN: Thank you, Mr. Gallo, for
19 reminding me of a point.

20 FURTHER EXAMINATION BY THE BOARD

21 BY JUDGE CALLIHAN:

22 Q Mr. McLaughlin, I come to Figure 8 of your
23 testimony which was under discussion yesterday concerning,
24 quote, "fit-up," unquote, of items to be welded.

25 If we look at Figure 8, there is a schematic of

mgc6-5

1 the gap. As you reviewed inspection reports, were there
2 discrepancies of this type?

3 A (Witness McLaughlin) Yes, sir.

4 Q What sort of dimensions are we talking about,
5 the angle or the maximum width of the gap itself?

6 A You are talking about the dimensions that
7 range from -- for the gap, from one-sixteenth to a quarter.
8 That's an inch, sixteenth of an inch to a quarter of an
9 inch.

10 Q Now you made some -- some something -- I'll
11 call them models, full-scale models -- I think we
12 understand that.

13 Was that dimension or the angle between the two
14 members a variable among your order of 10 models?

15 A No, it was the same, sir.

16 Q What was it?

17 A We tested it at an eighth, a gap of an eighth
18 of an inch.

19 JUDGE CALLIHAN: Thank you very much.

20 MR. GALLO: Your Honor, I'm sorry, but it's
21 been pointed out to me, one of the answers in
22 Mr. French's testimony indicates an evaluation is still
23 outstanding.

24 Were you going to ask that question, Judge Cole?

25 JUDGE COLE: Go ahead.

mgc6-6

1 FURTHER REDIRECT EXAMINATION

2 BY MR. GALLO:

3 Q Mr. French, let's turn to your testimony where
4 we talk about the outstanding or incomplete evaluations
5 with respect to -- I believe it was a missing clamp. Do
6 you find that in your testimony? Page 12 at the top of
7 the page.

8 You testified, "An evaluation of nine of these
9 cases showed that the discrepancies had no design
10 significance and the remaining case is still under
11 evaluation."

12 Has that remaining case -- strike that.

13 Has the evaluation of this last case been
14 completed?

15 A (Witness French) Yes, it was completed.

16 Q What were the results of the evaluation?

17 A The results of the evaluation were that that
18 tenth missing clamp did not have design significance.

19 I would like to explain a bit on that, in that
20 the tenth missing clamp was a very unique physical
21 configuration. Typically, the missing clamps consisted
22 of the last -- these were termed critical clamps. Typically,
23 they were in a horizontal conduit run, and the last clamp,
24 of course, leaves the length of conduit cantilevered out
25 with no further clamp on the end. Therefore, the load

mgc6-7

1 on that clamp tends to be higher than on a clamp that's
2 intermediate in a conduit run. That was termed a critical
3 location.

4 The first nine were evaluated, and the method
5 of evaluation was, since the clamp was missing, to go
6 back to the next clamp back. We checked to make sure
7 that it was not missing and then determined whether that
8 clamp had sufficient strength to hold up the entire length
9 of conduit. Due again to the granularity and conservatism,
10 those nine were found to be adequate, even though one
11 clamp was missing.

12 The tenth one was a unique configuration where
13 a small conduit, three-quarter-inch conduit, came out of
14 a box -- came out of the bottom of a box, went down about
15 a foot, and then made a 90-degree bend into the horizontal
16 plane. There was then a support located under that
17 horizontal plane, and there was a clamp designed to be put
18 on that horizontal support. The conduit then ran another
19 couple of feet, and then there was a piece of flexible
20 conduit turning down into another box.

21 The critical clamp in that case was a single
22 clamp on that six or seven-foot run of conduit. The
23 location was extremely crowded. There was barely enough
24 room for a workman to get up into that area. It was up
25 high. It was surrounded by other piping and duct work and

mgc6-8

1 steel and things like that, very difficult to get into to
2 install the conduit and the clamp.

NBU

3 The clamp was missing. The reason why it would
4 seem like it was missing completely, the conduit was
5 unsupported. However, the other things in that area,
6 there was another piece of steel for some other function
7 located immediately adjacent to the horizontal run of
8 conduit. On the other side of the conduit, there was
9 another larger conduit. Even without the clamp, the
10 conduit could only move a fraction of an inch.

11 Can you picture that again? It comes down,
12 makes a 90-degree bend. It should have had a clamp. But
13 there's a piece of steel on one side, another larger
14 conduit on the other side, so it was located between two
15 other items which were entirely adequate to support it.
16 if it tried to move.

17 Now that was very unique, and the structural
18 engineer -- that was a very detailed analysis. It was
19 done by structural engineers, and I reviewed it with
20 them, and the question was, would the connection up at
21 the junction box be adequate with this restriction that
22 existed from these other things? Would those two things
23 be adequate to prevent the conduit from pulling out during
24 a seismic event?

25 And they did a thorough analysis, and they

mgc6-9

1 determined that it would not, that there was no design
2 significance, due to a rather unique set of circumstances
3 in that case.

4 I might add, that's probably the most
5 significant thing we found in this entire 60,000 things
6 that we looked at.

7 JUDGE SMITH: Did you go, in addition, and
8 determine the significance of the added load on the other
9 two conduits?

10 WITNESS FRENCH: The one member was a heavy
11 steel member. That, just by inspection, would not require --
12 they did analyze the amount of movement and the forces
13 that would be set up by this three-quarter-inch conduit
14 and determined that if it hit against the other conduit,
15 there would be no effect on the functioning of either
16 conduit. The other conduit was somewhat larger. I don't
17 remember the size, but conduit is steel. It's relatively
18 strong, and therefore they determined that there would be
19 no effect on the other conduit either.

20 JUDGE COLE: Just one additional question,
21 gentlemen, to any or all of you.

22 FURTHER EXAMINATION BY THE BOARD

23 BY JUDGE COLE:

24 Q There seemed to be a significant amount of work
25 done on the evaluation of discrepancies, and a considerable

mgc6-10 1

2 portion of these discrepancies were repaired prior to
3 the time you made your evaluation. And someone who is
4 reviewing the significance of a discrepancy, having a
5 knowledge that it's already repaired, might behave in a
6 different way in conducting his review. I just postulate
7 that as a possibility.

8 Do you know if any of this took place, or
9 do you think it might modify the way a person reviewed
10 something, if he knew that it's not going to make any
11 difference? "It's already repaired. Why am I doing this?"

12 A (Witness Branch) I can address that. From
13 my viewpoint and information that I looked at, I noted
14 a tremendous amount of thought and effort by the people
15 that did the evaluations to ensure that in their own
16 minds, there absolutely was no question that there was
17 not a problem.

18 I didn't get any indication that someone sloughed
19 it off and said, "Well, it doesn't matter anyway. It's
20 already been fixed." I did not detect that.

21 MR. GALLO: I'd like to have each of the
22 witnesses answer that.

23 BY JUDGE COLE:

24 Q Mr. French?

25 A (Witness French) Again, to the specifics of
the question, as I said for, the nature of the Hatfield

mgc6-11

1 objective discrepancies were such that there was really
2 no need to go after any other information. So no effort
3 was made.

4 However, philosophically as engineers, we
5 design things. In the office, we make drawings and
6 calculations. When an engineer or a designer receives
7 information on some unique situation, something that went
8 wrong, that is more interesting to him than routine
9 daily work. He digs into it. He's curious. He has just
10 plain that sort of thinking going on in his mind. He
11 becomes actually not less diligent, but more diligent when
12 he works on discrepancies. He doesn't have the opportunity
13 to get out in the field many times. Now here's an
14 opportunity to see the results of his work and to learn
15 more about his trade.

16 So my observation would be just the opposite
17 of yours, Judge Cole, that these things were very
18 interesting to the people working on them.

19 Q I guess I can understand that, sir. But does
20 your firm do that as a matter of general practice to
21 review and disposition a discrepancy, even equipped with
22 the knowledge that it's already been changed and fixed?

23 A Most of the review work and the discrepancy
24 analysis -- it's called by other names. As I mentioned
25 before, there's a regular paperwork process, so that any

mgc6-12

1 deviation comes back for review. This is very routine
2 in the nuclear business. So we do do that type of work
3 routinely, yes.

4 Q Now would you have done that, even if there
5 was not a reinspection program ongoing?

6 A The review of -- they are generally called
7 nonconformances in the routine of the work. The reinspection
8 program was a special program, but the ongoing review of
9 apparent nonconformances and changes goes on continually
10 in the routine design of a nuclear plant. The reinspection
11 program was a completely separate effort.

12 Q I guess my question is this: If you were not
13 to have the reinspection program and you were to receive
14 information about discrepancies, would you have handled
15 them the same way you did, the same way you handled the
16 discrepancies that are involved in your testimony, or would
17 you just say, "The item has been repaired, so we don't
18 have to evaluate the impact of that discrepancy"?

19 A No, that's not correct. In the routine ongoing
20 review of discrepancies, the work has been done, and
21 inspectors determine that there's some problem with it,
22 it is analyzed to determine whether it should be repaired.
23 Many things come in of similar nature. The inspector has
24 a tolerance. He inspects to that tolerance. But when we
25 look at it, there's a major margin beyond the routine

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tolerance.

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Therefore, a decision has to be made. Is it worth repairing a small discrepancy?

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Q Yes, but that's a step beyond. Let's say now, you know that it's already been repaired, as is the case with a lot of the discrepancies here, but you went on with the review to determine whether it had to have been repaired.

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A In the normal process, it would not have been repaired prior to us reviewing it.

Q All right, sir. That answers it.

A In this process, that did happen.

JUDGE COLE: Okay, thank you.

End 6

71b1

1 Mr. McLaughlin?

2 A (Witness McLaughlin) Sir, I'm absolutely
3 confident that the engineers that did the calculations on
4 the discrepancies that were repaired had no different
5 attitude toward that work than they did, whether it had
6 been repaired or it had not been repaired. Our design
7 process, our constraints, you know, don't allow an engineer
8 to say it's repaired, it's not important. They prepare
9 review approval and criteria that we have -- I think the
10 second item -- I talked to these people that have done this
11 work and I'm just confident that they treated that work as
12 very important, that the calculations had to be correct, they
13 had to demonstrate even if it hadn't been repaired that it
14 had no design significance.

15 So I'm really very confident that the situation
16 you asked about did not occur in my discipline.

17 Q All right, sir. Thank you.

18 MR. GALLO: I have one question to follow up on
19 Dr. Callihan's question. It has to do with Figure 8.

20 CROSS ON BOARD EXAMINATION

21 BY MR. GALLO:

22 Q If I recall your answer to Judge Callihan,
23 you indicated that the biggest gap observed
24 was a quarter of an inch. Is that correct?

25 A (Witness McLaughlin) That was the maximum gap

71b2

1 observed.

2 Q And that the test specimen gap that was used for
3 the test specimen, was an eighth of an inch. Is that
4 correct?

5 A Yes.

6 Q Can you explain why the quarter inch gap was
7 not used for evaluation purposes?

8 A I would like to preface that, before I answer
9 that, to make it absolutely clear to everyone that in doing
10 our technical evaluation of this joint, we downgraded the
11 weld for that gap. In other words, if the gap was a quarter
12 of an inch, we took that into account with calculations.
13 We didn't use the test results to disposition this item.
14 I just want that to be clear. The reason we used an eighth
15 of an inch is we believe that that was the more typical
16 case, that the quarter inch was an extreme case.

17 And we dispositioned the extreme case. If we got
18 another one at a quarter of an inch, we'd have to disposition
19 that also. But the eighth of an inch represented what we saw
20 as a more typical case. The quarter inch was an extreme case.

21 MR. GALLO: That's all I have, Your Honor.

22 JUDGE SMITH: Mr. Cassel.

23 MR. CASSFL: Thank you, Judge.
24
25

1 RECROSS EXAMINATION

2 BY MR. CASSEL:

3 Q To the panel at large, I gather from your
4 testimony that it was almost invariably true that Sargent
5 & Lundy did its engineering analysis on the basis of
6 documentation or other information received from the field
7 and did not, in any of the design significance evaluations,
8 go out and look at the actual hardware and the hardware
9 around it. Is that correct, or is that not correct?

10 A (Witness McLaughlin) I know, from personal
11 experience, that that's not correct. I have personally seen
12 twice, a number of the structural design discrepancies that
13 were evaluated by the people doing the work. I'm also aware
14 that the engineers that actually did the work were in the
15 field to look at some of these discrepancies. I'm not saying
16 that that was a routine thing, that every discrepancy an
17 engineer went out to look at, but I have personal knowledge
18 that engineers that were working on dispositioning these
19 discrepancies went in the field to look at the physical
20 discrepancy.

21 Q That happened sometime, but you don't know
22 quantitatively how much of the time that happened?

23 A Yes, I can't tell you.

24 Q Could Mr. French and Mr. Branch also address that
25 question?

71b4

1 A (Witness French) In my area, as I've stated
2 before, there was no need, in our discrepancies, to perform
3 any field review. However, the critical missing clamp
4 conduit problem that I mentioned before, was very unique and
5 I personally went out and looked at it, after it had been
6 evaluated and been determined to be non-significant.

7 I can attest to the fact that that conduit could
8 not move any significant amount. However, the routine
9 evaluations were based upon the dimensions and details that
10 were provided on discrepancy reports, in all cases, in the
11 Hatfield objective work.

12 A (Witness Branch) In our case also, the work was
13 done by people who were at the field and had the opportunity
14 to look at certain items. I do not know if they were -- what
15 items they went out and looked at. I myself also went out
16 in the field and looked at items of typical applications.
17 I could not look at the actual items, obviously they had
18 been repaired, but I was able to look at items that were
19 typical of the kinds of things.

20 Q Your work was at the review stage, after the
21 engineering evaluations had already been done?

22 A Right, correct.

23 Q You say the engineering evaluations, concerning
24 which you testified, were done by Sargent & Lundy people at
25 the site?

71b5

1 A Yes.

2 Q And they had an opportunity to look at the
3 deficiencies, if they wanted to?

4 A Yes.

5 Q But you don't know whether they, in fact, did?

6 A No, I don't know which ones they may have or may
7 not have.

8 Q Do you know, Mr. McLaughlin, in any of the cases
9 that you referred to, whether the deficiencies that were
10 physically observed by the evaluator involved welds?

11 A (Witness McLaughlin) Yes, they did involve welds.

12 Q And in addition to actually looking at some of the
13 welds, is it not the case -- and I guess I should address
14 this to Mr. McLaughlin and Mr. Branch, who were the only
15 ones as I understand it, testifying on welds -- is it not
16 the case that in each instance of an engineering calculation
17 on a discrepant weld, you requested a weld map from the field?
18 Is that correct?

19 A Yes, except for the Hunter welding, where the weld
20 had already been repaired.

21 Q Why did you request a weld map from the field in
22 each of those cases, if the inspector's report on the
23 deficient weld provided you all the information you needed
24 to do an engineering evaluation, as I thought you testified
25 a few moments ago?

71b✓

1 A I testified that the information on the Hunter
2 weld report was sufficient to disposition the discrepancy.
3 The information on the Hatfield report was not sufficient
4 to disposition the discrepancy.

5 Q Mr. Branch, as I recall, you are testifying about
6 Hunter welds, is that correct?

7 A (Witness Branch) Yes.

8 Q Was the information that you received on Hunter
9 welds from the inspection reports adequate to make an
10 engineering evaluation without a weld map?

11 A Yes, in fact, the kinds of information that was
12 on the inspection report would be equivalent to a weld map.

13 Q Did Sargent & Lundy ask for weld maps on the Hunter
14 welds to which you are testifying?

15 A No, sir.

16 Q Mr. McLaughlin, with respect to these Hatfield
17 welds, do you know whether any of the Hatfield welds were
18 repaired prior to the engineering evaluation?

19 A (Witness McLaughlin) None of the Hatfield welds
20 were repaired prior to the engineering evaluation.

21 Q You had a weld map on every Hatfield weld that was
22 evaluated by Sargent & Lundy?

23 A We have a weld map on every Hatfield weld that
24 was evaluated.

25 Q I apologize if you already have answered this, but

71b7

1 let me just get it clear. I may have missed it.

2 On the Hatfield welds, there were no Hatfield
3 welds that were repaired before your engineering evaluation,
4 to your knowledge?

5 A To my knowledge, none of the Hatfield welds
6 were repaired prior to our engineering evaluation.

7 Q Now in response, Mr. McLaughlin, to Mr. Gallo's
8 redirect, I believe you reaffirmed your testimony that none
9 of the discrepancies in the welds, concerning which you are
10 testifying, exceeded the code allowable. Is that correct?

11 A Yes. The allowables for the stress allowables.

12 Q Stress allowables.

13 Do you know, Mr. McLaughlin, whether it's the case
14 that -- let me backtrack a minute.

15 You are testifying concerning - is it 356
16 Hatfield welds and how many Hunter welds, approximately?

17 A 69.

18 Q Do you know --

19 A I'm sorry, it's 60.

20 Q All right. Do you know, Mr. McLaughlin, whether
21 it is the case that any of the 356 Hatfield welds and the
22 60 Hunter AWS welds, concerning which you are testifying,
23 would not have been within the allowable stress under the
24 code if it had not been for the 10 percent overstress factor
25 which Sargent & Lundy used in some of the calculations?

71b9

1 A Could you restate that, please?

2 Q Sure.

3 Do you know whether any of the welds, concerning
4 which you are testifying, would have failed to be within
5 the allowable stress limits under the code, if Sargent & Lundy
6 had not included in the calculations the 10 percent
7 overstress, concerning which you testified yesterday?

8 A I know that the 10 percent overstress factor was
9 used in the calculations. So if you looked at the calculation,
10 you see the 10 percent overstress factor in there being
11 used to disposition the calculation -- to disposition the
12 weld.

13 I'm also not saying that if we took the 10 percent
14 overstress factor out, that we couldn't show that the weld
15 could be dispositioned without the overstress factor. But to
16 answer your question, the overstress factor is in the
17 calculation.

18 Q That's useful information, but let me try to be
19 more precise about the question. The question is do you
20 know whether any of those welds, concerning which you
21 are testifying, would not have been within code allowable
22 stress if you had not factored in that 10 percent overstress?

23 A I think I answered that.

24 Q I don't believe you did. You said the 10 percent
25 was used in the calculations. I'm asking you if it had not

71b9

1 been used, would some of those welds -- would some of those
2 welds have failed to be within code allowable stress?

3 A Let me try to restate it. Your expert witness
4 asked the calculations. If you take the 10 percent overstress
5 factor out of the calculations, don't use it. It will
6 appear from the calculation that the allowable stresses will
7 have been exceeded. It will appear. So I'm not saying that
8 if we go back and adopt the philosophy of not using the
9 10 percent overstress that we cannot make another calculation
10 without the 10 percent overstress to show that the
11 allowable stresses have not been exceeded.

12 Q Did you, in fact, make any effort in your
13 review of the calculations to determine how many of these
14 356 Hatfield welds and 60 Hunter welds would have appeared,
15 as you say, to be in excess of code stress limits, if you
16 had not included the 10 percent overstress factor?

17 A No. I did not try to make a count of the number
18 of calculations.

19 Q Is the 10 percent overstress factor written into
20 the FSAR for Byron?

21 A I'm not sure if it's written in or not, but I do
22 know that this is not a policy we have adopted for the
23 reinspection program. This is in our design standards.
24 It's a policy that is used across the board. It's a
25 reasonable policy. It's an acceptable policy. It's been

1 audited. We have been audited on this by the NRC. And
2 I believe it's reasonable.

3 Q Is it not the case -- maybe you can help me
4 out here, Mr. McLaughlin. I'm not an expert at all in
5 this area. I was under the impression that any design
6 criteria used for the nuclear power plant in this case,
7 Byron, was supposed to be specified in the FSAR. Am I
8 incorrect on that?

9 A The FSAR establishes general bases for design.
10 It does not include every idiosyncrasy of the design. Our
11 design criteria is very out front, very well stated. We
12 have been audited on it. It has been reviewed by everyone.
13 It is not something that we came up for the reinspection
14 program.

15 Q I'm not suggesting that it is. Do you know
16 specifically what document, the name of the document,
17 contains the explanation for the 10 percent overstress
18 factor, as it was used in the Byron reinspection calculations
19 on the welds that you reviewed?

20 A I can't give you the exact name of the document.
21 I know that your expert witness has looked at the document.
22 It's a structural engineering design standard. It's
23 published in a bound book on yellow paper, controlled
24 distribution.

25 end7

T8 MM/mm 1

2 Q It was also the case, Mr. McLaughlin, in the
weld calculations --

3 JUDGE SMITH: Excuse me, is this all recross-
4 examination? This is all examination that is built up from
5 the Board's questions and from Applicant's redirect?

6 MR. CASSEL: I think you have got a good point
7 there.

8 JUDGE SMITH: I think I've got a very good point.
9 It seems like you have just deferred a lot of your cross-
10 examination to now.

11 MR. CASSEL: No, I really am responding to the
12 reaffirmation elicited by Mr. Gallo after a series of
13 questions about the welds by Mr. McLaughlin that none of
14 the discrepancies exceeded the code-allowable.

15 I admit, I think I am ranging rather far from
16 that, Judge. If you think it is too far beyond the scope, I
17 will just drop that line of questioning.

18 JUDGE SMITH: That is not for the Board to decide.
19 If you believe that these questions are necessary, ask them.
20 I would like to have some type of understanding as to the
21 protocol here. It seems to me you are just continuing your
22 cross-examination as a second thought.

23 MR. CASSEL: I did not intend it that way, Judge.
24 And I think I probably crossed the line without even
25 thinking about the line. And I would be happy not to go any

mm2

1 further, if you think there is a question there.

2 JUDGE SMITH: If you think it is important,
3 proceed.

4 MR. CASSEL: Thank you, Judge. I don't think
5 I will have to proceed much further on that line, in any
6 event.

7 BY MR. CASSEL:

8 Q Mr. McLaughlin, is it also the case that in those
9 calculations where the weld was within the allowable stress
10 without having to add in the 10 percent overstress factor,
11 that the 10 percent overstress factor was not added in. That
12 is, it was added in only where it was needed to get over the
13 line in terms of allowable stress?

14 A (Witness McLaughlin) Yes.

15 Q Mr. McLaughlin, I believe you testified in
16 response to someone's questions here during the redirect or
17 the recross, I don't remember which, that while you took
18 Mr. Singh's statistical calculations into account, you mentioned
19 your engineer judgment. I think it was you. Please correct
20 me if I have the wrong -- was it Mr. French?

21 Anyway, I will ask the question. It was somebody.
22 Whoever it was, please correct me. But the gist of it was
23 that you took it into account, it looked reasonable. But,
24 your basic evaluation was done as a matter of engineering
25 judgment. And, if you had not had Mr. Singh's calculations

mm3

1 available, you would have reached the same conclusions.

2 A (Witness French) You are mixing up
3 Mr. McLaughlin's and my response. But, go ahead. Part of
4 it was mine, part of it was his. What did you say?

5 Q Was it you, Mr. French, who said that the
6 calculations looked reasonable to you and you took them
7 into account. If you disregarded them you would reach the
8 same conclusion.

9 A I said that the results reported looked reasonable
10 in my judgment.

11 Q I see.

12 And was it also the case that you took into account
13 the fact that Mr. Singh's calculations appeared to show
14 that from a statistical point of view there was no problem
15 that would raise a question about the engineering judgment
16 you would otherwise reach on the basis of other factors?

17 MR. GALLO: Objection. Asked and answered.

18 He said in his prior testimony that they appeared
19 reasonable, but he did not take them into account. He
20 relied solely on engineering judgment.

21 MR. CASSEL: I think I can go to the next question
22 which is really where I am en route.

23 BY MR. CASSEL:

24 Q Suppose a set of statistical calculations had been
25 presented to you, which did raise questions which were not

mm4

1 merely corroborative of your engineering judgment, but were
2 inconsistent with what your judgment would have been on the
3 basis of everything else, would that have led you to want to
4 look into those statistical calculations?

5 A (Witness French) Your question is presupposing
6 a wrong sequence.

7 I read the reinspection reports. I noted the
8 results. From then on, I ignored them. I really didn't
9 take them into consideration at all when I was doing my
10 engineering evaluation.

11 If the results had shown some different result,
12 I probably would have done the same thing. It would have been
13 an interesting point, but it would not have entered into
14 my engineering evaluation.

15 Q Is your answer the same, Mr. McLaughlin?

16 That is -- well, the question is on the floor. If
17 you would like it repeated, I will.

18 A (Witness McLaughlin) Please?

19 Q If the statistical calculations which had been
20 presented to you, rather than corroborating all of the
21 other engineering information you had available to you, had
22 in any way been inconsistent with that other information or
23 raised questions about it, would you then have wanted to, or
24 have found it necessary to take into account the statistical
25 analysis before reaching your engineering judgment on the

mm5

1 conclusion about the work quality at the plant?

2 A It's impossible for me to understand a situation,
3 a hypothetical situation that you explained, how that could
4 happen.

5 As I have explained, engineers or myself, I have
6 used statistics. I can't believe of a situation where an
7 engineering evaluation has been done, and then you do a
8 statistical study that says it is not okay. That's a
9 hypothetical situation that I don't think could happen.

10 MR. CASSEL: Can we have just a moment, Judge?

11 (Pause)

12 JUDGE SMITH: It is long past time for a break. I
13 just didn't imagine you would have so much recross. In
14 proportion to your original cross it is quite substantial.
15 Do you have much more?

16 MR. CASSEL: I think we will be finished within
17 a couple of minutes, Judge.

18 BY MR. CASSEL:

19 Q Mr. French, your answer 23 in your direct
20 testimony states, does it not, "The quality of the work
21 reinspected is adequate?"

22 A (Witness French) Yes, it does.

23 Q And at your deposition taken last week by
24 Ms. Judson, do you recall being asked that?

25 MR. CASSEL: Joe, this is at page 20.

mm6

BY MR. CASSEL:

1
2 Q Mr. French, if you have your deposition there, it
3 is page 20 in lines 8 through 10.

4 Do you recall being asked after that sentence
5 about the quality of the work reinspected is adequate, the
6 question: "Does this conclusion extend to any work beyond
7 that reinspected?"

8 Answer: "No, not from my work."

9 Do you recall that?

10 A (Witness French) I do.

11 Q Does that remain your testimony?

12 A No, it does not.

13 At the time of the deposition I had not really
14 given any serious consideration as to what are legally
15 called inferences. I believe that is what you are getting to
16 here, and that is what I said at the deposition.

17 However, subsequent to the deposition I have had
18 considerably more time to do some review, and think about
19 it. To get to your point, we had a situation where we
20 reviewed a large number -- I reviewed a large number of the
21 evaluations of the discrepancies. The conclusions of those
22 reviews were such that I could infer that all of the
23 discrepancies, even those that we didn't look at, would have
24 provided the same results; namely that they were not significant
25 to the design.

num 7

1 The work done by the Hatfield Electric Company was
2 divided into reinspectable items and another group of
3 items which were termed inaccessible and not recreatable.

4 Those other items of work were not included in the
5 reinspection program merely because they just couldn't be
6 included in evaluating the inspectors.

7 Again, repeating what I said before, looking at a
8 total population of 60,000 things that the Hatfield Electric
9 Company did that were included in the reinspection program,
10 finding ultimately that none of them had design significance,
11 can lead me to the additional inference that I just can't
12 conceive of how a company like Hatfield could have come
13 up with a good result on the reinspected items and not also
14 have a good result in the quality of the work that was
15 not reinspected.

16 This was done basically over a time period by
17 the same company. And at the time the work was done, no one
18 knew there would be a reinspection program. There was no
19 way that they could have been better on the reinspected
20 items than they were on the nonreinspected items.

21 My inference then can be that even though not
22 reinspected, the inaccessible and nonrecreatable work likewise
23 was adequate.

24 Q Mr. McLaughlin, you testified --

25 JUDGE SMITH: Let's take a break.

 (Recess)

mgc9-1

1 JUDGE SMITH: Mr. Cassel?

2 BY MR. CASSEL:

3 Q Mr. McLaughlin, this is a question which
4 could easily be misunderstood, so I just want to make
5 it clear to you that I'm not intending anything negative
6 in the way I am putting it.

7 You testified earlier that in making an
8 engineering judgment such as the engineering judgments
9 that you three gentlemen have made on the program, the
10 engineer takes into account his experience, including
11 experience with other nuclear power plants and including
12 knowledge of design conservatism and so forth.

13 You have been involved at Sargent & Lundy,
14 I gather, for a good many years now in the business of
15 designing nuclear power plants or participating in the
16 design of nuclear power plants, including Byron; is that
17 correct?

18 A (Witness McLaughlin) Yes, sir.

19 Q And over those many years, plant after plant,
20 design item after design item, have you not developed a
21 deep conviction that nuclear power plants, in part because
22 they are so conservatively designed, in your view, are
23 inherently likely to be quite safe?

24 A I guess I wouldn't state it that way.

25 Q How would you state it?

mgc9-2

1 A The safety is not inherent. It's intentional.
2 It's put in intentionally. I mean, an engineer just can't
3 take the attitude, "I've been around nuclear power plants
4 for fifteen, twenty years, and they're safe, so everything
5 is okay." He's got to understand all the things I
6 mentioned -- the loads, how the loads were established,
7 how the computer model was set up, how the loads were
8 used in the design. You just can't say, "I've been around
9 them for a long time, and I know we have conservative
10 design practices, so everything is okay."

11 Q Yes. You testified that there were many
12 factors that your judgment took into account. But did
13 you not say that one of them was your -- by "your," I
14 mean engineers making engineering judgments -- experience
15 with respect to other nuclear plants and knowledge of
16 design conservatism generally, as opposed to specific facts
17 relating to the particular plant at issue in any given
18 case?

19 A I'm having trouble trying to determine what --
20 where I'm supposed to be going. I guess when I refer to
21 my experience on nuclear power plants, I would like to go
22 back to what an engineer coming out of school knows, versus
23 a person with fifteen to twenty years experience in the
24 nuclear industry.

25 Now a person coming out of school has the basic

mgc9-3

1 technical knowledge to make the calculation of whether
2 a weld is okay or how to size a beam or how to size a
3 column. He has no basis for making a judgment. He only
4 knows what the calculation tells him. As he practices,
5 as he is involved in the preparation of the PSAR, the
6 determination of the loadings, when he serves on code
7 committees to understand how allowable loads are established,
8 what criteria is used in establishing allowable loads,
9 he starts to accumulate this data base of experience,
10 so that when he gets to the point where he's been doing it
11 for fifteen or twenty years, he feels this feeling of
12 confidence, that he understands, he understands the
13 structure, he understands the loading, he understands the
14 code allowables, how they got to the code allowables. He
15 has all this stored-up knowledge that the engineer coming
16 out of college doesn't have.

17 So I think you are trying to characterize it
18 as -- "Well, you've been around them for a long time, and
19 you know they're safe," and that's just not the way it
20 works. It doesn't work that way.

21 Q You did not in any way, in your engineering
22 judgment with respect to Byron, take into account a belief
23 that nuclear power plants are safe for the reasons
24 discussed in your last answer?

25 A I'm having trouble agreeing to what you're

mgc9-4

1 saying. You appear to want me to say that. I'm not saying
2 that I don't think nuclear power plants are safe, but you
3 just can't jump to the answer, the last line. You just
4 can't say, "Nuclear power plants are safe." You have got
5 to say why I think this nuclear power plant and these
6 design discrepancies are not a design problem.

7 Q And in saying that with respect to each
8 discrepancy, you exercise your engineering judgment; is
9 that right?

10 A The discrepancies that I -- the AWS discrepan-
11 cies for Hatfield and Hunter, except for the five cosmetic
12 for Hatfield and the 19 cosmetic for Hunter, are not
13 engineering judgments. They're design calculations.

14 Q I think that's right, and I misstated it. But
15 in inferring from that data to the conclusion I believe
16 Mr. Gallo asked you about earlier, that the plant is
17 basically safe, in that inference, you exercise your
18 engineering judgment?

19 A Yes.

20 MR. GALLO: Objection. That was a
21 mischaracterization, Your Honor. My questioning led to
22 the conclusion that the Hatfield work or Hunter work which
23 Mr. McLaughin evaluated was adequate.

24 JUDGE SMITH: Mr. Gallo, he's already answered
25 the question.

mgc9-5

1 MR. GALLO: It's a mischaracterization of
2 the testimony. I guess that's Trick Question No. 4.

3 MR. CASSEL: Judge, I don't want to be unfair
4 to the witness.

5 BY MR. CASSEL:

6 Q Did you mean to limit your last answer just
7 to the Hatfield and Hunter work concerning which you're
8 testifying? I think Mr. Gallo is correct about what you
9 said before. I didn't mean to mischaracterize it.

10 A (Witness McLaughlin) I didn't understand what
11 he said.

12 (Laughter.)

13 MR. CASSEL: I have no further questions, Judge.

14 JUDGE SMITH: I am concerned now.

15 MR. CASSEL: If you want us to clear that up --

16 JUDGE SMITH: As I say, the only thing out of
17 the whole series that I understood was his answer, yes.
18 I don't understand Mr. Gallo's objection, nor your questions.
19 So where are we?

20 MR. GALLO: At the risk of not being understood
21 again, Judge, if I may, I will try to explain the
22 dichotomy that I perceive.

23 Mr. Cassel's question referred first of all
24 to my question on redirect with respect to Mr. McLaughlin's
25 engineering judgment, which is reflected in the last answer

mgc9-6

1 of his testimony. And then Mr. Cassel asked if, in reaching
2 that judgment that the plant was safe, whether or not
3 Mr. McLaughlin had exercised the judgment that Mr. Cassel
4 is inquiring about.

5 My questions of Mr. McLaughlin did not go to
6 the bottom line of whether or not the plant was safe, but
7 whether or not the work that was the subject of the
8 evaluation was adequate. I was just trying to clear up that
9 distinction.

10 JUDGE SMITH: Yes, I had missed that nuance.
11 However, Mr. McLaughlin's answer was yes to the broader
12 question.

13 MR. GALLO: Maybe we ought to ask him if it's
14 still yes, based on the characterization. I suspect he
15 was answering my question again and didn't pick up the
16 nuance in Mr. Cassel's question.

17 MR. CASSEL: I share that concern with Mr. Gallo.
18 I wasn't clear on what the witness was answering, because
19 I had asked the question, and I think Mr. Gallo's
20 clarification --

21 JUDGE SMITH: All right. How do you want to
22 leave the record.

23 MR. GALLO: You can ask both questions. If
24 the witness has an opinion on each --

25 JUDGE SMITH: Having heard the discussion,

mgc9-7

1 Mr. McLaughlin, why don't you comment?

2 WITNESS MC LAUGHLIN: Mr. Gallo is correct.
3 I thought I was answering his question. That's what I
4 thought I was answering.

5 MR. CASSEL: And actually that's what I intended
6 to ask. I just wasn't specific.

7 JUDGE COLE: So that was with respect to
8 Hatfield and Hunter?

9 WITNESS MC LAUGHLIN: Yes.

10 MR. CASSEL: Thank you, Judge. I have no
11 further questions.

12 JUDGE SMITH: Any additional questions of
13 this panel?

14 (No response.)

15 JUDGE SMITH: Thank you, gentlemen. You may
16 step down.

17 (Witnesses excused.)

18 MR. GALLO: Judge Smith, you will recall, I
19 believe, that I had reserved the right to recall Mr. Hansel
20 with respect to his testimony. I would like to do that
21 at this time, if I might.

22 JUDGE SMITH: Mr. Hansel?
23
24
25

mgc9-8

1 Whereupon,

2 JOHN L. HANSEL

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

5 FURTHER REDIRECT EXAMINATION

6 BY MR. GALLO:

7 Q Mr. Hansel, you are still under oath.

8 Do you recall during the cross-examination by,
9 I believe, Mr. Cassel, a discussion concerning a particular
10 matter involving Pittsburgh Testing Laboratories, and in
11 particular a matter covered in Appendix O of Mr. Shewski's
12 testimony, set forth in a Byron Site QA Surveillance --
13 that is, Report No. 5696, concerning Pittsburgh Testing
14 Laboratories? Do you recall that?

15 A I do.

16 Q Do you have that surveillance report in front
17 of you?

18 A I do.

19 Q Does this surveillance report set forth a
20 set of circumstances discovered by Byron site QA during
21 this surveillance?

22 A It does.

23 Q Would you just briefly summarize for the
24 perspective of the public just what the point is that's
25 covered here?

mgc9-9

1 A As a result of some of the reinspections being
2 conducted by Pittsburgh Testing Lab, they had requested
3 an interpretation concerning the criteria. They felt
4 there was a difference between the earlier inspection
5 done by the original inspector and the reinspection, and
6 they had requested an interpretation on July the 11th in
7 a letter to Mr. Tuetken.

8 That was approved by Mr. Tuetken and by
9 Mr. Stannish of the site QA organization for implementation.

10 During the surveillance by site QA, they
11 found that after implementation of Interpretation No. 11,
12 which changed some minor points concerning overlap and
13 undercut, that PTL had changed the deficient status of
14 some welds which were rejected for reasons other than were
15 changed by the interpretation.

16 Q All right. Now, Mr. Hansel, have you had an
17 opportunity to review this particular matter?

18 A I have.

19 Q And is it true that as of yesterday while you
20 were on the witness stand, that you were unfamiliar with
21 this particular matter?

22 A That's true.

23 Q How did you familiarize yourself with this
24 matter?

25 A I reread the surveillance report and the

mgc9-10

1 Interpretation No. 11. I also had discussions with
2 Mr. Marvin Talent, who is the Manager of Pittsburgh
3 Testing Lab; Ken Hansig, the current Manager of Site
4 Quality Assurance; Bob Klingler and Dick Tuetken.

5 Q Did you satisfy yourself now that you understand
6 this matter, based on this review?

7 A I do, yes.

8 Q Do you believe that this particular circumstance
9 discussed in the Byron site QA surveillance report, Report
10 No. 5696, was an example of Pittsburgh Testing Laboratory
11 attempting to alter the results of the reinspection program?

12 A I do not interpret it that way.

13 Q Can you explain why not?

14 A It's my feeling, after reviewing and discussing
15 it with the parties, I feel it was an honest attempt to
16 try to clarify the criteria.

17 Now when they applied it, there was apparently
18 a problem in terms of being able to get all the parties
19 involved to go out and do the reinspection. Primarily
20 the Sargent & Lundy people were busy in other reinspections.
21 And it appears, at least from the data that I could gather,
22 that they went beyond in some cases.

23 Now I did not find any intent that that was
24 willful. I could not get exact numbers, but from
25 discussions, there were not very many. I think it was

mgc9-11

1 an interpretation. The directions given by Mr. Tuetken
2 originally when he approved this interpretation were
3 that they were to not go and redo this without a third-party
4 inspector being included. So they waited for some period
5 of time before they went back out, and they then went
6 back to Mr. Tuetken in September because the work was
7 piling up.

8 And at that point in time, then, Mr. Tuetken
9 said, "Well, we'll just keep good records, and we'll catch
10 up the third-party inspections." So I see no evidence
11 of any attempt to alter the records or to game the
12 system, as I would call it.

13 Q Mr. Hansel, did you see any attempt or evidence
14 whatsoever in your review that PTL attempted to conceal
15 its activities with respect to this particular matter?

16 A None whatsoever. It was open. They had
17 their original interpretation. Mr. Tuetken was aware of it.
18 I think if a mistake was made, it was that Mr. Tuetken did
19 not tell Mr. Hansig that they were going to be doing this.
20 I saw no records -- if any records were going to be
21 altered, this would have been one of the poorest ones to
22 do it, because these numbers on the results were at this
23 point in time in a number of different places for recording
24 purposes.

25 So if anybody were alter the system, I would

mgc9-12

1 have thought that this would have been the very poorest
2 place to pick.

3 Q Is that because the numbers were spread in a
4 number of areas?

5 A The numbers were in Mr. Tuetken's hands. I'm
6 sure that they were downtown with Commonwealth Edison.
7 I'm certain that Sargent & Lundy had some of the values.
8 So it just would have not been the right place to go.

9 Q In your last answer when you used the phrase
10 or the word "numbers," what did you mean exactly?

11 A The results of inspections. And those are
12 all recreatable. You can certainly audit that, right
13 down to the gnat's eyebrow.

End 9

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1 Q Mr. Hansel, I overlooked one question on
2 redirect. You were asked a series of questions by
3 counsel for the Intervenors concerning the subjective
4 acceptance criterion of 90 percent. Do you recall those
5 questions?

6 A Yes.

7 Q Can you recall being asked to explain, as a part
8 of your basis, with respect to accepting that criterion,
9 the documentation that you reviewed and in particular the
10 book written by Harris and Cheney?

11 A Yes.

12 Q Do you recall referring to a particular table
13 in that book that had, as one leg of the table, a listing
14 for equipment complexity and the other leg the degree
15 of performance achieved from the inspection?

16 A I remember the discussion. I would like to
17 clarify a point. In the original deposition --

18 Q Just a minute. Let me continue. I don't believe
19 your testimony will be meaningful unless all the parties
20 and the Board have the table on which you are about to
21 testify.

22 (Document distributed to Board and parties.)

23 BY MR. GALLO:

24 Q Do you have a page in front of you, Mr. Hansel,
25 that shows -- I guess pages 76 through 77?

1 A Yes.

2 Q Could you tell me what that is?

3 A This is two pages from Drs. Harris and Cheney's
4 book. I don't know the exact chapter. I had the whole
5 book but I pulled this particular one. Do you want me to
6 go ahead and explain this?

7 Q No, no. Is this the book that is referenced in
8 your testimony?

9 A Yes.

10 Q And what is this table shown on page 77?

11 A This is a result of a series of studies that were
12 done by Drs. Harris and Cheney. They took a number of
13 pieces of equipment varying in complexity. If you look
14 over under 6.1 on the opposite side, they picked everything
15 from a printed or ceramic printed circuit board all the way
16 up to a very complex piece of equipment which I had previously
17 mentioned in my testimony.

18 Q Would you tell me, just in a brief statement, what
19 the table stands for? That's all I want.

20 A This is a pictorial display of their evaluation
21 of inspector performance, when you took it in comparison to
22 equipment complexity.

23 Q Did you xerox this page from the book?

24 A Yes.

25 MR. GALLO: If there's no objection from the parties,

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1 Your Honor, I would like to have this page bound into the
2 transcript at this point, of Mr. Hansel's testimony, if
3 that is acceptable, following the same rubric as the
4 Sargent & Lundy witnesses.

5 JUDGE SMITH: Objection?

6 MR. CASSEL: No objection, Judge.

7 (The document referred to as excerpt from book
8 authored by Drs. Harris and Cheney follows:)

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or more inspectors inspected each item; each inspector had an unlimited amount of time to make his inspections.

The measure of inspection performance associated with each equipment item was the percentage of defects detected in the item by the eight or more inspectors who inspected it. Defects in each item had been

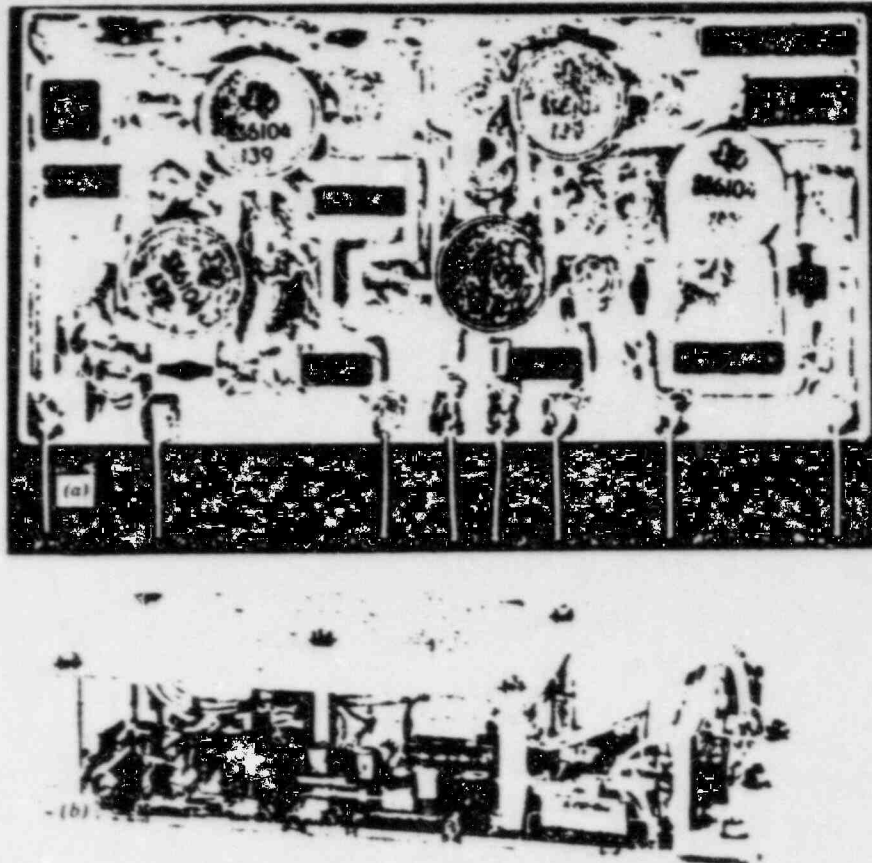


Figure 6.1 Sample electronic items and their complexity indexes: (a) ceramic printed circuit, complexity index = 28; (b) autonavigation module, complexity index = 84.

verified by a panel of four or more experts. Equipment complexity was measured by counting the number of major parts comprising each item, for example, circuit boards, resistors, wire bundles, connectors, and transistors. The complexity index thus obtained ranged from six to 100. Two of the items together with their complexity indices are presented in Figure 6.1.

The results indicated that complexity has a significant negative effect on inspection performance which apparently cannot be overcome simply by providing inspectors with an unlimited amount of inspection time. This finding suggests that inspection jobs must be designed so as to overcome the effect of task complexity; significant gains in inspection performance may be obtained by reducing task complexity or by developing procedures and aids which reduce the effect of complexity. The relationship between inspection performance and equipment complexity is shown in Figure 6.2.

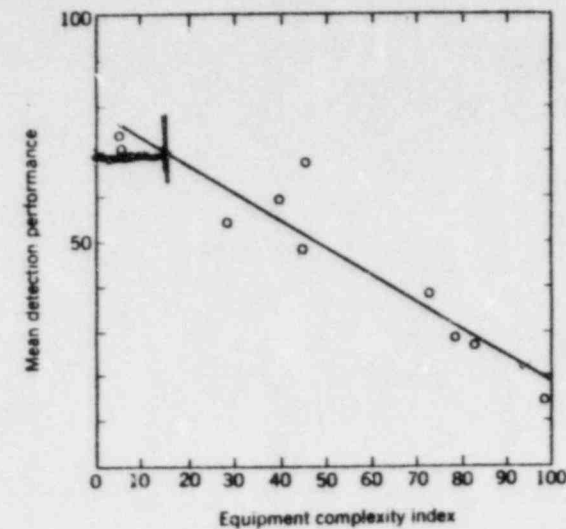


Figure 6.2 Inspection performance as a function equipment complexity.

The Effect of Defect Rate

Most production programs have a typical learning curve associated with them. Early in the program, product defect rate is high but quality usually improves until, later on, the defect rate is relatively low. Other circumstances, such as variations in production schedules, may also cause the defect rate to vary in a predictable way. Should inspections be conducted in the same manner regardless of the defect rate? This depends, of course, on the relationship between defect rate and inspection accuracy. A study was conducted to determine the effect of defect rate on inspection accuracy [3].

Since both scanning and monitoring inspection tasks have some ele-

1 MR. GALLO: I'd like the record to show that
2 what I've been referring to as a table on pages 76 and 77
3 really is Figure 2.

4 BY MR. GALLO:

5 Q Mr. Hansel, please tell us first what the table
6 shows, in terms of what the author of the book intended?

7 A I'll have to go back a little bit and give you
8 little bit of a background, not a whole lot. The authors
9 had taken a number of pieces of equipment and had those
10 inspected a number of times by -- I believe -- 65 to 70
11 different inspectors. They compiled the results of that into
12 this table.

13 As I indicated, the equipment complexity range --
14 there was a range associated with it -- all the way from
15 the very simplest which, in their particular case, they
16 labeled that as 28 over on Figure 6.1. And then there's
17 autonavigation module with a complexity index of 84.

18 After they have had all of the components inspected
19 by all of the various inspectors, they came up with a mean
20 or an average detection performance for the defects, that
21 were included within those various pieces of hardware.

22 In pure explanation, the range was all the way from
23 80 percent accuracy or mean detection performance for the
24 more simpler pieces of hardware all the way down to a
25 20 percent performance on the most complex pieces of hardware.

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1 Q All right, Mr. Hansel, how did you use this
2 figure 6.2 in drawing your conclusion, concerning the
3 subjective acceptance criterion of 90 percent?

4 A If you take a weld and, as we have seen through
5 the exhibits and heard a good bit of testimony about, there
6 are a number of points that you need to inspect a weld for.
7 I don't know the exact number. It's probably in the
8 neighborhood of 10 to 12 various characteristics that you
9 would look at that weld for, to see if the weld had it, such
10 as porosity, undercut, and so forth.

11 They took, in this study, a printed circuit board
12 with a complexity index of 28. A printed circuit board is
13 not a very complicated piece of hardware. In fact, at the
14 point in time when this book was written, it's a rather
15 simple piece of hardware.

16 It's difficult to compare one piece of hardware
17 to another, so I guess I used "my own engineering judgment"
18 to do this. But I felt maybe a weld would fall someplace
19 in the neighborhood of 10 to 15 on the equipment complexity
20 index which would tell me that our inspection performance
21 that we might expect in the subjective category, in the
22 reinspection program, would be somewhere in the neighborhood
23 of 70 to 80 percent and that's the basis for my remarks, both
24 in my prepared testimony and what I've said here in the
25 last couple of days.

1 Q And have you marked that figure 6.2 on the basis
2 of your engineering judgment?

3 A I marked a lower range of about 15 on the
4 equipment complexity index, corresponding to about 70.
5 I did not mark the upper one. That is my mark on the paper.

6 Q To be clear, that part -- well, I won't try to
7 characterize it. So it's clear on the record, indicate
8 just what mark you contributed to the figure?

9 A I'm sorry, I did not understand.

10 Q So it's clear on the record, indicate the mark
11 that you made on the figure, so that it can be distinguished
12 from what was there originally.

13 A Okay. It's the horizontal line on the inner
14 side of the graph. Then I have an intersect point with the
15 vertical line at about the intersection of 70. And you
16 have to estimate then about 15 on the complexity index.

17 JUDGE SMITH: I think it's pretty clear. It's
18 marked in pencil.

19 THE WITNESS: Again, we're talking in range,
20 I'm talking somewhere in the neighborhood of 78 percent.

21 BY MR. GALLO:

22 Q And you made this demarcation on the basis of your
23 engineering judgment?

24 A Yes.

25 Q Would you explain briefly what factors you took

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1 into account in doing this?

2 A Well again, I have dealt with inspectors and
3 their results for years, results of their inspections, and
4 have been in many of the same positions as some of the
5 Sargent & Lundy folks have been into. I have also seen
6 a lot of variation between inspectors.

7 Part of what led me to this 70 or 80 percent
8 figure subsequent to this point in time -- this
9 book was published in 1960. I had Drs. Harris and Cheney
10 work with me on studies just like this. So I'm very
11 familiar with their data and with their approach and the
12 method that they went through in their investigation.

13 So it's that primarily with just hand to hand
14 knowledge of the variation in making judgments on a piece
15 of hardware.

16 Q And what did this information and judgment tell
17 you, with respect to the acceptance criterion of 90 percent?

18 A I felt that that was high. In fact, when I was
19 first briefed by Commonwealth Edison, that was my first
20 comment. Gee, that's high. I don't know how you'll ever
21 meet it. But again, I think that they were conservative
22 when they selected that number. You have to pick a number
23 someplace and I think that probably added in some more
24 conservative bias.

25 It's very difficult to judge and to make a

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1 comparison like that between the weld, with many
2 inspection characteristics. It's difficult. You could
3 probably go out today with more inspectors and find another
4 body of minor discrepancies.

5 MR. GALLO: That's all, Your Honor.

6 JUDGE SMITH: Mr. Cassel?

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mgc11-1

1 FURTHER RECROSS EXAMINATION

2 BY MR. CASSEL:

3 Q It's been a long morning, Mr. Hansel. You'll
4 excuse me if I want to stand for this one.5 Mr. Hansel, referring to Figure 6.2 in the
6 Harris and Cheney book, it shows what is called an
7 equipment complexity index, does it not?

8 A Yes.

9 Q And that's shown on page 77?

10 A Yes.

11 Q On page 76, down at the bottom of the page,
12 it explains what equipment complexity means or how it
13 was measured. It was measured by counting the number of
14 major parts comprising each item; is that correct?

15 A Yes.

16 Q And it says, "The complexity index thus
17 obtained ranged from 6 to 100," correct?

18 A Yes.

19 Q So the chart on page 77 shows you the mean
20 detection performance on reinspection of equipment that
21 ranged from 6 major parts all the way to 100 major parts;
22 is that correct?

23 A Yes.

24 Q Now if you will refer to the top of page 76,
25 it states, does it not, "The measure of inspection

mgc11-2

1 performance associated with each equipment item was
2 the percentage of defects detected in the item by the
3 eight or more inspectors who inspected it," correct?

4 A Yes, sir.

5 Q So that if an item had twelve defects, for
6 example, potentially, and the first inspector found four
7 of the defects, and the second inspector found the same
8 four defects, the reinspection would precisely validate
9 the original inspection, correct?

10 A I'm sorry. Would you repeat that, please.

11 Q Let's take an item that has -- well, let's see,
12 how many defects are there, if you know, that would have
13 potentially been counted in the reinspection program here
14 for, say, a visual weld inspection? Approximately 12?

15 A Wait a minute. You have to be more specific.

16 Q In the visual weld inspections that were done
17 at Byron, there were on the order of a dozen or so potential
18 different defects, any one of which would have disqualified
19 the weld, right?

20 A Yes, sir.

21 Q All right. Now using the Harris and Cheney
22 table, let's take the example of a piece of equipment with
23 twelve parts, okay? That would have been 12 on the
24 equipment complexity index here, right?

25 A Not necessarily.

mgc11-3

1 Q No, it wouldn't have been? Why wouldn't it
2 have been?

3 A Again, they picked ceramic -- you know, they
4 applied these numbers based upon the number of parts that
5 were in there. And if that's what you're saying, that
6 there could be twelve defects on a part, that's different
7 than twelve parts.

8 Q How many parts does a visual weld have or a
9 weld that is visually inspected?

10 A Well, I would count it as one part, but you
11 have twelve possibilities for messing up.

12 Q Now wouldn't this chart be applicable to visual
13 weld inspections, if the reinspectors had been graded
14 differently than they were graded in this reinspection
15 program? And let me explain specifically what I mean.

16 Wouldn't this chart be applicable to visual
17 weld inspections if the reinspectors -- excuse me -- if
18 the inspectors were graded according to whether they detected
19 the same percentage of defects in the weld that was detected
20 by the reinspector?

21 A I'm sorry. You're going to have to repeat that.

22 Q Take a look again at the top of page 76.
23 It says, does it not, first sentence in the first paragraph,
24 "A measure of inspection performance associated with each
25 equipment item was the percentage of defects detected in

mgc11-4

1 the item," is that correct?

2 A That's correct.

3 Q All right. Wouldn't this table be applicable
4 to visual weld inspections at Byron if the score of the
5 inspector had been based not on an up-or-down weld is
6 okay or not, but on the percentage of defects that the
7 original inspector detected in the weld, compared to the
8 percentage of defects found by the subsequent reinspector?

9 A I guess that's a possibility. I think it's
10 overcomplicating it. Again, we were out to verify or
11 Commonwealth Edison was out to verify whether or not
12 a reinspector would see a weld the same way that the
13 original inspector had. And if there was a difference
14 in the reinspection effort from the original inspector,
15 then that was considered a discrepancy.

16 Now to get down and count much below that,
17 I don't think it's necessary.

18 Q Turning now, Mr. Hansel, to the issue
19 relating to PTL, that all happened in the documentation
20 of the CECO audit in 1983?

21 A Yes. That was a surveillance, not an audit.

22 Q Did you happen to see that surveillance and
23 the documentation related to it while you did your review
24 of the reinspection program at Byron earlier this year?

25 A I think you asked me that question yesterday,

mgcl1-5

1 or somebody did, and I said, no, I had not seen it.

2 MR. CASSEL: I have no further questions,
3 Judge.

4 JUDGE SMITH: Mr. Lewis, do you have questions?

5 MR. LEWIS: No.

6 JUDGE SMITH: Do you have any more?

7 MR. GALLO: No.

8 (Witness excused.)

9 JUDGE SMITH: All right. Thank you. Shall
10 we being with our new panel after lunch?

11 MR. MILLER: That would be better.

12 JUDGE SMITH: We will return at 1:15.

13 MR. CASSEL: Can we make it 1:30? I don't
14 expect the questioning of that panel to be as long as one
15 might anticipate?

16 JUDGE SMITH: Okay. 1:30.

17 (Whereupon, at 12:05 p.m., the hearing was
18 recessed, to reconvene at 1:30 p.m. this same day.)

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AFTERNOON SESSION (1:30 p.m.)

1 JUDGE SMITH: We are on the record. You may
2 call your panel.
3

4 MR. MILLER: We would like Mr. Laney, Mr. Behnke,
5 and Mr. Del George to take their seats at the witness table,
6 please.

7 Judge Smith, Mr. Del George has previously been
8 sworn. Mr. Behnke and Mr. Laney have not.

9 Whereupon,

10 LOUIS O. DEL GEORGE

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

13 Whereupon,

14 ROBERT V. LANEY

15 WALLACE B. BEHNKE

16 took the stand and, having been first duly sworn, were
17 examined and testified as follows:

18 DIRECT EXAMINATION

19 BY MR. MILLER:

20 Q Mr. Behnke, would you state your name for the
21 record, please?

22 A (Witness Behnke) My name is Wallace B. Behnke,
23 Jr.

24 Q By whom are you employed?

25 A I am employed by the Commonwealth Edison Company.

1 Q What is your present title or position with the
2 company?

3 A My present title and position with the company
4 is Vice Chairman of the Board.

5 Q Mr. Del George, once again, will you state your
6 name, company affiliation, and position, for the record?

7 A (Witness Del George) My name is Louis O. Del George.
8 I am employed by Commonwealth Edison as the Assistant
9 Vice President for Licensing and Engineering.

10 Q Mr. Laney, would you state your name for the
11 record, please?

12 A (Witness Laney) My name is Robert V. Laney.

13 Q By whom are you employed, Mr. Laney?

14 A I am self-employed, as a consultant.

15 Q Thank you.

16 MR. MILLER: For the record, Judge Smith, I
17 would like to point out that Mr. Del George has had his
18 prefiled written testimony bound into the transcript on the
19 first day of this session of the hearings, on July 23rd,
20 1984. Questions 38 and 39, which go to the adequacy of the
21 work of Hatfield and Hunter are the specific focus of his
22 direct testimony in this session.

23 I would now like, if I may, to introduce the
24 written testimony of the other two witnesses.

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1 BY MR. MILLER:

2 Q Mr. Behnke, do you have before you a 15 page
3 document to which is appended a two page attachment?

4 A (Witness Behnke) I do.

5 Q By whom is that document prepared?

6 A That document was prepared by me with the assistance
7 of counsel.

8 Q And that bears on the front of it, does it not,
9 the legend Testimony of Wallace B. Behnke, Jr.?

10 A Yes.

11 Q Mr. Behnke, are there any corrections or
12 additions that you would like to make to that testimony?

13 A Yes, sir. There is one change that I would like
14 to make that is found on page 10. It has to do with the
15 identification of the date at which Mr. James O'Connor,
16 the Chairman of the Board of Commonwealth Edison Company,
17 met with the President of Hatfield Electric.

18 Q All right, sir. Would you describe for us where
19 the changed date belongs?

20 A The material that I'm referring to is in the
21 second full paragraph of A-10. That is, the answer to question
22 10. And the last sentence in that paragraph reads "At my
23 suggestion, Mr. O'Connor met with the President of Hatfield
24 and communicated directly and forcefully to him Commonwealth
25 Edison Company's concerns regarding the quality of Hatfield

1 work." That meeting did occur in the latter part of 1982 and
2 the corrected page reflects that date.

3 MR. MILLER: I should just observe that this
4 change was due to a failure of communication between
5 Mr. Behnke and our office when the testimony was initially
6 submitted.

7 JUDGE SMITH: As far as actual language is
8 concerned, is the only change in the date?

9 MR. MILLER: Yes, sir. In order to make the
10 paragraph of Answer 10 proper in form, the sentence which
11 refers to the meeting between Mr. O'Connor and the President
12 of Hatfield, Mr. Brock, is moved to the end of the paragraph.

13 JUDGE SMITH: Got it.

14 BY MR. MILLER:

15 Q With that correction, Mr. Behnke, is your testimony
16 accurate?

17 A (Witness Behnke) To the best of my knowledge and
18 belief.

19 MR. MILLER: At this point in time, Mr. Chairman,
20 I would ask that Mr. Behnke's direct testimony be incorporated
21 into the record as if read.

22 JUDGE SMITH: Are there any objections?

23 MR. CASSEL: Objection, and that's already been
24 overruled, Judge. We objected to it as irrelevant to the
25 issues in the rehearing. And you overruled me.

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1 MR. LEWIS: Staff has no objections.

2 JUDGE COLE: Is there a typographical error on
3 line 2 of page 2?

4 WITNESS BEHNKE: No, there is not, Judge Cole.

5 JUDGE COLE: The copy that I have, in answer to
6 question 5 "I hold Bachelor of Science and Bachelor of
7 Science in Electrical Engineering."

8 WITNESS BEHNKE: I hold two degrees at Northwestern.
9 One is a Bachelor of Science degree and the other is
10 a Bachelor of Science degree in electrical engineering.

11 JUDGE COLE: Okay, thank you.

12 MR. MILLER: Excuse me. Did the Board rule with
13 respect to admission of Mr. Behnke's testimony?

14 JUDGE SMITH: The testimony is received.

15 (The prepared direct testimony of Wallace B. Behnke
16 follows:)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter Of)
)
COMMONWEALTH EDISON COMPANY) Docket Nos. 50-454-OL
) 50-455-OL
(Byron Nuclear Power Station,)
Units 1 & 2))

SUMMARY OF WALLACE B. BEHNKE, JR.'S
TESTIMONY ON CONTENTION 1
(OVERVIEW OF QUALITY PROGRAMS - WORK QUALITY)

- I. Wallace Behnke is the Vice Chairman of Commonwealth Edison Company. Until March 1984 he was the senior corporate officer to whom the corporate manager of quality assurance reported.
- II. In 1973, Edison's QA organization was revised. A separate QA department was established which reported directly to Mr. Behnke (then executive VP). Edison's QA department has always met NRC requirements for independence and has conducted audits and inspections in accordance with a documented quality assurance program and has been upgraded over the years.
- III. QA management personnel are professionals who have received special training in quality assurance.
- IV. Edison's QA program prescribes many and varied audits and surveillances at its nuclear construction sites.
 - A. Initial responsibility for quality is delegated to the contractors performing the work.
 - B. Contractor audits and inspections are complemented by a thorough Edison effort:
 1. directly through Edison's own QA department, and
 2. through PTL, which conducts independent over-view and unit concept inspections at Byron and Braidwood.
- V. There has been continuous enhancement of the quality assurance functions since 1980.

- A. The level of supervision of the site QA organizations was increased in 1980.
 - B. A commitment to increased overinspection led to implementation of the Unit Concept Inspection program at Byron and Braidwood in 1982.
 - C. Special comprehensive management audits were conducted at Byron and Braidwood in 1983.
- VI. QA personnel have consistently been given complete freedom to uncover problems and to take whatever action is required to protect work quality.
- VII. Edison's QA program has been regularly reviewed for effectiveness.
- A. Edison has commissioned bi-annual independent management audits of the program since 1975.
 - B. Edison has, at least semi-annually, performed corporate audits and evaluations of QA activities at the Byron site using experienced personnel not directly responsible for the work at Byron.
 - C. Tri-annual certification surveys are conducted by ASME.
- VIII. The routine functioning of the QA organization has been adequate to assure the quality of Hunter's work.
- IX. Hatfield's activities resulted in senior management attention on three occasions.
- A. Multiple items of noncompliance and a stop-work order in 1980 resulted in a meeting concerning quality between Edison's president and Hatfield's president.
 - B. An increased Hatfield audit schedule was implemented in 1981.
 - C. An extensive reinspection of cable pan hangers installed by Hatfield was initiated in 1982.
- X. The quality control inspector reinspection program produced no indications of serious problems with Edison's QA program.
- XI. The existing quality programs adequately control the quality related activities of Hatfield and Hunter, and provides reasonable assurance that the overall quality of the work of Hatfield and Hunter is adequate. This judgment is reinforced by the results of the quality control inspector reinspection program.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
COMMONWEALTH EDISON COMPANY) Docket Nos. 50-454-OL
(Byron Station, Units 1 and 2)) 50-455-OL

TESTIMONY OF WALLACE B. BEHNKE, JR.

Q.1. State your full name.

A.1. Wallace B. Behnke, Jr.

Q.2. By whom are you employed?

A.2. Commonwealth Edison Company.

Q.3. What is your present position with the Company?

A.3. I am Vice Chairman of the Company.

Q.4. What are your responsibilities as Vice Chairman?

A.4. I am generally responsible for corporate financial and accounting matters. Until March of 1984 I was the senior corporate officer to whom the corporate manager of quality assurance reported. On that date those responsibilities were transferred to Mr. James J. O'Connor, Chairman and President of the Company.

Q.5. Please describe your professional education.

A.5. I hold Bachelor of Science and Bachelor of Science in Electrical Engineering degrees from Northwestern University. I am a registered professional engineer in the State of Illinois, a member of the National Academy of Engineering, a fellow of the Institute of Electrical and Electronic Engineers and a member of the American Nuclear Society. I am past president and honorary member of the Western Society of Engineers and am currently Chairman of the Board of the Atomic Industrial Forum, Inc.

Q.6. Please describe your employment at Commonwealth Edison Company.

A.6. I have been employed by the Company since 1947. My association with the Company's nuclear power construction and quality assurance activities stems from 1965 when I was appointed Assistant to the President with responsibilities that included nuclear licensing, environmental affairs and related corporate planning activities. These responsibilities encompassed the Company's early involvement in formalized quality assurance systems. In 1970, I was elected Vice President of the Company with primary responsibility for the Company's service divisions as well as its

research and development related to the liquid metal fast breeder reactor. Since 1972 I have served as Chairman of Project Management Corporation, the non-profit Corporation established to represent the electric utility industry's interest in the Clinch River Breeder Reactor Project. In this capacity, I was involved along with the United States Atomic Energy Commission and the Tennessee Valley Authority in setting up the quality assurance system for this project. In 1973, I was elected Executive Vice President of the Company and was assigned responsibility for engineering, construction, production and division operations. In 1976, in accordance with our company's normal rotation of top executives, I relinquished my then current duties to James J. O'Connor, then Executive Vice President, and assumed responsibility for the Company's corporate, financial, accounting and related affairs. I was elected a director of the Company in 1978 and Vice Chairman in 1980. As Vice Chairman I was responsible for quality assurance activities until last March, when I relinquished this responsibility to Mr. O'Connor.

Q.7. What is the scope of your testimony?

A.7. The scope of my testimony is to provide the Licensing Board and the parties with my conclusions with respect

to the efficacy of the Company's quality assurance program as it relates to the work of Hatfield Electric Company ("Hatfield") and Hunter Corporation ("Hunter") at the Byron site.

Q.8. Please describe how the quality assurance function has developed at Commonwealth Edison Company over time.

A.8. In 1973, when I was elected Executive Vice President, the Zion Nuclear Power Station was nearing completion and we were proceeding with pre-construction planning and engineering for our LaSalle County, Byron and Braidwood nuclear power plant projects. As a part of this effort, I revised the Company's quality assurance organization and established a separate Quality Assurance Department reporting to me. Mr. Shewski was named head of that department, a position he holds today. Since then, the Company's quality assurance department has met NRC requirements for independence and has conducted audits and inspections in accordance with a documented quality assurance program. (This program was described generally in the testimony of Mr. Shewski, which was bound into the transcript of this proceeding on March 28, 1983). The program has expanded significantly over the years. There has been a substantial growth in the number of management per-

sonnel assigned to this function, from 62 in 1976 to 142 in mid-1984. These individuals are highly trained professionals. Eighty-five of these people are graduate engineers with degrees in various engineering disciplines related to nuclear power. The remaining professionals have degrees in non-engineering fields and/or years of hands-on experience involving nuclear power plant operation, maintenance, construction, engineering and related technical activities. Some have had experience with the naval reactors program. All have had special training in quality assurance. There has been a concomitant growth in quality assurance departmental expenditures from about \$1.3 million in 1976 to \$6.8 million estimated for expenditure in 1984.

Our quality assurance program prescribes a large number and varied type of audits and surveillances to be conducted at our nuclear construction sites. Commonwealth Edison Company's practice is to delegate the initial responsibility for quality control and quality assurance to the contractors actually performing the work. This is done because of our belief that the organization doing the work will produce a higher quality product if it inspects and audits itself. This is also consistent with the Company's policy to

insist on obtaining documented quality performance from each of the contractors and vendors with whom it does business. However, the contractor inspections and audits are complemented by a thorough Commonwealth Edison Company effort, both directly through our own quality assurance organization and through the use of Pittsburgh Testing Laboratory ("PTL"). PTL acts as an arm of our quality assurance department in conducting overview and unit concept inspections at Byron and Braidwood. (The functions of PTL are fully described in Mr. Shewski's current testimony.)

Since 1980, when I again assumed senior management responsibility for the quality assurance function there has been a continuous enhancement of the quality assurance function. I decided with Mr. Shewski to increase the level of supervision of the site quality assurance organizations in 1980. This led to the appointment of Quality Assurance Superintendents at each construction site. Following an enforcement conference with the NRC Staff regarding items of noncompliance at Braidwood Station in 1982, Mr. Shewski and I discussed an increased overinspection program at that site and at Byron, as well. These discussions led to the implementation of the Unit Concept Inspections by PTL at Byron and Braidwood. Most recently we

decided to conduct a special and more comprehensive management audit at Byron and Braidwood in 1983.

At all times, personnel assigned to the Quality Assurance Department have been given a free hand to ferret out problems and to take whatever action they feel is required to protect the quality of the work. In my judgment the Company's quality assurance personnel have vigorously pursued their responsibilities.

I want to stress that the activities of the Quality Assurance Department have taken place in an overall corporate context in which there has been an unequivocal management commitment to quality. Quality assurance has received support at the highest levels of corporate management. Mr. Shewski is able to communicate with me freely and informally. Both Mr. O'Connor (to whom the Company's Generating Stations Projects department reports) and I make sure that the views of the Quality Assurance Department receive appropriate and sympathetic consideration.

Q.9. Has the quality assurance program been reviewed for effectiveness from time to time?

A.9. Yes. At my direction, the Company has commissioned bi-annual independent management audits of the system

beginning in 1975. The Company implemented all the recommendations made in the course of these audits with respect to construction sites. The recent change in Mr. Shewski's reporting relationship, from me to Mr. O'Connor, resulted from a recommendation made by the organization conducting the 1983 independent audit. This change was implemented to further demonstrate the Company's commitment to Quality Assurance by having that function report to the same coordinate level in the Company as Project Construction.

In addition, the Company, at least semi-annually, has performed corporate Quality Assurance audits and evaluations of quality assurance related activities at the construction site utilizing experienced personnel not directly responsible for the work at Byron. The conclusions expressed by the third party management audits and the corporate Quality Assurance audits are that the overall system provides adequate control of construction activity.

Further confidence in the adequacy of the Company's system has been derived from the tri-annual certification surveys conducted by the American Society of Mechanical Engineers ("ASME"). These surveys have resulted in issuance and several successive renewals

of "N" certificates plus "NA" and "NPT" certificates to the Company. These certificates grant authority to design, fabricate and install items that must meet ASME code requirements for nuclear reactor systems.

In addition to the verification activities which have been performed regularly throughout the course of the construction project, a special intensive evaluation of the Byron project was performed in late October, 1982. The basis for the evaluation was the Institute of Nuclear Power Operations Performance Objectives and Criteria. Commonwealth Edison Quality Assurance coordinated this self-initiated evaluation. The evaluation was carried out by a twenty-man team, consisting of senior management personnel with broad backgrounds in construction, engineering and operating along with five consultants. The team looked, in depth, at the plant facilities, work under construction, construction practices, design input, design output and design review. The Byron project was found to measure up well against the INPO Criteria. Corrective action for the deficiencies identified by the Team were readily undertaken.

Q.10. What specific actions has senior management taken to assure that Hunter and Hatfield provide quality work at the Byron site?

A.10. I recall nothing specific regarding Hunter, indicating to me that the routine functioning of the quality organizations, directed by Mr. Shewski, were sufficient to assure the quality of Hunter's work.

With respect to Hatfield, I recall three separate occasions on which that organization's activities resulted in senior management attention. In 1980, an NRC inspection of Hatfield's activities at the Byron site led to multiple items of noncompliance and issuance of a stop-work order by the Quality Assurance organization (of which I was informed and concurred in). In 1981, an increased audit schedule of Hatfield by the Company's QA Department was discussed and, with my concurrence, implemented. In 1982, I participated in discussions which led to an extensive reinspection of cable pan hangers installed by Hatfield. This reinspection was deemed necessary because of incomplete documentation of inspections by Hatfield. At my suggestion Mr. O'Connor met with the President of Hatfield, and communicated directly and forcefully to him Commonwealth Edison Company's concerns regarding the quality of Hatfield work.

Q.11. Are there any other factors which relate to your evaluation of the effectiveness of the Company's policies

because of incomplete documentation of inspections by Hatfield.

Q.11. Are there any other factors which relate to your evaluation of the effectiveness of the Company's policies and programs bearing on the quality of work of Hatfield and Hunter at Byron?

A.11. Yes. The quality control inspector reinspection effort produced no indication of programmatic inadequacy or a systematic breakdown of the Company's quality assurance program. Testimony by others in this proceeding that the reinspection program has confirmed the competency of quality control inspectors also reinforces my confidence in the effectiveness of the quality assurance program.

Q.12. What is your conclusion regarding the effectiveness of the Company's quality programs, particularly as they relate to control of the activities of Hatfield and Hunter through the Company's quality assurance program?

A.12. At the Byron site, I believe the quality programs in place adequately control the quality related activities of Hatfield and Hunter. The efficacy of the QA system is demonstrated by the quantity of inspections, audits and surveillances undertaken of the work of

these two contractors as well as the number of discrepancies identified. A summary tabulation of these data was prepared at my direction and is attached to my testimony as Attachment A. This tabulation lists, by year, the audits and surveillances conducted by each contractor's quality assurance organization, those conducted by CECO's Quality Assurance organization, PTL overview inspections and PTL Unit Concept Inspections. In addition, the number of Commonwealth Edison audit findings, non-conformance reports ("NCR") and PTL discovered deficiencies are also listed.

The identification of discrepancies indicates basically that the quality assurance program is functioning effectively. I am satisfied that the discrepancies in construction which were identified by the various audits, surveillances and inspections have either been corrected or are correctible in the normal course of construction activity and therefore are not a matter of concern.

There are no implications of systematic problems and programmatic deficiencies that I have derived from these data that have not been resolved. Analysis of the data from the Unit Inspection Program likewise indicates no programmatic inadequacy of potential

safety significance or systematic breakdown of the quality assurance program. Moreover, I am generally familiar with the NRC non-compliance history at Byron and conclude that it does not undermine the credibility of the Company's quality assurance program. I am satisfied that the quality assurance system provides reasonable assurance that no potentially safety significant quality problem has gone undetected. The primary basis for this judgment is the coverage and scope of the quality assurance program which provides multiple layers of inspections and audits and gives me confidence that all discrepancies of potential safety significance are being identified and controlled.

Q.13. Are you able to reach a conclusion regarding the overall quality of the work of Hatfield and Hunter at Byron?

A.13. Yes. In my opinion, there is reasonable basis for concluding that the work by Hatfield and Hunter is generally adequate. The primary basis for this judgment is the underlying integrity of the Company's quality assurance program and my assessment of the information with respect to these two contractors produced by this program and the Quality Control Inspection Reinspection Program. While we have experienced

some problems with the performance of Hatfield and Hunter, I am satisfied that the discrepancies are being identified and controlled. Those that have not been closed out are of a character that would normally be resolved in the course of the construction program.

Q.14. What use have you made of the results of the Quality Control Inspector Reinspection Program in reaching your conclusion?

A.14. The fact that the reinspection program examined over 200,000 inspection points (about 160,000 of these inspection points involved the work of Hatfield and Hunter) without detecting any discrepancies having design significance clearly adds to my confidence in the quality of the work of Hatfield and Hunter. This judgment is reinforced by the conclusions of the quality control inspector reinspection program itself and the review of that program by Mr. John Hansel. That program indicated that the quality control inspectors employed by those contractors prior to September, 1982 were competent to perform their assigned tasks. Competent inspectors can be expected to catch discrepancies in a construction program of this magnitude, especially any with potential safety significance. The results of the program show that

this occurred at Byron. Moreover, the conclusions reached by Sargent and Lundy and Mr. Robert V. Laney as to the quality of the work of those two contractors following their review of the results of the reinspection program also are factors in my own analysis.

HATFIELD

Year	Hatfield		CECo				PTL Overview		PTL UCI	
	Audits	Surv.	Audits	Findings	Surv.	NCRs	Inspect. Performed	Def.	Items Reviewed	Def.
Col. 1	2	3	4	5	6	7	8	9	10	11
1976	2	33	5	6	7	1	-	-	-	-
1977	5	183	11	14	65	2	143	21	-	-
1978	4	191	3	8	79	5	90	14	-	-
1979	5	164	6	13	33	8	113	33	-	-
1980	4	181	6	16	132	26	242	69	-	-
1981	19	188	10	24	246	44	583	209	-	-
1982	28	421	10	7	100	7	713	79	1,398	143
1983	30	589	13	12	355	28	1007	98	16,846	435
1984*	<u>6</u>	<u>102</u>	<u>6</u>	<u>2</u>	<u>70</u>	<u>14</u>	<u>447</u>	<u>26</u>	<u>7,564</u>	<u>69</u>
	103	2052	70	102	1087	135	3338	549	25,808	647

* Through 4/30/84

In addition to the audits, surveillances and inspections referred to above, CECo has processed three 50.55(e) reports with respect to the activities of Hatfield, 1 in 1981 and 2 in 1984.

There have been three reinspections implemented by Hatfield. Concrete expansion anchors in 1979, cable crossover bridges and risers, conduit support cable tray stiffeners and cable routing in 1981; and cable pan hanger installation connection detail from 1982 through 1984.

KEY

The columns from left to right represent the following:

- Col. 1: Year in which activity took place.
- Col. 2: Number of audits conducted by Hatfield Quality Assurance.
- Col. 3: Number of surveillance conducted by Hatfield Quality Assurance.
- Col. 4: Number of audits conducted by CECo Quality Assurance.
- Col. 5: Number of audit findings documented in CECo Quality Assurance audits.
- Col. 6: Number of surveillances conducted by CECo Quality Assurance.
- Col. 7: Number of CECo Nonconformance Reports initiated with respect to Hatfield activities.
- Col. 8: Number of PTL overinspections of Hatfield activities performed.
- Col. 9: Number of deficiencies identified by PTL in overinspections.
- Col. 10: Number of Hatfield items reviewed in PTL Unit Concept Inspections.
- Col. 11: Number of deficiencies identified in PTL Hatfield Unit Concept Inspections.

HUNTER

Year	Hunter		CECo				PTL Overview		PTL UCI	
	Audits	Surv.	Audits	Findings	Surv.	NCRs	Inspect. Performed	Def.	Inspect. Items Reviewed	Def.
Col. 1	2	3	4	5	6	7	8	9	10	11
1977	31	122	4	15	92	6	0	0		
1978	20	269	4	8	62	4	0	0		
1979	16	242	4	1	62	13	0	0		
1980	13	250	5	11	114	10	0	0		
1981	9	329	4	3	85	1	5	0		
1982	6	301	6	8	106	8	0	0	1,207	33
1983	8	303	13	10	155	7	31	28	17,396	418
1984*	<u>2</u>	<u>101</u>	<u>3</u>	<u>0</u>	<u>53</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>7,139</u>	<u>100</u>
	105	1917	43	56	729	50	36	28	25,742	551

Through 4/30/84

One 50.55(e) report was processed for Hunter in 1983, in addition, reinspections of concrete expansion anchors and pipe hangers were conducted in 1979 and 1980, respectively.

KEY

The columns from left to right represent the following:

- Col. 1: Year in which activity took place.
- Col. 2: Number of audits conducted by Hunter Quality Assurance.
- Col. 3: Number of surveillance conducted by Hunter Quality Assurance.
- Col. 4: Number of audits conducted by CECo Quality Assurance.
- Col. 5: Number of audit findings documented in CECo Quality Assurance audits.
- Col. 6: Number of surveillances conducted by CECo Quality Assurance.
- Col. 7: Number of CECo Nonconformance Reports initiated with respect to Hunter activities.
- Col. 8: Number of PTL overinspections of Hunter activities performed.
- Col. 9: Number of deficiencies identified by PTL in overinspections.
- Col. 10: Number of Hunter items reviewed in PTL Unit Concept Inspections.
- Col. 11: Number of deficiencies identified in PTL Hunter Unit Concept Inspections.

1 BY MR. MILLER:

2 Q Mr. Laney, do you have before you a 27 page document
3 to which are appended four attachments identified as
4 Attachments A through D? The document bears, on the first
5 page, the legend Testimony of Robert V. Laney.

6 A (Witness Laney) Yes, I do.

7 Q By whom was that document prepared, Mr. Laney?

8 A It was prepared by me.

9 Q And are there any changes or corrections that
10 you wish to make to that document?

11 A Yes. There are three corrections. The first
12 appears on page 12.

13 Q Just hold on for one second and let me get these
14 around to the Board and the parties.

15 (Document distributed to Board and parties.)

16 BY MR. MILLER:

17 Q Mr. Laney, you were directing our attention to
18 page 12?

19 A (Witness Laney) Yes, sir. The sixth line from
20 the bottom, the word conduct should read conduit. It's
21 simply a typo.

22 Q All right, sir. Are there other changes or
23 corrections?

24 A On page 19 --

25 JUDGE SMITH: Is that the only change on page 12?

121b7

1 WITNESS LANEY: Yes.

2 JUDGE CALLIHAN: Is that the only change noted
3 in your handout, Mr. Miller?

4 MR. MILLER: Yes, sir. I believe it is.

5 WITNESS LANEY: Six lines from the bottom, Mr. Smith.
6 The next to the last word, conduct ought to read conduit.

7 JUDGE SMITH: All right. So we don't have to
8 substitute these changes.

9 MR. MILLER: If you make it on the face of the
10 document, certainly. We did have an opportunity to prepare
11 a new page and we did so.

12 JUDGE SMITH: Okay.

13 WITNESS LANEY: On page 19 there was a phrase
14 missing from the first line. The first sentence on page
15 19 should read "It may appear implausible to the Board that
16 this should be so. However, the reasons are straightforward --"
17 And then it continues on as written.

18 BY MR. MILLER:

19 Q And then what is the page on 20?

20 A (Witness Laney) On page 20, the sixth line from
21 the bottom, following the word however, insert the word all.
22 So the sentence will read "However, all are not loaded to
23 maximum capacity."

24 JUDGE CALLIHAN: Mr. Miller, are those also
25 the only changes noted on your handout?

121b8

1 MR. MILLER: I believe so.

2 JUDGE CALLIHAN: Thank you.

3 BY MR. MILLER:

4 Q Mr. Laney, with those additions and corrections,
5 is your testimony true and complete?

6 A (Witness Laney) Yes, sir.

7 MR. MILLER: At this time, Judge Smith, I ask
8 that Mr. Laney's testimony be bound into the record as if
9 read.

10 JUDGE SMITH: Any objections?

11 MR. CASSEL: None, other than the objection --
12 I hope I've got the right witness here, that was noted
13 on Monday and overruled, Judge.

14 JUDGE SMITH: The testimony is received.

15 (The prepared direct testimony of Mr. Robert V.
16 Laney follows:)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter Of)
)
COMMONWEALTH EDISON COMPANY) Docket Nos. 50-454-OL
) 50-455-OL
(Byron Nuclear Power Station,)
Units 1 & 2))

SUMMARY OF THE TESTIMONY OF
ROBERT V. LANEY ON CONTENTION 1
(WORK QUALITY)

- I. Mr. Laney is a nuclear energy consultant with 35 years of experience in naval reactors, nuclear shipbuilding and commercial nuclear power plant construction.
- II. The results of the Byron Reinspection Program confirm that Hatfield and Hunter construction work is of adequate quality. To reach this conclusion, it was necessary for Mr. Laney to go beyond the information contained in the Reinspection Report. He did the following:
 - A. Compared the work sample which was reinspected with the total of the Hatfield and Hunter safety-related work;
 - B. Reviewed the results of certain supplemental reinspections;
 - C. Assessed the discrepancy disposition decisions recorded in the Reinspection Report;
 - D. Examined the general scope of Edison's QA program at Byron;
 - E. Examined and viewed the types of discrepancies identified in the reinspection program and discussed their design significance with the responsible design engineers;
 - F. Evaluated the quality of contractor inspectors at Byron as revealed by the Reinspection Report; and

G. Discussed many of the above areas personally with responsible managers and engineers at the Byron site, at Edison headquarters and at Sargent and Lundy headquarters.

III. Mr. Laney concludes that the work quality of Hatfield and Hunter is adequate. The following reasons provide support for his conclusion:

- A. The quality data gathered in the Reinspection Program and in follow up reinspections confirm work adequacy;
- B. The Reinspection Program validates the competence of Hatfield and Hunter inspectors and this validation confirms work adequacy;
- C. Engineering analyses of discrepancies found by the Reinspection Program shows that generous design margins make virtually all of them inconsequential; and
- D. Edison's QA program is fundamentally sound, comprehensive and independent.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
COMMONWEALTH EDISON COMPANY) Docket Nos. 50-454-OL
(Byron Station, Units 1 and 2)) 50-455-OL

TESTIMONY OF ROBERT V. LANEY

Q.1. Please state your name and business address.

A.1. My name is Robert V. Laney. My business address is
24 Trout Farm Lane, Duxbury, Massachusetts 02332.

Q.2. Please describe your educational and professional
background.

A.2. I am a graduate of the U. S. Naval Academy. I hold a
Masters degree in Marine Engineering from the Massa-
chusetts Institute of Technology and an MBA from the
University of Chicago. During and following World War
II, I was on active Navy duty at sea and ashore. I
was Engineering Officer on a carrier, destroyer and
battleship.

From 1948 to 1960 I served under Admiral H. G.
Rickover as Project Manager in the Naval Reactor Pro-
gram and later as Technical Representative of the AEC
and the Navy at the Westinghouse Bettis Atomic Power

Laboratory during the design and construction of various nuclear power plants for Naval vessels and the Shippingport nuclear power station.

While working in the Naval Reactors Program, I acquired extensive experience in designing and constructing naval nuclear power plants. This included construction and operation of a landbased submarine prototype power plant and the Shippingport nuclear power station.

While Naval Technical Representative at the Bettis Plant in Pittsburgh, I led the development of the first comprehensive quality assurance program for the industrial plants supplying critical reactor components for naval vessels.

In 1960 I became Nuclear Manager at the Quincy (Mass.) Shipyard of Bethlehem Steel Company where I was responsible for the construction and installation of nuclear plants in the nation's first two nuclear powered surface ships. After General Dynamics Corp. acquired the Quincy yard in 1964, I became Vice President and General Manager of the Quincy Division.

As General Manager, I was responsible for construction and delivery to the Navy of several nuclear powered

submarines. This required retraining shipyard personnel accustomed to constructing conventional commercial ships to build nuclear submarines to the most exacting standards of quality.

In 1970 I joined the Argonne National Laboratory, operated by the University of Chicago, as Associate Director responsible for nuclear reactor research and development. I later became Deputy Director, with responsibility for all applied energy research and development and for the operation of Argonne's several research reactors.

Since leaving Argonne in 1979, I have been an independent consultant in the nuclear energy field.

Q.3. Would you please describe your professional experience since leaving the Argonne National Laboratory?

A.3. I have:

a) Served on a senior advisory Panel, reporting to the Chairman of the Board of the Commonwealth Edison Company, whose mission was to assess the adequacy of the Company's initiatives taken as a result of the accident at Three Mile Island.

b) Served as member of an Advisory Committee to the Chief Executive Officer of the General Public Utili-

ties Corporation, whose mission was to evaluate two particular areas of concern after TMI: (1) personnel selection and training, and (2) man/machine interface and communications problems.

c) Formed and served as Chairman of a review team whose purpose was to improve engineering support for the nuclear construction program of the Washington Public Power Supply System (WPPSS).

d) Served as consultant to Houston Power and Lighting Company to evaluate their Engineering Quality Assurance Program for the South Texas Nuclear Station.

e) Formed and served as Chairman of a Panel which audited the Washington Public Power Supply System's program to verify the design and construction of their WNP-2 nuclear station.

f) Served as member of a special study group formed to advise the Nuclear Regulatory Commission on means to improve the quality of construction of commercial nuclear power plants.

g) Assisted Admiral Rickover in preparing an assessment of GPU Nuclear Corporation's management capability to operate TME-1.

A copy of my resume is attached to this testimony as Attachment A.

Q.4. What is the relevance of your experience to evaluating the adequacy of the Byron Reinspection Program as a means of validating the quality of construction work performed by Hatfield and Hunter?

A.4. My nuclear experience of thirty-five years in naval reactors, nuclear shipbuilding, and commercial nuclear power plant consulting has frequently required me to be intimately involved with means of achieving and confirming high standards of construction quality. The history of nuclear construction since about 1950, both naval and commercial, has been marked by a succession of quality-raising events, sometimes initiated by technical advances and sometimes by widely observed cases of quality deficiency. It is difficult for constructors and regulators alike to comprehend the significance of these changing quality standards, especially for construction projects spanning eight or more years. Only when looking back at earlier plants do we realize that sweeping improvements in standards and in work quality have taken place. This steady upward trend of required construction quality has occurred in both Naval and commercial plants. I have had the opportunity to participate in both.

My experience in Naval nuclear construction and as a consultant in commercial nuclear construction are both

relevant to evaluating the Byron reinspection program. Nuclear submarines require extremely high standards of quality for obvious reasons. Achieving such standards and assuring others that this has been done is no less vital in submarine than in commercial work. Although commercial nuclear plants and Naval nuclear plants differ in many ways, they do not differ in the underlying principles by which high quality is achieved. Experience in one is largely transferable to the other.

In addition to Navy experience, I recently completed a program of construction quality validation of a commercial nuclear power station nearing the end of construction. It was my responsibility, as leader of a small oversight team, to assist the Washington Public Power Supply System to plan and conduct a program to verify the adequacy of safety related construction work. This was achieved through a combination of hardware reinspections and document reviews. The oversight panel reviewed and approved the program, audited its performance, and provided independent evaluation of its results.

This quality verification program involved many of the same features as the Byron reinspection program --

sample selection, independent reinspection of hardware, analysis of results, sample expansion when data was inconclusive, etc. I, with other team members, was responsible for assuring that the program formulation was sound and that it was objectively conducted. In doing this I acquired familiarity with the difficulties of such an undertaking and with understanding and interpreting its results.

Q.5. What is the purpose of your testimony?

A.5. The purpose of my testimony is to show that the data accumulated in the Reinspection Program Report of February, 1984, as supplemented, provides substantial confirmation that Hatfield and Hunter construction work is of adequate quality.

Q.6. Are you familiar with the Byron Reinspection Program?

A.6. Yes. I reviewed and commented to Commonwealth Edison Company on early drafts of the program. I have read the Reinspection Report issued in February, 1984 and certain supplementary data. I had no part in performing the program other than the comments mentioned above, and no part in preparing the Report.

Q.7. What was the thrust of your comments on the earlier drafts?

A.7. I append hereto as Attachments B, C and D the three letters on this subject I wrote to Mr. L.O. Del George, Assistant Vice President, Commonwealth Edison, dated January 31, 1984; March 1, 1984; and March 12, 1984. These letters are the ones referred to in my previous answer.

These letters made two particular points. First, that the Reinspection Program Report of January 12, 1984, seemed adequate to confirm the qualification of inspectors, provided several areas which my letter described were covered more thoroughly. Second, that the program as then structured did not appear to be suitable to verify construction quality. This opinion was based on my doubts as to work sample scope in relation to total work performed.

An additional comment, contained in my March 1 letter, criticized the February, 1984 report for its apparent failure to address the significance of inaccessible work. I later withdrew this comment, as explained in my March 12 letter, after I observed the information on inaccessible work in Appendix F of the Reinspection

Program Report. Pages F-7 through F-12, provided an adequate answer to this question.

Q.8. Since you did not participate in the Reinspection Program, what is the basis for your opinion on work quality?

A.8. Since the Reinspection Program was originally designed to test the competence of inspectors rather than directly to validate the quality of work, it was necessary for me to determine whether the substantial body of reinspection data obtained could be used for Hatfield and Hunter work validation. This involved going beyond the information contained in the report by comparing the work sample which was reinspected with the total of the Hatfield and Hunter safety-related work; reviewing the results of certain supplemental reinspections; assessing the discrepancy disposition decisions recorded in the Report; examining the general scope of the Commonwealth Edison Quality Assurance program at Byron; examining and viewing the types of discrepancies identified in the reinspection program and discussing their design significance with the responsible design engineers; evaluating the quality of contractor inspectors employed at Byron as revealed by the Reinspection Report; and discussing

many of these areas personally with one or more responsible managers or engineers at the Byron site, at Commonwealth Edison, and at Sargent and Lundy.

I applied my own experience and judgment to the information obtained.

Q.9. Do you have an opinion as to the quality of Hatfield and Hunter construction?

A.9. Yes. I believe that the work of these contractors is adequate.

Q.10. On what do you base this opinion?

A.10. I base this opinion on the following:

First, the body of quality data gathered in the Reinspection Program and in certain follow-up reinspections confirms work adequacy; Second, the Reinspection Program validates the competence of Hatfield and Hunter inspectors and this validation confirms work adequacy; Third, engineering analysis of discrepancies found by the Reinspection Program show that generous design margins make virtually all of them inconsequential. This fact gives me confidence that the portion of the work of Hatfield and Hunter that was not reinspected is adequate, even if discrepancies comparable to those uncovered in the reinspection program exist;

Fourth, a general familiarity with Commonwealth Edison's quality assurance programs and a knowledge of the evolution of quality program shows me that this program is fundamentally sound, comprehensive and independent.

Q.11. Would you expand on your reasons for believing that the Reinspection Program confirms the adequacy of Hatfield and Hunter work?

A.11. Yes. The Reinspection Program was designed to test the competence of contractor's inspectors and not specifically to provide direct evidence on work quality. Nevertheless the Program assembled in an organized way some 200,000 pieces of data related to work quality.

I have examined the usefulness of this data for informing us about Hatfield and Hunter work quality. I inquired into whether the work sample reinspected was sufficient to reasonably cover Hatfield and Hunter safety-related work. I assessed the adequacy of sample size in relation to all work performed by these contractors. I personally looked at the types of discrepancies which have been found, as well as the calculations made to assess their design importance.

Q.12. How did you determine the adequacy of the reinspection program data for your evaluation of work quality?

A.12. I reviewed the data and found it divided into attributes and work elements. I use the term "attribute" to designate major segments of like work, such as "cable pan hangers," "cable terminations," etc. I use the term "work element" to identify inspectable features of attributes, such as "configuration," "location," "bolt size," etc.

For both Hatfield and Hunter I compared the attributes which were reinspected with the total of each contractor's attributes as shown in their work procedure index. For Hatfield, I found that nine out of the eleven attributes which could be reinspected were reinspected. The two which were accessible but not inspected were Cable Pan Covers, not yet installed, and Cable Pan Identification, a less significant attribute. Ten attributes were either inaccessible or not recreatable; among these were Material Receiving, Material Handling, Housekeeping, Embedded Conduit and Underground Duct Runs. In my opinion these ten attributes, are on the whole, less significant in size and importance than the nine which were reinspected. In addition, the embedded conduit and underground duct runs were installed using the same procedure as was

used for exposed conduit and duct runs, and exposed conduit and duct runs were reinspected. On this basis I believe that a representative and sufficient sample of Hatfield's work scope was reinspected to provide a basis for assessing work quality.

For Hunter, I found that eighteen out of twenty-one work elements (comprising the 3 Hunter attributes) which could be reinspected were reinspected. Fourteen work elements were not reinspected either because they were not recreatable or were inaccessible. I note that seven of the fourteen which could not be reinspected were welding in process inspection points such as preheat or welding interpass temperature. However, the Reinspection Program found Hunter's welding quality to be good, with less than a 3% discrepancy rate on 3725 welds and no design significant discrepancies. In my opinion, Hunter's favorable weld reinspection record reduces the importance of being able to reinspect these seven in process elements.

The Reinspection Program also reinspected Hunter's quality assurance documentation. I find that twenty-five out of thirty-three document elements were reinspected and found satisfactory.

Taking both hardware and document reinspection into account, I believe that a representative and sufficient sample of Hunter's total work scope sample was reinspected to provide a basis for assessing work quality. Even though sample scope is sufficient, I also inquired whether the sample size is large enough to justify a conclusion as to work quality.

Q.13. What was the sample size coverage of the reinspection program sample for Hatfield and Hunter?

A.13. Table III-3 on page III-7 of the Program Report shows that eleven percent of all Hatfield inspection months were reinspected in the program and six percent of all Hunter inspection months were reinspected. From this it is reasonable to infer that, overall, some five to ten percent of the total work of these two contractors was reinspected. This is a significant sample size.

I believe that this sample gains additional value when one considers that it was selected by a random, one-in-five selection of inspectors, with no prior consideration of the kind of work each inspected. In other words, this was a randomly chosen work sample. Sample adequacy has now been further improved by (1) evaluating a group of highly stressed welds drawn from the body of discrepant cable tray connection

welds, 2) reinspecting and evaluating a group of highly stressed cable tray support welds which had been originally inspected by the ten Hatfield Weld inspectors who were not included in the Reinspection Program, and 3) performing additional inspections for certain Hatfield objective attributes where the sample sizes in the original program were not statistically significant. These additional evaluations and inspections are reported in the Supplement to the Reinspection Report. This present sample size is sufficient to be used to confirm the results of other more extensive inspection programs.

Q.14. Did you make any further evaluation of the data accumulated in the Reinspection Program.

A.14. I reviewed a number of the discrepancies which were identified in the Reinspection Program, giving particular attention to some of the worst Hatfield welds, and to the depth of engineering analysis which was used to assess their significance. Based on this personal assessment, I believe that these discrepant welds have no design significance. As a group, they exemplify the statement found in AWS A3.0-80 that "[a] discontinuity is not necessarily a defect" (See Rein-

spection Report, Appendix C, Exhibit C-2, page 2 of 15).

Q.15. What were the results of the Reinspection Program on which you relied?

A.15. The Reinspection Program data shows, for Hatfield, that of 87,783 inspections made, 3661 discrepancies were found. 1,251, or 34% of these were actually within design parameters and were not discrepant; 2,010 or 55% were of such a minor nature that they could be dispositioned as acceptable, based on engineering judgment. 400 or about 11% were analyzed by calculation to determine their significance. None of these Hatfield discrepancies had design significance and none reduced design margins below the level required by conservative design practice.

The Reinspection Program data shows, for Hunter, that of 73,349 inspections made, 793 discrepancies were found. 639, or about 81% of these were actually within design parameters and were not discrepant; 75, or 9% were of a minor nature and were dispositioned as acceptable, based on engineering judgment. 79 or 10% were analyzed by calculation to determine their significance. None of these Hunter discrepancies had design significance and none reduced design margins

below the level required by conservative design practice. I conclude that the Reinspection Program gives inspection data on adequate and representative samples, randomly selected, of Hatfield and Hunter work. As a result, the data is significant and gives convincing confirmatory evidence of adequate work quality, supplementing other more extensive inspections.

Q.16. Would you explain your reason for believing that the Inspector Reinspection Program further attests to the adequacy of Hatfield and Hunter work?

A.16. Yes. The Inspector Reinspection Program was initiated to verify the reliability and effectiveness of Hatfield and Hunter inspectors after these contractors' certification and qualification practices had been questioned. The program was performed by re-inspecting substantial samples of the work of twenty percent of the inspectors, selected by a random process. The reinspection were performed by qualified and certified inspectors who had not previously inspected the work of the samples. Criteria were established by which to determine whether or not the reinspection confirmed the reliability of the original inspectors and inspections. In every case the reliability of the Hatfield and Hunter inspectors and

inspections was confirmed. The confirmation of the reliability of a randomly selected twenty percent of Hatfield and Hunter inspectors testifies to the reliability of all Hatfield and Hunter inspectors.

This confirmation of the reliability of the entire body of Hatfield and Hunter inspectors, whose reliability had previously been in question, adds further confidence that the work of these contractors embodies an acceptable level of quality. The presence of competent inspectors suggests that significant discrepancies are unlikely to go undetected. By removing doubt as to the qualification and capability of the whole body of inspectors, the Reinspection Program gives me confidence in the quality of the body of work which they inspected.

Q.17. Would you explain what you mean by "generous design margins" and how this bears on the adequacy of Hatfield and Hunter work?

A.17. Yes. When reviewing the Reinspection Program Report I observed that, whereas a substantial number of discrepancies were identified, no discrepancy was found to have any actual design significance. That is, no discrepancy reduced design margins below a level consistent with conservative design practice.

It may appear implausible to the Board that this should be so. However, the reasons are straight forward and, I believe, are important to a full understanding of the Reinspection Program Report and its relevance to work quality.

Upon questioning why none of the discrepancies had design significance, I found two principal reasons. First, the process of design inherently introduces additional margins of conservatism beyond the normal margin which the designer intends. Second, the American Welding Society Structural Welding Code defines as discrepancies almost any deviation from a perfect weld, even though, as previously mentioned, the AWS states that discontinuities as defined in the code need not actually be defects. Both of these conditions, that is, additional margins and AWS Code adherence, are integral to the design and construction processes. These conditions lead inevitably to the identification of numerous construction "deviations from design" or "deviation from AWS Code" which are found, upon engineering analysis, to be acceptable.

A few examples from my review of Sargent and Lundy's design practice will illustrate this point and show how, in specific construction situations, deviations may be analyzed and found acceptable.

Cable and Pipe Sizing - Electric cable and pipe are purchased from available incremental ranges of sizes. The designer specifies the range within which his specific service need falls, thus probably calling for a cable or pipe size which has more capacity than required for the service. One use of the additional margin thus obtained could be to find certain kinds of construction discrepancies to be acceptable, if they should occur.

Conduit and Cable Tray Supports - Electric conduit supports are designed on the assumption that the conduit in service will be full of cable. Since conduits are usually not full, this assumption results in support structures having extra margin. As a result the designer may be able to accept a construction deviation in a specific case, after analysis.

Similarly, cable tray supports are designed on the assumption that all trays have a uniform cable load which is an assumed maximum load. However, all are not loaded to maximum capacity. The result of the design assumption is that supports are designed with extra margins. In specific cases, the designer may use some of this extra margin as a basis for accepting construction deviations, without encroaching on normal

design margins. This would, of course, require a prior engineering analysis of the specific case.

AWS Welding Connections - The design process by which welded connections are designed for conduit and cable tray supports results in additional margins beyond the margin of approximately two which is inherent in the AWS Code. This additional margin is due to the use of standard connection details chosen from a group of incremental sizes, selected so that the bounding loads envelope the required design point. This will usually result in use of a connection having additional margin beyond the Code margin. Further design conservatism is introduced through the methods used to apply seismic loading and in the selection of material allowable stresses. The overall result of these conservative design processes is to introduce additional design margin which could be as much as fifty percent of design stress.

Under these circumstances, the design engineers would be able to show that certain construction deviations can be accepted without encroaching on normal design margins.

Numerous other examples of inherent design conservatism, in addition to these three, could be presented.

The point to be made is that a specific construction discrepancy may or may not be a deficiency requiring a hardware change. Engineering evaluation of the discrepancy may be required in order to find out.

Q.18. Please explain how the AWS code contributes to the identification of discrepancies which frequently have no design significance.

A.18. The AWS Code governs all welding on nuclear plants except the welding of pipe and pressure vessels which falls under the ASME Code. All of Hatfield's welds are AWS welds. According to the American Welding Society, a weld discrepancy is "An interruption of the typical structure of a weldment, such as lack of homogeneity in the mechanical, metallurgical or physical characteristics of the material or weldment. A discontinuity is not necessarily a defect." (See Answer to Question 14)

The Code identifies a series of discrepancies. Some of these do not reduce loadcarrying capacity and therefore have no design significance; other forms of discontinuity have potential design significance and, in a specific instance, may require analysis; a crack is always a basis for rejection of a weld.

All nuclear construction uses the AWS code. In doing so, the constructor undertakes to follow the code as to weld process and weld conformation and to inspect welds according to the Code specified discrepancies. This tends to identify significant numbers of discrepancies which, upon analysis, the designer may find he can accept as is.

Inherent design conservatism combined with meticulous definition of weld discrepancies, leads to generating reports of many discrepancies which are found to be, in fact, acceptable. Understanding this assists in interpreting the Reinspection Report and in using its results to assess work quality. The total absence of any design-significant discrepancies increases my confidence that the work of Hatfield and Hunter is adequate.

Q.19. Please describe your general familiarity with Commonwealth Edison's quality assurance program and how this provides a basis for your opinion on the adequacy of Hatfield and Hunter's work?

A.19. I have reviewed Commonwealth Edison's Report CE-1-A titled "Quality Assurance Program for Nuclear Generating Stations" Revision 28, dated March 16, 1984; and a statement by Mr. W. J. Shewski, Manager of Quality

Assurance for Commonwealth Edison, titled "Commonwealth Edison Company Quality Assurance Statement Regarding Verification of Adequacy of Design and Construction of Byron Nuclear Power Station Unit #1," revised April 2, 1984. The first of these two documents delineates mandatory requirements and actions which are required to assure that Commonwealth Edison's nuclear plants are designed, constructed, and operated to meet requirements of quality, reliability, and safety. Each of the eighteen Sections of the report addresses one of the eighteen Criteria listed in Appendix B to 10 CFR 50.

From my review of this document I believe that the Company's Quality Assurance Program is soundly constructed, organized so as to be independent of line construction management, and possesses the attributes necessary to effective performance. These include clear statements of line management's responsibilities for construction quality; adequate delegation of authority to Quality Assurance to identify quality problems and to verify implementation of solutions; and express delegation of authority to Quality Assurance to stop unsatisfactory work or further processing of unsatisfactory material. The second document describes how Commonwealth Edison has implemented

these general requirements and policies at the Byron Station. It provides detail on quality assurance organization, both headquarters and field; educational qualifications of quality assurance personnel; formal training provided; qualifications, certifications, and periodic recertifications; audit and surveillance scope and frequency; stop work authority and stop work actions; use of independent testing agencies; NRC and ASME surveys; Quality Assurance reports to management; INPO and other external evaluations; construction Quality Assurance staffing level; and site contractor self-audits and inspections.

In my opinion this document describes a comprehensive and adequate system of activities directed at assuring Byron construction quality. In thoroughness of coverage and in use of duplicative and diverse oversight groups, the Byron program attests to a management having high quality standards and expertise in the use of formal quality assurance methods.

I have reviewed testimony presented to this Board which indicates that the quality assurance processes of Commonwealth Edison and its construction contractors have not functioned satisfactorily in certain instances. Nevertheless, the structure, scope, and

independence of the Company's program are impressive, and add to my confidence that Hatfield and Hunter's construction work is of adequate quality.

Q.20. Would you sum up your opinion on the quality of Hatfield's and Hunter's work and your reasons

A.20. Yes. My conclusions are:

1. The Company's overall Quality Assurance organization and programs are well designed, comprehensive, and structurally independent, attesting to sound management attitudes towards quality.
2. The Company's inspector reinspection program validates the reliability of Hatfield and Hunter inspectors and inspections. It is worth noting that this reinspection program was begun to determine if contractor inspectors had performed reliably even though there may have been deficiencies in some of their qualification records. By confirming inspector reliability, the reinspection program also demonstrates the inherent effectiveness of the Company's extensive program of oversight and check inspections which are specifically intended to assure that contractor's inspectors maintain required inspection standards.

3. The reinspection program, including supplementary reinspections, produced a substantial body of quality data which is relevant to any assessment of Byron construction quality. In my opinion, this data, as it relates to Hatfield and Hunter, gives significant and convincing confirmatory evidence of adequate work quality.

4. Analysis of discrepancies which were found show that they have no design significance. This is due both to the minor character of the discrepancies and to conservatism inherent in design processes.

In summary, I observe at Byron an experienced owner, a sound quality program, and a conservative design. The reliability of Hatfield and Hunter inspectors, when challenged, is confirmed. More than 160,000 extra Hatfield and Hunter quality reinspections reveal no discrepancies of design significance. In my opinion these provide substantial bases for my conclusion that Hatfield and Hunter construction work is of adequate quality.

RESUME

ROBERT V. LANEY
24 Trout Farm Lane
Duxbury, MA 02332
Phone: 617-585-8912

Robert V. Laney is a consultant in nuclear energy and energy project management. He has broad executive and technical experience in power plant operation, in energy research and development, in the construction and operation of large energy projects, and with the complexities of bringing new energy processes into practical use. His working experience includes extensive periods in operating power plants for the U.S. Navy, in the Navy nuclear reactor program, in the construction industry, in Government, and in energy research and development.

While an officer in the Navy, Mr. Laney was a member of a small group of engineers chosen by Admiral H. G. Rickover to assist him in developing nuclear power plants for naval ship propulsion. He served as Project Manager for the development, design, and construction of the land prototype of the Sea Wolf nuclear power plant. He participated in the construction of the first nuclear submarines, the U.S.S. Nautilus and Sea Wolf. These were followed by several other applications of nuclear power, including surface ships and the first utility-operated nuclear power station at Shippingport, Pennsylvania.

While Naval representative at the Bettis Laboratory, Mr. Laney led the development of the first comprehensive quality assurance program for the Navy's network at nuclear component suppliers.

From this work in developing a new energy technology for the Navy, Mr. Laney, as a civilian, moved into nuclear ship construction at the General Dynamics Shipyard in Quincy, Massachusetts. In 1963, he was appointed Vice-President and General Manager. In this capacity, he was responsible for the design and construction of a nuclear powered surface ships and submarines.

In 1970, he turned to the development of more advanced energy technologies when he was asked by the University of Chicago to become Associate Director of the Argonne National Laboratory, devoted to developing a range of new energy options. He was later appointed Deputy Director with additional responsibility for total Laboratory administration. During this period, he directed program for improved methods of coal combustion, conservation technologies, high-temperature high-efficiency batteries, nuclear fusion, and breeder reactors.

He retired from Argonne in 1979 to become a private consultant. Since then he has:

- Served as a member of the Senior Advisory Panel to the Chairman of Commonwealth Edison to determine the strengths and deficiencies in the Company's nuclear energy program in the light of Three Mile Island.
- Served as a member of an Advisory Committee to the President of General Public Utilities to evaluate two areas of concern after the Three Mile Island accident: personnel selection and training; and man/machine interface and communications.
- Participated in the Department of Energy/New York State program to find suitable ways to solidify and remove high-level radioactive wastes which are located at West Valley, NY.
- Served as chairman of a team which evaluated and advised ways to improve the nuclear engineering and construction programs of the Washington Public Power Supply System.
- Served as chairman of a committee of experts formed to advise the Department of Energy concerning the merits of various processes for vitrifying high-level nuclear waste.
- Served as a consultant to Houston Lighting and Power Company in an evaluation of the Engineering Assurance Program for their South Texas nuclear plant.
- Served as chairman of a Technical Audit Associates panel which audited the Washington Public Power Supply System's program for verifying the design and construction of their WNP-2 Nuclear Station.
- Served as a member of a special study group formed to advise the Nuclear Regulatory Commission on means to improve the design and construction quality of commercial reactor plants.
- Recently assisted Admiral Rickover to prepare an assessment of GPU Nuclear Corporation's management competence to operate TMI-1.

Mr. Laney holds a B.S. degree from the U.S. Naval Academy, an M.S. degree from the Massachusetts Institute of Technology, and an MBA from the University of Chicago.

ROBERT V. LANEY
Employment History

January 25, 1984 to Present	Member GPU Nuclear Board of Directors and Chairman of Board Committee on Safety
November 1, 1979 to Present	Consultant in Energy Project Management
1972 to Nov. 1, 1979	Deputy Director, Argonne National Labo- ratory, University of Chicago. Respon- sible for all applied research and development, and for Laboratory admin- istration of this 5300 person institu- tion.
1970 - 1972	Associate Director, Argonne National Laboratory, responsible for nuclear reactor research and development.
1964 - 1970	Vice President and General Manager of Quincy (Massachusetts) Shipyard Divi- sion of General Dynamics. (8500 em- ployees)
1960 - 1964	Nuclear Design and Construction Manager of Quincy Shipyard of Bethlehem Steel Company.
1954 - 1960	As U.S. Naval Captain, technical repre- sentative of the Atomic Energy Commis- sion at the Westinghouse Bettis Atomic Power Laboratory, Pittsburgh.
1948 - 1954	Reactor Development Project Manager in the Naval Reactor Program of the Atomic Energy Commission and the Navy's Bureau of Ships, Washington, D.C.
1939 - 1948	Active duty Naval officer; various duties at sea and shore. Engineer office on carrier, destroyer, and battleship.

Robert V. Laney

Consultant
Energy Project Management

24 Trout Farm Lane
Duxbury, Massachusetts 02332
Phone (617) 585-8912

January 31, 1984

Mr. L. O. Del George
Commonwealth Edison Co.
Nuclear Licensing
One First National Plaza/34th Floor
Chicago, IL 60690

Dear Mr. Del George:

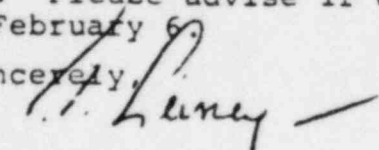
I have had an opportunity to review the material which you sent, related to Commonwealth Edison's Byron Station. Since Cordell Reed suggested that you might be interested in considering a fall-back position, I have tried to take a rather negative view of things, asking what is the worst that could happen? In my opinion, the worst that could happen, based solely on reading the three documents which you sent, would be a requirement that CE verify all work performed by Hatfield and Hunter. This would be in line with ASLB's position that they lack confidence in this work and in the present re-inspection program's capability to remedy. Finally, this view recognizes that ASLB has retained control over questions related to Hatfield and Hunter work quality.

The appended notes are largely self-explanatory. The most important point is that the present program is not well suited to this larger task of verifying total work quality of one or more contractors. It was not designed for that purpose and should not be used for that purpose. If you want to consider, as a fall-back position, preparing for the larger task, the present program must be restructured.

Let me be the first to acknowledge that my understanding of the Byron situation is quite limited, and my comments may all be obvious to you. If there are points you wish to question, the attachment to this letter provides a basis for discussion.

Based on this brief exposure, I believe that I might be of some assistance to you in the Byron matter, if only because my work is primarily with so-called "troubled" utilities, a category in which CE does not fit. Please advise if we should meet in Chicago during the week of February 6.

Sincerely,


Robert V. Laney

RVL:pb
enc

cc: Mr. Cordell Reed, Vice President

00001292

Attachment B

BYRON NOTES

Regulatory Climate

The Nuclear REGULATORY Commission staff is demanding more forceful owner management actions to correct perceived quality control deficiencies. Some recent design and construction problems leading to extended delays or abandonments are viewed as evidence that the affected utilities were weak in experience and competence, and hence ineffective in managing their quality programs. While it can be argued that the NRC is also responsible, because of failure to intervene sooner and for escalating standards, there is a strong perception in the staff and in some Congressional quarters that individual owners have failed to meet their responsibilities.

Oversight Congressional committees and NRC commissioners question the ability of the industry to construct nuclear plants in a way which assures public safety. The same committees as well as self-appointed public spokesmen question the ability of the NRC to provide adequate assurance of safe construction. Public confidence in the NRC and in the quality of construction has been eroded by the widespread attention and economic consequences of such cases as Marble Hill and Zimmer. A broad public perception of high standards is plainly lacking. Such uncertainty now pervades NRC's surveillance and licensing process that real quality problems and seeming quality problems tend to be treated the same. This leads to an attitude which, in effect, is less concerned with quality acceptability (even when analytically demonstrated) than with quality demonstrability.

00001293

Quality demonstrability through systematic documentation is an absolute requirement, independent of and in addition to demonstration of quality by adequate engineering, design, and test. In itself this is not new, but the degree of explicit conformance being required is.

The Byron situation should be viewed in this context. Commonwealth Edison has its own unique reputation with the NRC staff. The Byron history and record is a part of that. Obviously, both are important factors in the present proceedings, and solutions must be found within the GE/staff/ASLB framework. It is also true, however, that the wider influences alluded to above are at work. A successful recovery plan should take account of the total regulatory climate as well as individual Byron problems.

From this viewpoint I have reviewed the three documents sent me by Mr. Lou Del George on January 23. These are: CE letters of February 23, 1983, and January 12, 1984, to Region III describing the reinspection plan and summary of its results, and the ASLB "Initial Decision", dated January 13, 1984. In the comments which follow, I look at the CE reinspection plan in terms of its adequacy to achieve two different objectives: first, its declared objective, "... to provide additional assurance that contractor quality control inspectors were properly trained and qualified..." (CE letter of February 23, 1983, page 1); and second, its implicit objective, "These evaluations indicate that the reinspection program is confirming the quality of construction at Byron..." (CE letter of January 12, page 2). Despite

similarities these are actually two distinct tasks requiring different approaches. The present reinspection program, after remedying several weaknesses which are mentioned below, appears capable of meeting the first of these two objectives. I feel less confident that the present reinspection program is structurally adequate to accomplish the second objective.

If we were to assume that, in the future, Byron were required to respond to ASLB's statement "The Board does not have confidence that the quality of the work at Byron by Hatfield is adequate to provide reasonable assurance that the Byron facility can be operated without undue risk to the public health and safety," (ASLB, p. 299, para. D-434), it is doubtful that the present program is adequate.

Comments on the present reinspection program's adequacy to meet the two objectives follow, presented separately.

Program's Adequacy to Validate Qualification of QC Inspectors

I believe the principal parameters by which to assess the program's adequacy for the stated purpose are suitable and defensible, provided several peripheral weaknesses are corrected. The strengths are in the size of the sample of inspectors, greater than one in five; the demonstrated diversity of the kinds of work covered; the large number of reinspections made; and the automatic sample enlargement process. These, together with the numerical results yielded by the completed process, provide the principal basis for concluding that the inspectors performed competently at the times of the original inspections.

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The process is susceptible to criticism in several areas, and its overall conclusions would be bolstered if these were successfully addressed in subsequent reports. If this is not done there is a possibility that the reinspection program's credibility could be harmed by attacks on matters of secondary importance, such as:

- Explain how the independence of the re-inspectors was maintained. How did you assure yourself that inspectors did not re-inspect their own work? How were the re-inspectors instructed by their management in order to encourage "independent" re-inspection?
- How did you assure yourself that the re-inspectors, at the time of re-inspections, were properly trained and certified? Bear in mind the ASLB statement that they "...do not have assurance even today that applicant has met those responsibilities..." (referring to an effective QA program - See page 299, ASLB)
- Explain the significance, in terms of overall re-inspection process credibility, of inaccessible work. Is the volume of work in this category a small fraction of the whole? Is it of less concern by its nature? Are there other ways of establishing its acceptability?
- ASLB page 300, D-438, seems to assert that Hatfield's re-inspection record-keeping excluded certain deficiencies from inspector trending data, thus laying a basis for questioning the accuracy of the process. This should be answered.

00001296

- . Re-inspection letter (January 12) states that the inspector selection process assures that the entire period of work performance is covered. This is not obvious, but is readily susceptible to positive demonstration.
- . Some rationale should be offered to explain why third party inspections always increase the percent of work found acceptable, and in at least one instance raised the percent above the 90 percent threshold.

One last, minor point: I am unable to find the data which justifies the 96.4 percent in letter of January 12, Table A.7, page 32. Probably the number is correct, but I could not derive it.

Program's Adequacy to Confirm Quality of Work at Byron

The ASLB, p. 299, stated -- "The Board does not have confidence that the quality of the work at Byron by Hatfield is adequate to provide reasonable assurance that the Byron facility can be operated without undue risk to the public health and safety." CE's letter of January 12 states that "These evaluations indicate that the re-inspection program is confirming the quality of construction at Byron."

If (1) CE believes that it may become necessary to address the broader question of the acceptability of Byron construction, or of Hatfield construction, and (2) if a program of re-inspection is to be a principal part of the response, then the present re-inspection program would not, in my opinion, be suitable for such a purpose. If CE were to set out to verify the adequacy of construction quality, either in-toto or contractor

by contractor, the re-inspection plan would employ a different approach. Among the differences are these:

- . Work samples chosen for re-inspection would be based upon percentages of total work quantities, selection of work types and attributes having a history of difficulty, work performed in all time intervals, work performed by contractor on-site and by suppliers off-site, work performed by second-tier contractors, etc. In comparison with this, under the present plan, work was selected by a random choice of inspectors without regard for the nature of the work. The actual diversity of work types achieved is circumstantial and not optimum.
- . Attributes for re-inspection would be selected based on records of difficult-to-inspect attributes and for those having special safety significance, i.e. radiography of welds in pressure boundaries.
- . Re-inspecting the work of only one piping inspector would be an insufficient quantity. Same for single cable pan and bolting inspector.
- . Discovery of defects upon re-inspection would require a consideration of whether the defect might indicate a generic or a singular fault. Simply repairing the discovered defect might not suffice.

This list could be expanded, but its purpose is merely to show that a re-inspection program for the broader purpose stated above would require fundamental changes.

00001298

Robert V. Laney

Consultant
Energy Project Management

24 Trout Farm Lane
Duxbury, Massachusetts 02332
Phone (617) 585-8912

March 1, 1984

Mr. L. O. Del George
Assistant Vice President
Commonwealth Edison
P. O. Box 767
Chicago, IL 60690

Dear Lou:

My comments on the "Byron Q. C. Inspector Reinspection Program" of February, 1984, are attached. As in my January comments on the preceding documents, I have adopted a critical attitude, asking, "if I were going to attack the report's credibility, where would I start?" I find two vulnerable targets.

The first is a weakness in the case which is made to support the conclusion that "The quality of construction work at the Byron Station was determined to be good." (page ES-5) The second is what seems to me to be an error in logic in sample selection. While neither of these threatens the total impact of the report, they are weaknesses and you should plan your defenses. The two targets are identified in the following paragraphs and described more fully in the attachment.

First, the broad conclusion on the quality of all work at Byron, quoted above, is weakened by the report's failure to estimate the amount or importance of inaccessible work (see item I of the attached notes).

Second, replacing a non-qualifying inspector who had no inspections beyond three months with the next inspector listed and dropping the first inspector's results from the tally is a non-conservative action. (See item II of the attached notes.) (I have assumed his results were dropped because I can find nothing in the report to the contrary.)

Item III of the attached notes may be useful to you in helping to explain the "human factor" which enters into reinspections.

00001299

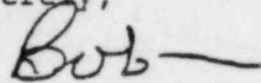
Attachment C

Mr. L. O. Del George
March 1, 1984
Page 2

To repeat, neither of the vulnerabilities mentioned should seriously hurt you, but they might allow an aggressive critic an opening. You should be prepared, or out ahead, on both.

Since I am going to be out west next week and I want to meet your March 15 date, I have read the report somewhat hurriedly. If there is anything to add later, I will call you.

Sincerely,

A handwritten signature in cursive script that reads "Bob" followed by a horizontal line.

Robert V. Laney

RVL:pb
enc
cc: Cordell Reed (w/enc)

00001300

NOTES ON BYRON REINSPECTION PROGRAM

I. Quality of the Work

The report mentions frequently that only accessible and recreatable work was reinspected, but does not indicate whether this is a significant omission. While it is true that inspection results for work which is accessible tell us something about the quality of inaccessible work, omitting the latter may or may not be a significant factor in the overall conclusion. The fraction of the total which is inaccessible is a cause for concern, if only because it seems to be ignored.

An appropriate place to discuss this would be on page VII-5, Sampling Adequacy, following the sentence which says that, by sampling, one can make inferences about a larger population provided the larger population is homogeneous. One could argue that your basis for asserting a sufficient sample size breaks down by its failure to start with a statement of the total population and its accessible and inaccessible fractions.

This difficulty is pointed up in the case of Peabody. Only 6 of 37 inspectors could be reinspected; 31 inspectors had no reinspectable items (page III-4, Table III-1). The 6 inspectors who were reinspected had a 75 percent acceptance rate on subjective (visual welding) factors and a 75 percent acceptance rate on objective factors (App. A, Table A-8).

The report's overall conclusions on Peabody are stated on page V-2 and in Appendix C-2, pages 14 and 15.

The latter reads as follows: "The work performed by Peabody Testing has been determined to be of good quality and no further inspections are warranted. This conclusion is based on the small scope of work performed by Peabody Testing, the small number of discrepancies, and the evaluation as expanded to 100 percent of the reinspectable work which determined that no discrepancy had design significance."

The reader knows, however, that:

- a 25 percent discrepancy rate was found upon reinspection, hardly a "small number";
- 31 out of 37 Peabody inspectors could not be reinspected; and
- the character of the non-reinspectable work is unmentioned.

To accept these conclusions one has to make some mental disposition of the work of 31 unreinspectable inspectors, but without knowing what that work is.

I recommend that you look closely at this non-reinspectable fraction for all contractors to determine:

- is it homogeneous, that is, is the non-accessible sufficiently similar to the accessible so that the accessible can be treated as a representative sample of the whole?
- what fraction is the accessible of the total?
- is any of the inaccessible of a particularly sensitive nature?

00001302

II. Sample Selection

On page III-6, paragraph 3, the following appears:

"If an inspector had no inspections beyond 3 months and did not meet the Program acceptance criteria, the next inspector listed chronologically was substituted." The reader must assume, since nothing to the contrary appears, that the negative results of the first inspector's 3 months are dropped from further consideration and from the record.

This substitution of another randomly selected inspector, accompanied by dropping the negative (non-qualifying) results of the first inspector, is non-conservative. A known negative sample is dropped, classed as indeterminate, and a replacement, neutral sample is substituted.

Yet, in Section VII, page 6, paragraph 3, and elsewhere, the report refers to use of the first 3 months as a "conservative bias". Further, in Section VII, page 8, second paragraph, the report is said to provide an "adequate basis for drawing inferential conclusions on the entire population of inspectors." These assertions can be attacked with some logic, I believe, if your sampling plan allows scrubbing an inspector's work from the record after you find he fails to meet the criterion.

Insofar as sampling logic is concerned, this could be remedied by retaining the non-qualifying data from the first inspector in the base and using it in calculating discrepancy rates.

09001303

III. Reinspections Produce More Rejects Than Original Inspections

On page ES-5, paragraph 3, the report refers to "human factors," without elaboration, to explain why there is a higher discrepancy rate for subjective factors between original inspections and reinspections. There is a logical explanation for this and it would be well for CE spokesmen to be prepared in case the point comes up during hearings. The point could, of course, be elaborated in the text if you think it useful.

It has been observed in other projects that inspectors doing reinspections, especially when they know that their work will be closely scrutinized, tend to become more conservative. In work such as visual weld inspections involving subjective standards, a significant number of cases will be found to lie in a border zone between accept and reject. It is reasonable that a larger fraction of such borderline cases would be rejected in reinspection than during the initial inspection. If one wanted to look for confirmation of this generalization, he would look to see if there actually were a substantial number of borderline cases, and if the observed disparity between inspection and reinspection could be explained by the more conservative treatment referred to. Note, for example, Table C-2, Appendix C, which shows that three-fourths of the discrepancies are of the Y category.

This rationale is reenforced by CE's finding (Appendix C-1) that none of the weld discrepancies are design-significant.

00001304

Although the inspector is not supposed to inject his own opinions of design-significance, it is reasonable to assume that if the original inspector should assert his own engineering judgement, he would be most likely to do so in a case which is borderline as to acceptability. A reinspector, on the other hand, would scrupulously observe only the defined attributes and would rule out use of engineering judgement. This would obviously cause a discrepancy in findings.

00001305

Robert V. Laney

Consultant
Energy Project Management

24 Trout Farm Lane
Duxbury, Massachusetts 02332
Phone (617) 585-8912

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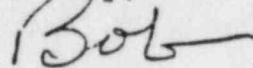
Mr. L. O. Del George
Assistant Vice President
Commonwealth Edison
P. O. Box 767
Chicago, IL 60690

Dear Lou:

I write to advise that, in preparing my letter to you of March 1, I failed to observe that Table Q9-1 and text on pages F-7 through F-9 in Appendix F contain an adequate answer to my concern about non-reinspectable and non-recreatable work. Now that I have seen it, I request that you disregard comment I attached to my letter of March 1.

Sorry for the error.

Sincerely,



Robert V. Laney

RVL:pb
cc: Cordell Reed

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Attachment D

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1 MR. MILLER: Judge Smith, would it be appropriate
2 for me to make a brief oral summary of the testimony of
3 these witnesses for the benefit of the spectators?

4 JUDGE SMITH: Yes, I think that works out well.

5 MR. MILLER: These three witnesses comprise the
6 panel appearing on behalf of Commonwealth Edison Company
7 to address the quality of work of Hatfield and Hunter,
8 the two contractors which are the focus of these reopened
9 hearings. Mr. Behnke is the Vice Chairman of Commonwealth
10 Edison Company. Until March of 1984 he was the senior corpor-
11 ate manager to whom the Corporate Manager of Quality Assurance,
12 reported, a function which he has performed since 1980.

13 He has had, earlier in his career, other
14 responsibilities in connection with the Quality Assurance
15 program at Commonwealth Edison Company. Mr. Behnke's
16 testimony reviews the various layers and programs of
17 Commonwealth Edison's Quality Assurance program and reached
18 the conclusion that on the basis of his understanding of the
19 control of contractor activities exerted by those programs,
20 as well as the results of the Quality Control inspector
21 reinspection program and the engineering evaluation of
22 deficiencies identified during that program, that the quality
23 of the work of Hunter and Hatfield is adequate.

24 Mr. Del George, in his capacity as Assistant
25 Vice President, also addresses the quality of the work of

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1 those two contractors. And on the basis of his familiarity
2 with quality programs of the company and his detailed
3 knowledge of the results of the Quality Control reinspection
4 program, also concludes that the quality of the work of
5 those two contractors is adequate.

6 Finally, Mr. Laney, who is now a nuclear energy
7 consultant, has had a long distinguished career in both
8 the naval and civilian nuclear industry. Mr. Laney has
9 served as an assistant director of Argonne National
10 Laboratory and, among other things, has served on a committee
11 panel that consulted -- acted as consultants to the
12 Nuclear Regulatory Commission regarding Quality Assurance
13 matters.

14 Mr. Laney's testimony describes his evaluation of
15 the results of the Quality Control reinspector program --
16 reinspection program, and certain supplemental investigations
17 which were undertaken following that program. He has
18 analyzed the data that has been accumulated in that
19 program. He has assessed the evaluation of discrepancies
20 discovered in that program.

21 Evaluations were undertaken by Sargent & Lundy, of
22 course. And he has reviewed the design process at Sargent
23 & Lundy, as well as having a basic familiarity with Commonwealth
24 Edison's overall Quality Assurance program. On that basis,
25 Mr. Laney also concludes that the adequacy of Hatfield and

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1 Hunter's work has been established.
2 That concludes my presentation.
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1 JUDGE SMITH: Are the witnesses available
2 for corss-examination?

3 MR. MILLER: Yes.

4 JUDGE SMITH: Mr. Cassel?

5 Wait a minute. I did have one preliminary
6 question of Mr. Laney.

7 As a member of the Atomic Safety & Licensing
8 Board on the Three Mile Island restart case, I recently
9 received a notification as to your new appointment in
10 some position at GPU Nuclear. My memory was that it
11 was as the Chairman of the Board of Directors' Committee
12 on Safety. I see that that was already a position that
13 you had held at the filing of your testimony.

14 Is there a new position that you hold now?

15 WITNESS LANEY: No. I've held that position
16 since January of this year.

17 JUDGE SMITH: It must have been a late
18 notification.

19 WITNESS LANEY: Member of the Board and Chairman
20 of the Committee.

21 CROSS-EXAMINATION

22 BY MR. CASSEL:

23 Q Good afternoon, Mr. Behnke.

24 Your direct testimony states that Pittsburgh
25 Testing Laboratories acts as an arm of Edison's Quality

mgc13-2 1 Assurance Department at Byron; is that correct?

2 A (Witness Behnke) That is correct.

3 Q And the attachments to your testimony or
4 Attachment A to your testimony seems to indicate that of
5 all of the various audits and findings and surveillances
6 and so forth over the years that Edison has done of
7 Hatfield and Hunter at Byron, that especially in recent
8 years, PTL seems to have done a large number of them.

9 Is that impression correct?

10 A The table shows that PTL has made a large
11 number of inspections, overview inspections for us of both
12 contractors.

13 Q Is it accurate to state that half or more
14 of all the audits, surveillances, inspections and so forth
15 done of Hatfield and Hunter at Byron by Edison QA have
16 been done by PTL acting for Edison?

17 A No.

18 MR. MILLER: I really have to object, because
19 the table itself distinguishes in the columns between
20 the count, if you will, on PTL as between his overview
21 inspections and what are identified as UCI inspections.
22 And it's a little bit misleading, I think, to count both
23 inspections performed and items reviewed as the same.

24 MR. CASSEL: That's really the point of my
25 question. It's rather difficult, from looking at the

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1 attachment, since the labels on the PTL activities are
2 different from the labels on the direct Edison QA
3 Department activities.

4 I am trying to get a sense, quantitatively,
5 whether PTL really contributed more than half of a major
6 portion of Edison's QA oversight. That's why I'm asking
7 the question.

8 Perhaps the witness can clarify that.

9 WITNESS BEHNKE: Perhaps you'd be good enough
10 to repeat the question.

11 JUDGE SMITH: You can repeat the question, but
12 Counsel has objected to the question. Just bear that in
13 mind when you hear it.

14 BY MR. CASSEL:

15 Q If you would refer to Attachment A of your
16 testimony, Mr. Behnke, you will see that the CECO activities
17 are listed as audits and, I believe, surveillances, whereas
18 the PTL activities are listed as overview inspections and
19 UCI inspections. So the labels are not identical, and
20 therefore it's somewhat difficult for a person not familiar
21 with these activities directly to compare the numbers in
22 the various columns and reach any conclusion.

23 Bearing in mind that difficulty, can you give
24 us some indication of what proportion of Edison's total
25 QC oversight at Hatfield and Hunter at Byron has been done

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1 by PTL, rather than by Edison's own employees?

2 MR. MILLER: Excuse me. The question was
3 asked in terms of QC oversight? I don't believe that's
4 an accurate characterization.

5 JUDGE SMITH: I think he would like to have
6 this witness give him some, in whatever terms are
7 appropriate, some quantitative comparison of the auditing,
8 surveilland and inspection functions performed by the three
9 entities.

10 MR. CASSEL: I was really focusing on the
11 two, PTL and CECO. Hatfield, itself, of course, has done
12 additional work. I was limiting my question to the PTL
13 and CECO activities, CECO being Commonwealth Edison,
14 although I have no objection if the witness wants to
15 address the other as well.

16 WITNESS BEHNKE: Very well. The table, as
17 the headings indicate, defines the types of investigations
18 that were made by the various entities -- namely, the
19 Commonwealth Edison Company audits and surveillances, and
20 in the case of Pittsburgh Testing Laboratory, overview
21 inspections, and in the case of another program, the unit
22 inspection program, the table seeks to point out the number
23 of items reviewed.

24 These numbers obviously are not additive, and
25 to compare one column with the other -- that is, unit

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1 inspections with overviews with audits is akin to comparing
2 apples and oranges.

3 The mainline effort in quality assurance at
4 Commonwealth Edison, of course, is its own Quality Assurance
5 Department. PTL is retained from time to time to perform
6 certain third-party inspection activities. And what you
7 see on this table is simply a summation of those activities
8 in summary form.

9 BY MR. CASSEL:

10 Q Now understanding that the activities cannot
11 be compared numerically directly from column to column,
12 can you give us some picture, Mr. Behnke, of what proportion
13 of Edison's total oversight of Hatfield was done by PTL
14 as an arm of your QA/QC Department, as opposed to directly
15 by your own employees?

16 A (Witness Behnke) As I indicated earlier, the
17 mainline effort in quality assurance is by the Commonwealth
18 Edison Quality Assurance Department. I'm not sure in what
19 context you seek to make the comparison between the
20 activities of the various areas. But the mainline effort
21 was and is the company's quality assurance organization.

22 Q Well, the specific area that I am attempting
23 to focus on is the area of inspections, including whatever
24 kind, whether it be audit, surveillance, any kind of
25 inspection activity of Hatfield and Hunter by Edison or PTL

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1 at Byron.

2 A I cannot give you a quantitative answer to that,
3 because in my review of this, I simply didn't add up all
4 of the inspections that were made by the Commonwealth
5 Edison people. But my judgment would be that, as I indicated
6 before, the mainline effort, the bulk of the effort, is
7 by the Commonwealth Edison organization, and PTL was used
8 for certain selected assignments -- in one case, overview,
9 third-party overview inspections; in another case, the
10 carrying out of a specific program which Mr. Shewski
11 identified in his testimony as our UCI or unit concept
12 inspection program.

13 Q Do you know, for example, in the column on
14 Attachment A, page 1, where it talks about -- it's
15 Column 8, PTL Overview Inspections Performed, and in the
16 year 1983, the column indicates there were 1007 such
17 inspections. Does that mean, for example, 1007 particular
18 pieces of hardware were examined or 1007 inspections were
19 conducted, each one of which included a significant number
20 of pieces of hardware or other attributes?

21 A My understanding of that figure is that it
22 represents inspections. It does not represent individual
23 attributes, and it does not represent individual pieces
24 of hardware. It represents inspections.

25 Q And each inspection could include many pieces

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of hardware?

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A It can include a number of things.

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1 Q Mr. Behnke, you reviewed the results of the
2 reinspection program, in terms of the performance levels
3 of the various contractors, have you not?

4 A I've read the report.

5 Q And were you aware, in the area of visual weld
6 inspections, PTL's performance on average was well below that
7 of Hatfield and Hunter?

8 MR. MILLER: I'm going to object to the form of
9 the question. I don't know what well below means. The
10 numbers are a matter of record. I don't know of what
11 relevance this line of inquiry is, anyway.

12 JUDGE SMITH: What do you have to say about it,
13 Mr. Cassel?

14 MR. CASSEL: The relevance of the line of inquiry,
15 Judge, is to question about why Commonwealth Edison would
16 entrust major oversight activities, as Mr. Behnke's own
17 words "an arm of his QA department", to a contractor whose
18 performance, as we all know from Attachment E to
19 Mr. Del George's testimony, was an average of 85 percent
20 for visual weld inspections when the average for Hatfield
21 was in the 92 percent range and for Hunter it was in the
22 96 percent range plus.

23 And yet Edison wanted PTL to serve Edison as
24 the verifier of work quality for Hatfield and Hunter.

25 MR. MILLER: Judge, it seems to me if the

1 witness is going to be asked a question which goes to the
2 overall evaluation of PTL, that if it's going to be limited
3 to visual weld inspection, we've got to determine if this
4 witness knows how much of the overview activities and
5 unit concept inspections involve visual weld activities.

6 And if it involves all activities, then in fairness
7 it seems to me Mr. Cassel ought to present the witness with
8 the averages for PTL's objective performance. It's really
9 quite high and quite good.

10 So I really don't understand the relevance of
11 comparing averages out of the reinspection program to the
12 function that is being shown on these attachments to
13 Mr. Behnke's testimony.

14 JUDGE SMITH: I think that the complaint that
15 you should specify the reach of your question is well made.

16 MR. CASSEL: I specified, in particular, visual
17 welds inspections.

18 JUDGE SMITH: Yes, but not in your original
19 question.

20 MR. CASSEL: If I didn't, I will certainly
21 rephrase it to that effect.

22 JUDGE SMITH: The Board feels that the direction
23 of the question is relevant. Now if you will clean it up
24 so that everyone agrees that the question is understood, it
25 may be asked and answered if possible.

1 MR. CASSEL: Let me try it in two steps.

2 BY MR. CASSEL:

3 Q Do you agree, Mr. Behnke, that the results of
4 the reinspection show that respect to visual weld inspection,
5 which were a very large proportion of all the inspections in
6 the program, that PTL scored an average of approximately
7 85 percent, whereas Hatfield scored an average of better than
8 92 percent and Hunter better than 96 percent?

9 MR. MILLER: Excuse me, Judge, Mr. Cassel insists
10 on building up his questions with things that are either
11 irrelevant or not established in this record. And I don't
12 believe there has been anything established in this record
13 that, with respect to PTL, the large bulk of their
14 inspections involves visual welds.

15 MR. CASSEL: I didn't say that they did, Judge.
16 I said that a large proportion of all of the reinspections in
17 the entire program involve visual inspections. Mr. Miller
18 will certainly have an opportunity to ask any questions that
19 he would like to ask on redirect. I'm entitled to ask the
20 questions --

21 JUDGE SMITH: No question about that. However,
22 Mr. Miller is quite appropriate in making sure that the
23 question is specific enough that any answer is an accurate
24 one and accurately reflects the facts. Now between you two
25 gentlemen, I am sure that you can work it out.

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1 MR. CASSEL: Let me try again, Judge.

2 BY MR. CASSEL:

3 Q Mr. Behnke, do you agree that in the area of
4 visual weld inspection, in the reinspection program, PTL
5 scored an average of approximately 85 percent whereas Hatfield
6 scored on average better than 92 percent and Hunter on average
7 better than 96 percent?

8 A (Witness Behnke) I don't have the data before me
9 and you have the advantage of having the table. Perhaps
10 you would show it to me.

11 Q Surely.

12 JUDGE SMITH: If that data is accurate, would
13 you stipulate?

14 MR. MILLER: I represent to you, Mr. Behnke, that
15 that data appears -- perhaps Mr. Del George will share with
16 you the table attached to the end of his testimony.

17 BY MR. CASSEL:

18 Q Were you not aware until today, Mr. Behnke, that
19 PTL had, in fact, scored what I will characterize as
20 considerably below Hunter and Hatfield in the area of
21 visual weld inspections?

22 A (Witness Behnke) As I indicated before, I had
23 reviewed this report. I have read it. I have concluded
24 from reading the report on balance that the PTL inspectors
25 were shown to be competent. And on that basis, I felt

1 comfortable in relying on the overall result. The program
2 sought to confirm the competency of these inspectors by
3 examining them in a number of different ways. And I have
4 been satisfied by the people on whom I rely that the
5 reinspection program, in fact, demonstrated that the PTL
6 inspectors were competent and we could rely on the results
7 that they produced.

8 Q You've answered a question but not the one I
9 asked.

10 JUDGE SMITH: Well, now, it is exactly the
11 question you asked. You put another question on top of your
12 first question. Before he could answer your original question
13 you loaded another question on him because you saw an
14 opportunity.

15 The question he asked was were you not aware,
16 as compared to given the data that was -- that Mr. Del George
17 is showing him, that you stipulated to.

18 Nevertheless, he's answered your question.

19 BY MR. CASSEL:

20 Q Does it make sense and if so why, Mr. Behnke,
21 to place in charge of overinspecting Hunter and Hatfield, a company
22 which, on visual weld inspections, did not score as well as
23 either of those two contractors in the reinspection program?

24 MR. MILLER: Excuse me, Judge Smith. Again I
25 have to object. First of all, I don't believe that there has

1 been any showing on this record that the overview
2 inspections performed by PTL with respect to Hatfield and
3 Hunter relate to visual weld inspections. And secondly,
4 Mr. Behnke has explained at length what his evaluation of
5 the reinspection program results are. A question that
6 doesn't make any sense has been answered. It makes a great
7 deal of sense to Mr. Behnke, perhaps not to Mr. Cassel.

8 JUDGE SMITH: It's not that simple. Mr. Behnke
9 has yet to answer a question which specifically takes into
10 account the concern raised by Mr. Cassel. My difficulty is
11 it seems like no matter how he asks the question you find
12 something wrong with it and --

13 MR. MILLER: Judge, I don't want to keep Mr. Cassel
14 from pursuing legitimate lines of inquiry. Mr. Behnke is here,
15 in part at least, as an expression of Commonwealth Edison's
16 concern with this hearing and to express his views. And I
17 want him to have an opportunity to be examined on those views.

18 JUDGE SMITH: Neither of you are performing
19 incorrectly. Both are performing the role that you're supposed
20 to. So everyone is doing just fine. Now as I understand,
21 your complaint is that he is -- based upon a comparison of
22 performance on visual weld inspections, he is asked Mr. Behnke
23 to accept the premise that PTL did not do as well as the
24 other two and therefore does it make sense that the overview
25 inspection should be entrusted to them.

1 And you say there's been no demonstration that
2 the overview inspections relate to visual weld. Is that
3 where we are?

4 MR. MILLER: Yes, sir.

5 JUDGE SMITH: Okay. Taking all of those
6 considerations into account then, can you answer Mr. Cassel's
7 question? Is that all right? Is that all right with
8 everybody?

9 MR. CASSEL: That's fine with me.

10 WITNESS BEHNKE: Judge Smith, let me attempt to
11 answer that. As I understand the contractor quality
12 control inspector reinspection program, we were attempting
13 to determine whether the original inspectors of certain work
14 turned out to be competent. And we did that by having
15 other inspectors from the same company examine their
16 work in precisely the framework, time, and considerations
17 and criteria that existed when the first inspectors did
18 their work.

19 When the PTL inspectors came along the second time
20 and identified these differences, it seemed to me that what
21 that indicated was that PTL did have a competency to identify
22 objective weld attributes, just as well as subjective
23 attributes. And therefore, I could continue to rely on the
24 part that they played in this program.

25 I don't believe that the data in the table here,

1 in any way suggests that PTL was incompetent to perform those
2 weld inspections.

3 BY MR. CASSEL:

4 Q Doesn't that suggest, Mr. Behnke, logically that
5 any result, whether it was high or low, would make PTL look
6 good, because if it was low that means they caught a lot of
7 errors. And if it was high, that means they were good in
8 the first place?

9 MR. MILLER: I believe that's a mischaracterization
10 of what Mr. Behnke said.

11 JUDGE SMITH: It's a pure question to him. He
12 could say no it doesn't suggest it or yes it does or he
13 could say I disagree with your premise.

14 MR. MILLER: Okay.

15 JUDGE SMITH: Or he could do whatever he wants
16 to.

17 (Laughter.)

18 WITNESS BEHNKE: I wonder if we could have the
19 question repeated?

20 BY MR. CASSEL:

21 Q Sure. It seems to me there's a logical
22 inconsistency there. If they score low you're saying well,
23 they must be pretty good because they caught all these
24 errors. And if they score high, you say they must be pretty
25 good because they didn't commit many errors. Is there any

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1 score they could have achieved which would not have raised
2 doubt in your mind about their reliance?

3 JUDGE SMITH: Now do you agree with his
4 premise? Before he began the question is there any score
5 they could have achieved, he gave a premise there that he is,
6 by implication, asking you to accept. The premise being
7 that if they had scored low that makes them look good, if
8 they scored high that makes them look good.

9 WITNESS BEHNKE: I'm sure there are lots of answers
10 that could have come out of this reinspection program
11 that would have suggested that the PTL people weren't
12 competent. From my reading of the report and from the
13 counsel that I have had from the experts who have examined
14 this, I can't come to that conclusion.

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1 BY MR. CASSEL:

2 Q By the way, Mr. Behnke, do you know whether
3 PTL's unit concept inspections and overview inspections
4 listed on Attachment A of Hatfield and Hunter include
5 any visual weld inspections?

6 A (Witness Behnke) They might have. My
7 recollection is that the unit concept inspection covered
8 a very wide range of attributes in the particular spatial
9 areas that were being examined.

10 Q Thank you, Mr. Behnke.

11 Now passing to Mr. Laney, because poor
12 Mr. Del George has already been on the hotseat now for
13 most of the week, Mr. Laney, you are not a Registered
14 Professional Engineer in any state, are you?

15 A (Witness Laney) No, I am not.

16 Q Nor do you possess the qualifications that
17 you would require to be certified; is that the case?

18 A I suspect that's the case.

19 Q And you're also not an expert in the field
20 of statistics?

21 A That is true.

22 Q Your expertise, then, would be best described
23 as in the field of management of enterprises involving
24 nuclear activity, or would you give us --

25 A I would say technical enterprises.

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1 Q The technical aspects of nuclear --

2 A Technical management, yes.

3 Q You were, of course, asked here to be an
4 expert in your field of expertise and not in the other
5 fields.

6 Did you play any role in designing Commonwealth
7 Edison's reinspection program?

8 A No.

9 Q In fact, you were first contacted by
10 Mr. Del George for assistance in regard to the reinspection
11 program sometime after this Board initially denied Edison's
12 license for Byron back in January?

13 A I was first contacted in January of this year.

14 Q Following the denial of the license?

15 A I don't know the date of the denial of the
16 license. All I can say is that I was first contacted in
17 January of this year?

18 Q In late January?

19 A I will say yes, because the basic letter I
20 was sent to review was dated January the 12th, so I must
21 have been contacted sometime later than that.

22 Q Mr. Del George, in fact, who made the contact,
23 perhaps remembers when it was made?

24 A (Witness Del George) It was made after
25 January 13th of 1984.

mgc15-3

1 Q Mr. Laney, on page 4 of your direct testimony,
2 paragraph (e), you indicate that you served as chairman
3 of a panel which audited the Washington Public Power
4 Supply Systems' program to verify the design and
5 construction of their WNP-2 Nuclear Station.

6 Would you briefly describe what your activities
7 as chairman of that panel entail?

8 A (Witness Laney) It was to select a panel
9 of competent people to review the design and performance
10 of a plant reverification program. I believe that was
11 the exact title which we used. That involved reviewing
12 the reinspection plan, if you will, offering comments on it,
13 ultimately approving it in preparation for the performance
14 of it, and then auditing the performance by visiting the
15 site of performance from time to time, and at the end of
16 the performance of the program, preparing and submitting
17 to the Washington Public Power Supply System our evaluation
18 of the adequacy and completeness of the performance.

19 Q Now unlike Edison, the Washington Public Power
20 Supply System contacted you, did it not, prior to
21 completing the development of the design of the reinspection
22 program?

23 A Yes.

24 Q And, in fact, your team which you headed actually
25 rejected the initial draft of the program that the Power

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1 Supply System had proposed and sent it back to them with
2 comments to improve the design?

3 A That is true.

4 Q Was the Washington Public Power Supply System
5 program, in fact, better suited to ascertaining work
6 quality than the reinspection program conducted at Byron
7 by Edison?

8 A The Washington Public Power program had a
9 different objective than the Byron program that we are
10 discussing here. Its purpose from the beginning and
11 throughout the conduct of it was to validate the quality
12 of construction, whereas the Byron program had a somewhat
13 different objective, as we all know.

14 Therefore, the approach taken in the Washington
15 Public Power program was somewhat different. There were
16 similarities, however, as well as differences between the
17 two.

18 Q And, in fact, in your judgment, the sampling
19 methodology used in the Washington program was better for
20 the purpose of determining work quality than the one used
21 here by Edison?

22 A The initial program, due to the difference in
23 objective, as prepared by Washington Public Power,
24 directly addressed the full scope of work of the safety-
25 related work, and therefore encompassed from the beginning --

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1 and I emphasize "from the beginning," -- encompassed a
2 suitable sample to test the quality of the safety-related
3 work.

4 In contrast to that, the original program for
5 Byron, having a different objective in mind -- namely,
6 the qualification or to examine qualification and performance
7 of inspectors -- paid less attention initially to covering
8 the total scope of work.

9 As we know, this led to subsequent revisions
10 to the Byron program. And if one wanted to make a
11 comparison between the two, I think that comparison should
12 be based on the overall and final program at Byron -- that
13 is, if we're talking quality of work, the comparison
14 should be between the final program at Byron and the WNP-2
15 program.

16 Q And making the comparison on that basis, was
17 the sampling methodology in the Washington program better
18 suited to determining work quality than the sample here?

19 A I think if you took the final program -- and
20 I include in that the samples that were inspected also
21 in the supplement -- that it is fair to say several things
22 about each of them.

23 Putting aside now their original purpose and
24 the fact that there were originally some differences between
25 them, at the conclusion of the total program, each of them

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1 examined -- or I should say reexamined or reinspected a
2 very substantial and representative sample of the safety-
3 related work. To that extent, they were similar.

4 They were similar in another way that has been
5 discussed in previous testimony. Namely, both programs
6 utilized the inspectors who had originally performed the
7 work. That is, the inspectors employed by contractors
8 and to some extent by the utility to perform the
9 reinspection. They did this at Washington Public Power
10 because they felt that those inspectors, suitably
11 safeguarded against inspecting their own work, could
12 produce a more competent reinspection than a new group of
13 people who were unfamiliar with the plant.

14 I'm not sure, but I think a somewhat similar
15 consideration applied in the Byron case as well.

16 Q Were there other respects, Mr. Laney, in which
17 the Washington program, as initially designed, was better
18 suited to the task of determining work quality than --

19 A You have implied by your question that I have
20 stated that there were some already, and I believe I
21 answered your previous question by saying, if you examined
22 the final Byron program, including the supplemental
23 inspections, that each of them -- that is, the WNP-2 and
24 the Byron programs -- each of them covered a large
25 representative sample of the safety-related work.

mgcl5-7

1 Now my comments with respect to the Byron
2 program are restricted to the areas which I have examined.
3 Rather than to be too general, I particularly examined
4 Hatfield and Hunter, and I would want that comment to
5 apply to that part of the Byron program.

6 Q Then your testimony expresses an opinion on
7 the work quality of Hatfield and Hunter?

8 A Yes.

9 Q And you have expressed no opinion on the work
10 quality of the other 17 contractors at Byron?

11 A That's correct.

12 Q Was there, on your recommendation, built in to
13 the Washington program any different requirements for
14 independence of review than those embodied in Edison's
15 program?

16 MR. MILLER: Excuse me. Could we have a
17 definition of terms, please, before the witness answers --
18 "independence of review"? What independence of review
19 are we referring to?

20 MR. CASSEL: I'd like the witness to use his
21 own definition of "independence." The word "independence"
22 appears in many places in the discussion of this program.
23 In the discussion of the other program, I think the
24 witness is well-qualified to give us his views on that.

25 JUDGE SMITH: How about "review," though?

mgcl5-8

1 MR. MILLER: That's what bothered me. I don't
2 know whether he's talking about engineering reviews or
3 what.

4 MR. CASSEL: The review of the actual work,
5 as opposed to the design, setting aside for the moment
6 the design; we're talking now about the review of the
7 work quality.

8 WITNESS LANEY: Would you repeat your question?

9 MR. CASSEL: Surely.

10 BY MR. CASSEL:

11 Q Were there any different provisions for
12 independence in the review of work quality in the Washington
13 program, as opposed to Edison's program?

14 A (Witness Laney) I think there was a great
15 deal of similarity. Perhaps if I describe that, there
16 may be some difference that come to mind.

17 As I mentioned earlier, the reinspection
18 programs in both cases relied upon inspectors who had
19 previously performed inspection work at the sites in
20 question. In both case, there were administrative
21 safeguards to assure that inspectors did not reinspect
22 work that they, themselves, had previously inspected.
23 In both cases, external overview, overview inspection,
24 people were employed. In the case of WNP-2, instead
25 of PTL, it was Bechtel, but the same purpose was carried

mgcl5-9

1 out by both, namely to check, inspect, and provide
2 additional insurance of the integrity of the system.

3 They did have one difference. Namely they
4 had me and a panel of three other people who periodically
5 went out and talked to the people that were performing
6 the work and discussed it with them and reached our own
7 conclusions and, in some cases, offered suggestions. But
8 on the whole, I would say there was perhaps as much
9 similarity between the two as differences, perhaps more
10 smilarity than differences.

11 Q And the other members of your team were also
12 eminent experts in the field?

13 A Well, if you wish me to tell you who they are,
14 I'd be glad to do that.

15 Q Certainly.

16 A They were a gentleman named Lou Roddis, who
17 was formerly an associate of mine in the Navy program and
18 later President of Consolidated Edison; Solomon Levy,
19 who is a consultant now, but who had been a GE power plant
20 designer for a number of years, boiling water reactors,
21 WNP-2 is a boiling water reactor; and Herman Sheets, who
22 is a former Technical Director of Electric Boat and an
23 expert in welding and metallurgy.

24 Q Mr. Laney, in your testimony, you mention that
25 you were asked to and, in fact, did look at some of the worst

mgc15-10

1 welds in Byron in the course of your review.

2 In that statement, did you mean worst in terms
3 of visual appearance or worst in terms of the safety
4 consequences if the weld failed?

5 A These were all or largely structural welds in
6 cable pans, support hangers, and in pipe support
7 structures. What I had requested was to be shown some of
8 the rejected -- yes, I guess that's the proper term --
9 some of the welds which had been inspected, reinspected
10 by the inspectors, and had been found to contain
11 discrepancies. I was shown these by a Level III inspector
12 who had overinspected and resolved, I suppose, some
13 disagreements in some cases and was extremely familiar with
14 the whole body of the so-called discrepant welds.

15 My belief is he was going on weld appearance,
16 since that was the basis for his inspection, visual weld
17 inspection, and I don't believe, in any case, that any
18 consideration was given to something that really wasn't
19 known by him -- namely, the possible consequences of
20 failure.

21 End 15
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1 Q Is it your opinion, Mr. Laney, that you cannot
2 reach a conclusion on the work quality of Hatfield and
3 Hunter at Byron without going beyond the information
4 contained in the reinspection program, even as it was
5 supplemented in June?

6 A Upon reviewing the reinspection program and
7 without the supplement, because the supplement as you know
8 came in June and I was first studying this program in May,
9 I had a need to some investigation of my own, of which I
10 must say is going beyond what was in the report. And I did
11 so. I wanted to see the discrepancies or representative
12 examples because this is not something that one can get
13 readily from reading the report.

14 I wanted to talk to people who had done the
15 analyses and dispositioned some of these discrepancies. And
16 I did that because I wanted to understand the manner and the
17 depth of their investigation and frankly, to look at whether
18 I would find it convincing or not.

19 So in that respect, yes. I felt a need to go
20 beyond. I think that need was in the nature of reassurance.
21 I was seeking reassurance of areas that were not altogether
22 clear and possibly totally convincing to me. So I went
23 beyond it.

24 Q Let me refer you to page 20 of your deposition
25 this week, Mr. Laney, Monday night. Referring to page 20

1 of your deposition transcript, lines 12 through 18. Did I
2 not ask you "Question: But was it your opinion that the
3 information contained in the report, considered by itself,
4 was insufficient for you to reach a professional judgment
5 that the quality of work at Byron was inadequate?"

6 "Answer: Yes, that's true. And that's why I
7 went beyond the information in the report before reaching
8 a judgment."

9 Do you recall so testifying?

10 A Yes.

11 MR. MILLEP: Judge Smith, I move to strike the
12 question and the answer, insofar as they read this deposition
13 into the record, because the question and answer are
14 completely consistent with the testimony that Mr. Laney has
15 just given in response to Mr. Cassel's previous question.

16 If this is impeachment, I don't see anything
17 impeaching about it.

18 JUDGE SMITH: I don't know if it has to be
19 impeachment, you know. That doesn't have to be his
20 purpose for asking those questions. He can just do it to
21 test his direct testimony -- oh, I see. Your point is
22 bringing in the question and answer from the deposition.

23 MR. MILLER: Yes, sir.

24 JUDGE SMITH: Yes. Well, I didn't see anything
25 in the deposition that I would not have inferred from his

161b3

1 prepared testimony, as a matter of fact, let alone his
2 previous answer.

3 MR. CASSEL: The only reason for that question
4 was the next question was whether Mr. Laney agrees with what
5 you just said. In other words, did you intend your testimony
6 today to be consistent with that statement you made, in
7 response to my question?

8 MR. MILLER: Excuse me, the very next question in
9 the deposition went on and asked Mr. Laney why the report
10 should be on its face -- why was the report inadequate?
11 Mr. Laney then catalogued the very same reasons and told
12 what steps he wished to follow, that he described on this
13 record. We are burdening this record with extracts from the
14 deposition to no purpose.

15 MR. CASSEL: We're simply attempting to clarify
16 the answer to the question. I think Mr. Laney intended to
17 give the same answer today that he gave on Monday, but he
18 used slightly different words and I wanted to make sure
19 he meant the same thing.

20 JUDGE SMITH: Mr. Miller does have a point,
21 however. He did take a part of the deposition which, standing
22 alone, is not a complete story. I don't think you were yet
23 at the point, or were you even in the direction, of having
24 to go to the deposition to extract the testimony you want
25 from the witness.

1 Just ask him the question. I don't think you
2 had to use that deposition question and answer.

3 MR. CASSEL: I agree, Judge. I think it was one
4 way to do it. Another way to do it is just to ask the
5 question again, and I will ask it to you precisely as I
6 asked it in the deposition, except there I did not -- as I
7 should have -- limit the question to Hatfield and Hunter.
8 So I'll do it this time.

9 MR. MILLER: Excuse me, Mr. Cassel.

10 Judge, may we have a ruling on my motion to
11 strike.

12 JUDGE SMITH: We will strike now the question and
13 answer from the deposition, although I might point out that
14 you should have made your objection before the answer.

15 MR. MILLER: That's true. Or before the proffer.
16 However, nevertheless, let us disregard and strike
17 figuratively from the transcript the question and answer
18 from the deposition. I think it's an important point that
19 you are making and it should be an accurate answer from
20 the witness.

21 And let's be careful that he understands the
22 question and gives an accurate answer.

23 MR. CASSEL: Fine.

24 BY MR. CASSEL:

25 Q Mr. Laney, is it your opinion that the information

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1 contained in the reinspection report, considered by itself,
2 was insufficient for you to reach a professional judgment
3 that the quality of Hatfield and Hunter work at Byron was
4 adequate?

5 A (Witness Laney) Well, as I have testified, my
6 experience is in technical management. And as a technical
7 manager, you read a lot of reports. Seldom do you read a
8 technical report such as the Byron reinspection report without
9 having a desire to probe certain areas more deeply. Not
10 because on the face of them you are suspicious or doubtful,
11 but perhaps they just aren't clear.

12 There were certain aspects to the Byron reinspection
13 report about which I had that feeling. Since my objective
14 was to ascertain the quality of the work, it seemed highly
15 necessary, or at least prudent of me, to go beyond the
16 report and explore areas where additional information was
17 readily available, as by talking to the designers, as
18 by talking to the analysts, to better understand what they
19 had done.

20 And so I did so. I don't know that I ever asked
21 myself the question, if this was all you had could you reach
22 a conclusion, because it was never all I had. I had all sorts
23 of other resources available to me and it never occurred to
24 me not to use them.

25 And so I have no way, now, of saying to you had

161b6

1 I been on a desert island and given that report, could I
2 have reached a conclusion on it. The fact is, I didn't. I
3 supplemented the information with other valid information,
4 which was meaningful to me. And on the basis of everything,
5 I reached a conclusion.

6 MR. CASSEL: Now, I think, Judge, if I've heard
7 the answer correctly, it is not precisely the answer provided
8 in the deposition. Without reading that question and answer
9 again, I move to reinstate the question and answer from
10 the deposition where he answered yes to my question.

11 MR. MILLER: Excuse me. I really think that we
12 are carrying impeachment to extremely hyper-technical grounds.
13 Mr. Cassel may very well be entitled to a yes or no answer,
14 although he hasn't asked for one from this witness -- Judge,
15 do you have a copy of the deposition before you?

16 JUDGE SMITH: No.

17 MR. MILLER: Let me share mine.

18 JUDGE SMITH: In any event, whether he's entitled
19 to use the deposition or not, we would hope that the entire
20 subject matter, as it appears in the deposition, won't end
21 up in this record.

22 MR. MILLER: I think it has already, perhaps
23 more so.

24 (Documented handed to Board.)

25 JUDGE SMITH: Let's let Mr. Laney look at the

161b7

1 question and answer -- he's doing it now, all right.

2 See if that comports with his testimony today.

3 WITNESS LANEY: I would like to supplement my
4 previous answer.

5 JUDGE SMITH: That is your previous answer today
6 or your previous answer in the deposition?

7 WITNESS LANEY: Previous answer today, Judge.
8 The question here refers to the report. Now the report, to
9 me, is the February 1983 reinspection report, without
10 supplement. At the time of my evaluation alluded to in
11 this question, the supplement wasn't available.

12 So the question, was there sufficient information
13 in the report, I think not only calls into question my own
14 independent investigation, but also the information contained
15 in the supplement, which is not implied in this question.

16 My reaching a state of conviction, as to the
17 quality, as I testify in my direct testimony, is based on
18 several things of which reinspection results from the report
19 is but one. The other include the validation of the
20 competence of the inspectors. It includes the basic
21 integrity of the Commonwealth Edison's Quality Assurance
22 system and it includes my additional investigation into the
23 disposition and the basis for the disposition.

24 And it is only after all of those are taken
25 together that I reached the conclusions which I have expressed.

1 JUDGE SMITH: Now, what is your pleasure,
2 counsel?

3 MR. CASSEL: I believe that I would like to have,
4 Judge, the question and answer from the deposition, as well
5 as anything preceeding it and after it that the Board or
6 Edison's counsel might want concerning this subject matter,
7 to be in the record because I think it indicates a view
8 of the witness which is not expressed entirely in what
9 he has said here today alone.

10 MR. MILLER: Excuse me, Judge. It seems to me
11 that deposition should be read into the record for one
12 purpose only, where the witness is available for live
13 testimony, as Mr. Laney is. That is to impeach his credibility
14 by demonstrating, through the use of the deposition, that
15 he gave an answer inconsistent with the one in his live
16 testimony at his deposition.

17 I don't believe that that showing has been made
18 at all. Everything that Mr. Laney said in his deposition
19 and in answer to at least three questions around the point
20 have been totally consistent.

21 JUDGE SMITH: Let's say they have not been
22 necessarily inconsistent. But Mr. Laney has not been
23 answering questions directly and I think that you should
24 be -- you should perhaps -- I'm not suggesting that you have
25 been evasive. In fact, to the contrary, you have been very

161b9

1 much concerned that the whole answer be on the record and
2 you are somewhat concerned that a yes or no answer may be
3 taken out of context, and I appreciate that. But in this
4 proceeding, you also have to appreciate that the utility
5 is represented by very competent counsel who understand
6 the issues very well and that the Intervenors understand
7 the issues very well.

8 But they have a right to yes or no answers, if
9 they can be given. And if the yes or no answer needs
10 explanation, you will have the opportunity to explain. And
11 believe me, counsel will make sure that even if you don't
12 take advantage of the opportunity, that you are reminded or
13 in one way or the other, your complete story will get into
14 the record.

15 In the meantime, however, I think it would be
16 very helpful if you would very carefully address the point
17 being made by Mr. Cassel. And there does, to me, seem to
18 be perhaps not an inconsistency but you have not really
19 wrestled with the positive statement that you made in the
20 deposition. I don't mean wrestle. You have not really come
21 to grips with that.

end16

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1 I understand the point you made that the initial
2 January report standing alone was one thing. But you did
3 make the statement.

4 Would you like to comment on it further?

5 WITNESS LANEY: To the question, Judge?

6 JUDGE SMITH: The suggestion before you now is
7 that during your deposition, you regarded the information
8 contained in the report -- and that's the February 1984
9 report -- as insufficient for you to reach a professional
10 judgment on whether the quality of work at Byron was
11 adequate. And that's that report and nothing but that
12 report that is being talked about. And you agreed.

13 Not only that, but in the next question,
14 you agreed with the premise of the question, as you will
15 see, the next question being, "And was, in your opinion,
16 was the report on it's face" -- "on its face, inadequate
17 to show work quality at Byron?"

18 Not only did you accept that premise, but you
19 went on to explain why you believed that was the case.

20 Now we have read your written testimony, your
21 direct testimony, and I think probably you have explained
22 your overall position. But you have not satisfied
23 Counsel's right to have a direct answer to that question.
24 He has that right.

25 WITNESS LANEY: On the January report -- the

mgcl7-2

1 February report -- excuse me -- I did not find that
2 sufficient.

3 BY MR. CASSEL:

4 Q Do you find the February report, together
5 with the June report, on their face, sufficient for you
6 to reach a professional judgment that the quality of work
7 by Hunter and Hatfield at Byron was adequate?

8 A (Witness Laney) The basis of my judgment is
9 expressed in my direct testimony. It is based on more
10 than those two reports.

11 Q Would those two reports alone suffice to enable
12 you to reach that judgment?

13 A Had I not made additional inquiries myself, had
14 I no knowledge of any of the other things which I have
15 mentioned, I don't know.

16 Q Now one of the other things on which you relied
17 was Edison's quality assurance program at Byron, as
18 described in a couple of documents listed in your answer
19 to Question 19 on page 23; is that correct?

20 Why don't we turn to Answer 19.

21 (The witness complies.)

22 Let me restate the question now that we have
23 turned there.

24 One of the other things on which you rely
25 was Edison's quality assurance program at Byron, as

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1 described in the two documents listed here in your answer;
2 is that correct?

3 A Yes.

4 Q Did you have any knowledge or do you have
5 any knowledge of whether the programs as described -- I'm
6 sorry -- let me try that again.

7 Do you know whether Edison's actual execution
8 of its quality assurance program over the years at Byron
9 has been in compliance with the programs as described in
10 those two papers?

11 A One of the two papers describes the program at
12 Byron, and the other describes the overall Edison program.
13 My knowledge of the extent to which they have been carried
14 out at Byron is based on my review of the ASLB record
15 in this case and correspondence between -- some correspondence
16 involving the same subject between the NRC and Commonwealth
17 Edison. But I have no direct or continuing knowledge of
18 the execution of the program at Byron.

19 MR. CASSEL: I have no further questions, Judge.

20 JUDGE SMITH: Mr. Lewis.

21 MR. LEWIS: We have no questions.

22 Your Honor, let me double back. There is one
23 question.

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CROSS-EXAMINATION

BY MR. LEWIS:

Q Mr. Laney, on Answer 15 of your testimony, you provide some figures regarding Hatfield -- numbers of Hatfield inspections conducted under the reinspection program and numbers of discrepancies discovered from those inspections. The number you provide is 3661 discrepancies.

I would like to draw your attention to Table B-5, Revised Table B-5 of the reinspection program, which provides a tabulation of Hatfield inspection results, and one can calculate from there, although it is not directly presented in that format, a number of discrepancies.

Have you reviewed that table, and do the results in there agree with that figure of 3661?

A (Witness Laney) What part of Table B-5? Would you state your question again? I don't understand it.

Q In Table B-5, which is in the supplement to the reinspection program report, there are numbers of -- there are inspection results that have Hatfield's listed, and one can extract from that table the total number of Hatfield discrepancies.

A Yes.

Q Have you reviewed that table, and do you know whether or not the number of Hatfield discrepancies in that report are the same as the number reported in your

mgcl7-5

1 testimony?

2 A I didn't extract my number from this table.
3 I did discover when I reviewed Mr. Del George's testimony
4 that my number differs from his number, and I've discussed
5 with him our difference, and I'm prepared to say that I
6 suspect my aggregation of the discrepancies from various
7 tables in the report is incorrect. The difference is of
8 the order of ten percent of the numbers of discrepancies,
9 and I concluded that it made little difference to me, so
10 far as my conclusion in my testimony was concerned, as
11 to whether the number of discrepancies was 3661 or 4001,
12 which Mr. Del George had. And I have not attempted to
13 retrace the source of my number or to discover in what way
14 it's inaccurate, if it is.

15 Q Is that 4000 or 4101?

16 A 4101, excuse me.

17 MR. LEWIS: That was the only clarification.

18 Thank you.

19 EXAMINATION BY THE BOARD

20 BY JUDGE COLE:

21 Q Mr. Laney, on page 11 and also on a couple of
22 the pages following that, you make reference to an
23 assessment of the adequacy of sample size in relation to
24 all work performed by the contractors, Hatfield and Hunter.

25 Could you tell me a little bit about your

mgcl7-6

1 assessment of the adequacy of the sample size, what your
2 considerations were, and if you quantified that at all?

3 Could you tell me what you did there, sir?

4 A (Witness Laney) My first assessment was that
5 for Hatfield six percent of the inspection months were
6 captured by the reinspection program.

7 Q Excuse me. I don't know what that means, sir.

8 A Well, if you multiply the number of inspectors
9 that were reinspected by the number of months of work of
10 each that was reinspected, you get inspection months.
11 Six percent -- there is a table --

12 Q Six percent of the total inspection months were
13 captured?

14 A Of Hatfield was captured in the reinspection
15 programs. Eleven percent of the inspection months of
16 Hunter was captured in the reinspection program.

17 On this basis, it appeared evident to me that
18 taking those two contractors together, somewhere between
19 five and ten percent of their work had been reinspected.
20 That obviously assumes that these were representative
21 amounts of inspections in each of the inspection months
22 and I did not attempt to verify that, because we're talking
23 about a fairly sizeable number of inspectors.

24 But having reached the point of believing that
25 there is five to ten percent of the work that had been

mgc17-7

1 reinspected, I realized that that is a significant sample
2 for purposes of validating work which has already been
3 inspected or previously, and hence I concluded that it
4 was a significant and sufficient sampling.

5 Q Now this was just the work that was included
6 in the main report, sir, wasn't it, the February '84 report?

7 A The main report, yes. But I recognized that
8 the supplemental report did not materially add to the
9 number of inspections performed. It simply reinspected
10 some of the previously made inspections.

11 Q So do you know what the purpose of the supplement
12 to the reinspection report was, sir?

13 A Yes. I know, and I focused on the particular
14 purpose of it. The particular purpose of it was to take
15 account of the fact that several significant work elements
16 had not been sufficiently reinspected and sufficient
17 reinspection data produced to provide an adequate basis
18 for conclusions.

19 .This had to do with certain of the subjective --
20 rather the objective inspection elements. And one of the
21 purposes of the supplement was to strengthen -- that is,
22 to increase the amount of reinspection data available for
23 these -- I'll call them under-reinspected elements, if
24 you catch what I mean by that.

25 Q All right, sir. Well, your overall conclusions

mgc17-8

1 concerning the adequacy of the sample size to draw
2 conclusions concerning the whole, did you consider both
3 the information contained in the main report and the
4 supplement, or is your initial conclusion or your conclusion
5 based on the information as contained in the initial report?

6 A No. Both.

7 Q Both. All right, sir.

8 You were asked some questions about your
9 overall evaluation in considering just the main report,
10 and you indicated that, in your view, you would have
11 wanted more information to draw conclusions. I gather
12 that is still your opinion, had you been given just that
13 information?

14 Did you have anything to do with the
15 supplemental report, sir, in initiating any of the work
16 that had been done on that?

17 A No, sir.

18 Q Do you know when the work on the supplemental
19 report started?

20 A No, I do not, Mr. Cole.

21 JUDGE COLE: All right, sir. Thank you.

22 MR. MILLER: Judge Cole, perhaps Mr. Del George
23 could assist in the answer.

24 BY JUDGE COLE:

25 Q Do you know, Mr. Del George? I'm sorry. I should

mgcl7-9

1 have asked you.

2 A (Witness Del George) It was in the February
3 timeframe.

4 Q Do you recall why it was, the specific reason
5 why it was initiated? Who found that there was a
6 shortage of information on certain attributes, and that
7 you should fill that in?

8 A Let me first say that the additional work was
9 performed not because it was our judgment that there was
10 a shortage in certain areas, because we had concluded on
11 the basis of the previous work that had been done that a
12 conclusion could be drawn generally about the work of
13 Hatfield for which the supplemental inspections were
14 performed.

15 However, it became obvious to us on the basis
16 of question raised by the Board in its initial decision,
17 as well as by the NRC in their review of our January 12th
18 report which reported on the results that had been provided
19 to them, developed to that point in time, that we could
20 present a stronger argument in certain areas if additional
21 inspections were performed. And in order to provide that
22 stronger argument, we did supplemental inspections, which
23 are reported in the supplement that was issued in June of
24 1984.

25 Now as it happens, Mr. Laney had raised some of

mgcl7-10

1 the same comments that had been raised by the Board, as
2 well as the NRC Staff. And the additional work that
3 we did had the complementary effect of addressing each
4 of those concerns.

5 JUDGE COLE: All right, sir. Thank you.
6 That's all.

7 BY JUDGE SMITH:

8 Q Mr. Laney, I think I may have missed some of
9 the thrust of the question asked you about Question and
10 Answer No. 19 beginning on page 23 of your written testimony.
11 What I am missing is, you are referring here to two
12 documents, neither of which form the foundation for the
13 construction of the plant.

14 So how can those documents provide to you any
15 reassurance?

16 A (Witness Laney) Did you say page 19, Judge?

17 Q No. I'm sorry. It was the answer to Question 19.
18 It begins on page 23.

19 End 17
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1 A You're referring to the documents referenced at
2 the bottom of the page?

3 Q Yes, sir, and one on the following page.

4 Question 19, you say -- I think the answer
5 is being suggested to me by Dr. Cole here, but I looked
6 at -- the problem is you described your general familiarity
7 with Commonwealth Edison's Quality Assurance program by
8 reference to two documents, one dated March 16, 1984 and
9 the other dated April 2, 1984. Dr. Cole just pointed out
10 to me that the document dated March 16, 1984 was in its
11 28th revision, so obviously it has had a major role in
12 the quality assurance foundation of the construction of the
13 plant.

14 And the other document also notes that it was
15 revised. I really don't think I need the question anymore,
16 but is that correct? These were the documents that you
17 inferred did form a quality assurance standard for the
18 construction of the plant?

19 A Yes. And I would like to say, about the first
20 of these documents, the one with revision 28, dated March
21 of 1984, is the basic quality assurance program of the
22 company. It sets forth the principal policies and assigns
23 the principal responsibilities. It is fundamental to an
24 understanding of Commonwealth's quality assurance operation.

25 The second document, authored by Mr. Shewski,

1 describes how those policies set forth in the underlying
2 document were implemented at Byron. Together, they give
3 one a picture of the application and the extent to which
4 good principles were applied at the Byron site.

5 JUDGE SMITH: Thank you.

6 JUDGE CALLIHAN: I have one question, I believe,
7 with respect to the witnesses. I will direct it to Mr. Miller.
8 I'll ask him if these two documents just discussed are in
9 the record?

10 MR. MILLER: I do not believe they are.

11 JUDGE CALLIHAN: Please believe me. I'm not
12 asking for them. It might save me hunting.

13 MR. MILLER: I'm relatively confident that they
14 are not.

15 JUDGE CALLIHAN: That's all I have, thank you.

16 JUDGE SMITH: Any redirect?

17 MR. MILLER: Let me consult for one second.

18 (Pause.)

19 MR. MILLER: No questions.

20 JUDGE SMITH: All right, gentlemen. Thank you
21 very much. You may step down.

22 (Panel excused)

23 MR. CASSEL: Judge, could we have, if I'm not
24 incorrect, the next witnesses would be Mr. Binder and Mr.
25 Treece. Is that correct?

1 MR. CASSEL: I don't think we're going to have
2 that much cross of them, Judge. But if we could have
3 until 3:30 to start that, I think it would be helpful.

4 JUDGE SMITH: We're in the unusual situation where
5 the Board has a lot more time than parties and we can be
6 very relaxed about the intermission, the time you take. So,
7 if no one objects, you can take all the time you want.

8 MR. CASSEL: If that's the case, Judge --

9 JUDGE SMITH: Let's go off the record.

10 (Discussion off the record.)

11 JUDGE SMITH: Let's return here then at 3:45.

12 (Recess.)

end18

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1 JUDGE SMITH: On the record.

2 MR. GALLO: We are ready to proceed.

3 JUDGE SMITH: I wanted to have a discussion about
4 the tour.

5 I will begin by stating that with respect to the
6 proposed visit to the plant, I have had several ex parte
7 conversations, one with Mr. Miller in which he indicated
8 he did want an opportunity to discuss controls to be put
9 on the visit. Then I had an ex parte conversation with
10 Mr. Cassel in which he asked me about who would be eligible.
11 And I suggested to him that it would be open to discussion,
12 but that probably we would have a limitation on only those
13 who are actively participating in the issues that are the
14 subject of the visit.

15 And then conversation with counsel of NRC Staff
16 which simply ascertained that they, too, would like to go.

17 So let's begin with Mr. Miller. Would you express
18 your thoughts about the controls to be put on the tour?
19 First, let's establish that the only reason we wish to go
20 is not for a plant tour, as such, nor for an inspection tour.
21 Of course, we're not inspectors.

22 We simply want to have a better picture in our
23 minds of some of the items that are being discussed in this
24 reopened hearing. It just simply is easier for us to under-
25 stand the testimony when we have seen a cable plan, for example.

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1 Or perhaps we have seen the items that are involved in the
2 systems control. So we are not looking for a general tour.

3 So that being the case, the tour is much more
4 litigation specific or issue specific than the general tours.
5 And I do believe that some type of limitation should be
6 put on the ground rules.

7 MR. MILLER: Yes. Judge Smith, there are a
8 couple of considerations. First of all, many of the items
9 that are the subject of litigation are located in cramped
10 quarters in the plant itself. There is some climbing of
11 ladders that is necessary, some peering around various
12 kinds of obstructions to view a particular weld or a
13 particular connection of one sort or another. For that
14 reason, the number of people on the tour really should be
15 limited or else it takes 20 minute -- or could take up to
16 20 minutes at each location while everybody in the tour
17 climbs up the ladder and observes the point, the feature that
18 is being observed.

19 Secondly, it seems to me that there ought to be
20 some sort of controls on conversations with the Licensing
21 Board while the tour is in place. I'm sure no one would do
22 anything that was not totally proper, but in an informal
23 setting the opportunity for conversation among people from
24 the same group, that is the NRC Staff, the Applicant, or
25 the Intervenors, could be overheard. We ought to try very

1 hard to see to it that there is nothing said in the
2 presence of the Board that could influence it.

3 Secondly, the Company is happy to give more than
4 one tour for Intervenor's counsel and perhaps their expert
5 as well. But again, it seems to us, for the reasons that
6 I have just expressed, that the tour tomorrow morning ought
7 to be quite limited. Obviously, a member of Commonwealth
8 Edison Company Staff, Sargent & Lundy onsite personnel,
9 the appropriate people to lead the tour.

10 That being so, I guess it's appropriate also
11 that representative of the other parties be present as well.
12 But if we could limit it to one representative from each
13 party and the Licensing Board and the gentleman that you
14 mentioned earlier from your Staff who wishes to accompany
15 you, that would make seven in the group and that's a comfor-
16 table size for this kind of a tour.

17 JUDGE SMITH: We have, monitoring this hearing,
18 Mr. Kent of the Office of Congressional Affairs, the NRC.
19 And there has been apparently, that I'm aware of, substantial
20 Congressional interest in this proceeding. And I think
21 it would be helpful for him to have a general idea of what's
22 happening here.

23 MR. MILLER: He's certainly welcome. That's the
24 man I was referring to. I didn't realize he was a separate
25 branch of the NRC. But I know you identified him earlier on

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1 the record.

2 JUDGE SMITH: He is not associated with the NRC
3 Staff. He is a member of the Office of the Commissioners.
4 But in a very discrete function.

5 MR. MILLER: That's my suggestion, that we limit
6 this to seven people and that if there is a request for
7 tours from Intervenors or obviously the Staff, we will
8 handle them outside the context of your visit to the site.

9 JUDGE SMITH: Would nine be feasible? I think
10 we could probably accomodate everyone's interest with nine.
11 That would make Mr. Stokes from the Intervenors, plus a
12 counsel from the Intervenors, and then both of the
13 attorneys from the NRC Staff. But there would be no
14 technical members from the NRC Staff.

15 MR. MILLER: Let me consult.

16 JUDGE SMITH: Was it your preference, you want
17 to have counsel along, too, Mr. Cassel?

18 MR. CASSEL: Yes, sir.

19 JUDGE CALLIHAN: Mr. Miller, is tomorrow a
20 regular working day?

21 MR. MILLER: No, I don't believe so.

22 I think that would be feasible. I think because
23 there will be counsel for the other parties present, there
24 will be an attorney for Commonwealth Edison present as well.

25 JUDGE SMITH: And I suspect another aspect for the

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1 ground rules, that we might have questions, and we will
2 try to ask them in such a way that everyone present knows
3 what the questions are, but that no members of the Staff
4 or Intervenors ask questions, except by presenting to us
5 the question that they want to ask.

6 Well, I haven't thought that through very well.

7 MR. MILLER: I guess I would object to that
8 procedure.

9 JUDGE SMITH: What I'm suggesting is that they
10 would hand us a written question to ask. I guess that's
11 not important. My concern is straying from the narrow
12 purpose of the visit, which is merely to get a general visual
13 impression of some of the hardware that we have been talking
14 about in this proceeding.

15 MR. MILLER: Yes, sir. It seems to me, to make
16 this meaningful, that you are going to have to ask questions
17 of the individual who is directing the tour. And that seems
18 to me to be perfectly appropriate. It's done in the presence
19 of the representatives of the other parties. I don't see
20 that there would be any prejudice.

21 But should the other parties have questions, I
22 suggest that they pose them within the confines of this
23 hearing room, to knowledgeable individuals. Because
24 presenting the question to you seems to me is an opportunity
25 for a communication outside the record that could influence

1 this proceeding. And that's my concern.

2 JUDGE SMITH: I was going in exactly the opposite
3 direction. However, I understand your concern. I guess
4 I didn't explain it very well. I don't see how they can
5 ask a question in the hearing room about something they
6 observe there. If there is a question to be asked and the
7 question is put to us rather than asked and answered --
8 that's up to you. You know, any way you want to do it.

9 But if they ask a question and the question is
10 answered outside the scope of the hearing that's something
11 we have no control over, I guess.

12 MR. MILLER: Yes, I would just like to point out
13 that we have said the company has made available and
14 continues to be willing to make available a comparable tour
15 for the Intervenors. If it could be that such a tour would
16 be of assistance to them in formulating questions on
17 cross-examination or developing their own direct --

18 JUDGE SMITH: As a separate tour?

19 MR. MILLER: Yes. But I think our view would be
20 that this is your show and that the others are really there
21 to observe what you see and listen to questions that you
22 ask and the answers that you receive. And that's the end of it.

23 JUDGE SMITH: Okay. Is that satisfactory?

24 MR. CASSEL: It is, Judge. And I appreciate Mr.
25 Miller's offer to make a separate tour available for the

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1 Intervenor. I think we will want to take them up on that
2 offer at the earliest convenient opportunity. And I
3 wanted to inquire whether he has any sense of whether that
4 might be possible, if not tomorrow, then maybe next week?
5 Because the sooner we get it, obviously, the more we can
6 use it in preparing our direct testimony.

7 MR. MILLER: I think that it will be okay, but
8 we will have to check. We will get back to you at a later
9 time.

10 MR. CASSEL: Fine.

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1 JUDGE SMITH: One last item, then. The
2 groundrule would be that there will be no comments by
3 the parties to the Board about what you see.

4 MR. CASSEL: I don't see any particular
5 problem with that, Judge.

6 JUDGE SMITH: Do you have a time in mind?
7 We thought midmorning would be appropriate, if you can
8 accomodate us then.

9 MR. MILLER: Any time? 9 o'clock? 10 o'clock?

10 JUDGE SMITH: How aobut 10 o'clock?

11 MR. MILLER: 10 o'clock is fine.

12 JUDGE SMITH: At the plant?

13 MR. MILLER: Yes, sir. You've been there
14 before, but we'll be happy to give you directions.

15 JUDGE SMITH: All right.

16 JUDGE CALLIHAN: The gate on the north side?

17 MR. MILLER: Yes. Still the construction
18 entrance.

19 JUDGE CALLIHAN: Main gate.

20 MR. MILLER: Did you want approximately a
21 two-hour -- we're happy to make it as long or as short
22 as you wish.

23 JUDGE COLE: Two hours is a good limit.

24 JUDGE SMITH: No more than that.

25 MR. MILLER: Are there any items that you can

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1 identify for us right now that you would like specifically
2 to arrange to see?

3 JUDGE SMITH: Generally, we want to talk about
4 the hardware items that have been discussed. We'd like
5 to see the components that are involved in the -- examples
6 of the components involved in the systems control issue.

7 We'd like to see what, for example, the
8 Sargent & Lundy panel is talking about -- conduits and
9 their supports and what a cable pan looks like, a cable
10 pan hanger, and expansion anchors is sort of interesting
11 to me, to see what problems are connected there.

12 JUDGE CALLIHAN: I gather we don't want to see
13 the missing conduit clamp.

14 (Laughter.)

15 MR. MILLER: I'm not sure it's fully accessible
16 to everybody.

17 JUDGE SMITH: Our interest is inversely
18 proportional to the amount of climbing or crawling.

19 (Laughter.)

20 MR. MILLER: I do urge you to wear clothes
21 that are comfortable, that you won't mind getting a little
22 soiled, because there is a certain amount of ducking under
23 and climbing over that's involved.

24 MR. CASSEL: Was that 10:00 a.m.?

25 MR. MILLER: At the construction entrance, which

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1 is on the far side of the plant.

2 MR. MILLER: Judge Smith, before we begin,
3 I don't know that I have introduced my partner, Martha
4 Gibbs, to the Board and the parties. Ms. Gibbs will be
5 conducting the direct examination of Mr. Bender and
6 Mr. Treece.

7 JUDGE SMITH: Ms. Gibbs.

8 (At the request of the Chairman, Volume II
9 of the day's proceedings follows, separately bound.)
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CERTIFICATE OF PROCEEDINGS

This is to certify that the attached proceedings before the
NRC COMMISSION

In the matter of: Commonwealth Edison Company
(Byron Nuclear Power Station Units 1 & 2)
Date of Proceeding: Friday, July 27, 1984
Place of Proceeding: Rockford, Illinois

were held as herein appears, and that this is the original
transcript for the file of the Commission.

Mimie Meltzer
Official Reporter - Typed

Mimie Meltzer
Official Reporter - Signature