

## NUCLEAR REGULATORY COMMISSION

---

### IN THE MATTER OF:

PORTLAND GENERAL ELECTRIC COMPANY  
et al.

(Trojan Nuclear Plant)

Docket No. 50-344SP

Place - Salem, Oregon

Date - Thursday, 14 December 1978

Pages 2983 - 2996

---

Telephone:  
(202) 347-3700

ACE - FEDERAL REPORTERS, INC.

*Official Reporters*

444 North Capitol Street  
Washington, D.C. 20001

NATIONWIDE COVERAGE - DAILY

7812280004

CR 1382  
LANDON  
MELTZER  
M.BLOOM  
jl-1

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the matter of:

PORTLAND GENERAL ELECTRIC COMPANY,  
et al.

(Trojan Nuclear Plant)

Docket No. 50-344SP

Hearing Room A  
State Capitol  
Salem, Oregon

Thursday, 14 December 1978

The hearing in the above-entitled matter was  
reconvened, pursuant to adjournment, at 9:00 a.m.

BEFORE:

MARSHALL E. MILLER, Esq., Chairman,  
Atomic Safety and Licensing Board.

DR. KENNETH A. MC COLLOM, Member.

DR. HUGH C. PAXTON, Member.

APPEARANCES:

On behalf of Licensee:

MAURICE AXELRAD, Esq., Lowenstein, Newman, Reis,  
Axelrad & Toll, 1025 Connecticut Ave., N.W.  
Suite 1214, Washington, D.C. 20036.

ROLAND F. BANKS, Jr., Esq., Souther, Spaulding,  
Kinsey, Williamson & Schwabs, 1100 S.W.  
6th Avenue, Portland, Oregon 97204.

RONALD JOHNSON, Esq., 121 Southwest Salmon St.,  
Portland, Oregon.

J1 2

## 1 APPEARANCES: (Continued)

2 On behalf of Bonneville Power Administration:

3 WILLIAM KINSEY, Esq., P.O. Box 3621, Portland,  
4 Oregon 97203.

5 On behalf of the State of Oregon:

6 JOHN SOCOLOFSKY, Esq.

7 On behalf of NRC Regulatory Staff:

8 JOSEPH GRAY, Esq., and MARJORIE ULMAN, Esq.,  
9 U.S. Nuclear Regulatory Commission, Washington,  
10 D.C.

11 On behalf of Coalition for Safe Power and pro se:

12 EUGENE ROSOLIE, 215 SW 9th Street, Portland,  
13 Oregon.

14 On behalf of Consolidated intervenors and pro se:

15 MINA BELL, 632 SW 18th Street, Portland, Oregon.

16 On behalf of Columbia Environmental Council:

17 ELIZABETH SCOTT.  
18  
19  
20  
21  
22  
23  
24  
25

mm1

C O N T E N T SWITNESSES:DIRECTCROSSREDIRECTRECROSSBOARD

Kenneth Herring )  
 Charles Trammell )  
 Vincent Noonan )  
 Daniel McDonald, Jr.)  
 Henry George )

2887

---

---

---

2930

---

2949

---

---

---

EXHIBITS:IDENTIFICATIONEVIDENCE

Staff Exhibit No. 11  
 (SER on Fire Protection)

2969

2969

CR1332  
MELTZER  
ji-1

P R O C E E D I N G S

CHAIRMAN MILLER: Are we ready?

The evidentiary hearing will resume. I think the Staff has the floor.

MR. GRAY: Mr. Chairman, at this time the Staff will call a panel of Staff witnesses, consisting of Mr. Kenneth Herring, Mr. Charles Trammell -- both of whom have appeared before in this proceeding, and Mr. Vincent Noonan, Mr. Daniel McDonald, and Mr. Henry George.

CHAIRMAN MILLER: Come forward, please.

Whereupon,

KENNETH HERRING

and

CHARLES TRAMMELL

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

and

Whereupon,

VINCENT NOONAN,

DANIEL MC DONALD, JR.,

and

HENRY GEORGE

were called to the stand as witnesses on behalf of the NRC Staff, and, having been first duly sworn, were examined and testified as follows:

j1 2

1 MR. GRAY: The Staff is presenting these witnesses  
2 pursuant to our responsibilities with regard to the public  
3 health and safety and in an attempt to address the Board ques-  
4 tions which were propounded yesterday.

5 I should point out that this should not again be  
6 taken any sort of a waiver of our legal position, whatever  
7 that might be.

8 CHAIRMAN MILLER: Yes. Let the record show that as  
9 to the witnesses produced by the Licensees yesterday and the  
10 Staff witnesses today that these witnesses are called at the  
11 Board's request. The Board accepts the responsibility there-  
12 for.

13 This is not to be construed as a waiver of the  
14 position by any of the parties, nor is counsel, in the legal  
15 sense, vouching for the relevance or germaneness of the testi-  
16 mony. The Board accepts that responsibility.

17 You may proceed.

18 DIRECT EXAMINATION

19 BY MR. GRAY:

20 Q For purposes of the reporter's information, could  
21 each of you gentlemen state your name, starting with  
22 Mr. Herring.

23 A (Witness Herring) Kenneth Herring.

24 A (Witness Trammell) Charles Trammell.

25 A (Witness McDonald) Daniel McDonald.

j1 3

1 A (Witness Noonan) Vincent Noonan.

2 A (Witness George) Henry George.

3 MR. GRAY: As I indicated Mr. Herring and Mr. Tramme

4 have previously testified, that statements of professional  
5 qualification have been presented and admitted into the record.

6 BY MR. GRAY:

7 Q Mr. Noonan, would you, for the record, state your  
8 business address, your job title, and your job description.

9 A (Witness Noonan) My business address is Washington,  
10 D.C. 20555. My job title is Branch Chief in charge of  
11 Engineering Branch Division of Operating Reactors; and the  
12 job description, basically, is I am in charge of the structural  
13 engineering, mechanical engineering, and material engineering  
14 sections for the Division of Operating Reactors.

15 Q Mr. Noonan, can you give us a summary of your  
16 educational, professional, and employment background?

17 A Basically, I have a Bachelor of Science degree in  
18 Aeronautical Engineering, a Master of Science degree in  
19 Engineering Mechanics. I have completed about a year and a  
20 half towards my law degree.

21 I have been in the industry from -- starting with  
22 1955 -- 1959, excuse me. Upon graduation from college, I  
23 basically have been in the field of structural dynamics. I  
24 have been involved in the areas of vibration, acoustics, shock,  
25 seismic areas, involving both analysis and tests.

j1 4

1 I have been -- in my career, witnessed, or have set  
2 up approximately 300 vibration tests, seismic tests, of  
3 all the electrical and mechanical equipment, and published  
4 papers on many of the tests that appear in the Shock and  
5 Vibration Bulletins, published annually -- in 1966, for two  
6 papers involving vibration tests conducted on space crafts;  
7 and in 1973, on one involving electrical-mechanical equipment  
8 on the Navy Missile Program.

9 Q Mr. McDonald, could you state your business address,  
10 your job title, and a description of your employment duties?

11 A (Witness McDonald) My address is Washington, D.C.  
12 20555. I am a Reactor Engineer, Instrumentation, and Division  
13 of Operating Reactors, Plant Systematic Evaluation Program  
14 Branch.

15 I have an A.A. degree from Solano College, Fairfield  
16 California. Prior to coming to work at the Commission, I was  
17 employed for 17 years -- University of California, Lawrence  
18 Livermore Laboratory, Livermore, California.

19 During my career at the laboratory, I was involved  
20 in nuclear effects tests at the Nevada test site, involved in  
21 the design of instrumentation control systems for the  
22 Livermore pool-type reactor, prompt burst reactors.

23 CHAIRMAN MILLER: Spell that, please.

24 WITNESS MC DONALD: P-r-o-m-p-t b-u-r-s-t reactors.  
25 These are research reactors, looking at the effects on

j1 5

1 materials, electronic components.

2 I joined the lab -- I went to work for the  
3 Commission on a loan program from the National Labs, to assist  
4 in the licensing of nuclear power plants. I was in the  
5 Instrumentation Control Systems Branch, involved in licensing  
6 for CPs, construction permits, and OLs -- operating license --  
7 in the Electrical Instrumentation Control System portions of  
8 the technical review.

9 During my review in that branch, I was involved on  
10 a generic review for the equipment qualification of Westinghouse  
11 topicals and involving the seismic qualification of equipment.

12 Currently, I am in a systematic evaluation program  
13 in which we are looking at 11 of the oldest reactors and their  
14 design in relation to our current criteria.

15 BY MR. GRAY:

16 Q Were you ever involved in the review of Trojan  
17 safety-related equipment?

18 A (Witness McDonald) When I was in the Electrical  
19 Instrumentation Control Systems Branch, I was the primary  
20 reviewer on a Westinghouse verification program, which includes  
21 Westinghouse Topical WCAP 78-21, which was the basis for  
22 qualification of electrical Class 1E equipment for the Trojan  
23 facility.

24 Q Mr. George, will you state your business address,  
25 your job title, and give us a description of your employment

j1 6

1 duties?

2 A (Witness George) My business address is Washington,  
3 D.C., ZIP 20555.

4 My past experience -- or education, first -- I have  
5 a Bachelor of Engineering Science degree in Mechanical Engineer-  
6 ing from Johns Hopkins University. I received that in 1971.  
7 I also have a Masters Degree from the University of Alabama,  
8 and it is in Administrative Science.

9 I have worked for the Army Missile Command, Redstone  
10 Arsenal, Huntsville, Alabama. My responsibilities there  
11 involved evaluation and test programs for various hydraulic  
12 systems in missile control.

13 I have been working for the Nuclear Regulatory  
14 Commission for the past five years, and in my present position  
15 as Engineering Systems Analyst, and have been involved in  
16 evaluation of quality assurance programs, test programs, and,  
17 most recently, in evaluation of fire protection programs at  
18 operating plants.

19 Q Were you involved in fire protection review for  
20 the Trojan Nuclear Plant?

21 A Yes, I was. Over the past three years, I have been  
22 involved in the review of the fire protection programs at a  
23 number of operating plants, which included Trojan.

24 We pretty well completed approximately 12 reviews  
25 this time. Fire protection at Trojan was one of them.

j1 7

1 CHAIRMAN MILLER: Fire protection and what?

2 WITNESS GEORGE: Fire protection at Trojan was one  
3 of the programs there.

nd j1

1 t1

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

T2 mm1  
MILTNER/

1 BY MR. GRAY:

2 Q These next series of questions will be directed to  
3 Mr. Noonan and Mr. McDonald.

4 Do you gentlemen have before you a document which  
5 is titled, "Report on Seismic Audit of Westinghouse Electrical  
6 Equipment" which has been previously identified as Staff  
7 Exhibit 10?

8 Do you have that?

9 A (Witness Noonan) Yes, we do.

10 Q Are you familiar with that document?

11 A Yes, we are very familiar with the document.

12 My entry into the NRC back in 1974, I was made a  
13 member of this seismic review team that was started by the  
14 Engineering Branch and involved the Electrical Branch with  
15 Mr. Dan McDonald who is sitting next to me.

16 As a result of the audits that were performed on  
17 a number of plants, this document is the net results of those  
18 audits.

19 Q Could you briefly explain what the audit  
20 which resulted in this document, involved?

21 A The audit consisted of, number one, we started  
22 out with the Westinghouse equipment, looking at the qualifica-  
23 tion type testing that they did, their methods, methodology,  
24 the types of tests, whether it was done under sine testing  
25 or multi-frequency testing.

MMO

1 CHAIRMAN MILLER: Multi what?

2 WITNESS NOONAN: Multi-frequency testing.

3 CHAIRMAN MILLER: Gentlemen, it would be helpful --  
4 I know it is natural to look at the interrogator. But  
5 remember that the Board has to hear what you are saying. You  
6 have to speak clearly, you have to locate the microphones  
7 because you are projecting orally now. If you will keep that  
8 in mind, it will help us.

9 WITNESS NOONAN: Okay, sir.

10 We looked at -- as I said, looked at the Westinghouse  
11 equipment. First we looked at it from the standpoint of  
12 the methodology and then, Mr. McDonald can address the  
13 operability part of that question.

14 We basically visit a number of plants, looking at  
15 the equipment itself to determine in our own minds whether or  
16 not the applicability of the 1971 criteria as used in a lot  
17 of this equipment was indeed the right type of testing to  
18 be done for this equipment.

19 If not, we requested those changes be made, or  
20 maybe some new testing. In any event, maybe some changes in  
21 equipment inside these cabinets.

22 So we looked at it from both the construction  
23 standpoint and from the operation standpoint.

24 BY MR. GPAY:

25 Q Both of you gentlemen, then, did participate in the

mm3 1 audit which resulted in this report, is that correct?

2 A (Witness McDonald) Yes, that is correct.

3 A (Witness Noonan) Yes, that is correct.

4 MR. GRAY: Mr. Chairman, at this point I ask that  
5 this document which has been identified as Staff Exhibit No. 10  
6 be admitted into evidence.

7 CHAIRMAN MILLER: Is there any objection?

8 (No response)

9 Staff Exhibit 10 will be admitted into evidence.

10 (The document heretofore  
11 marked Staff Exhibit 10 for  
12 identification, was received  
13 in evidence.)

14 BY MR. GRAY:

15 Q I am not totally sure of whether you may have  
16 already mentioned this, but would you gentlemen explain the  
17 results of this audit which are embodied here in Staff  
18 Exhibit 10?

19 A (Witness McDonald) As we have indicated,  
20 Mr. Noonan has indicated, the evaluation in a seismic area is  
21 divided into two technical areas; one being the methodology, of  
22 which mechanical engineering has the responsibility, and the  
23 functional operability performance requirements, of which the  
24 electrical instrumentation control systems branch has  
25 responsibility.

mm4

1           The topical reports system was devised as a means  
2 of doing a single evaluation providing a generic envelop  
3 that could encompass many applications.

4           As a result when it is assigned for review and  
5 evaluation it is looked at in a very thorough manner.

6           As a result of the seismic area there were three Westinghouse  
7 topicals, 78-17, 78-21 and 80-21, of which the Trojan facility  
8 falls into the envelop of 78-21.

9           In the initial evaluation of the report it was  
10 found in looking at the test results as identified in the  
11 topical, that there were some questions even though it did  
12 appear as the result of the tests, that the equipment would  
13 function.

14           As a result of this we did our evaluation and  
15 asked for additional information on the concerns related to  
16 the particular type of equipment, its sensitivity to the  
17 different methodologies and whether or not the performance  
18 required met the design specifications for the application  
19 in the plant.

20           As a result of this there is much documentation,  
21 and an additional report to the one that has been presented  
22 in evidence will be completed, I believe, in approximately  
23 two weeks, which is a summation of what we term the  
24 Westinghouse verification program, which is the reports that  
25 I mentioned, with an additional 20 topical reports to support

mm5

1 it.

2 CHAIRMAN MILLER: Pardon me.

3 Are you familiar with the contents of that report  
4 which you indicate will be issued in about two weeks, at  
5 least sufficiently to enlighten the Board as to the matters  
6 that were contained there that might be applicable in this  
7 proceeding?

8 WITNESS MC DONALD: Yes, sir. I was one of the  
9 primary authors for the input on the report. There were  
10 several people -- but, yes.

11 In relation to 78-21 we have found the topical  
12 report acceptable as a bases for licensing plant, and the  
13 seismic qualification for the equipment identified in it.

14 As I indicated, there were 20 supporting topicals.  
15 Many of them were as a result of additional verification  
16 testing that was done, which, in fact, confirmed the initial  
17 testing even though we used some of the different methodologies  
18 depending on the mechanical engineering assessment of the type  
19 of equipment and its sensitivities to the methodology used.

20 In these reports, as I indicated, the initial  
21 tests, for example, design requirements are that they function  
22 before, during and subsequent to the design event. For  
23 example, the earthquake.

24 In some cases maybe the equipment was not tested  
25 during the seismic shaking, but did function before and after.

mm6

1 And when we did the verification tests they did confirm that  
2 it would conform during, as well as before and after, as an  
3 example.

4 I believe that that kind of, briefly, summarizes  
5 what will be in the report.

6 In addition to the report itself there are, I  
7 believe, 100 and some document references of all the  
8 information that was the bases for our conclusions.

9 WITNESS NOONAN: If I could add to that a little  
10 bit, Mr. Gray.

11 Part of this report also includes the paper that  
12 we have just submitted into evidence as Exhibit No. 10.  
13 I would like to expand slightly on that paper and the way  
14 that it is written.

15 The paper itself endorses the latest IEEE  
16 document 344, 1975 as being the appropriate document to  
17 proceed with now from this point in time for testing of  
18 new equipment.

19 This paper is not intended to indicate that we  
20 invalidate any testing done prior to issuance of 344, 1975.  
21 In fact, in our audits we found that under certain cases,  
22 testing that was done under the 1971 version of 344, and  
23 particularly some of the sine-beat testing, the testing is --  
24 the single-axis type sine-beat testing as prescribed in the  
25 1971 document -- is by far the more conservative test in

mm7

1 certain cases. It has to be looked at from the standpoint of  
2 the type of equipment you are talking about, the judgment  
3 made as to the appropriateness of which test is the more  
4 conservative or the better test for that type of equipment.

5 So I would just like to make that point that this  
6 document, you know, doesn't say that testing done under the  
7 old 1971 document has been invalidated.

8 BY MR. GRAY:

9 Q With regard to Staff Exhibit 10, I believe page 12  
10 of that document, there were five items or conditions.

11 Can you explain -- do you have that document?

12 A (Witness McDonald) Yes.

13 Q Can you explain the significance of those  
14 conditions and in addition indicate if you can, direct that  
15 toward Trojan and toward the significance of those conditions  
16 with regard to the qualification of Trojan equipment and the  
17 results as to this audit.

18 A (Witness Noonan) Okay. I will address a few  
19 of the items and Mr. McDonald will address the other ones.

20 I will basically talk about -- all five items  
21 have been resolved, particularly for the Trojan plant, all  
22 five items are resolved. And it would say that the testing  
23 done for Trojan is -- has both been approved for the type of  
24 testing they did -- has been approved as the adequate  
25 seismic qualification of that equipment from a safety standpoint.

nr-8

1 The one of substance, I think, is Item No. 3  
2 where we talk about the performance of it, and I think I  
3 would like to have Mr. McDonald talk about that particular  
4 paragraph, because I think that is the one that should be  
5 discussed, probably.

6 A (Witness McDonald) Item 3 is the electrical  
7 performance. And as I have indicated, we expect within about  
8 two weeks to have the entire report that addresses all  
9 areas, and its supporting documentation.

10 As far as Trojan facility and the requirements of  
11 78-21, they have met all requirements the test results  
12 indicate.

13 One thing I might mention in addition, the  
14 confirmatory testing done in most cases was done at a higher  
15 level than required by the generic topical report which did  
16 provide even the additional margin in the assurance of the  
17 safety requirements and operability.

18 CHAIRMAN MILLER: At what level were you speaking?

19 WITNESS MC DONALD: Do you know? The level of 80?

20 WITNESS NOONAN: I don't recall the exact level.

21 It is what they call the high seismic area that would be  
22 appropriate to the Diablo Canyon area.

23 WITNESS MC DONALD: The PG&E they refer to as  
24 Pacific Gas & Electric, I'm not sure of the exact number, but  
25 it is higher than the 78-17 level.

nd T2

t3mm1

BY MR. GRAY:

Q Would you gentlemen explain what standards the Staff considers to be appropriate, and what standards were used to assure the seismic capability of the electrical and mechanical equipment at Trojan?

A (Witness Noonan) We considered, as mentioned previously, the IEEE 344-1971 document as the basic document.

We looked at it from that standpoint. We considered what the updated version, the 1975 version has, as far as the effect on the previous qualification tests, whether there was anything we wanted to have redone because of the new specs.

We looked at the Westinghouse topicals WCAP 78-21 primarily, as it related to the Trojan equipment. And we looked at the test levels and how the spectrums were shaped.

We talked about the amplitude levels based upon what levels in the building the floor response spectrum was developed.

So all that criteria was considered in this evaluation.

In addition to that, Mr. McDonald has some other criterion.

A (Witness McDonald) I'm on two 8-2 electrical electronic engineering working groups developing daughter

end MM  
jl fls

MELTZER

j1 1

3 contd

1 standards for qualification of equipment for Class IE electrical  
2 functions.

3 As we are all aware, as we learn more, and technology  
4 increases, we find more ways to demonstrate by tests and  
5 analysis whether or not we have assurance that equipment can  
6 function and perform its desired safety-related requirement.

7 As Mr. Noonan indicated, in this case, the verifica-  
8 tion tests done, in fact, confirm that the initial were adequate  
9 and for certain types of equipment probably were more severe  
10 than the newer requirement.

11 From the functional point of view, I might mention  
12 -- and this was applicable to Trojan -- the output relays for  
13 solid state protection system were all replaced with rotary-  
14 type relay, the basis we had on the initial tests -- there were  
15 some spurious operations.

16 It did not indicate that all of the relays would  
17 operate spuriously, but there was a chance. In most cases, the  
18 spurious operation would lead in a safe direction and provide  
19 the safety function.

20 But, under a certain set of conditions, there could  
21 be possibility of getting an adverse function that might be  
22 detrimental, so we did, in fact, replace all the output relays.

23 Well, I do know that Trojan has replaced theirs.  
24 But generally speaking, for the functional requirements, we  
25 have confirmed that the initial tests were adequate and did

j12

1 demonstrate the operability.

2 CHAIRMAN MILLER: For the record, could you  
3 describe the way that you used the term "spurious"?

4 WITNESS MC DONALD: Spurious -- IEEE 279 gives us  
5 guidance in designing the electrical protection system. It  
6 indicates that it should be designed to function, as designed,  
7 and provide the safety-initiating signals, safety requirements.

8 If, in fact, given a seismic event and a safety  
9 signal is not required by the variables monitored by some  
10 coincident logic, indicating that a safety function should  
11 occur, but an arbitrary bounce -- or I use the term "spurious  
12 operation", which initiates a safety function when it was not  
13 required, would be in the nature of spurious.

14 Most designs are based on if a spurious occurs, a  
15 failsafe design, it would provide the safety function, but it  
16 would depend on other conditions. It may not be desired under  
17 a certain set of conditions.

18 CHAIRMAN MILLER: Thank you.

end MM:j1  
LONDON  
fls

e t3

20

21

22

23

24

25

1 BY MR. GRAY:

2 Q To your knowledge, is there any electrical safety-  
3 related equipment in the Trojan Control/Auxiliary/Fuel  
4 building complex that has not been tested or qualified accord-  
5 ing to the standards required for Trojan?

6 A (Witness McDonald) To my knowledge, there are none.

7 Q Mr. Trammell, the Licensing Board inquired yesterday  
8 into engineered safety feature switchgear, and a matter with  
9 regard to concerns that may have been raised as to that  
10 equipment, and how those matters were resolved at the operating  
11 license stage.

12 Can you explain how those matters were resolved?

13 A (Witness Trammell) Yes. The branch input from Mr.  
14 Pollard's branch, Electrical Instrumentation and Control  
15 Systems Branch, dated April 19, 1974, and enclosure 5 to his  
16 limited appearance statement, did indicate an open item under  
17 Section 8.3.2, saying that the entire resolution of the  
18 seismic qualification of the ESP switchgear would have to take  
19 place later.

20 Subsequently, PGE amended their application in May  
21 1974 with Amendment 13 wherein they state that they had made  
22 some changes which are more or less suggested in this Branch  
23 input. And as a final resolution, the Safety Evaluation Report  
24 of October 1974 states that there is no open items in this  
25 area.

WEL 2

1 CHAIRMAN MILLER: Did it cover this particular  
2 matter, or was it just a general statement?

3 WITNESS TRAMMELL: No, it covered these concerns  
4 specifically. I wasn't involved at the time, but very  
5 typically what happens, and it's understandable, is when a  
6 project manager gets an input like that, which basically  
7 says later that's not a solution-oriented type of input,  
8 actions are usually taken one way or another to get the thing  
9 moved off dead center. And apparently that's what happened  
10 in May of '74 when PGE volunteered an amendment to their  
11 FSAR.

12 CHAIRMAN MILLER: Are you referring to page 10  
13 of Mr. Pollard's written limited appearance statement,  
14 paragraph 8.3.2?

15 WITNESS TRAMMELL: 8.3.2, page 10, yes, sir.

16 CHAIRMAN MILLER: Of Enclosure 5 thereof?

17 WITNESS TRAMMELL: Yes.

18 CHAIRMAN MILLER: I think there are several matters  
19 that I'd like to be sure you are addressing specifically.

20 One of them relates to the types of relays which  
21 will be replaced that may have been addressed, but I'm not  
22 sure.

23 Secondly, the consideration of automatically  
24 blocking the tripping functions of other relays, and so forth.  
25 Next is the additional information on the seismic qualification

wel 3

1 program, and the results of the evaluation of the inadequacies  
2 of the testing will be reported in a supplement to this.

3 You may have covered it, but I'd like you to cover  
4 specifically and concretely those matters, if you would,  
5 please.

6 WITNESS TRAMMELL: I'll read from the original  
7 Safety Evaluation Report, as published by the Commission,  
8 taking those items in turn:

9 "The Applicant subsequently stated that those  
10 types of relays that do not have adequate capability  
11 to withstand seismic events will be replaced with  
12 relays of a different manufacturer for which test  
13 data indicate a capability of 5g, a greater capabil-  
14 ity than is required."

15 So I believe that takes care of one of the items.

16 CHAIRMAN MILLER: I think we've had testimony,  
17 have we not, that that was in fact done, that the replacement  
18 actually did occur. Is that correct, Mr. Axelrad?

19 MR. AXELRAD: Yes.

20 CHAIRMAN MILLER: I so understood from the  
21 witnesses yesterday, but I wanted to understand we were  
22 talking about the same thing.

23 MR. AXELRAD: Yes.

24 WITNESS TRAMMELL: The other item is:

25 "Relays that are mounted for locations at which

1 the amplification factor of the emergency diesel  
2 generator switchgear has not been determined will  
3 be automatically disconnected from breaker tripping  
4 circuits when the diesel generator has received an  
5 automatic start signal."

6 The third item, I believe, is:

7 "Other relays which could mis-operate during  
8 a seismic occurrence are used for alarms only so that  
9 at worse their mis-operation would only cause an  
10 alarm in the event of an SSE."

11 In the conclusion we find that:

12 "The modifications proposed by the Applicant  
13 will provide reasonable assurance that the occurrence  
14 of an SSE will not result in the loss of capability  
15 to perform the safety functions provided by safety-  
16 related electric systems. Therefore, we conclude  
17 that the seismic qualification of the engineered  
18 safety feature switchgear meets the requirements of  
19 the Commission's regulations and is acceptable."

20 MR. ROSOLIE: Excuse me, Mr. Chairman.

21 Maybe Mr. Trammell can cite the pages and sections  
22 he's reading from.

23 CHAIRMAN MILLER: Could you, please?

24 WITNESS TRAMMELL: This is Section 8.3.2 of  
25 the original Safety Evaluation Report for Trojan, page 8-6

1 and 8-7.

2 BY MR. GRAY:

3 Q Mr. George, you indicated that you were involved  
4 in the fire protection review for the Trojan Nuclear Plant,  
5 is that correct?

6 A (Witness George) That's correct.

7 Q Based on your involvement and your review therein  
8 did you identify any fire control or protection equipment  
9 that is classed as safety-related in the Control/Auxiliary/  
10 Fuel building complex?

11 A Based on our review we are not aware of any  
12 systems in those areas, any fire protection systems, which  
13 are seismic-1.

14 CHAIRMAN MILLER: Are you giving some term of art  
15 in seismic-1? In other words, we want the whole picture.  
16 You're not limiting it, are you?

17 BY MR. GRAY:

18 Q What are you referring to?

19 A (Witness George) I'm not sure I understand.  
20 Whether there was any seismic design criteria for the systems,  
21 is that what your question is?

22 Q Well, what we're really asking is, the fire  
23 protection and control equipment in the building complex, is  
24 that classed as or considered to be safety-related equipment  
25 as we refer to safety-related equipment, such as the

wel 6

1 emergency core cooling system?

2 A No, it's not classified as safety-related.

3 Q Will you identify and list, to the best of your  
4 ability, any fire protection system, components and equipment  
5 in the Control/Auxiliary/Fuel building complex?

6 A Okay. At the time of our review, these building  
7 included a number of various protective features.

8 They included some fire detection devices in a  
9 number of areas, including cable spreading room and some  
10 additional rooms.

11 They included hose standpipes and manual hose  
12 stations.

13 It also included portable fire extinguishers,  
14 CO<sub>2</sub> hose cart.

15 There are also fire barriers, which are separating  
16 the various areas into smaller rooms, so that the fire  
17 effects would be confined to those rooms.

18 I think that essentially covers -- excuse me --  
19 there is also an automatic sprinkler coverage in a couple of  
20 locations. The cable spreading room has an automatic sprinkler  
21 system. There's a radwaste and bailer area which also  
22 included a sprinkler system and water spray systems on a  
23 number of charcoal filter units located in the Auxiliary  
24 building.

25 Q Has there been any evaluation made of the

wel 7

1 possibility of a fire being initiated by a seismic event?

2 A We have not performed any such evaluation at  
3 Trojan.

4 Q Can you indicate why?

5 A The Staff criteria which were developed subsequent  
6 to the Browns Ferry fire are contained in Appendix A to the  
7 Branch Technical Position 9.5-1, and that document does not  
8 establish any requirements for fire protection systems to  
9 be operable following a seismic event.

10 The basis for not having this requirement in  
11 Appendix A of the Branch position stems from a number of  
12 reasons, a combination of reasons.

13 Essentially, the Staff does not believe that a  
14 seismically-induced fire is a likely event. The types of  
15 failures of equipment which could result from a seismic  
16 event and subsequently lead to a fire, generally are not  
17 located in safety-related areas, things like turbine lube oil  
18 piping, some hydrogen lines, that sort of thing.

19 You generally have the fire barriers separating  
20 safety-related areas from the non-safety areas.

21 Additionally, there is reasonable assurance that  
22 fire protection systems would be operable following a seismic  
23 event. This includes a number of things. The manual fire  
24 fighting capability, portable extinguishers would still be  
25 available. Personnel would be available. All plants, Trojan

1 included, are required to have a fire brigade on site at all  
2 times, and these individuals are trained to fight fires  
3 manually using portable extinguishers or whatever equipment  
4 is available.

5           Additionally, historical data which the Staff  
6 has, which provides information on the capability of fire  
7 protection systems to withstand earthquakes that have  
8 occurred in the past, indicate that as far as fire detection  
9 systems, failures which were identified where earthquakes  
10 have occurred, where one switch did not render the systems  
11 inoperable --- it might have been mounting brackets ---

12           CHAIRMAN MILLER: Might have been what?

13           WITNESS GEORGE: Pardon me?

14           CHAIRMAN MILLER: Might have been what?

15           WITNESS GEORGE: They included things such as  
16 mounting brackets, but the detector remained in place and  
17 the detector remained operable.

18           As far as suppression systems and sprinkler  
19 systems, in those areas where they are designed to the Code  
20 requirements, the NFPA Code requirements, which establishes  
21 requirements on size of piping and mounting techniques and  
22 materials, the history has shown that in nearly all cases  
23 these remained in place and remained functional.

24           Again, most of those failures have been failures  
25 of perhaps a mounting support. The piping stays in place.

1 Ones where the equipment was found to fail was one where  
2 the building collapsed. But the suppression system didn't  
3 fail in those cases where the building remained intact.

4 CHAIRMAN MILLER: What magnitude of earthquakes  
5 were involved in those that you mentioned?

6 WITNESS GEORGE: Okay. I couldn't specify exactly  
7 what it is. The San Fernando earthquake of '71 was where a  
8 large part of the data comes from. I'm not familiar with  
9 the magnitude there. The area involved was, of course,  
10 basically San Fernando radius, looking at those buildings.

11 I don't know if anyone else on the panel could  
12 offer anything on that.

13 DR. PAXTON: You were, then, referring to general  
14 experience, not experience in nuclear plants, I gather?

15 WITNESS GEORGE: That's correct, relating to  
16 general experience on fire protection systems installed to  
17 NFPA Code requirements.

18 I will add that in our review we looked very  
19 closely at the design of the fire protection systems at  
20 Trojan, and they are in conformance with the Codes.

21 DR. MC COLLOM: The NFPA Codes?

22 WITNESS GEORGE: The NFPA Codes, that's correct.

23 BY MR. GRAY:

24 Q For the record, can you tell us what NFPA is?

25 A (Witness George) National Fire Protection

1 Association codes.

2 I might also add that they include the National  
3 Electric Codes, so that it's a combination of the two that  
4 apply to the detection systems.

5 So what this means is that the Staff criteria  
6 does not require a seismic evaluation, an evaluation of the  
7 effects or the potential for seismically-induced fire.

8 However, in the course of our review we are taking  
9 a look at hazards in the plants and where they are located,  
10 and of course we did this at Trojan, in taking a look at  
11 things which, if they failed and resulted in a fire, what  
12 is the effect on the safety systems.

13 DR. MC COLLOM: You started off, "In our review."  
14 What review is this?

15 WITNESS GEORGE: I'm sorry. This is in our  
16 fire protection review of Trojan. I'll go back and explain  
17 that.

18 After Appendix A to the Branch position was  
19 issued, we initiated, then, the review of all the operating  
20 plants in terms of fire protection programs.

21 At Trojan this began -- I believe it was like  
22 February, March, of 1977 -- somewhere in that time period  
23 we initiated it.

24 We visited the plant site a couple of times and  
25 obtained information from the Licensee based on an analysis

w:1 11

1 which he had performed, along with fire protection consultants.  
2 And the Staff evaluated that with the assistance of fire  
3 protection consultants also.

4 CHAIRMAN MILLER: Do you have any reports or  
5 documentation as a result of that in relation to Trojan?

6 WITNESS GEORGE: Yes. We have a Safety Evaluation  
7 which was issued in March of '78 which addresses our review  
8 of Trojan.

9 CHAIRMAN MILLER: Is that in evidence, or has  
10 that been marked?

11 MR. GRAY: No, that has not been marked, Mr.  
12 Chairman.

13 CHAIRMAN MILLER: Do you plan to do so?

14 MR. GRAY: If the Board wishes we can offer that  
15 into evidence.

16 CHAIRMAN MILLER: Well, since it's been referred  
17 to in the testimony and it appears there is documentation,  
18 I think the Board would prefer. If you don't want to vouch  
19 for it, we'll mark it.

20 MR. GRAY: I probably don't have quite the number  
21 of copies ---

22 CHAIRMAN MILLER: All right, we'll relieve you  
23 temporarily of that imposition, but if we can get our hands  
24 on at least one copy, and then you can supply copies to the  
25 parties when you are able.

wel 12

1 WITNESS GEORGE: I might add that some of the  
2 information which, you know, might be pertinent to what we're  
3 discussing here, I don't believe we discussed in detail in  
4 the SER because we weren't looking at the potential for  
5 seismically-induced fires.

6 However, as I indicated, we did look at a number  
7 of hazards which, if they failed, potentially could affect  
8 safety-related equipment. And in many cases that includes  
9 piping or tubing, which may not be seismically qualified.

10 We looked at things like hydrogen lines and how  
11 they're routed through the plant, propane lines, fuel oil  
12 lines, and those types of things, not considering what the  
13 cause was of failing but just considering failures as a  
14 result of fire.

15 At the Trojan plant, in summary, essentially what  
16 we found was that in the areas where this piping is located  
17 includes hydrogen lines for the volume control tank, propane  
18 and other gas lines running into a lab, and also fuel oil  
19 lines for the diesel generator and diesel driven aux feedwater  
20 pump. These are lines, now, that are running through or  
21 into safety-related buildings.

22 What we found is that the areas where they're  
23 routed they would not affect safety-related equipment if  
24 they failed and resulted in a fire, with the exception of  
25 those that are in diesel driven aux feedwater pump rooms and

fls wel

j1 1

1 diesel generator rooms.

t4 cont'd

2 But, that piping, the piping in those areas is  
3 seismically qualified.

4 BY MR. GRAY:

5 Q You mean if the piping for the fire protection  
6 system?

7 A. (Witness George) No, excuse me. Let me clarify  
8 that.

9 The piping that I am referring to is the fuel oil  
10 lines for that equipment which, if it failed, resulted in a  
11 fire that could effect the safety-related equipment. It is  
12 that piping which I referred to.

13 To add a little bit more to that, the hydrogen  
14 lines to the volume control tank come into the auxiliary  
15 building. Those lines, rather than directly to the volume  
16 control tank, they go through one other area prior to going  
17 into the volume control tank room.

18 There is a single line, excuse me.

19 And we looked at that area, and the fire in that  
20 area would not effect any equipment which would be required to  
21 safely shut down the plant.

22 Additionally, that hydrogen line included, in an  
23 excess flow check valve, located at the tank, such that if you  
24 had a break in the line, the valve's sensitive cuts off the  
25 flow.

11 2,           The line that is going to the lab from propane and  
1           other tanks -- the tanks are located outside the auxiliary  
2           building, and that line runs directly into the lab. It does  
3           not go through any safety-related areas.  
4

5           So, I guess, in summary, from what we found, even  
6           though we were not looking specifically at Trojan for  
7           seismically-induced failure of this equipment, or this piping,  
8           if it were to fail, we do not believe that there would be any  
9           adverse effects on safety-related equipment or the capability  
10          of safety -- shutdown the plant.

11          WITNESS HERRING: Chairman Miller, in regard to  
12          your question about the magnitude of the San Fernando event,  
13          it was magnitude 6.6.

14          And, for the Board's information, if they would like  
15          to get a feel for the accelerations which were measured at  
16          various places, you can refer to an article entitled,  
17          "Accelerations in Rock of Earthquake in the Western United  
18          States," by Schnabel, S-c-h-n-a-b-e-l, and Alton Seed.

19          It was published in the bulletin of the Seismological  
20          Society of America, Volume 63, Number 2, pages 501 to 516,  
21          April 1973.

22          CHAIRMAN MILLER: Thank you.

23          MR. GRAY: Mr. Chairman, at the moment, I don't  
24          know quite how to handle the fire protection safety evaluation  
25          issue by Staff. Possibly, at the next recess I can --

j1 3

1 CHAIRMAN MILLER: Whatever is convenient to you.

2 MR. GRAY: I could obtain copies of that, and we  
3 could offer that prior to the time these gentlemen are excused.

4 CHAIRMAN MILLER: Very well.

5 BY MR. GRAY:

6 Q Mr. George, what assurances do we have that if a  
7 safe shutdown earthquake occurs at the same time there is a  
8 fire in the control, auxiliary or fuel building on plaques,  
9 that adequate fire protection will be available, that adequate  
10 fire protection measures can be taken.

11 A (Witness George) As I indicated earlier, the Staff  
12 does not believe that seismically-induced fire, which could  
13 affect safety equipment, is a credible event, but nonetheless,  
14 if one were to occur, it appears that it would not affect  
15 safety-related equipment.

16 If we then talk about a randomly-occurring fire, in  
17 a safety-related area, I believe we would still have the pro-  
18 tection available.

19 As I noted before, the suppression systems -- and,  
20 of course, even if they are not available, you have manual  
21 systems. You have fire brigade available, on site. Manual  
22 systems would include use of portable extinguishers.

23 Additionally, the technical specifications on the  
24 facility, which are implemented at Trojan, require that if  
25 systems, fire protection systems, in the safety-related areas

1 become inoperable. The sprinkler system in the cable spreading  
2 room, for example, is inoperable. It requires that a fire  
3 watch be constantly in that area until the system is restored,  
4 which would mean that if any fire situations were to develop,  
5 someone is there to immediately respond.

6 I might also add that a fire in that area is  
7 extremely remote. There are no ignition sources and nothing  
8 that is easily ignitable.

9 There would have to be some transient-type load  
10 brought into the area and allowed to burn for a period of time  
11 to get cables going. And it is not very likely there's someone  
12 in the room.

13 CHAIRMAN MILLER: In that regard, you said someone  
14 in there to respond. You hypothesized an earthquake, a  
15 seismic event, of not inconsiderable magnitude; people might  
16 not be responding as precisely as though they were dealing  
17 with a fire brigade only, would they?

18 Have you taken that into consideration?

19 WITNESS GEORGE: That may very well be. We didn't,  
20 in our review, take a look at how many operators would be  
21 required to shut down the plant following a large seismic  
22 event.

23 The technical specification requirements require  
24 that a minimum fire brigade of five personnel be available on  
25 site at all times, not to include the operators required to

j1 5

1 shut down the plant. And that would be, of course, the  
2 normal operating crew, and perhaps some of those five must be  
3 used for shutdown. You still have sufficient people, I believe.

4 CHAIRMAN MILLER: Have you really seriously consid-  
5 ered the relationship that would exist if you had both earth-  
6 quake of substantial magnitude and a fire, whether or not  
7 caused by that earthquake, what the situation would be, what  
8 the scenario would be like in terms of, in your case, fire  
9 control?

10 WITNESS GEORGE: We didn't look at that  
11 specifically in our review, but --

12 CHAIRMAN MILLER: No, I am not getting in your  
13 review now. You are testifying before the Board, and we would  
14 like to have the benefit of your expertise, and I might say  
15 that I am asking now about the possibilities, whether you  
16 regard them as -- are they credible, or not?

17 I am asking you now to address, as though that  
18 were happening, even though that is highly hypothetical.

19 A. I understand the area, the control auxiliary fuel  
20 building, where this could potentially have the greatest  
21 effect on, say, shutdown capability, would be the cable  
22 spreading room; and in that area what we found, in our review,  
23 is that redundant cables are fairly well separated.

24 There are Marinite-type fire barriers which are  
25 also located in this area between redundant divisions.

j1 6

1 CHAIRMAN MILLER: Separating redundant divisions?

2 WITNESS GEORGE: Yes.

3 CHAIRMAN MILLER: In all cases where such redundancy  
4 has a safety factor, or safe shutdown factor?

5 WITNESS GEORGE: That's correct, wherever.

6 It is ever coming in proximity; if it is clear on  
7 opposite sides of the rooms, there is no barrier, but an  
8 intervening space. And that was something which we looked  
9 very closely at in our review, looked at drawings which traced  
10 out the location of these cables and looked at it when we were  
11 at the site.

12 CHAIRMAN MILLER: So you are satisfied that the  
13 as-built, as reflected in the drawing, are accurate enough  
14 for this purpose, at least?

15 WITNESS GEORGE: Yes.

16 Now, to postulate a fire which could affect both  
17 divisions, I think it would have to be one where nobody  
18 responded, and it would be something on the order of perhaps  
19 over an hour and a half, something in that time period.

20 Tests have been performed on the Marinite barriers  
21 that Rancho Seco and at other plants, by Rancho Seco facility,  
22 which indicate that you can expect something on that time order,  
23 fire resistance for that type of barrier.

24 BY MR. GRAY:

25 Q Mr. McDonald and Mr. Transwell -- Mr. McDonald, are

j1 7

1 you familiar with the event that occurred at the Zion facility,  
2 involving a bypassing of certain signaling instrumentation that  
3 resulted in the draining of a pressurizer?

4 A (Witness McDonald) Yes, I am.

5 Q Could you briefly describe what that incident was?

6 A The Zion plant was a hot shutdown condition, at  
7 zero power. The plant manager requested they do some surveil-  
8 lance testing while they ran this data. The normal procedure  
9 does not allow for putting dummy test signals into instrumenta-  
10 tion channels simultaneously for extended period.

11 If I recall, there were something like 31 signals  
12 simulated into the instrumentation system, of which four were  
13 pressurized, or pressure, and three were pressurized, or level.

14 These simulated signals masked if you made the actual  
15 condition of the level and pressure in the pressurizer. And  
16 in the particular Westinghouse design they used the same instru-  
17 ments to provide the signal for the safety function, and through  
18 qualified isolation device, as is used also for control func-  
19 tion.

20 If I recall, I believe these dummy signals were in  
21 for a period of 40 minutes, and the Zion operator noticed that  
22 there were some strange readings as a result of the control  
23 signals being fed to the operator.

24 So he requested that they remove the signals, and,  
25 in fact, the pressurizer pressure and level was low, and the

jl 2

1 injection pumps came on about and brought the system back up.

2 There was an abnormal occurrence report to Congress.  
3 I believe it was 77-7. It's a new reg report, 0090-10. It  
4 indicated that this was a procedural error, and it was improper  
5 review and approval of the procedures to do the tests.

6 And I believe that corrective action in the case  
7 was they modified their test, their procedural requirements,  
8 and instructions to the management people to adhere to the  
9 standard procedures, as applies to their plant.

end WEL:jl

end t4

MB fls

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

5 MADBLON/  
mphl

1 Q Mr. Trammell, are you aware of measures that  
2 have been taken to assure that Zion-type incidents during  
3 reactor operation will not occur at Trojan?

4 A (Witness Trammell) Yes.

5 Following the Zion event a circular from the  
6 Office of Inspection and Enforcement was issued. It was  
7 Circular 77-13, dated September 22, 1977. It went to all  
8 operators of nuclear power plants cautioning them of the  
9 event that occurred at Zion, which was quite a strong  
10 function of management controls at the plant.

11 The Office of Inspection and Enforcement follow-  
12 ed up on PGE's actions in response to the circular. They  
13 have resolved that no action was required, that the proce-  
14 dures were in place at Trojan and were acceptable as they  
15 stood.

16 This is documented in Inspection Report -- on  
17 Trojan, Inspection Report 77-22 in 1977.

18 A (Witness McDonald) I might add one thing that  
19 I neglected to state.

20 In the Zion event in spite of having the 31  
21 channels bypassed there was still protection for the plant:  
22 the high containment signal and the steam generator differ-  
23 ential would have still provided a protective signal if in  
24 fact needed.

25 Q I address this next question to each member of

mpb2 1 the panel. And I ask you to respond to the best of your  
2 knowledge.

3 Are there any unresolved safety issues with  
4 regard to the seismic capability of safety-related equip-  
5 ment in the control, auxiliary, and fuel building complex  
6 at Trojan that would bring into question the ability to  
7 shutdown the reactor in case of a seismic event up to and  
8 including the .25g SSB?

9 A (Witness Herring) None to my knowledge.

10 A (Witness Trammell) None to my knowledge.

11 A (Witness McDonald) None to my knowledge.

12 A (Witness Noonan) None to my knowledge.

13 Q I'm not sure if Mr. George is actually qualified  
14 to respond to that since he has been involved only in the  
15 fire protection portion.

16 CHAIRMAN MILLER: Let me inquire:

17 Not to your knowledge. Have you gentlemen  
18 made any check of the so-called list of unresolved safety  
19 issues, unresolved generic issues? Do you have them firmly  
20 and clearly enough in mind to be able to categorize each as  
21 to its possible relationship to a seismic event such as that  
22 mentioned by Counsel at the Trojan Plant?

23 MR. GRAY: Mr. Chairman, the question was direct-  
24 ed not to general generic issues, but really to unresolved  
25 safety issues with regard to equipment with seismic capability.

mpb3 1

2 safety issues are of various kinds. What I want to know is  
3 whether or not the witnesses have or will specifically con-  
4 sider the so-called unresolved safety issues such as those  
5 mentioned in River Bend, but not limited to that because I  
6 know there has been some evolution in the Staff's analysis.  
7 But I want to be sure that the answer so far as I know is a  
8 meaningful answer which can only be -- I'm not going to come  
9 into the record by going to many unrelated kinds of safety  
10 issues, but we would like specific assurance that they have  
11 addressed it in a concrete fashion.

12 Now you may rephrase your question however you  
13 desire to, laying that foundation, and we would appreciate  
14 it.

15 Is this something -- tell me when you want a  
16 recess. We don't care. But if it would aid you in some of  
17 the things that you mentioned, you tell us when.

18 MR. GRAY: Okay, Mr. Chairman. I think possibly  
19 a recess at this point would be helpful.

20 CHAIRMAN MILLER: All right.

21 (Recess.)

22 CHAIRMAN MILLER: Are we ready?

23 MR. GRAY: Mr. Chairman, in the time frame  
24 available these witnesses have not gone through each of the  
25 generic issues listed in NUREG 0410, which happens to be the

mpb4 1 document which does identify all generic issues before the  
2 NRC, and specifically a part of Trojan and the resolution  
3 and so on, although Mr. Trammell can indicate what the Staff  
4 has done in this regard.

5 CHAIRMAN MILLER: Very well.

6 WITNESS TRAMMELL: I'm familiar with the  
7 River Band Appeals Board decision, at least as far as the  
8 extent that it affected me as a task manager. At the time  
9 that this decision was rendered I was the Trojan Project  
10 Manager, as well as manager of Task A2, which is asymmetric  
11 blowdown loads on the reactor vessel.

12 In response to that it was my job to add to  
13 the Task Plan on the basis -- to formalize the Staff's basis  
14 on why it was all right for operating plants to continue  
15 operating while this problem was being pursued and resolved.

16 This was done for all the tasks. As Trojan  
17 Project Manager I am in a position to know whether or not  
18 Trojan was unique in any respect and should be singled out  
19 for particular or different action. And I can tell you that  
20 there is no case where Trojan has been cited as an unusual  
21 plant, and that a particular unique action should be taken  
22 for Trojan. And therefore I'm comfortable in telling you  
23 that Trojan is covered by these basis statements for each  
24 one of the Task Action Plans.

25 CHAIRMAN MILLER: All right.

mpb5 1 That's about half the problem, insofar as the  
2 relationship between Trojan and other plants on the unresolv-  
3 ed issues themselves.

4 Second, now, is the question of the seismic  
5 capability in relation to the safe shutdown earthquake and  
6 the like at Trojan. In other words, the issues that are  
7 present in this are in Phase 2 modifications.

8 So in that respect also can you tell us whether  
9 there are any unresolved safety issues which would be appli-  
10 cable to any plant with a seismic situation, or to Trojan in  
11 view of the present issues. We're looking now at the seis-  
12 mic aspects of unresolved safety issues.

13 WITNESS TRAMMELL: As applied to Trojan?

14 CHAIRMAN MILLER: Well, beginning on the ground  
15 where you'd better explain if you think there's some seismic  
16 aspects of unresolved safety issues which are applicable to  
17 some plants, but not to Trojan. You would then have to  
18 differentiate.

19 WITNESS TRAMMELL: I'm aware of none.

20 CHAIRMAN MILLER: Very well.

21 MR. GRAY: Mr. Chairman, my original question  
22 was really directed toward equipment qualification. We have  
23 two witnesses here who are intimately involved and have been  
24 with qualifying seismically safety-related equipment. We  
25 also have Mr. Herring, who has been the principal reviewer

mpb6 1 and Staff witness for the evaluation that has taken place  
2 with regard to the Trojan control building and seismic  
3 response spectra, and the like. And Mr. Trammell, who is  
4 the Project Manager, and whose overall responsibility within  
5 the Staff is for coordinating all of the efforts with regard  
6 to the Staff's efforts in this proceeding.

7 And my question was directed to these witnesses  
8 based on what they know and their experience and the  
9 specific review of the situation here for Trojan. Do they  
10 feel that the safety-related equipment within the control  
11 building, the fuel building, and the auxiliary building  
12 complex is properly and adequately seismically qualified  
13 such that it will safely withstand earthquakes up to and  
14 including the safe shutdown earthquake for Trojan.

15 And I would now direct that question to these  
16 gentlemen.

17 WITNESS HERRING: I'm aware of none.

18 BY MR. GRAY:

19 Q Well, the question was:

20 Do you feel that the safety-related equipment  
21 is adequate?

22 A (Witness Herring) Yes, it's adequate.

23 A (Witness Trammell) Yes.

24 A (Witness McDonald) Yes, I do.

25 A (Witness Noonan) Yes, I do.

mpb7 1

2 MR. GRAY: The Staff has no further questions  
3 and these witnesses are available for questions of the Board  
4 and the parties.

5 CHAIRMAN MILLER: Just one general question that  
6 I have, and then I think my colleagues will have some ques-  
7 tions.

8 EXAMINATION BY THE BOARD

9 BY CHAIRMAN MILLER:

10 Q I would like to ask all of you gentlemen as  
11 members of the NRC technical Staff, and mindful of your  
12 duties, just as the Board, another segment of the NRC, has  
13 its duties, do you know of any safety-related or other  
14 matters which would have a bearing upon the seismic capabil-  
15 ity of the Trojan Plant in its present condition, the build-  
16 ings, equipment, and anything else, which would have any  
17 bearing, even remote as you might view it, or even less than  
18 credible, which would impact upon the safety of interim  
19 operation of that plant?

20 In other words, I'm asking you now to make  
21 full disclosure of any matters, whether they've been covered  
22 by your official performance of duties or questions been  
23 asked by Staff Counsel or by the Board, I'm asking each of  
24 you to tell the Board whether there are any matters that  
25 would have a bearing, even though remote, on the safety of  
interim operation?

mpb8 1 A (Witness Herring) None to my knowledge.

2 Q You understand I'm going beyond, now, the  
3 questions that are normally asked. I'm now asking you  
4 professionally and in your own obligations to the NRC and  
5 to the public to make full disclosure if there be any  
6 matters, even though you may have considered rejecting it  
7 as too remote or whatever, I'm now asking for full disclosure.

8 Gentleman?

9 A (Witness Trammell) None that I can think of.  
10 If in the remaining few minutes something comes to mind, I  
11 will bring it to your attention. Obviously there's already  
12 evidence that they have completed adding supports, and so on,  
13 to the piping.

14 If anything comes to mind in the next -- prior  
15 to the close of the hearing I will bring it to your attention.

16 Q Fair enough.

17 A (Witness McDonald) In the area of my know-  
18 ledge, I know of none.

19 A (Witness Noonan) I guess I would like to slight-  
20 ly expand on that, if I may, a little bit.

21 Q All right. Go right ahead.

22 A Just taking over as Branch Chief of the  
23 Engineering Branch in August of this year, whenever a safety  
24 issue was raised, whether it be generic or plant-specific,  
25 I have looked at it from the standpoint of all the hearing

mpb9 1 boards that are basically assembled, whether they should be  
2 notified or not.

3 Q Yes.

4 A At this point in time we have discussed every  
5 issue that has come across my desk as related to Trojan,  
6 and I know of nothing that we have not already covered, that  
7 has been covered in this hearing. I know of nothing from an  
8 engineering standpoint.

9 Q All right.

10 A (Witness George) I'm not aware of any matters  
11 beyond what we've already discussed today.

12 Q Thank you.

13 CHAIRMAN MILLER: Dr. McDonald, Dr. Paxton?

14 (Laughter.)

15 I want to correct the record. Dr. McDonald is  
16 a witness and Dr. McCollom is on the board.

17 (Laughter.)

18 DR. MC COLLOM: It's been a long week.

19 BY DR. MC COLLOM:

20 Q I believe that I'd like to ask just a little  
21 bit more about the IEEE 344-1971 versus -1975. And,  
22 Mr. Noonan, you said that the sine beat kind of test was  
23 conservative for some kinds of equipment.

24 Would you elaborate on that some and tell me  
25 what kinds might be and what kinds might not be?

mpbl0 1 A (Witness Noonan) Yes, I'll elaborate on that  
2 quite a bit.

3 Q One other point:

4 Tell me what is better about the 1975 group,  
5 particularly in terms of this more random shaking of the  
6 units.

7 A Okay, I'll address that.

8 First of all, when I basically started out at  
9 the aerospace industry -- this was back in the 1961-'62  
10 version -- we were in the process of building our first  
11 spacecrafts. At that point in time we were looking for  
12 data to qual-test all of our equipment aboard these space-  
13 crafts. We had none because we'd never performed spacecrafts  
14 before, so we were involved in setting the criteria for a  
15 new industry, basically.

16 We went back and we did a lot of research into  
17 the type of testing done, sine testing basically at that  
18 time. We started to look at this, what we call the new  
19 random vibration of multi-frequency type vibration, and I  
20 believe at McDonald Aircraft we were the first one in the  
21 industry to propose such a test. And this was around 1961.

22 So we had basically taken that type of test,  
23 admitted it internally into the company, and then eventually  
24 had it admitted into the military specifications for test-  
25 ing of electrical equipment and mechanical equipment as far

mpb111 aircraft and spacecraft.

2 So we did that for a long time.

3 When I came to the NRC, which was then the  
4 AEC in 1974, based on this background it became part of the  
5 seismic review team and I became involved with 344-1971 and  
6 -1975 versions. At that time the 1975 version was in draft  
7 form, but we were looking at it. The 344-1975 version is  
8 really an update and an expansion of the 1971. It doesn't  
9 do anything to the previous testing, in that the previous  
10 testing is set forth in 1971 with the exception maybe of  
11 editorial changes and stuff like that.

12 But the basic concepts are the same; they  
13 haven't changed.

14 We set the sine beat tests -- we talked about  
15 the sine beat test in the 1971 version. The 1975 version  
16 identically talks about the same test in that respect. The  
17 '75 version expanded the '71 version on two bases:

18 One, it added the random vibration or the multi-  
19 frequency test vibration, as it is called in the document.  
20 And it also added the concept of multi-axis testing.

21 Now this multi-axis testing in the -- multi-  
22 frequency-type testing is really a more mechanistic approach  
23 to the test, but is not necessarily a better test. It's  
24 a more representative type test, it's more mechanistic. In  
25 some cases the test is less severe because you don't build up

mpb12 1 structural resonances within the equipment because you're  
2 not dwelling on frequencies and so forth, and particularly  
3 in the seismic-type time histories where they become what  
4 we call non-stationary type functions. The test is even  
5 less severe sometimes because of the variation in amplitudes  
6 throughout the time history.

7 The mean amplitude is varying all over the  
8 place. It's not constant with time. But it is more  
9 mechanistic, so it's like it would be more realistic. We  
10 wanted to represent more of the actual case, the actual  
11 environment.

12 When we looked at this testing and we did  
13 the review of the Westinghouse equipment, particularly --  
14 and I kind of dwell on Westinghouse because we did the  
15 testing when I was involved at that time. I might add, we  
16 looked at all the NSSS vendors, CE and B&W, and they looked  
17 at a number of the balance of plant type architect-engineers,  
18 Bechtel being included.

19 When they went back to this type of thing, we  
20 looked at which test is the best test based on what we saw.  
21 Well, now all of this equipment was already qualified. It  
22 had been qualified under the sine test. So we went back and  
23 looked at the equipment.

24 And by looking, I mean physically looked at it.  
25 We opened the doors and pulled out the drawers. We looked

mpbl31 for types of things, based on my experience from aerospace  
2 work, where I felt the vibration was a better test. For  
3 example, on the relays, relays being one area where at  
4 aerospace it was a big headache to us. We were always hav-  
5 ing what we called relay failures, relay shatter problems,  
6 contact shatter.

7 Under sine testing sometimes you have to go to  
8 extremely high levels to get this relay to shatter because  
9 of the different natural frequencies inside the relays,  
10 depending on the size of the contacts and so forth.

11 Multifrequency test basically bring about that  
12 function at a much lower level, a much more realistic type  
13 level in the environment. And so that is one case where  
14 the multi-frequency type testing might be more appropriate.  
15 But again, you have to look at the type of relay you're talk-  
16 ing about.

17 If you're looking at the very simple type of  
18 relay where it's basically a single degree of freedom relay,  
19 then, so, the multifrequency doesn't really offer you any  
20 advantages. The sine probably does a better job, because  
21 you will dwell at resonance; even though you might not be  
22 able to determine the resonance within the inside of the  
23 relay, you set up your tests so that you hit every frequency  
24 or every octave, say, starting at one hertz, two hertz, four  
25 hertz, and you pretty well assure yourself based on that

mpbl41 kind of testing that you're going to test the resonance  
2 within that relay even though you will not physically be  
3 able to determine what that resonance is from the test.  
4 You can monitor the outside, but you can't get in the inside  
5 in a lot of cases.

6 Again, to get back to the random vibration --  
7 you see, that's kind of the concept: When I speak of  
8 certain equipment, it's a judgment factor. You have to look  
9 at the equipment and say will this test be severe. Now,  
10 for example, in cabinets --The type of nuclear instrumenta-  
11 tion cabinets-- After a while when you deal with certain  
12 designers, they have a way of designing cabinets, they have  
13 a way of designing things. And you can almost predict,  
14 after watching the first few tests, no matter what that  
15 cabinet is going to hold, how its intended use is, it  
16 pretty much has a common denominator of natural frequency  
17 not based upon a design, based upon that particular vendor  
18 who does things a certain way within his organization, and  
19 it just comes out that way.

20 I think in the Westinghouse case probably  
21 eight, nine, ten hertz is pretty much the common mode for  
22 most of those cabinets. You look at the internal boxes, the  
23 way that they're packaged, solid-state type of equipment.

24 After you've got through the cabinet resonances  
25 basically none of the systems is acting like an attenuator

mpb151 and you see the rigid body vibrations inside the cabinets at  
2 the higher elevations, basically the first mode vibrations.  
3 So anything you have higher than a natural frequency, say ten  
4 hertz, would basically be a rigid type motion.

5 So a sine wave test for a cabinet would be a  
6 very good test for a cabinet.

7 If I became involved in a piece of equipment  
8 that internally had a lot of moving parts, small equipment,  
9 there I am concerned of whether or not I can find resonances  
10 very well because it might have many, many resonances in-  
11 side a small piece of equipment that might be within a fre-  
12 quency range of interest that I'm talking about. There,  
13 because I'm not smart enough to determine resonance, I fall  
14 back on the multifrequency type testing and say Well, what  
15 I'll do, I'll use the statistical approach, which is really  
16 what this is, and apply that across the board to the equip-  
17 ment.

18 In that way, I don't really care if I know  
19 whether the resonance is ten hertz, or if it's a 15 hertz  
20 or if it's at 30 hertz. I've broad-banded it and I've  
21 assured myself that at some point in time I will hit those  
22 resonances.

23 The non-conservative part comes in where I  
24 can't necessarily dwell on the resonances. Now a lot of  
25 seismic events it's not required because the seismic

mpb161 vendors are a non-stationary function. There are no real  
2 dwell frequencies in time histories. It's a peak-on, peak-  
3 off type situation where you hit a very high peak stress,  
4 maybe for an instant, and then it's back down to nothing  
5 again.

6 So that's why the multifrequency test is applied.

7 Q Okay.

8 Now knowing that, and knowing that the Trojan  
9 facilities initially -- the safety-related equipment was  
10 evaluated by the 1971 version, what is your best judgment  
11 on the kinds of equipment, the safety-related group, that  
12 should have been or would have been more adequately qualified  
13 if they had been qualified under the 1975?

14 A Okay.

15 Basically it was, like I say, the relays, that  
16 was the first thing. And that resulted in this one change  
17 that we have already mentioned about where we found a relay  
18 problem, like I was sure we would. And we can run those  
19 relays through rotor relays, where you don't have those  
20 problems; we don't have contact problems.

21 I have to recall from memory now. We went  
22 through all of the Westinghouse equipment and in general--  
23 generally speaking, I believe we said that all of the  
24 Westinghouse equipment -- may I refresh my memory for just a  
25 minute?

mpb171 Q Yes.

2 A Excuse me.

3 (Pause.)

4 I'll quote here from the thing that we basically  
5 found a type of equipment that we said Okay, should be  
6 qualified by the later spec, and, again, the relays.

7 The nuclear instrumentation system by stable  
8 amplifier, which we felt were rather complex and very diffi-  
9 cult to determine from the regular standpoint, Westinghouse  
10 CID 700 series, processing analog instrumentation, system  
11 by stables, again by stables.

12 We had a Westinghouse ISD 7300 series process-  
13 ing instrumentation by stables. And the Foxborough process  
14 instrumentation by stables. And those were the items that  
15 we basically said we felt the random or the multiple frequency  
16 tests would be the better tests.

17 Q Now the nuclear instrumentation and the process  
18 instrumentation by stables.

19 A By stables.

20 Q That's the problem, right?

21 A Right.

22 Q Have those now been tested by the multiple  
23 frequency test?

24 A Yes, sir.

25 Q And they are adequately qualified based on the

mpbl81 1975 version?

2 A Yes, sir.

3 Q And these are the same units that are located  
4 within the Trojan nuclear instrumentation and the nuclear  
5 process?

6 A Yes, sir.

7 If I could comment on one more point, now, on  
8 this, the 1975 version also added this multi-axis type test.

9 And I'd like to offer a personal opinion based  
10 on my prior experience: I see no real advantage in the multi-  
11 axis testing.

12 Q Excuse me, Mr. Noonan.

13 Would you describe to us two different multi-  
14 axes?

15 A Normally when we have the single-axis vibration  
16 type test it means the vibration input is in one direction  
17 at a time. It's put in either horizontally or vertically,  
18 but independently, not combined. When we talk about the  
19 multi-axis type test it says we are putting the input in  
20 simultaneously in all three directions, the two horizontal  
21 directions and the one vertical direction.

22 This results in complexity. It's very diffi-  
23 cult to run this type of test. It results in the complexity  
24 of maintaining the proper levels because now you have a very  
25 large table. You have a lot of hydraulic gear to do this.

mpbl91 It's a hard test to conduct.

2 Both the aerospace and aircraft industries have  
3 not adopted this. And yet we have the same problems. The  
4 vibration inputs are multi-axis inputs on aircraft and aero-  
5 space.

6 From the standpoint of safety we found no real  
7 value in going into that type of test. It is more realistic,  
8 I'll agree with that. It does represent the actual case.

9 The only thing you would require that type of  
10 testing on -- and I think if we look in our document, Exhibit  
11 10, it's addressed in there -- it's where you expect a lot  
12 of coupling between, say, the vertical axis and the horizontal  
13 axis. And that can be determined quite readily by looking at  
14 the design of the equipment, based on knowledge of -- if I  
15 can use the term -- shear centers.

16 When the shear center is off place from the  
17 pivotal axis of the equipment you would expect to see  
18 coupling develop. Depending on how far that shear center  
19 is off the primary axis, the more coupling will be involved,  
20 say, from horizontal to vertical.

21 So that can be determined, and it can usually  
22 be determined by looking at the particular design.

23 Q Okay.

24 I think it's good to get carried away with  
25 your technical work.

mpb201

(Laughter.)

Now we've been talking about IEEE 344-1975.

Now that's primarily electrical equipment.

A Yes, sir.

Q Now what about the other categories of equipment that we have in the safety-related group, consisting of the components, mechanical equipment, cable trays, and the like? What is the difference if you were going to have those designed today to some code or criteria versus the way that the Trojan Plants are now constructed?

A There is basically no difference. If we were to -- let's get away from the electrical equipment.

The IEEE spec is so designated as electrical because that was its origin. In reality, that spec would be applied to both electrical and mechanical equipment. The procedures there are really basically no different. There might be some slight differences. I'd have to look at the document to refresh myself, but in general there is -- the document would hold for both types of equipment.

Q I'd like to ask Mr. George one thing about something that he said. I think there may or may not have been an implication there.

You indicated that no study on seismic-induced -- potentially seismic-induced fire had been done at Trojan. Has it been done anywhere?

mpL211<sup>1</sup> A (Witness George) Not to my knowledge.

2 Q Okay.

3 When you added "at Trojan" it raised a little  
4 flag.

5 I would ask -- and I guess again it's Mr.  
6 George -- would you describe the status of the implementa-  
7 tion of those things required at Trojan in the fire protec-  
8 tion system not yet implemented?

9 A I'm afraid I couldn't comment on that. I know  
10 which modifications are required, and that they are to be  
11 implemented prior to startup of cycle three operation. I  
12 guess that's the outside data, but I'm not sure where imple-  
13 mentation stands at present.

and 5

14

15

16

17

18

19

20

21

22

23

24

25

T6 mm1  
MELTZER/

1 Q Mr. Trammell, you are leaning forward.

2 (Laughter.)

3 A (Witness Trammell) I can comment briefly. I  
4 have investigated this just in my normal course of duties as  
5 project manager, and I can say this:

6 That the interim operation and the studies and so  
7 forth that have gone on for this case have impacted to some  
8 extent on the progress of setting in place some of the  
9 modifications, and in particular the Staff's desire or --  
10 embodied in the order, and we will make no modifications  
11 which would in any way alter the strength of the shear walls.

12 And there are some fire-protection related items  
13 in this, particularly when extrapolated to other walls which  
14 are now being relied on in the auxiliary building.

15 So I think it is fair to say that PGE has been  
16 pretty busy with this particular action, in particular the  
17 modifications which we're now -- or they're now faced with.

18 They have submitted on schedule as required by  
19 the Staff's amendment to their license, the additional  
20 information that we requested. So that part seems to be on  
21 schedule.

22 And we have initiated review of that additional  
23 information, so that the intent was to get all the loose ends  
24 tied in so that the implementation date would be met not

25 only for the items which we approve, but for the ones which

mm2

1 we didn't have enough information on.

2 I think that is all I know about it.

3 Q Thank you.

4 Mr. McDonald, do you think that at this time the  
5 verification of the Westinghouse instrumentation and control  
6 components that are safety related, is that now what you  
7 would call complete?

8 And, has the Staff now reviewed all of the kinds  
9 of tests and confirmed to their own knowledge that it is  
10 satisfactory at this point?

11 Or, are there pending yet things to be done?

12 A (Witness McDonald) The verification program  
13 encompasses many reports, as I indicated. A total of 23.  
14 Those reports applicable to Trojan and was referenced in  
15 the Safety Analysis Report for the basis of qualification  
16 for their component seismic, if that's a true statement.

17 There are a few areas that, for example, I was  
18 going to put on the record, the Exhibit 10, I believe it was,  
19 where I indicated the electrical performance characteristics.

20 There was one other item, Item 5 was related to  
21 Eagle timers. To our knowledge, Zion is the only station  
22 that is being handled on design case specific. Trojan has  
23 no Eagle timers.

24 There was a question about the seismic qualifica-  
25 tion to that. But, in relation to Trojan and the equipment

mm3 1 supplied by Westinghouse as referenced in the topical and  
2 the tests done to support that, it has all been satisfactory.

3 Q I'm not sure whether I am as sure about this  
4 Eagle timer, because we have talked about a design, a DPA  
5 device in Trojan. That isn't what you would call an Eagle  
6 timer?

7 A (Witness Trammell) Dr. McCollom, I think I can  
8 clarify that one.

9 Mr. McDonald was mentioning these Eagle timers,  
10 he was mentioning Zion as having the only Eagle timers. That  
11 is true with respect to Westinghouse-supplied equipment under  
12 these WCAPs that he is mentioning.

13 Trojan, nevertheless, does have Eagle signal  
14 timers, which are the DBA sequencers. And they are qualified  
15 by the -- under Bechtel's program, or PGE's program.

16 A (Witness McDonald) There again I would point out  
17 when I was talking on the verification, it is that equipment  
18 supplied under their scope of supply.

19 Q I understand.

20 A I was aware of the Eagle timers in the sequencers.

21 Q I understand.

22 (Board conferring)

23 BY DR. PAXTON:

24 Q I would like to ask whether Staff Exhibit 10 has  
25 been available to the public?

WU4

1           A       (Witness Trammell) An inspection on the document  
2 on the back, indicates it has not been available to the  
3 public, and this has the characteristic transmittal of one  
4 technical group to another. It appears to be what you  
5 might classify as branch input or division input to someone  
6 else.

7                   It does not appear to be available to the public.

8           DR. PAXTON: Thank you.

9           WITNESS NOONAN: Can we make one point on that  
10 again.

11           CHAIRMAN MILLER: Yes?

12           WITNESS NOONAN: Okay, go ahead.

13           WITNESS MC DONALD: I wanted to mention, as I  
14 indicated, the report on the verification program which  
15 also encompasses Exhibit 10, we expect the report to be out  
16 in approximately two weeks, and that will include -- I  
17 indicated, I believe, 100 references, which Exhibit 10 is one  
18 of them. All these references will be available.

19           DR. PAXTON: That report will be placed in the  
20 public document room?

21           WITNESS MC DONALD: Yes, it will.

22           DR. PAXTON: Okay.

23           CHAIRMAN MILLER: Well, since Exhibit 10 has been  
24 admitted into evidence, it is now a public document I think  
25 as a matter of form.

nm5

1 MR. GRAY: I believe it is.

2 (Laughter.)

3 CHAIRMAN MILLER: All right, we will ask counsel  
4 for Licensees, do you wish to inquire?

5 MR. AXELRAD: May we go last as is usual?

6 CHAIRMAN MILLER: All right.

7 Mr. Socolofsky?

8 MR. SOCOLOFSKY: I can't think of anything that  
9 hasn't been covered, so I don't have any questions.

10 CHAIRMAN MILLER: Intervenors?

11 MR. ROSOLIE: I have some questions.

12 CHAIRMAN MILLER: All right. Mr. Rosolie?

13 CROSS-EXAMINATION

14 BY MR. ROSOLIE:

15 Q I guess getting back to the status of the WCAPs,  
16 when was the last report filed by the Staff on the status of  
17 the WCAPs?

18 A (Witness McDonald) The last report -- there is a  
19 NUREG document, I don't recall the number, that gives -- I  
20 believe, in fact, it might be referred to in Mr. Pollard's  
21 input that gives the status of topical reports as being  
22 acceptable, unacceptable or under review.

23 As I indicated, there are, like 23 topicals  
24 referenced in this report that will come out. And of those,  
25 some of those will be found to be acceptable. Others there

mm6

1 may be some pending things. But in relation to the 78-21 the  
2 conclusion is that that is an acceptable report.

3 But I don't recall the number of the NUREG.

4 Q Looking at Mr. Pollard's testimony -- limited  
5 appearance -- on page 10 I believe he states NUREG 0390.

6 A That was the number I couldn't recall, yes.

7 Q Dated October 15, 1978.

8 Was that the date it was issued?

9 Is that correct?

10 A Yes, that's the date that is indicated in his  
11 testimony. I'm just not familiar with how often that report  
12 comes out. I think it may be monthly, quarterly. I couldn't  
13 tell you that.

14 Q And if we look under WCAP 78-21, is that an  
15 accurate reflection of what is in NUREG 0390?

16 A That would be the status as of the time of that  
17 report, and as I indicate our report where we have concluded  
18 it acceptable won't be out for a couple of weeks. And the  
19 status report will be updated to reflect that whenever its  
20 next issuance is.

21 Q Can you tell me why it won't be out for a couple  
22 of weeks?

23 Is it still being reviewed?

24 A There are many people who provide input, and it  
25 is reviewed by many people, you know, within the Commission.

nm7

1           Like I say, I believe it will be a couple of weeks.  
2           It may be sooner, but it is just a question of getting  
3           everybody who had input or any questions or concerns related to  
4           it.

5           A       (Witness Noonan)   Could I also respond to that  
6           question for you?

7           Q       Sure.

8           A       Yesterday when -- yesterday afternoon when I  
9           realized I was coming out here, I looked up the status of  
10          that report and I found out that it had not been published  
11          yet.

12          I know that about 18 months ago from a technical  
13          standpoint the concurrences were made and I couldn't understand  
14          why it wasn't published.

15          So I called the appropriate people in my office  
16          and we had a meeting. And I wanted to see whether there was  
17          some technical issue that I was not aware of that was holding  
18          up the publication of this document.

19          It turned out there was not one, and it was basically  
20          one based on priorities of work. The branch that was next in  
21          line basically felt that it was a low-priority item to get  
22          this thing on the street and so they did not do the  
23          concurrence on it.

24          It turned out they had done the work on it; they  
25          had gone through and did the review. They just hadn't put their

mm8 1 signature to the package.

2 So as of yesterday they concurred on it,  
3 and this is why the document now will be published in two weeks.

4 Q And that is what certain people within the  
5 Commission told you?

6 A That's what the people that reviewed the document  
7 told me.

end T6 8 Q Did they tell you why they considered the  
9 qualification of seismic capability of safety equipment not  
10 important?

11 A Could you repeat that, please?

12 Q Can you tell me why -- can you tell me if they told  
13 you why they considered the qualification of -- the seismic  
14 qualification of safety equipment and its resolution not  
15 important?

16 MR. GRAY: Mr. Chairman, I am going to object to  
17 that.

18 CHAIRMAN MILLER: Sustain the objection as to  
19 form.

20 That was not the testimony and you are misquoting  
21 the testimony in the form of your question, Mr. Rosolie.

22 You may restate it, however, if you wish to  
23 pursue the point.

24 MR. ROSOLIE: I'm sorry.  
25

mm9

1 BY MR. ROSOLIE:

2 Q Well, I would like to pursue the point.

3 In Mr. Pollard's limited statement which I -- on  
4 page 10, under WCAP 78-21, I asked earlier if that was a  
5 correct reflection of what was in NUREG, and I believe it  
6 was stated by Mr. McDonald that that was.

7 Can you tell me why there it says -- I wish I  
8 had NUREG 0390 so we can tell, but we don't --

9 "The Staff received additional information  
10 by letter dated September 29, 1978. The review  
11 is scheduled to be completed by January 1, 1978."

12 I believe that was supposed to be 1979.

13 There seems to me to be conflict between what  
14 you were told and what is there. Can you help resolve that?

15 A (Witness McDonald) I'm sorry, I can't find the  
16 timeframe you are referring to here.

17 CHAIRMAN MILLER: I think the record should reflect  
18 Mr. Rosolie is probably correct, the last -- the sentence  
19 which is on page 10 at the quoted materials says:

20 "The review is scheduled to be completed by  
21 January 1, 1978."

22 In view of the earlier reference to 1978 the  
23 great probability is that that should be January 1, 1979,  
24 and considering that those are the dates and the timeframe,  
25 can you give Mr. Rosolie an explanation?

nm10 1

WITNESS MC DONALD: Yes, I can.

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

You know, being involved as a primary reviewer involving a lot of people, when you project a schedule it is a projection and based on the availability of the people to do the task, the time to concur and review it.

As I pointed out, this verification program has been from a period I believe in late '73, from '74 where we have been looking at a composite of topical reports. There are 100 and some reference documents in that material and evaluation has been going on, including the audit teams' review at the various sites as we have indicated in earlier testimony.

When the projected schedule for completion comes out, often it is a question of estimating the availability of other people, other branches that have to concur and look and provide their technical input in a particular area, its best estimate. And as all schedules, it has to be adjusted based on priorities and other tasks that need to be done.

I would like to emphasize though, the technical concerns about the acceptability of the equipment performance function, we felt had been resolved earlier. It is just getting the report together, all the people to concur. And if there are any questions relative to the evaluation as such.

mm11 1

BY MR. ROSOLIE:

2 Q Can you tell me what was in the letter that was  
3 received September 29th, 1978 in regards to CAP 78-21?

4 A (Witness McDonald) I don't recall that letter  
5 offhand. I don't know.

6 Q You would concur with Mr. Noonan that basically  
7 this whole thing was done 18 months ago?

8 A Pardon?

9 Q Would you concur with Mr. Noonan, who has reflected  
10 it has been told him that basically this whole thing was done  
11 18 months ago?

12 A There again the verification program covered more  
13 than just the seismic, and more than just 78-21. From the  
14 standpoint of the methodology and the capability of the  
15 equipment as it relates to Trojan in 78-21, that's probably --  
16 that is a true statement. I agree with Mr. Noonan.

17 Q How easily could I get a copy of that  
18 letter dated September 29, 1978?

19 Do you have a copy with you?

20 A No, I don't.

21 MR. ROSOLIE: Could Staff perhaps see if they could  
22 furnish a copy?

23 MR. GRAY: When do you want the copy?

24 I suspect that the only available copies are back  
25 in Washington, number one.

mm121

2 Secondly, I do not know what it contains. That is  
3 not to say that it contains proprietary information or anything  
4 of that nature, but I just don't know the status of that letter  
5 at all.

6 If you can indicate what you need it for, we can  
7 attempt to try to get a copy for you.

8 MR. ROSOLIE: Well the witnesses here are testifying  
9 that as far as WCAP 78-21 goes, work was completed on that  
10 sometime ago. But yet in NUREG 0390 it has also been testified  
11 that a letter was issued by the Staff, to the Staff, dated  
12 September 29, 1978, which evidently seems to have brought into  
13 some question the status of WCAP 78-21.

14 MR. GRAY: I don't see how it quite brings into  
15 question the status of WCAP 78-21. But we can check and see  
16 if we can get a copy of that letter for you.

17 I don't know when we can get it or whether it  
18 might be available.

19 WITNESS NOONAN: If I understand your question  
20 regarding -- you feel that there is a discrepancy between  
21 what we are saying here and NUREG 0390, I guess it is.

22 If you understand the process, that NUREG covered  
23 all topicals, and it will show WCAP 78-21 as not complete  
24 until such time as this other document appears saying that  
25 we have done everything we are supposed to do and we have  
found 78-21 as an acceptable document. Only then will NUREG

mal3 1 be brought up to date to reflect that information.

2           So if the process were tomorrow the NUREG was  
3 released again -- I'm giving you a hypothetical thing here --  
4 it would still show 78-21 as not complete, even though we  
5 are standing here telling you today that it is complete. It  
6 is just that the paperwork process has not caught up to make  
7 the Reg be changed. That's all it is.

8           DR. MC COLLOM: Let me ask a question or two here.

9           At this stage of such a verification program where  
10 you are nearing completion of it, even in the paperwork, if  
11 you were to receive a letter at that point from the vendor  
12 which I assume is what we are talking about here -- I'm  
13 guessing that this is a letter from the vendor, what kind  
14 of information would you expect to have in that at that  
15 point in the process?

16           WITNESS NOONAN: I would at this point in time  
17 expect that information to treat plants under license, under  
18 the CP/OL stage.

19           I am confident that all operating plants, that  
20 issue has been covered and has been satisfied for all  
21 operating plants.

22           DR. MC COLLOM: What kind of information would  
23 this be?

24           It would be considering special situations at the  
25 plant?

nm14

1 WITNESS NOONAN: I would be making a guess it  
2 would be something like that.

3 I guess the only people that maybe could tell us,  
4 are the originators of that memo.

5 WITNESS MC DONALD: Maybe I could address this a  
6 little bit.

7 DR. MC COLLOM: Mr. McDonald?

8 WITNESS MC DONALD: I think one has to understand  
9 the total review process, I think as Mr. Pollard brought  
10 out in his testimony. And as a technical reviewer, the  
11 process is not just writing off and accepting a report. There  
12 are many meetings, exchanges of information via phone,  
13 meetings, documentation requirements.

14 There again, this letter, without knowing the  
15 exact content, could have been confirmatory information  
16 needed to support the documentation.

17 My point, 18 months ago, or as Mr. Noonan said,  
18 from a technical point of view, we had a feeling that there  
19 were no safety concerns and that the equipment in fact was  
20 qualified.

21 But to have all the documentation, get everything to-  
22 gether -- this particular report we chose to give these 23  
23 in one package, which is assimilating a considerable amount of  
24 material, so that was the rationale.

25 MR. ROSALIE: At some point I would still

mm15 1 appreciate receiving that letter.

2 MR. GRAY: As I indicated, we will see what we  
3 can do for you.

4 CHAIRMAN MILLER: Well that point is not going to  
5 happen unless it happens by 1 o'clock or a quarter of one  
6 today, because we have to catch an airplane, and there  
7 are engagements which won't permit any extension, and the  
8 Board very much wishes to complete the examination of the  
9 panel and the conclusion of this phase of the evidence.

10 MR. AXELRAD: Mr. Chairman, if I may clarify one  
11 point?

12 CHAIRMAN MILLER: Yes?

13 MR. AXELRAD: It is my understanding that  
14 Westinghouse adopts the procedure of supplying additional  
15 information to the Staff from time to time, and this  
16 particular letter of September 29, 1978 relates to new  
17 qualification for a new design of some equipment which is  
18 not involved at the Trojan plant.

19 It is, I believe, a Barton pressure transmitter,  
20 and the information was being provided to the NRC Staff in  
21 connection with that equipment, which is not equipment  
22 involved with the Trojan plant.

23 MR. ROSALIE: Is Mr. Axelrad testifying?

24 CHAIRMAN MILLER: No. Counsel and parties, unless  
25 they are under oath, never testify.

mm16

1 BY MR. ROSALIE:

2 Q Okay.

3 Dr. McCollom mentioned, or you have heard mentioned  
4 also the DBA sequencers, or Eagle signals. And I believe you  
5 said they were qualified under Bechtel.

6 Is that correct?

7 A (Witness Noonan) That's my understanding as to the  
8 balance of the plant.

9 Q Can you turn to Table 5 of PGE Exhibit, or Licensee  
10 Exhibit 23?

11 A (Witness McDonald) Page number, please?

12 Q It is sheet 2 of 9, or K16. It is towards the  
13 back.

14 A Yes. You are referring to the qualification  
15 document reference. And it is not Bechtel? Is that what I  
16 understand your question?

17 Q Yes. I guess that is one of the questions.

18 A Okay.

19 If an architect-engineer, or whoever supplies equipment,  
20 any test lab, whether it be Wylie, in this case Anamet -- if I  
21 am pronouncing it correct -- Franklin Institute may do the  
22 actual test. But the responsible individual is a person that  
23 supplies the equipment.

24 As far as we are concerned, the qualification, it  
25 under the NSS supplier Westinghouse supplied. They may

mm17

1 contract anybody to do the actual test. But they are  
2 responsible for the test, the content and the result, and  
3 having the documentation to support it.

4 Q Do you know who supplied the DBA sequencers?

5 A It is my understanding it was under the Bechtel  
6 scope of supply.

7 Q Who was the manufacturer?

8 A (Witness Trammell) Eagle Signal Timer Company.

9 A (Witness McDonald) They were Eagle timers in the  
10 whole thing.

11 You are talking a design and I don't know. I  
12 don't know.

13 Q Is it possible that Westinghouse subcontracts  
14 their equipment to have other companies manufacture it and  
15 issue it under their name as Westinghouse equipment?

16 Of, do they manufacture all their equipment  
17 themselves?

18 A I do not believe they manufacture all their  
19 equipment.

20 When I am referring to the topical report or  
21 equipment supplied by Westinghouse, there again all that  
22 equipment that they supply and is identified in that report,  
23 they are responsible for the qualification.

24 Who manufactures the equipment is immaterial, as  
25 long as the documentation is supported, that it is qualified

run18

1 as identified in its specifications.

2 Q In light of problems with Westinghouse-supplied  
3 equipment, did the NRC review equipment supplied by other  
4 vendors?

5 MR. GRAY: Mr. Chairman, I am going to have to ask  
6 that Mr. Rosalie identify what problems with Westinghouse  
7 equipment he is referring to.

8 CHAIRMAN MILLER: Yes, that is true.

9 If you wish to refer to that you should identify  
10 it, Mr. Rosalie.

11 BY MR. ROSALIE:

12 Q In view of the problems with the Eagle timers  
13 supplied by Westinghouse, did the NRC look into the same  
14 products supplied by other vendors?

15 A (Witness McDonald) I am trying to understand the  
16 question. Excuse me.

17 The Eagle timers and the models supplied for the  
18 DBA sequencers, there is documentation to support the  
19 qualification for the particular application, the design  
20 application.

21 If Westinghouse chose to have an Eagle timer for a  
22 particular application -- and I believe in Zion station is  
23 the only one where they supplied that, that has been qualified  
24 for that application in that plant.

25 There again I point out the generic qualification in

mm19 1 a topical report is qualified to an envelope, and if a plant  
2 design falls into that envelope, it can be used for the  
3 application identified, the functional requirements and the  
4 design basis envelope.

5 Q Okay.

6 Moving to, I guess, the seismic qualification of  
7 engineered safety features switch gear.

8 Were all the relays tested?

9 A (Witness Noonan) Yes, all the relays were tested.

10 Q And the reason they were tested, was it because  
11 there was no documentation that they were seismically qualified?

12 A Again, according to Table 5 -- I just want to  
13 refresh my memory. Table 5 shows method of qualification,  
14 number 3, which is a test.

15 All the relays on that page are listed as being  
16 tested. And the purpose of the test was to show that they  
17 withstand the seismic environment.

18 Q Okay.

19 Right now I am referring to the engineered  
20 safety features switch gear, which was mentioned by  
21 Mr. Trammell earlier, which is in the Safety Evaluation  
22 Report 8.3.2.

23 And I was wondering if those relays mentioned  
24 there, the reason they were tested was because there was no  
25 documentation as to the qualification. That's the reason

mun20 1 they were tested?

2 A (Witness Trammell) I'm not 100 percent up with  
3 you. It sounds like the answer to that question is they  
4 were tested to qualify them.

5 What item are you speaking of? Something in this  
6 Table 5?

7 Q No, I am speaking in the Safety Evaluation Report  
8 8-6, page -- that you referred to earlier. Section 8.3.2,  
9 seismic qualification of engineered safety features switch  
10 gear.

11 A And what is your question?

12 Q My question is, were those relays tested because  
13 there was no documentation as to their seismic qualification?

14 Is that the reason they were tested, or was it a  
15 spot check?

16 A (Witness Noonan) I'm not sure I understand what  
17 you are saying, but I would like to try to respond if I can.

18 The relays weren't tested because of lack of  
19 documentation. The relays were tested or not tested because  
20 they are required to be seismically qualified.

21 You can do a number of things to seismically qualify  
22 certain items. You can do it by analysis; you can do it on  
23 a generic basis where the equipment is done generically and  
24 say this is the same piece of equipment; you can do it by what  
25 they call a quasi-static type analysis, which is really

mm21 1 basically a static analysis or test.

2 So there is a number of methods, right?

3 Q Right.

4 What I am trying to get at, it says in the opening  
5 here:

6 "Doing seismic testing of protective relays  
7 associated with the engineered safety feature  
8 breakers, some relays were found to misoperate."

9 Now, I am referring to, it says "during seismic  
10 testing."

11 Now is that testing that the NRC did, or is that  
12 testing PGE did to qualify them?

13 A (Witness McDonald) It was not testing NRC did,  
14 it was testing that was performed to verify their functional  
15 requirement in the design.

16 As I read on further it says:

17 "The conclusion was that since the relays were  
18 not damaged, this was acceptable."

19 And it further states:

20 "We informed the Applicant of our position that  
21 all safety-related electrical equipment is required  
22 to be designed to withstand the effects of the  
23 SSE without either malfunction or loss of capability  
24 to perform the intended function without operator  
25 action."

mm22

1 It further states:

2 "They subsequently stated that those types of  
3 relays that do not have adequate capability to  
4 withstand the seismic events will be replaced with  
5 relays of a different manufacturer for which test  
6 data indicate a capability of 5g's or greater."

7 And which infers and indicates, as we read on  
8 down, that that was an inadequate relay for that application  
9 and it was replaced.

10 MR. ROSALIE: May I approach the witnesses?

11 CHAIRMAN MILLER: Yes.

12 (Mr. Rosalie handing document to witness panel)

13 MR. GRAY: May I see that?

14 (Mr. Rosalie handing document to Counsel Gray)

15 BY MR. ROSALIE:

16 Q If you could, for the reporter and the record,  
17 identify the document I have just handed you?

18 A (Witness Noonan) The document handed to me just  
19 now is dated September 28, 1978.

20 It is a memorandum for Milton J. Grossman, Hearing  
21 Division Director and Chief Counsel, OELD, from Victor Stello,  
22 Jr., Director, Division of Operating Reactors, NRR.

23 And the subject is "Board Notification Pipe Support  
24 Base Plate Design."

25 Q Could you possibly read the bottom sentence there

mm23

1 and over to the next page?

2 A The bottom sentence says:

3 "We have concluded that the more detailed  
4 information required must be obtained from each  
5 operating facility. We are preparing a generic  
6 letter to each operating facility requesting  
7 detailed design installation and testing information  
8 of concrete embedded anchor bolted pipe supports of  
9 safety-related equipment."

10 Q Can you tell me what the status of that is?

11 A Yes, I can.

12 After issuance of this letter and after talking  
13 with our management, we decided to change directions slightly  
14 on this.

15 What we are issuing is a bulletin. The title is  
16 an NRR bulletin, stating that we have found in certain plants  
17 a deficiency in these types of supports. We state to the  
18 utility that what he must do in examination of his supports,  
19 there are a number of items stated. And it is stated that  
20 if he can meet the criteria we set out in this bulletin, then  
21 we no longer have to hear from him and that the I&E people,  
22 the Inspection and Enforcement office will follow up and  
23 make sure that he has done what the bulletin says he has done.

24 If he can't meet what is in the criteria, or if  
25 he identifies the problem to us, then we will review it on a  
case by case basis as to exactly what the problem is.

end T8

1 Q Has that been sent out yet, that bulletin?

2 A The bulletin has left my office. I can't verify  
3 that it has been sent to the utilities. I just don't have  
4 that information.

5 Q I'll address this question to Mr. George.

6 Is the fire protection . . . or is the NRC  
7 requiring an alternate or dedicated shutdown safety system,  
8 is that considered backfitting by the NRC?

9 A (Witness George) I guess I might have to ask for  
10 some help on this. I'm not sure whether it falls within the  
11 criteria or the clause of the regulations on backfitting. I  
12 really couldn't say.

13 It's a modification that, in the case of Trojan,  
14 is proposed by the Licensee. We did not require it otherwise.  
15 And it's something that, when installed, will resolve some  
16 Staff concerns based on current standards that the Staff has  
17 established for fire protection.

18 Q Mr. Trammell?

19 A (Witness Trammell) I wouldn't call it backfitting,  
20 in that the particular item here involves switches which can  
21 transfer control of a pump from the control room to the  
22 local panels needed for hot shutdown.

23 There's more than one way to achieve this  
24 objective. PGE proposed, and we accepted this method, and  
25 it does not fall in the category of something the NRC requires

wel 2

1 for a modification or a change which is required, and offers  
2 substantial additional protection necessary for the public  
3 health and safety. It doesn't fall into that category.

4 Q I believe it was stated that there would have to  
5 be installed by the third cycle -- there was some mention  
6 about the third cycle?

7 A Yes. It's a condition of their license, that  
8 these fire protection modifications will be completed prior  
9 to the startup for operation in cycle 3.

10 MR. GRAY: Mr. Chairman, excuse me, we do now  
11 have the copies of the Safety Evaluation Report on the fire  
12 protection matter which the Board requested the Staff offer  
13 in evidence. To wrap up a loose end and make sure we don't  
14 forget that, I might propose that we do that now.

15 CHAIRMAN MILLER: All right. What is the  
16 identification?

17 MR. GRAY: This would be Staff Exhibit 11.

18 CHAIRMAN MILLER: Staff Exhibit 11 will be  
19 received in evidence, and copies are now being tendered by  
20 Mr. Gray.

21 (The document referred to was  
22 marked for identification as  
23 Staff Exhibit 11 and was  
24 received in evidence.)

25 MR. ROSOLIE: I believe that's all the questions

wel 3

1 I have.

2 CHAIRMAN MILLER: Thank you, Mr. Rosolie.

3 MR. GRAY: I should point out that the notations  
4 on the cover of Staff Exhibit 11 obviously -- the handwritten  
5 notations -- have no evidentiary value and should be ignored.

6 CHAIRMAN MILLER: As far as the record is concerned,  
7 the handwritten notations will be considered deleted.

8 MS. BELL: Mr. Chairman, can you give us an idea  
9 of what our schedule is at this point?

10 CHAIRMAN MILLER: Yes. Our schedule is that we  
11 will conclude the evidentiary hearing and close the record  
12 at a quarter to 1:00, or sooner, if we're finished. But that  
13 is the time at which Dr. McCollom has to leave to catch his  
14 airplane.

15 The Board is reluctant to proceed by quorum, al-  
16 though we may do so in an emergency. We also feel that since  
17 we have called these witnesses we want you to have the right  
18 to cross-examine them, but we do believe that you, as Mr.  
19 Rosolie did, can cover it within reasonable proportions and  
20 not seek to expand it, as you might be tempted to do were  
21 these witnesses of a different character.

22 Now, how much time do you need? Do you or do you  
23 not want a recess? We don't care.

24 MS. BELL: A very short recess will probably help  
25 me.

1 CHAIRMAN MILLER: Very well.

2 (Recess.)

3 CHAIRMAN MILLER: All right, Ms. Bell, you may  
4 proceed.

5 MR. GRAY: Excuse me, Mr. Chairman. During the  
6 recess Mr. Noonon was able to call back to Washington and to  
7 orally hear the contents of that September 29, 1978 letter  
8 that Mr. Rosolie referred to.

9 CHAIRMAN MILLER: Good. Let's have the record,  
10 then, reflect what information you've been able to receive  
11 by telephone.

12 V NESS NOONAN: Yes, sir. I just called Dr.  
13 Chin from the Mechanical Engineering Branch of the Division  
14 of Systems Safety. He informed me that the letter referred  
15 to here on page 10 of Mr. Pollard's limited appearance  
16 statement, the letter dated 29 September 1978, involved new  
17 test data on some Barton transmitters for the Diablo Canyon  
18 application.

19 He further informed me that he has checked with  
20 the Electrical Branch, and that does not involve Trojan  
21 whatsoever.

22 CHAIRMAN MILLER: Thank you.

23 BY MS. BELL:

24 Q Would you say there were any significant  
25 differences between the IEEE report 323, its different

1 versions, that is, 1971 and 1974?

2 A (Witness McDonald) In relation to seismic  
3 qualification? In relation to what?

4 Q In relation to seismic qualification.

5 A To seismic, it references the daughter supporting  
6 standards, which are 344, the earlier version being '71 and  
7 then later, '75.

8 I believe Mr. Noonan has given complete detail  
9 on the relationship of those seismic standards.

10 Q So would you say there were significant differences  
11 between the two versions?

12 A Of what, the 344-71 and '75?

13 Q That was my next question, but you may address  
14 that now.

15 A Mr. Noonan?

16 A (Witness Noonan) I think I addressed that for you,  
17 but I'll respond again.

18 MR. GRAY: Mr. Chairman, I guess I would object to  
19 going into that again. I think it's repetitive. It was  
20 covered in some great detail, as far as 344 is concerned.

21 CHAIRMAN MILLER: Well, I think the question is  
22 probably limited to a summary type question. I don't think  
23 Ms. Bell was trying to go back and get --

24 MS. BELL: No, I'm not.

25 WITNESS NOONAN: I'll respond to that, because

wel 6

1 basically, like I said, I see no real significant differences,  
2 other than an update, as we would normally expect as specs  
3 change and new technology develops, and the state of the art  
4 is developed.

5 BY MS. BELL:

6 Q In that you were talking about seismic qualifica-  
7 tion?

8 A (Witness Noonan) Yes.

9 Q How about general environmental qualifications?

10 A (Witness McDonald) The difference between 323-74  
11 and '71?

12 Q No, the difference between 344 of '71 and '75.

13 A They're related to seismic. The environmental is  
14 323, which is -- we use the term "mother" document, which  
15 has many supporting documents, of which seismic is only a  
16 portion of what is addressed in 323. And I believe Mr.  
17 Noonan just indicated the difference between the two 344  
18 versions.

19 Q I'm sorry. I did mean the difference between  
20 the 323 versions, in terms of environmental qualifications.

21 A You're relating to the overall environmental  
22 qualification, then.

23 323-71 gave some general guidelines. 323-74  
24 expanded, and defined, for example, actual numbers. It also  
25 included actual requirements to consider aging as one of the

1 environmental parameters.

2 I believe those would be the two major differences  
3 between the documents. It was more explicit and detailed.

4 However, the consideration for margin and other  
5 things was included in the '71 version.

6 Q Could you briefly explain how aging might come  
7 into play in a piece of equipment?

8 A Aging, depending on the types of material and the  
9 considerations, the environment, the normal environment, the  
10 number of operational cycles, the application --- there are  
11 many variables that could be considered for a period of time  
12 that could affect, over a long period of time, the capability  
13 of certain components.

14 Q If, for example, we were taking metal plates and  
15 batteries, would those be subject to aging, show aging?

16 A Metal plates and batteries?

17 Q Yes.

18 A You're talking the internals of a battery?

19 Q Yes.

20 A They would be subject to aging normally from their  
21 use, and they have a requirement for batteries for testing,  
22 periodic testing, discharge testing, to be a measure to  
23 determine when a battery is nearing its end of life.

24 Q Does metal in equipment ever become brittle ---  
25 given age, become more brittle?

1 A (Witness Noonan) I'll say no, but I would like to  
2 qualify that, if I can.

3 In general, metal does not become brittle due to  
4 age. It does not change its material properties, with one  
5 exception. With the metals associated with the reactor  
6 vessel, due to radiation effects, there could be, depending  
7 on the type of metal, it could become brittle, yes.

8 Q How about any sort of small electrical components,  
9 such as wires, very thin pieces that might be used?

10 A Based on my personal knowledge of materials -- I'm  
11 not a materials man, and I'd have to refer back to my staff--  
12 I know of no metal that becomes embrittled, like electrical  
13 equipment type metals used in normal applications, unless  
14 they're subject to extremely high radiation values.

15 I'd really have to refer back to the staff to  
16 answer that question, because I am not a materials man.

17 Q Okay. Thank you.

18 How many years would you say it's taken for the  
19 NRC to find WCAP-7821 acceptable, given that 18 months ago  
20 you found it technically acceptable?

21 A (Witness McDonald) As I indicated earlier, I  
22 believe that as far as the starting of the evaluation, it  
23 was sometime in the frame of late '73 to early '74 when we  
24 started the evaluation.

25 As I pointed out, it does not infer that the

wel 9

1 topical was unacceptable. There seemed to be certain concerns  
2 and considerations that we needed to answer, but it did not  
3 mean that it was completely unacceptable.

4 We had some concerns, and in some cases required  
5 nothing more than additional documentation. In other cases  
6 we did feel it necessary to go ahead and do some confirmatory  
7 testing.

8 Q Okay. Now, Trojan relied on WCAP-7821?

9 A Yes.

10 Q Did you require additional documentation?

11 A Is that in relation to the topical report, or to  
12 Trojan specifically, or . . . I don't quite understand your  
13 question.

14 Q Let's say we have -- in various tables we have  
15 qualification reference document -- or document reference,  
16 rather, and the document there is WCAP-7821. How would we  
17 know if additional submittals or documentation were required  
18 for the qualification of that piece of equipment that  
19 referenced that document?

20 A The evaluation report, as I indicated, the one  
21 that will be published within a couple of weeks, will include  
22 the Staff's evaluation, will identify the references upon  
23 which the Staff evaluated and based their conclusion on.

24 That information will be included in the Public  
25 Document Room as part of the overall report.

1 Q Okay.

2 Now, getting back to Trojan, if they referenced  
3 a report that at that time was not considered acceptable by  
4 the NRC Staff, how do we know if they provided additional  
5 documentation, or if they were referencing actually a part  
6 of 7821 that was found acceptable?

7 A In the Final Safety Analysis Report for the  
8 operating license, Trojan indicated who supplied the  
9 equipment and identified these particular pieces of equipment  
10 in that generic topical that is in their plant design. Not  
11 all equipment qualified in there was part of their plant  
12 design.

13 In the Electrical Instrumentation Control Systems  
14 Branch we looked at the functional operability. We had  
15 concerns, but we found nowhere where we considered that it  
16 was unacceptable, but reasonable assurance that the equipment  
17 would still function.

18 We did have some concerns and required some  
19 additional information and documentation, as I indicated,  
20 some confirmatory tests.

21 It is a judgment factor of the individual that does  
22 the evaluation for the particular plant, those people  
23 involved in a generic evaluation. It's not absolute. Any  
24 test is designed to provide, in addition to other information,  
25 a reasonable assurance.

wel 11

1 We concluded in the Branch, because of the extent  
2 of information available on the report and our degree of  
3 confidence in it, that we would, on the Westinghouse-supplied  
4 equipment, rely on our generic evaluation, and we would not  
5 require the Licensee in a particular case to independently  
6 supply something, unless they so chose to.

LOWEL

7 Q In terms of seismic qualification of safety-related  
8 equipment, were the WCAP reports on page 11 of Mr. Pollard's  
9 limited appearance statement used in reference to the Trojan  
10 plant?

11 A None of those reports on page 11 are related to  
12 seismic. The only one is the one on page 10, the 7821.

13 Q And were any of these related to environmental  
14 qualification?

15 A 7744 and 7410-L were related to environmental  
16 qualifications.

17 Q And at the time, I presume, the time that Trojan  
18 was referencing these, they were in the category of not  
19 accepted by the NRC?

20 A They were being reviewed.

21 Q On topical reports 7821, 7744 and 7410, how many  
22 branches of the NRC do the review on these?

23 A In the area of 7817-21, the seismic, it's  
24 primarily the Mechanical Engineering Branch and the Electrical.  
25 We may also consult systems branches. It depends. If there's

wel 12

1 a concern of the application in a design, we may contact  
2 other branches. But those are the two primary reviewers.

3 I believe the Standard Review Plan, which in  
4 Section 310, 311, which identified the seismic and environ-  
5 mental, list the primary branches or responsible reviewer  
6 and supporting branches.

7 It would depend on the particular situation. But  
8 the two primary are the ones I've indicated.

9 In the area of environmental qualification, it's  
10 the Electrical Branch. It's the Containment Systems for the  
11 pressure profile in the containment.

12 It's the Accident Analysis Branch, related to the  
13 radiation.

14 It encompasses almost all branches, depending on  
15 the questions. It can be materials questions -- whatever.

16 Q And the status that he's referring to here is  
17 the status by the Electrical Branch, is that right?

18 A As primary reviewer on this, yes. As I indicated,  
19 there's a lot of work, and I have like 100-some documents  
20 referenced, and, being the primary reviewer have to request  
21 assistance from the other branches if there's a question in  
22 their particular area.

23 Q And the Staff document number 10 is basically the  
24 Mechanical Engineering Branch?

25 A Relative to seismic, that's true.

1 Q I think you've already answered this question, but  
2 let me ask it in a different way:

3 Did you require site-specific information for  
4 Trojan to qualify Westinghouse equipment?

5 A There are two ways. The accident analysis, and  
6 in the FSAR the Licensee or Applicant provides the profile  
7 that is the design for his particular plant. The equipment  
8 provided can be, as long as that profile is under a generic  
9 type profile, if I may, and there is adequate margin in it  
10 still encompassed within those bounds, can use a generic  
11 report to support the qualification.

12 It can be done either way, as accustomed to the  
13 actual profile for this plant, or fall under a generic  
14 envelope.

15 Q In the case of Trojan was there any site-specific  
16 information?

17 A There is seismic-specific information on the  
18 docket, yes.

19 Q I said site-specific.

20 A Site?

21 Q Yes.

22 CHAIRMAN MILLER: Aren't we getting beyond the  
23 point now of the issues that we wanted --

24 MS. BELL: Well, I was simply trying to find out  
25 if there's any documentation that at this point the record

lacks on --

CHAIRMAN MILLER: What? Documentation that what?

MS. BELL:--that the record lacks on Westinghouse equipment that was qualified generically. And if the answer is no, then there isn't any documentation that we're missing.

CHAIRMAN MILLER: Well, I'm not clear. I don't want to take up your time, but I'm not clear that you're pursuing an issue that was covered by the witnesses.

WITNESS NOONAN: I could respond.

CHAIRMAN MILLER: All right.

WITNESS NOONAN: There are response spectra that are supplied in the FSAR. That is used as a basis to compare, and that's the documentation that we used to look to. If there's a reference topical involved we would take that data and compare it to the topical to see whether the topical would encompass those spectra.

BY MS. BELL:

Q And this margin you referred to as a method that was used before, has that changed substantially between . . .

A (Witness McDonald) Between what?

Q Well, we were talking about margins in the IEEE ...

A 323?

Q 323, right.

A '74? As I indicated, it always has been implied in the '71 version that you do have margins for uncertainties

wel 15

1 whenever you perform a test, because in a test you attempt  
2 to simulate as close as practical the actual conditions.

3 323-74 did put some numbers -- for example,  
4 10 percent on pressure, if I recall. I'm not sure of the  
5 actual values. But it also indicated these are suggested  
6 values of margin.

7 Here again, it gets to be technical judgment to  
8 determine if the margin, in fact, is adequate and it's going  
9 to be based also on the calculations by which you've  
10 developed the particular environment that you're trying to  
11 qualify.

12 There are many variables considered there. And  
13 those are suggested values in 323-74.

14 Q On the balance of plant equipment, was there any  
15 site-specific documentation for seismic qualification of  
16 safety-related equipment?

17 A (Witness Noonan) Again, the response spectra as  
18 provided in the PSAR would be that documentation.

19 Q Are you familiar with page 12 of Mr. Pollard's  
20 limited appearance statement -- rather, page 13? It's after  
21 the discussion of the way he found out that there were some  
22 problems with relays, which was basically that he requested  
23 information from PGE and they supplied him with something on  
24 the relays. And at that point they found out that they  
25 could not determine whether they were seismically qualified,

wel 16

1 and that led to the operating license having a condition  
2 that those unqualified relays be replaced or removed.

3 Now, he goes on in the second paragraph on page  
4 13 and says:

5 "I performed no similar spot checks to determine  
6 whether the balance of plant safety-related equipment  
7 has undergone adequate environmental qualification."

8 Is it true that this is still not a normal  
9 practice, or that this is still normal practice not to do  
10 that kind of check?

11 A (Witness McDonald) I'm afraid I can't address how  
12 Mr. Pollard did his review, but let me explain how I've done  
13 a review when I was in the technical review area doing  
14 licensing reviews.

15 We do do an audit function, and by definition in an  
16 audit function we do not look at every detail.

17 For example, if there are 100 safety-related  
18 drawings, we do look at selected drawings, we try to confirm  
19 and verify that in fact the design criteria has been met as  
20 implemented.

21 The qualification aspect is just one of the  
22 additional areas that we look at, and that, in itself, is  
23 also an audit function.

24 The things such as generic evaluations and  
25 reviews done are factored in.

wel 17

1 If I understand the way Mr. Pollard wrote his  
2 testimony, the relays he referred to were the ones we  
3 identified under the solid-state protection system, and Mr.  
4 Pollard was aware of the review, as I indicated, in the  
5 Branch at that time.

6 We knew there were some concerns, and we were  
7 continuing it and waiting on the basis of the information  
8 provided for the entire topical.

9 The extent of his evaluation and review of the  
10 balance of plant equipment, I'm not sure. I do feel that  
11 the information provided in the FSAR, the conclusions drawn  
12 in the Safety Evaluation Report, he did do the sufficient  
13 evaluation to make a determination that in fact there was  
14 reasonable assurance that the equipment was qualified.

15 CHAIRMAN MILLER: Let the record show that the  
16 witnesses referred to the "testimony" of Mr. Pollard. This  
17 is not testimony. It's a written limited appearance  
18 statement, and we don't want there to be any misconception  
19 by anyone. It is not testimony.

20 WITNESS MC DONALD: I apologize.

21 CHAIRMAN MILLER: No, no, I just want it straight  
22 in the record.

23 BY MS. BELL:

24 Q Do you know if any audits included site visits to  
25 the Trojan site?

we: 18 1 A [Witness McDonald] I can't say categorically they  
2 did, but I am assured during any licensing review that the  
3 reviewer does go to the site. We make at least one, and  
4 often four or five -- whatever is deemed necessary that we  
5 need to get the justification and justify to our own minds  
6 that we have all the information we need to draw a technical  
7 judgment.

8 It can involve any number of trips that are  
9 required. I believe the Standard Review Plan identifies how  
10 the Electrical Instrumentation Control system did their  
11 site visits. It identifies those things they looked at, and  
12 there was at a minimum one -- I know of nobody that made  
13 less, and normally it's more than one.

14 Q Would it have been possible for somebody to do . . .  
15 well, do these site visits happen like, say before or after  
16 an SER would be written?

17 A Definitely before. It depends on the percentage  
18 of completion in the construction. We use not only the  
19 information available, criteria we're committed to, the  
20 meetings, and all the other paperwork. We rely on drawing  
21 reviews to be an additional assurance. We rely on the site  
22 visit.

23 Often if we write an SER prior to a site visit  
24 we will indicate that we will confirm during the site visit  
25 that in fact the criteria have been implemented, you know, in

wel 19

1 accordance.

2 Q Are records kept of that kind of audit, the site  
3 visit audit?

4 A Yes. Just as meetings with Licensees. After we  
5 write up a trip report we identify those areas we looked  
6 at, the detail we went into.

7 A typical site visit would involve three or more  
8 days. You know. An indoctrination of the area, sit down.  
9 And often we even have a pre-agenda: "Here's what we want  
10 to look at and confirm."

11 Q Are you familiar with any site visits done that  
12 would have had information on the seismic qualification of  
13 safety-related equipment at Trojan?

14 A Personally I can't answer that. I'm not sure.

15 Q Aside from the PDR where would we be able to find  
16 a copy of that?

17 A If there was a site visit, and there was a report  
18 written, a trip report, it's part of the record in the docket  
19 file. Is that a fair statement?

20 A (Witness Noonan) Yes, that's true.

end 10

21

22

23

24

25

tll  
LONDON  
j1-1

1 Q Could you tell me -- I am referring now to Staff  
2 Exhibit No. 10 -- why, on page 12, there is a condition number  
3 1, that the listed topics of reports are only applicable for  
4 plants having construction permit application docketed prior  
5 to October 1972?

6 A (Witness Noonan) I will respond to the best of my  
7 knowledge on that.

8 When it is a requirement being applied by the  
9 Division of System Safety on new plants, and plants in the  
10 CP and OL stage, it is a typical requirement that would be  
11 applied to use the latest criteria on your plants.

12 That would be their requirements. I assume that is  
13 what you mean.

14 Q Would you accept referencing these above reports on  
15 a construction permit today?

16 A I am not part of the Division of System Safety, so  
17 I am not qualified to answer that. I can speak in terms of  
18 the operating plants.

19 Q Now, IEEE 323, 1971, was not endorsed by regulatory  
20 guide; is that correct?

21 A (Witness McDonald) I believe that is a correct  
22 statement, yes.

23 Q And IEEE 323, '74, was that endorsed by regulatory  
24 guide?

25 A Regulatory Guide 1.89.

j1 2

1 CHAIRMAN MILLER: Miss Bell, let me point out, first,  
2 we are not involved in the environmental aspects.

3 You have got about five minutes, and you might want  
4 to concentrate in the time remaining on those items most  
5 significant to you.

6 MS. BELL: All right.

7 BY MS. BELL:

8 Q When you are considering the effect of a fire on  
9 the nuclear power plant, do you take -- and you are talking  
10 about the single failure criterion, do you take into considera-  
11 tion the probability of a fire occurring?

12 A (Witness George) In our fire protection reviews,  
13 we do not apply the single failure criterion. The regulations  
14 that pertain to fire protection are laid out in General Design  
15 Criterion 3, which, in essence call for a level of fire detec-  
16 tion suppression capability to limit the effects of fires on  
17 safety systems, so that there is application of fire protection  
18 across the board in the plant.

19 We don't, in this case, postulate seismic event,  
20 some fire occurring, as well as a single failure.

21 Q Are you familiar with the Underwriter Laboratories'  
22 test -- fire protection test -- that was done recently -- I  
23 think in the fall of this year?

24 A There were a number of them; but I am familiar with  
25 those tests, yes.

11 3 1 Q Could you tell me what the main -- let's see, how  
2 shall I put this. . .

3 Could you tell me what kinds of things they used in  
4 order to prevent fire spreading in their test?

5 They must have used some cable, insulation, things  
6 of this sort.

7 A Let me first try to summarize those tests.

8 The tests involved vertical cable trays, that were  
9 loaded with cables, to simulate cable trays from redundant  
10 divisions.

11 The vertical cable trays were separated by only  
12 several inches -- I don't recall the exact number. The  
13 cables that were used were PVC-type cables, which are highly  
14 combustible-type insulation.

15 It is not at all similar to the cable installation  
16 used at Trojan. THE PVC-type insulation is one which, if the  
17 thermal plastic and heating -- it starts breaking down and  
18 melting -- the type used at Trojan, and there were flame tests  
19 performed to qualify these cables, are ones which are  
20 thermal-setting, so that at higher temperatures the cable  
21 installation actually becomes harder -- harder, it doesn't  
22 break down.

23 So, it is then less likely to fail in a fire  
24 situation.

25 Additionally, in the UL tests, this situation

j1 4

1 involves sprinkler heads located at the ceiling. The cable  
2 trays were enclosed in the KAO-wool-type blanket, which is a  
3 mineral wool blanket that you might think of -- somewhat of a  
4 fiberglas blanket, although it is a different material.

5 And the ignition source was a two-gallon can of  
6 heptane fuel.

7 What was found in the test is that this small fire  
8 source did not generate enough heat to set off the sprinkler  
9 heads and then put out the fire.

10 And, additionally, the fuel shipped up through the  
11 KAO-wool blanket, burning within the blanket, and damaged the  
12 cables.

13 So, I guess the obvious question is does this mean  
14 you could have such a problem at Trojan?

15 First of all, Trojan doesn't have the KAO-type  
16 blankets, with the combustible up-through.

17 Additionally, when we looked at the cable separation  
18 at Trojan, we found no situations where we had something to  
19 the figuration used in the UL tests, where you had vertical  
20 cable trays that were adjacent to each other and could both  
21 be exposed by some small fire.

end WEL:j1

end t11

MADELOE/  
mpbi

Q Are there any physical separation problems at Trojan with, let's say redundant safety systems that could be affected by fire?

A In our review we identified a number of areas where the Staff was concerned, where redundant cables were in proximity. These were analyzed by the Licensees and in most of these it was found that the separation -- or the systems that could be affected were not redundant to each other, or the ones that were affected were not required for safe shutdown. They might have been remote indicating lights, or things of this sort.

In areas where problems were found, the Licensee has proposed to in some cases provide a barrier, in other cases, reroute the cable.

Let me add one thing:

In this fast evaluation what we are considering, I do want to emphasize that it's a very conservative approach. We apply a defense in depth approach which calls for taking a look at reasonable effects due to a fire and making sure that there is a very high degree of assurance that you don't have a problem. And then taking a look at something which I guess some people might consider not reasonable, considering perhaps that the fire involves a very large amount of equipment in an area, that there are no actions taken to put out the fire, and it continues for a period of time, perhaps

mpb2 1 something similar to Browns Ferry.

2 And in those situations at Trojan we took  
3 positions where we thought improvements should be made.  
4 But, again, we're talking about a situation which is very  
5 unlikely. It's an extra level of margin, an extra level of  
6 defense, assuming that systems fail, assuming that personnel  
7 take no action, the fire continues for a long period of time.

8 I might add, the areas where we required these  
9 additional modifications are identified in the SER.

10 MR. GRAY: Excuse me, that is Staff Exhibit --

11 WITNESS GEORGE: Yes, that's Staff Exhibit 11.

12 BY MS. BELL:

13 Q Could you explain to me what a non-detectable  
14 failure is and how that works into your assumptions about  
15 how a fire would affect systems?

16 A (Witness George) Could you explain this non-  
17 detectable failure? Is that referenced?

18 Q I don't have the reference. I believe it is --  
19 I believe that according to the regulations a system -- that  
20 there are two things that you can work with. One is that  
21 you must assume that a system has sufficient equipment,  
22 qualified equipment to take care of a failure caused by  
23 the result of an accident, right? And that it also must be  
24 able to deal with what would be called the non-detectable  
25 failure. In other words, something that you're not going to

mpb3 1 be able to assume is going to happen because it's in a system  
2 that you can't test for it.

3 Could you give me any clarification on that?

4 CHAIRMAN MILLER: I think you've got about two  
5 more questions. And I doubt that this is really relevant to  
6 the interim operation, Ms. Bell, but it's your time.

7 MS. BELL: I have no further questions.

8 CHAIRMAN MILLER: Thank you.

9 Does the Staff have any questions?

10 MR. GRAY: I believe the Licensee, I guess, has  
11 not had a chance.

12 MR. AXELRAD: The Licensee has no questions.

13 CHAIRMAN MILLER: I assume the Licensee would  
14 like to go last.

15 The Licensee has no questions?

16 MR. AXELRAD: Right.

17 MR. GRAY: The Staff has none.

18 WITNESS TRAMMELL: Mr. Chairman?

19 CHAIRMAN MILLER: Yes.

20 WITNESS TRAMMELL: I would like to make just a  
21 brief statement regarding the question you asked about an  
22 hour and a half ago, whether I had any personal reservations  
23 about interim operation.

24 I've had some time to think about it, and my  
25 answer is I do not. However I would like to add that this

mpb4 1 does not mean that if licensing does not continue there  
2 will not be letters to the Licensees on various subjects  
3 and there may be some licensing action during this period  
4 of interim operation.

5 CHAIRMAN MILLER: And you would continue,  
6 of course, the normal duties of the Staff in regard to  
7 safety and the like during the period of interim operation  
8 if interim operation be permitted, or during any period of  
9 operation, is that correct?

10 WITNESS TRAMMELL: Yes.

11 CHAIRMAN MILLER: If this Board should still be  
12 seized with jurisdiction I'm sure that you and Staff Counsel  
13 will keep the Board, and, hence, the parties advised, is  
14 that correct?

15 WITNESS TRAMMELL: That's correct.

16 CHAIRMAN MILLER: Thank you, sir.

17 Anything further?

18 (No response.)

19 The witness panel is excused.

20 (The panel excused.)

21 CHAIRMAN MILLER: The Board will close the  
22 evidentiary record -- close the record on this evidentiary  
23 hearing, the Phase I, or interim operation. As we've indi-  
24 cated, we will receive and consider proposed findings of  
25 fact and conclusions of law, or supplements thereto, if it

mpb5 1 is in the hands of the Board by Tuesday, December 19, 1978.

2 We expect to issue a partial initial decision  
3 next week, as indicated. We have covered the timing upon  
4 the Phase II or subsequent matter of modification of the  
5 contentions and the discovery relating thereto.

6 We stand adjourned.

7 MR. AXELRAD: Mr. Chairman, excuse me.

8 CHAIRMAN MILLER: Yes.

9 MR. AXELRAD: One last item:

10 In this respect I would like to do whatever  
11 would suit the Board's convenience. We have a few additional  
12 transcript corrections which we found in reading the tran-  
13 script of the last couple of days.

14 CHAIRMAN MILLER: Send us a letter and be sure  
15 we get it by Tuesday. We'll have it incorporated into the  
16 record -- or anyone else who has corrections, just get it to  
17 us and we'll have the record corrected.

18 MR. AXELRAD: Fine.

19 And we also have some additional findings and  
20 conclusions which we have now based upon what happened in  
21 the last day or two. Are we to send those to you?

22 CHAIRMAN MILLER: By Tuesday.

23 MR. AXELRAD: You don't want them read directly  
24 right now?

25 CHAIRMAN MILLER: Send them to Washington. We

mpb6 1 have arrangements with other members of the Board --

2 MR. AXELRAD: I just thought it would be con-  
3 venient for the members of the Board to have anything read  
4 into the record now. If you prefer to receive it in writing  
5 by Tuesday, I can do that. Whatever suits the Board's con-  
6 venience as of right now.

7 CHAIRMAN MILLER: Well, do you have them in  
8 writing now?

9 MR. AXELRAD: I have my handwritten notes. I  
10 have about three pages -- or typewritten pages that I could  
11 read into the record right now if the Board wished it.  
12 Whatever the Board prefers.

13 CHAIRMAN MILLER: I think the Board prefers to  
14 get to the airplane.

15 (Laughter.)

16 CHAIRMAN MILLER: Thank you. And if you'll have  
17 it in our hands, we'll appreciate it.

18 We stand adjourned.

19 (Whereupon, at 12:35 p.m., the hearing in the  
20 above-entitled matter was adjourned.)

21

22

23

24

25