

ORIGINAL
UNITED STATES
NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

PUBLIC SERVICE COMPANY OF
NEW HAMPSHIRE, et al.

(Seabrook Station, Units 1 and 2)

DOCKET NO: 50-443-OL
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ONSITE EMERGENCY PLANNING
AND TECHNICAL ISSUES

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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 In the Matter of :
 :
 PUBLIC SERVICE COMPANY OF : Docket Nos. 50-443-OL
 NEW HAMPSHIRE, et al. : 50-444-OL
 : Onsite Emergency Planning
 (Seabrook Station, Units 1 & 2 : and Technical Issues
 -----X

Howard Johnson's Motor Lodge
 Interstate Traffic Circle
 Salons A & B
 Portsmouth, New Hampshire

Wednesday, October 1, 1986

The hearing in the above-entitled matter
 reconvened, pursuant to recess, at 9:07 a.m.,

BEFORE:

SHELDON J. WOLFE, Chairman
 Atomic Safety and Licensing Board
 Nuclear Regulatory Commission
 Washington, D. C. 20555

EMMETH A. LUEBKE, Member
 Atomic Safety and Licensing Board
 Nuclear Regulatory Commission
 Washington, D. C. 20555

JERRY HARBOUR, Member
 Atomic Safety and Licensing Board
 Nuclear Regulatory Commission
 Washington, D. C. 20555

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C O N T E N T S

<u>WITNESS</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>	<u>BOARD</u>	<u>VOIR DIRE</u>
Harold Walker (Resumed)	676		709-A	718	713	
L. A. Walsh) and) G. S. Thomas)	727	741			809	731
Richard J. Eckenrode	819	823				

E X H I B I T S

	<u>IDENTIFIED</u>	<u>RECEIVED</u>
NECNP Exhibit Number 12	678	709-A
NECNP Exhibit Number 13	694	709-A
NECNP Exhibit Number 10		709-A
NECNP Exhibit Number 11		709-A

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#1-1-gjw

P R O C E E D I N G S

(9:07 a.m.)

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2
3 JUDGE WOLFE: The evidentiary hearing is resumed.
4 We will proceed with the cross-examination by Ms. Curran.

5 MS. CURRAN: I would just like to bring up a
6 matter that Mr. Turk pointed out to me, and that is that we
7 have been referring to NUREG 0588, which is a regulatory
8 guide from the NRC.

9 Since that is not officially a regulation of the
10 Commission, the NRC Staff and Applicants and NECNP have
11 stipulated that if the Board please, we can ask the Board
12 to take judicial notice of that regulatory guide and of
13 regulatory guide 1.89. Both of these are relating to environ-
14 mental qualifications.

15 JUDGE WOLFE: That is Revision 1, is it, to 0588?

16 MR. TURK: It is Revision 1, to NUREG 0588, and
17 it is also Revision 1 to Reg Guide 1.89.

18 JUDGE WOLFE: For the Board's convenience, Mr.
19 Turk, do you happen to have a copy of NUREG 0159?

20 MR. TURK: NUREG 8 --

21 JUDGE WOLFE: We have that. Regulatory Guide
22 1.89, do you have that?

23 MR. TURK: Yes, I have that. I will give you my
24 copy.

25 JUDGE WOLFE: Thank you. There being a stipulation,

#1-2-gjw

1 we will accept the stipulation, and the Board will take
2 official notice of NUREG 9588, Revision 1, and of Regulatory
3 Guide 1.89.

4 All right.

5 Whereupon,

6 HAROLD WALKER,
7 resumed the stand and, having been previously duly sworn,
8 was examined and further testified as follows:

9 CROSS EXAMINATION

10 BY MS. CURRAN: (Continuing)

11 Q Good morning, Mr. Walker.

12 A Good morning.

13 Q Yesterday, we were discussing the Meeting Summary,
14 dated April 11, 1986.

15 Do you have a copy of that from yesterday?

16 A Yes, I have.

17 Q Do I understand -- and I may be repeating what I
18 said yesterday -- in that audit, 12 equipment qualification
19 files were reviewed by the NRC Staff?

20 A That is correct.

21 Q And, out of those 12, the NRC Staff found
22 specific deficiencies in respect to six of those files; is
23 that correct?

24 A Yes.

25 Q And, with respect to all of those files, the NRC

1 found that the Applicant had misapplied the erroneous
2 equation with respect to qualification for temperature?

3 A That is not necessarily correct.

4 Q Mr. Walker, was your audit done in connection with
5 the Idaho National Engineering Laboratory?

6 A Yes.

7 Q I am basing my question on a statement made in
8 a letter from Idaho National Engineering Laboratory to Mr.
9 Mayo Carrington of the NRC, March 31, 1986.

10 That letter transmits a report entitled: Audit
11 of the environmental qualification of safety related
12 electrical equipment for the Seabrook Station.

13 And at page 6, that report states that in all of the
14 files reviewed during the onsite audit, the Applicant
15 incorporated unacceptable extrapolation of the erroneous
16 methodologies to establish the demonstrated post-EPA
17 operability time to their component.

18 Is that a correct statement?

19 MR. TURK: Could we have a minute to let the
20 witness look at the document?

21 MS. CURRAN: I have a copy of it to provide to him.
22 We would like to ask the Court Reporter to identify as
23 NECNP Exhibit No. 12, a report from the Idaho National
24 Engineering Laboratories, entitled Audit of the Environmental

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Qualification of Safety Related Electrical Equipment for
the Seabrook Station, Report No. EGG-NCA-7186, dated
March 1986. This report is transmitted to the NRC by
letter of March 31, 1986.

(Above referenced document is
marked NECNP Exhibit No. 12, for
identification.)

End 1.
MS fols.

Sim 2-1

1 JUDGE HARBOUR: Ms. Curran, what page is it
2 on again, please?

3 MS. CURRAN: It's on page 6.

4 BY MS. CURRAN:

5 Q Mr. Walker, is that a correct statement?

6 A I am not sure. If I may explain. There was
7 some disagreement with the use of the uranius equation. I
8 do not know if it applied to all the files that were
9 reviewed during the audit. So the word "all" is the
10 area were I am not certain about.

11 Q Are you uncertain because you recollect some
12 discussion with I&E concerning whether or not this was
13 true for all the files?

14 A I assume you mean Idaho National Lab.

15 Q Yes.

16 A I am uncertain because I was there and I
17 reviewed some of the files. I don't remember having
18 a problem with the files that I reviewed.

19 Q May you can describe for me how this review
20 was conducted.

21 A Why typically happens is that the applicant
22 is asked to submit information to the staff on their
23 equipment qualification program. We look at it and
24 review it, if you will, to try and determine if it is in
25 accordance with the requirements of 10 CFR 50.49 and the

Sim 2-2

1 guidelines provided in NUREG 0588 and Reg. Guide 189.
2 If we conclude that it is within those guidelines, we
3 often meet with the applicant to discuss any deficiency
4 that we may have found in that submittal. We will ask
5 that the deficiencies be corrected, and when they are
6 we usually agree to some time that is mutually acceptable
7 to conduct an audit.

8 When we arrive on the site for the audit, we
9 will typically provide the applicant with the list of the
10 files that we wish to review. There will be some discussion
11 on the program early. Usually that takes place prior
12 to reviewing any files. The discussion usually centers
13 around how the program was developed and what measures
14 were considered in order to meet the requirements and what
15 program they may have set up to maintain the equipment
16 in the qualified standards throughout the life of the
17 plant.

18 After that discussion is completed, we proceed
19 to review files.

20 Q Did you do that with Idaho National Engineering
21 Labs at the same time?

22 A Yes.

23 Q And you reviewed each file separately together
24 with Idaho National Engineering Labs?

25 A Separately and together? I don't ---

Sim 2-3

1 Q I mean you took each file separately and
2 for each of those files you and Idaho National Engineering
3 Labs went over those files together at the same time?

4 A No, that is not the way it is done.

5 Q Okay. How is it done?

6 A There is a team of three or four people.
7 Usually it is one NRC person, and in this case it was me,
8 and two or three Idaho Natinal Lab personnel, and we
9 review individual files. Each one of us reviews files
10 individually. Each person is responsible for determining
11 whether the file is acceptable or not.

12 Q Okay. So the NRC and INEL separately review
13 each of the 12 qualification files?

14 A I believe that is correct, yes.

15 Q And then INEL sent you a report that was by
16 that cover letter dated March 31st, '86?

17 A Yes.

18 Q And did you compare notes on your separate
19 reviews of these files before that time?

20 A At the conclusion of the audit we have what
21 we call a caucus where we compare notes and we try to
22 put the results of the audit in a manner in which we
23 can present the results to the applicant prior to leaving
24 the site. That is a time when we compare notes and try
25 to make our conclusions known to the applicant.

Sim 2-4

1 Occasionally we will discuss the results
2 after we return to our respective offices. In this case
3 I don't recall that we discussed it. We probably did,
4 that is subsequent to leaving the site.

5 As a matter of fact, I believe we did discuss
6 it subsequent to leaving the site.

7 Q In your personal review of those equipment
8 qualification files, did you find instances in which the
9 uranium equation had been improperly applied?

10 A I'm not sure. I cannot be sure that I did.
11 I don't remember. I do know that there was some lengthy
12 discussion about the way it was applied, but I don't
13 that it was limited to the files that Idaho Engineering
14 Laboratory reviewed or whether it carried over into the
15 files that I personally reviewed.

16 Q Okay. But am I correct that as a result of
17 this discovery regarding the misapplication of the uranium
18 equation that the applicants went back and reviewed all
19 of the files in which that equation was used and resub-
20 mitted those calculations?

21 A We requested that they review all of the
22 files in which that equation was used and that a correction
23 be made in instances where it was not applied in the manner
24 we thought it should be applied. The calculations were
25 not submitted.

Sim 2-5

1 However, the applicant provided a letter I
2 believe it was indicating that that had been done.

3 Q And as a result of the applicant's recalcula-
4 tion it was found for a number of components that the
5 post-accident qualification time was not as long as they
6 had previously thought and had to be reduced; is that
7 right?

8 A In accordance with the information I got
9 from the applicant, I believe that is correct.

10 Q Would you consider that to be a significant
11 finding of this audit?

12 A Significant in the sense that it was a
13 deficiency. I do not know that it required them to change
14 the post-accident operability time for that many pieces
15 of equipment. You know, I cannot answer that with
16 certainty.

17 Q Now this audit conducted in February showed
18 a number of other problems with the qualification files,
19 didn't it?

20 A Yes. Other deficiencies were found.

21 Q Am I correct in stating that for three of
22 those files the NRC found that additional test information
23 was needed to justify the qualification of the equipment?

24 A If you will permit me to take a look at ---

25 MS. CURRAN: Sure.

Sim 2-6

1 MR. TURK: It might help if counsel could
2 identify the document and the page she is referring to.

3 MS. CURRAN: I am referring to page 2, file
4 No. 113-03-01 for Oconite cable, file No. 174-15-01 for
5 Transamerica level transmitters and file No. 236-11-06 for
6 a Reliance motor.

7 MR. TURK: This is page No. 2 of the meeting
8 summary dated April 11th, NECNP Exhibit 11 for identification?

9 MS. CURRAN: Yes.

10 THE WITNESS: Would you repeat the question
11 now, please?

12 BY MS. CURRAN:

13 Q Is it correct to state that for three of
14 the audited files the NRC found that additional testing
15 information was needed to justify the environmental
16 qualification of the component?

17 A I don't believe that is correct.

18 end Sim
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#3-1-SueW

1 Q Why not?

2 A File Number 113-03-01, the comment is that: This
3 file should be updated to include the test information that
4 was provided during the audit justifying the use of this cable
5 in Seabrook's design basis events.

6 When you asked if there is additional -- were
7 there additional test information needed, if you meant needed
8 to be added to the file or you meant needed to be collected
9 by Seabrook, I'm not sure. If you meant needed --

10 Q I meant needed to be added to the file.

11 A Then, I agree with that.

12 Q Okay.

13 A For that --

14 Q For that component?

15 A Yes.

16 Q Okay.

17 A File Number 174-15-01: Applicant agreed to add
18 information to this file justifying the use of a test
19 sequence different from that specified in IEEE 323-1974.

20 That is not test information. It is justification
21 for doing what -- using the information the way they used
22 it.

23 Q It's information that describes a certain test
24 sequence and justifies it, right?

25 A That's right.

#3-2-SueW

1 Q Okay. All right. How about the last one?

2 A File 236-11-06: Applicant agreed to add clarifying
3 test report data to the equipment summary evaluation.

4 That amounts to moving information around. It
5 was not -- there is a summary report in the front of this file
6 which typically provides a reviewer with information he
7 would otherwise have to search through his test report to
8 find.

9 So, I don't believe additional test information
10 was required. I believe it just needed to be put in a
11 different place.

12 Q Okay. Now, for File Number 113-06-01, Brandrex
13 cable, Page 2 of the April 11th meeting summary states that:
14 Applicant agreed to add a statement to specify that
15 submergence qualification is not required.

16 Now, during the audit did Applicant explain to you
17 why the submergence qualification wasn't required?

18 A While I did not personally review that file, I
19 remember the discussion. And I think what happened was, the
20 person who reviewed it apparently concluded that it was not
21 going to be submerged. And, it was not clear in the file
22 that that was the case.

23 So, the request was that they should make it
24 clear that that cable was not going to be used in a submerged
25 condition.

#3-3-SueW

1 Q And, as for a File Number 248-37-01 for a
2 Limitorque motor operator, during the audit it was discovered
3 that there are three internal wires and a terminal block
4 that couldn't be identified. And, it was required that those
5 components must either be identified or replaced.

6 That's correct?

7 A I believe that's correct, yes.

8 Q What's the significance for environmental
9 qualification purposes when a component contains constituents
10 that can't be identified?

11 A In this particular case, which does not necessarily
12 represent all cases, but in this case there is information
13 to indicate that there may have been testings of Limitorque
14 operators that did not include all the internal wiring that
15 may be in the operators when they were installed in the plant.

16 And, if the operator had wires or terminal
17 blocks that was not a part of the operator when it was
18 tested, then it is our feeling that the operator has not been
19 shown to be qualified.

20 Q Okay. And, finally with File Number NSSS-220-02
21 for ASCO solenoid valve, apparently during a plant walkdown
22 it was discovered that the valve had two different equipment
23 identification numbers on it; is that right?

24 A That's correct.

25 Q Okay. Now, can you explain what was the follow-up

#3-4-SueW

1 by the Applicants and the NRC on this particular audit?

2 A On the audit?

3 Q Yes.

4 A What we typically ask is that the Applicant correct
5 all the deficiencies. And, sometimes that means going to
6 specific problems, sometimes that may mean going through the
7 entire program.

8 And, when those corrections are completed we ask
9 that we be notified that they are completed and that the
10 files should then reflect the corrected status. And that
11 is provided to the Staff by way of a letter usually.

12 At that point, the files are available for
13 a follow-up inspection should the Staff choose to do so.

14 Q As a follow-up to this audit, can you identify
15 those actions that the Applicants were directed to take
16 with respect to their entire qualification program as
17 opposed to with respect to individual qualification files?

18 A I believe they are part of this document. This
19 is written in a manner such that I tried to --

20 MR. DIGNAN: Excuse me, Your Honor. This witness
21 has referred to this document. Could we have in the record
22 what the document he is looking at is.

23 MS. CURRAN: We are still --

24 MR. DIGNAN: The witness seems to be looking at
25 Exhibit 11.

1 JUDGE WOLFE: Yes. Would you make an identification
2 of what you are looking to, Mr. Walker?

3 WITNESS WALKER: I'm reading from a memorandum
4 that went to Vic Nerses transmitting that meeting summary
5 that was earlier identified as the Exhibit 11, I believe.

6 JUDGE WOLFE: That's NECNP 11.

7 WITNESS WALKER: Right.

8 BY MS. CURRAN:

9 Q Is that dated April 11th, 1986?

10 A The one I'm reading from is dated March 20th.
11 It's the same document except this went from my branch to
12 Nerses. And you have one from Vic Nerses to the Applicant,
13 I believe.

14 Q The contents are exactly the same?

15 A The contents is exactly the same.

16 MR. TURK: Your Honor, the problem here is that
17 NECNP has not made additional copies of the document so that
18 the witness could have in front of him the same document
19 from which NECNP and the Licensing Board members are reading.

20 MS. CURRAN: I'm sorry. I thought Mr. Walker did
21 have a copy of that April 11th memo.

22 MR. TURK: It was not provided to him today here.

23 (Ms. Curran is handing the witness a document.)

24 JUDGE WOLFE: Mr. Walker, you have now been handed
25 a document of April 11, 1986, the subject of which is "Meeting

#3-6-SueW

1 Summary." Is that right?

2 WITNESS WALKER: That's correct.

3 JUDGE WOLFE: And there is a received date of
4 April 16th?

5 WITNESS WALKER: That's correct.

6 JUDGE WOLFE: That has also been identified as
7 NECNP 11, marked for identification, correct?

8 WITNESS WALKER: That's correct.

9 JUDGE WOLFE: All right. Proceed.

10 BY MS. CURRAN:

11 Q All right. I believe that you were talking about
12 the instructions that were given to the Applicant as a
13 result of this audit.

14 Can you identify the actions that the NRC directed
15 the Applicants to take with respect to the entire qualifica-
16 tions program as opposed to -- with respect to individual
17 qualification files?

18 A This document is written in a way that it separate
19 the comments that apply to individuals files from those that
20 apply to the entire program.

21 Items 1 through 4, I believe, apply to the entire
22 program. The remainder of the items apply to the files that
23 were identified in each of the comments.

24 Q I would just like to go through for a moment.

25 The first item relates to 38 items remaining to be qualified

#3-7-SueW

1 in the Applicants' program. I have no problem with that.

2 The second item had to do with three jumper wires
3 and a terminal block in a Limitorque motor operator that
4 could not be identified. Now, I'm a little confused here.
5 Maybe you can straighten me out.

6 I had thought that this referred to the specific
7 problem that was identified on the following page with the
8 components that couldn't be identified in the Limitorque
9 motor operator.

10 A I believe it is, yes.

11 Q Okay. So that --

12 A That --

13 Q Go ahead.

14 A That problem that is identified in File Number
15 248-37-01, that is the file in which the problem was found.

16 Item Number 2, I believe, suggests that they
17 should review their entire program to make sure that it does
18 not exist in other operators.

19 Q Okay. Okay, fine. That was my main question on
20 that. Now, you also mentioned, when you were describing
21 generally what kind of follow-up you do, that sometimes
22 there are additional inspections or audits of files; is
23 that true?

24 A The Office of Inspection Enforcement have a
25 program in which they are only follow-up audits. I do not

#3-8-SueW

1 know schedules or whether there will be follow-up audits to
2 all plants. I -- I am aware that the program exists, and
3 I'm not sure exactly what the schedule is.

4 Q This would be a follow-up to a Licensing Branch
5 audit? They would do something like that?

6 A Not prior to licensing the plant.

7 Q Oh, they --

8 A At least, it has not been done, to my knowledge,
9 prior to licensing a plant.

10 Q I see. So, in terms of the review necessary for
11 the approval of this license application, were any more
12 reviews of specific equipment qualification files contemplated
13 as a result of this audit?

14 A I don't believe so.

15 Q All right. Okay. I would just like to review the
16 manner in which audits are conducted and the purposes of
17 audits.

18 Now, do I understand that an audit is generally
19 performed at the time when the NRC has reviewed the equipment
20 qualification program and considers that it's basically
21 adequate?

22 A Yes. And the Applicant agrees that he is
23 sufficiently completed -- he has sufficiently completed his
24 program, that he is ready for an audit.

25 Q And that was done in this case?

#3-9-SueW

1 A Yes.

2 Q And, how do you choose the equipment that is
3 going to be audited?4 A We try for random selection except when the --
5 the instances where we believe that there could be problems
6 or lack of information or any indication that there are
7 reasons to believe that a file may not be complete.8 We will attempt to choose those files that we
9 think could potentially have problems.10 Q So, you take a -- you try to take a special look
11 at files that may be incomplete?

12 A If we have that impression, yes.

13 Q And, at the time of this particular audit, at the
14 time that this particular audit was done, wasn't it true
15 that the Applicants' had stated that there were over 35
16 qualification files that were incomplete?17 A I'm not sure about the numbers, but I do know
18 that there were problems that were not completed and that
19 were -- the Applicant agreed, or informed us, that they
20 weren't complete.21 Q And, weren't there over 100 files for which a
22 consultant hired by the NRC to review the Applicants'
23 qualification program had found that there were skew sheets
24 missing or confusing information or lack of information?

25 A I'm not sure if I follow your question. A hundred

#3-10-SueW 1

files, I don't believe --

2

Q A hundred components. Over 100 components. And, let me -- I will hand you a copy of that document.

3

4

A Okay.

5

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MS. CURRAN: I would like to ask the Reporter to mark for purposes of identification as NECNP Exhibit 13 the pre-audit review of the Seabrook Station equipment qualification program which was transmitted by EG&G of Idaho to the NRC by memorandum of February 21st, 1986.

10

(The document referred to is

11

marked as NECNP Exhibit Number

12

13 for identification.)

13

BY MR. CURRAN:

14

Q Do you have a copy of that, Mr. Walker?

15

A Yes, I have.

16

Q Did you review this report before you conducted the audit?

17

18

A I discussed this report with EG&G prior to meeting with the Applicant and, yes, prior to conducting an audit.

19

20

Q And, were you aware that there were a large number of components that EG&G had reviewed and found --

21

22

A Yes. I am aware of the components that are identified in this document as having some deficiencies.

23

End #3 24

4-1-gjws

1 Q And they are identified in Table 2, aren't they?

2 A I believe they are, yes.

3 Q Did you use this information in Table 2, or the
4 information that was given to you by EG&G as a result of
5 their study to chose the files that you were going to audit?

6 A Yes.

7 Q Can you explain the reasons for your choices?

8 A The reasons are as I stated. There were indications
9 either files weren't complete, or inconsistent information,
10 or any of the other deficiencies that were listed in the
11 Table that would lead me to choose a particular file.

12 Q Did you feel that the twelve files that you chose
13 were fairly representative of each type of deficiency that
14 was found by EG&G?

15 MR. TURK: Objection. I think the question again
16 has turned to the means by which the Staff conducts
17 environmental qualifications review, as opposed to whether
18 the time durations for the Applicant's electrical equipment
19 has been properly stated. I think we are really wandering
20 far into the Staff review procedure, rather than the
21 Applicant's equipment.

22 JUDGE WOLFE: Overruled. Proceed.

23 WITNESS: I don't remember the question.

24 MS. CURRAN: Neither do I. Could I have the
25 Reporter read it back, please.

1 (Reporter reads back the question.)

2 WITNESS: I don't know.

3 BY MS. CURRAN: (Continuing)

4 Q Okay. Have you now reviewed the EG&G Report,
5 Table 2?

6 A I have not reviewed this report any further, other
7 than the time that I indicated.

8 Q In other words, your discussions with EG&G?

9 A That is correct, yes.

10 Q So, would it be correct to say that the NRC Staff
11 has not sent out any correspondence or given directions to
12 the Applicants to correct the deficiencies specified in
13 Table 2?

14 A That is not correct.

15 Q Would you explain that answer?

16 A After discussing this report with the EG&G and
17 prior to the audit, we met with the Applicants, discussed
18 each of the deficiencies. They agreed to correct them.

19 As a result of that meeting and that agreement,
20 my reasons for choosing some of the files that we chose
21 was to try and determine if those corrections had been
22 made.

23 Q That was the reason for the audit.

24 A No. My reasons for choosing the files that I
25 chose was partially to determine whether those corrections

1 had been made as the Applicant agreed to make them.

2 Q And these corrections, you think, would have been
3 made between February 21st, when this report was prepared
4 on February 24, when an audit began?

5 A Although this report is dated February 21st, I
6 don't know that that is the date we discussed it with the
7 Applicant. As a matter of fact, I saw the report and had
8 copies before February 21st.

9 Q Do you remember when you might have had them?

10 A No, I am sorry I do not. But I do know that the
11 Applicant -- we expect for the Applicant to agree to correct
12 the deficiencies before we will agree that they are ready
13 for an audit.

14 Q Now, sir, would you agree that where a significant
15 number of the components identified in Table 2, the
16 Applicants had not provided a skew sheet, or a qualification
17 evaluation worksheet, like the sheets we were discussing
18 yesterday.

19 A I don't know how many, but it is true that at that
20 time they had not provided skew sheets.

21 Q I counted 54. Would you say that that is a
22 reasonable count?

23 MR. TURK: Objection. I don't see how the
24 witness could be expected to reply without counting himself.

25 JUDGE WOLFE: Sustained.

1 BY MS. CURRAN: (Continuing)

2 Q Now, those skew sheets present the critical
3 information on qualification parameters for various
4 pieces of equipment, and whether those equipment -- pieces
5 of equipment meet those parameters, is that correct?

6 A I believe it is correct, yes.

7 Q Do you consider it important to have those skew
8 sheets to be able to review those skew sheets to determine
9 whether or not a piece of equipment is qualified. Do you
10 consider it is an important tool for you?

11 A It is important in order to make a determination
12 in the office as to what we think the status of qualification
13 is for any given piece of equipment, yes.

14 Q But in this case you didn't feel that it was
15 necessary to have reviewed the remainder of those skew
16 sheets to determine which pieces of equipment ought to be
17 audited?

18 A We do not require an Applicant have a program
19 one hundred percent complete before we agree to conduct an
20 audit.

21 Q How complete does it need to be?

22 A That is a determination that is made by the NRC
23 person who is conducting the audit often.

24 Q And what was your determination in this particular
25 case?

1 case?

2 A I don't remember exactly what percentage, but I
3 would guess that it was seventy-five to eighty percent
4 completed.

5 Q You would?

6 A As indicated, of course, in their submittal and
7 in discussions with them, yes.

8 JUDGE WOLFE: Let me break in here for a moment
9 and ask the witness a question. Would you give us your
10 understanding of what a skew sheet is? The question has
11 been put to you several times.

12 WITNESS: A skew sheet is -- I guess it is
13 shop talk for component evaluation worksheet. It is a
14 sheet which summarizes the qualification of any given
15 component. It has both test information and requirements
16 listed.

17 JUDGE WOLFE: All right. Continue, Ms. Curran.

18 BY MS. CURRAN: (Continuing)

19 Q In the EG&G Report, at page 4, EG&G concluded
20 that thd deficiencies in Table 2 did not necessarily mean
21 that the equipment is unqualified.

22 However, the deficiencies are cause for concern,
23 and require a further case-by-case evaluation.

24 The Applicant should resolve these deficiencies
25 and document the resolutions in an auditable form.

4-6-gjw

1 MR. DIGNAN. Which exhibit are we referring to
2 now?

3 MS. CURRAN: This is Exhibit 13. The EG&G Report.

4 MR. DIGNAN: And might I have a page reference.

5 MS. CURRAN: Page 4.

6 BY MS. CURRAN: (Continuing)

7 Q Do you know that these deficiencies have received
8 a case-by-case evaluation by the NRC?

9 A As I indicated earlier, we met with the Applicant
10 prior to the audit, and we discussed each of the
11 deficiencies. They agreed to correct them, and the only
12 verification that I am aware of is my chosen files that
13 had some of these deficiencies, and trying to determine
14 if they had been corrected.

15 Q Mr. Walker, is it fair to say that an equipment
16 qualification audit is something of a diagnostic tool to
17 the NRC?

18 A I am not sure if I understand the question.

19 Q In other words, an audit is used to not just to
20 investigate the quality of completeness of the particular
21 qualification file that is chosen, but it is used -- but
22 representative files are chosen as an indicator of the
23 quality of the entire qualification program, would that
24 be correct?

25 A Yes, I believe -- I agree with that, yes.

1 Q Okay. And in some instances when the NRC performs
2 audits, is it true that you find that based on your
3 discoveries during the audit, that you consider that you
4 can't give the equipment qualifications program a good
5 report card, and that more investigation is necessary?

6 Is that true?

7 A That has happened in the past, yes.

8 Q What is your criteria for making that decision?

9 MR. TURK: Just for clarification, may I ask if
10 the witness is being asked for his personal criteria, or the
11 NRC criteria that has been used in the past?

12 BY MS. CURRAN: (Continuing)

13 Q The NRC Staff's criteria.

14 A Currently, the NRC Staff does not have a codefied
15 criteria that I am aware of. The purpose of meeting with
16 Application and discussing the program prior to agreeing
17 to an audit is to avoid unnecessary follow-up and additional
18 review that could be resolved in a single audit.

19 So, we try not to agree to conduct an audit until
20 we are convinced that the Applicant has a program that is
21 sufficiently complete and their understanding of what the
22 requirements are are up to what we think the standard should
23 be.

24 Q In this particular case, although you found for
25 half the files audited that there was some deficiency in the

1 equipment qualifications file. You decided that this
2 audit showed inadequate qualification program?

3 A The answer to that is, yes.

4 Q All right.

5 A However, it is not the number of deficiencies
6 along that is important. It is the extent, or the
7 specific deficiencies on how we think it affects the
8 entire program that we also look at in reaching the
9 conclusion that we reach, whatever it may be.

10 So, because a program may have half of the files
11 in an audit that we may look at may have deficiencies, does
12 not necessarily mean that the program itself is unacceptable.

13 It simply means that you have to look at those
14 deficiencies to determine the severity of them, and make
15 a judgment as to whether the overall program is acceptable.

16 Q And when you had several instances in which there
17 is qualification -- there is information missing regarding
18 a test that was done, or an explanation of why certain tests
19 were done the way they were, or a statement that would
20 explain the basis for the representation in the file
21 regarding the qualifications, that didn't make you worry
22 as to whether the rest of the qualification files were
23 also missing some of that documentation or explanation?

24 A Well, once again it depends on exactly what is
25 missing. In some instances, the Applicant has the information

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1 in his possession. It was not in the file.

2 My understanding of our goal is to determine whether
3 the equipment can perform its function, or whether it had
4 been shown to be able to perform its function.

5 If a file is incomplete because the information
6 is in the Applicant's possession and not in the file, I do
7 not consider that a significant deficiency.

8 It does not indicate to me that the equipment
9 cannot perform its intended function.

10 End ⁴.

11 MS fols.

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25 Ace-Federal Reporters, Inc.

1 Q But isn't it also your responsibility to
2 find compliance with the documentation requirements of
3 10 CFR 50.49?

4 A That is correct.

5 Q And would you say that in this particular case
6 that the audit showed that that particular requirement was
7 not being met for at least some of those components that
8 were audited?

9 A That is correct.

10 MS. CURRAN: I have no further questions.

11 JUDGE WOLFE: Ms. Curran, now would you
12 present to the Board reporter a copy of your cross-
13 examination plan, and that will be incorporated into the
14 record at this point.

15 MS. CURRAN: Yes, fine.

16 JUDGE WOLFE: Do you have a copy or do you want
17 to use one of the Board's copies?

18 MS. CURRAN: I have a copy.

19 JUDGE WOLFE: That will be incorporated into
20 the record now.

21 (NECNP's cross-examination plan follows:)
22
23
24
25

September 29, 1986

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

_____)	
In the Matter of)	
Public Service Company of)	
New Hampshire, et al.)	Docket Nos. 50-443 OL
(Seabrook Station, Units 1 & 2))	50-444 OL
_____)	ONSITE EMERGENCY
	PLANNING & TECHNICAL
	ISSUES

NEW ENGLAND COALITION ON NUCLEAR POLLUTION'S
CROSS EXAMINATION PLAN:
NUCLEAR REGULATORY COMMISSION'S WITNESS

The purpose of this cross examination is to a) determine the standards under which the NRC determines whether license applicants have adequately justified and documented the basis for representations that Seabrook safety equipment is environmentally qualified with respect to qualification times; b) determine the nature and extent of the NRC's review of Applicants' environmental qualification program and equipment qualification files for the adequacy of qualification times; and c) to determine whether that review was thorough enough to justify a finding of reasonable assurance that Seabrook electrical equipment which is important to safety meets the Commission's regulatory requirements with respect to qualification times.

- I. Question witness regarding the means by which qualification time is established.
 - A. Confirm witness' direct testimony (page 2) that applicable that standards are 10 CFR 50.49, NUREG-0588 (Category I), Regulatory Guide 1.89.
 - B. Confirm NRC testimony at page 6 that Staff generally requires post-accident qualification of 100 days.

- C. Confirm that qualification time is established with reference to testing or analysis of equipment for survival in postulated accident conditions. Parameters which must be tested are listed in 10 CFR 50.49(e), including temperature, humidity, radiation, aging, and where appropriate, submergence.
- II. Question witness on importance of consideration of submergence as an independent parameter.
- A. Under 10 CFR 50.49, submergence is listed as a separate parameter, in addition to other parameters such as temperature, pressure, radiation. Why?
 - B. Would you say that in order to know whether submergence qualification were required for a particular piece of equipment, it would be necessary to know the elevation of the equipment in the plant?
- III. Question witness regarding standards for testing vs. analysis in order to determine whether Applicants' qualification methods conformed to NRC requirements.
- A. Is it NRC's preference that applicants submit test results rather than analyses in support of qualification? (Refer witness to NUREG-0588, § 2.1(2), which provides that "In general, the Staff will not accept analysis in lieu of test data unless (a) testing of the component is impractical due to size limitations, and b) partial type test data is provided to support the analytical assumptions and conclusions reached.")
 - B. Confirm that NUREG-0588, § 2.2(5), states that submergence qualification should be established by testing unless equipment is located in watertight enclosures that have been qualified by test or analysis.
 - C. Where qualification is based on testing of a similar component, is it necessary to provide a technical description of the difference in characteristics between the tested component and the component used in the plant? Would you accept a statement that the tester was "confident" that the tested component was similar to the component being used?
- IV. Determine whether in this qualification review the staff has applied new information and guidance on equipment qualification that is not addressed in regulations or regulatory guides.
- A. Establish that the NRC contracts with outside contractors to conduct research on qualification testing methods and on the qualification of various safety components. NRC also periodically sends Inspection and

Enforcement Notices and Bulletins to licensees and applicants, notifying them of environmental qualification test failures that might affect the qualification of the components in their own plants. (If necessary, show witness I&E Notice 83-72 re: Environmental Qualification Testing Experience."

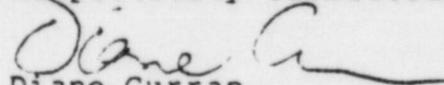
- B. Does staff routinely review and consider applicability of I&E notices and bulletins regarding equipment qualification to environmental qualification programs under review? Did the staff do that in this case?
- C. Does staff routinely review and consider applicability of other NRC publications, such as equipment qualification studies performed by the Sandia National Laboratories, to environmental qualification programs under review?
 - 1. If answer is no, question witness regarding the manner in which new qualification testing information is reviewed and resolved by the NRC staff.
 - 2. Is witness familiar with Bustard, "The Effect of LOCA Simulation Procedures on Ethylene Propylene Rubber's Mechanical and Electrical Properties," NUREG/CR-3538, SAND83-1258, Sandia National Laboratories (October 1983)?
 - 3. Is witness familiar with Bennett, et al, "Superheated-Steam Test of Ethylene Propylene Rubber Cables Using a Simultaneous Aging and Accident Environment," NUREG/CR-4536, SAND86-0450, Sandia National Laboratories, June 1986?
 - 4. Has staff evaluated these documents with respect to qualification of cables for Seabrook?
 - a. If yes, explain conclusion.
 - b. If no, explain why not.
 - c. If witness responds that program reviewers wait for official NRC instruction before taking action on issues raised by such reports, ask witness whether he is aware that equipment qualification research budget has been cut by \$0.5 million for FY 86 and \$1.9 million for FY 87. Isn't it possible that the issues addressed in these reports will not be resolved any time soon, either generically or with respect to Seabrook?
- V. Question NRC on thoroughness of equipment qualification audit and reasons why no further audits were done, in spite of significant number of errors found.

- A. Confirm importance of documentation of environmental qualification in qualification files.
 - 1. Is it not true that under 10 CFR 50.49(j), compliance must be documented in equipment qualification files?
 - 2. Confirm NRC policy as stated in Thompson memorandum dated August 6, 1985. (for purposes of enforcement, equipment for which qualification files are incomplete is considered unqualified.)
- B. Confirm that out of twelve files audited, half contained incomplete information.
 - 1. Review deficient files with witness. Is it correct that in each case, Applicants were required to add more information?
 - 2. Question witness on apparent contradiction between testimony (p. 7) and audit report of April 11, 1986.
 - a. Meeting summary of April 11, 1986, states that as a result of audit, staff was not satisfied with the way in which the Arrhenius equation was used to calculate post-accident operability times. According to Applicants' testimony at page 5, Applicants re-evaluated all equipment qualification files following the NRC's recommended methodology, and found that some components were not qualified for one year, or even 100 days.
 - b. Would witness consider NRC's discovery of the misuse of the Arrhenius equation to constitute a detrimental finding concerning the post-accident qualification time for safety equipment at Seabrook?
 - 3. Establish that this audit was not the only indication that a significant amount of information was missing from Applicants' qualification files. Question witness about pre-audit report from EG&G Idaho, Inc., which was submitted to NRC several days before the audit.
 - a. Review types of omissions, errors, inconsistencies found by EG&G, listed in Table 2.
 - b. These errors were found in summary reports or SCEW sheets, which do not even give all information about the components. Did NRC

check any of the equipment qualification files associated with this equipment to determine if the underlying files had additional problems?

- c. EG&G states that the deficiencies in Table 2 are "cause for concern" and "require further case-by-case evaluation." Has the NRC reviewed each of the deficiencies identified in Table 2 and determined that it is resolved?

Respectfully submitted,



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September 29, 1986

Sim 5-2

1 JUDGE WOLFE: Mr. Turk, redirect?

2 MR. DIGNAN: Your Honor, may I inquire
3 respectfully whether it is the intention of NECNP to offer
4 12 and 13 into evidence?

5 MS. CURRAN: Yes, please, Your Honor.

6 MR. DIGNAN: Do I understand that 11, 12 and
7 13 are offered?

8 MS. CURRAN: Yes, they are.

9 JUDGE WOLFE: You are not offering No. 10,
10 Ms. Curran?

11 MS. CURRAN: Oh, I am sorry, 10, 11, 12, and
12 13.

13 JUDGE WOLFE: Any objection?.

14 MR. DIGNAN: I have no objection provided
15 I can interrogate the witness with respect to the exhibits
16 which I am seeing for the first time today.

17 MS. CURRAN: I have no objection to that.

18 JUDGE WOLFE: Well, let's run through the
19 parties. Any objections at this point other than Mr. Dignan?

20 MR. TURK: I would have no objection as long
21 as I can retrieve the copies of the documents which were
22 previously mine which I made available to the witness
23 because he had not been given them by counsel for NECNP.

24 If we could have a minute before any further
25 examination goes forward.

sim 5-3

1 MS. CURRAN: I'm sorry ---

2 JUDGE WOLFE: Would you go back to your
3 microphone.

4 MR. TURK: Mr. Chairman, I would have no
5 objection to the applicant's examination of the witness
6 on these documents. However, during the course of
7 NECNP's examination of the witness it was necessary for
8 me to make available to the witness certain of the
9 documents which were my personal copies.

10 I would like to have those documents before
11 any further examination goes forward.

12 MS. CURRAN: May I take a minute to straight
13 that out, please.

14 JUDGE WOLFE: All right.

15 (Discussion off the record.)

16 (Recess taken.)

17 JUDGE WOLFE: Back on the record.

18 We were having some discussion over the proper
19 numbers of copies of exhibits that have to be deposited
20 with the Board reporter at the time of marking exhibits
21 for identification. Three copies of each exhibit must
22 be handed to the reporter to be marked for identification.

23 She is to keep those documents marked for
24 identification in her or his possession until such time
25 as they are offered admitted or rejected.

Sim 5-4

1 No exhibit that is deposited with the reporter
2 is to be used by anyone or taken from the reporter's
3 possession.

4 All right, now we were considering any
5 objections, and Mr. Dignan has advised that he wishes to
6 examine the witness with respect to what, those four
7 documents; is that correct?

8 MR. DIGNAN: Thank you, Your Honor. I was
9 just indicating that I had no objection to any of the
10 exhibits provided that I could have interrogation of the
11 witness.

12 Actually the only ones I am interested in
13 talking to the witness about are Exhibits 12 and 13.

14 JUDGE WOLFE: Marked for identification.

15 MR. DIGNAN: Marked for identification,
16 provided there is no objection to my doing so, and it is
17 my understanding there wasn't, and I have no objection to
18 the admission of the exhibits.

19 JUDGE WOLFE: All right.

20 And I take it there are no other objections
21 at this time?

22 MR. TURK: The staff has none.

23 JUDGE WOLFE: All right.

24 You can proceed then, Mr. Dignan.

25 MR. DIGNAN: Thank you.

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CROSS-EXAMINATION

BY MR. DIGNAN:

Q Mr. Walker, would you be kind enough to get in front of you the two documents that have been marked as Exhibits 12 and 13, NECNP Exhibits 12 and 13 in this proceeding.

A I have them.

Q Okay, sir. Am I correct in understanding that Exhibit 13, except for the fact sheet on it, is in fact the same document, other than tables having been relettered and so forth, that appears as Appendix A to Exhibit 12?

A That is correct.

Q Now turning to Exhibit 12 there are certain conclusions expressed in that exhibit which I take it are the conclusions of the Idaho National Engineering Laboratory, and they appear at page 12; is that correct?

A Yes.

Q All right. Now under a paragraph that says "The following items are outstanding and must be resolved prior to issuance of an operating icense," the first paragraph reads, one, "The applicant should submit their equipment qualification of safety related mechnican equip-ment report and three files from their mechanical EQ program per request of the NRC staff for approval prior to the issuance of the operating license."

Sim 5-6

1

Have those submissions been made by the applicant?

2

3

A Yes, they have.

4

5

Q And then two and three go on and say, "The outstanding items identified during the onsite audit by the staff must be resolved," and three says, "Any outstanding items identified by the staff in the applicant's submittal must be resolved."

6

7

8

9

Insofar as you are aware have these items been resolved?

10

11

A It is my understanding that they have been resolved, yes.

12

13

MR. DIGNAN: Thank you.

14

I have no other questions, Your Honor.

15

Oh, I have one other question.

16

BY MR. DIGNAN:

17

Q You were asked by His Honor about what is a skew sheet. Do you recall that?

18

19

A Yes.

20

Q Am I correct in believing that NECNP Exhibit 6, which I am now showing you, is an example of a skew sheet?

22

23

A Yes, it is.

24

MR. DIGNAN: Thank you.

25

I have no other questions, Your Honor.

Sim 5-7

1 JUDGE WOLFE: All right. Absent objection
2 then at this time, NECNP Exhibits 10, 11, 12 and 13 are
3 now admitted into evidence.

4 (NECNP Exhibits 10 through 13,
5 inclusive, previously marked for
6 identification, were admitted into
7 evidence.)

8 JUDGE WOLFE: Is there redirect, Mr. Turk?

9 MR. TURK: Yes.

10 REDIRECT EXAMINATION

11 BY MR. TURK:

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12 Q Mr. Walker, starting with the areas of examination
13 most recent, during your testimony you indicated that
14 a skew sheet was a component evaluation worksheet. Is that
15 correct, or is there some modification you wish to make
16 to that?

17 A That is not exactly correct. I think it is
18 is called a system component evaluation worksheet.

19 Q Also, one question that came up in this
20 morning's cross-examination had to do with the review by
21 NRC and INEL of files during the onsite audit, and I believe
22 in answer to one question you stated that the NRC and
23 INEL reviewed each file separately.

24 Is there any clarification that you wish to
25 make to that response?

Sim 5-8

1 A What I intended in my earlier remarks was
2 to express the fact that person on the audit reviewed files.
3 No one reviewed files that were reviewed by someone else,
4 if that clarifies things.

5 In this case there were 12 files reviewed and
6 there were four people. That indicates that there were
7 probably three files reviewed by each person on the audit.

8 Q How many files did you personally review?

9 A Three.

10 Q Are you serving as a reviewer for the NRC staff
11 of equipment qualifications for any other nuclear plants?

12 A Yes.

13 Q And have you also reviewed the equipment qualifi-
14 cation for nuclear plants in the past?

15 A Yes, I have.

16 Q Approximately how many plants have you reviewed
17 equipment qualification files for?

18 A I can think of six or seven perhaps.

19 Q Those are ongoing reviews?

20 A No, those are completed. Ongoing, three at
21 the moment.

22 Q Are you currently using as reference documents
23 or incorporating in your review, or have you in the past
24 utilized or incorporated in your review either of the
25 two Sandia documents which have been referred to in this

Sim 5-9

1 proceeding? I believe one of them is NECNP Exhibit 2
2 for identification and the other is NECNP Exhibit 3 for
3 identification.

4 A No, I have not.

5 Q In a question earlier today by NECNP and this
6 concerns their Exhibit No. 13, which is the February 21st,
7 1986 preaudit review. At page 4 of that document NECNP
8 referred to a statement which indicated "The deficiencies
9 are cause for concern and require further case-by-case
10 evaluation.

11 Do you have an understanding as to whether the
12 case-by-case evaluation referred to in that document was
13 intended to refer to either or both of the NRC or appli-
14 cants or to just one of them, or do you know?

15 A It is not clear to me what was meant by this
16 statement coming from EG&G. However, both the applicant
17 and the NRC -- the applicant is required to correct
18 deficiencies. The NRC is in a position to check and assure
19 themselves that those deficiencies are corrected.

20 The check can be in the form of an audit
21 or it can be in the form of checking the deficiencies. I
22 do not know how it is always done.

23 In this case it is not clear to me what is
24 meant by -- I mean when EG&G wrote this statement.

25 Q Is it your understanding that something further

Sim 5-10

1 is required of you or your office in the way of a case-
2 by-case evaluation?

3 A Not it is not.

4 Q In cross-examination yesterday there was some
5 reference to NUREG 0588 which this Licensing Board has
6 already taken official notice of. Could you explain
7 to what extent NUREG 0588 sets forth requirements for
8 nuclear power plant applicants?

9 A The requirements are set forth in 10 CFR 50.49.
10 NUREG 0588 and other documentation such as reg. guides
11 and IEEE standards are guidance, which means that they
12 provide means by which equipment can be qualified, but
13 not necessarily the only means.

14 Q Does NUREG 0588 set forth requirements which
15 must be adhered to?

16 A NUREG 0588 sets forth guidance by which the
17 requirements can be met. There can be deviations from
18 0588 with proper explanation and justification.

19 Q One last area of inquiry. Do you have an
20 opinion at this time as to whether the applicants are
21 in compliance with the documentation requirements of
22 10 CFR 50.49?

23 A Yes, I have an opinion.

24 Q Could you share that with us, please?

25 A I believe they are in compliance.

Sim 5-11

1 Q Could you explain the basis for that opinion?

2 A I have received a letter from the applicant
3 stating that the files are complete and that the require-
4 ments have all been met and that the files are available
5 for our inspection.

6 MR. TURK: That is all the redirect I have.

7 JUDGE WOLFE: Anything more, Ms. Curran?

8 MS. CURRAN: No.

9 (Board conferring.)

10 JUDGE WOLFE: We will not proceed to Board
11 questions.

12 Judge Luebke.

13 BOARD EXAMINATION

14 BY JUDGE LEUBKE:

15 Q Mr. Walker, were you in the hearing room
16 yesterday when there was some discussion about two files
17 or equipment items that remain to be submitted to the
18 staff on this environmental qualification? It was late
19 in the afternoon on staff cross-examination.

20 A It is not my understanding that two files
21 remain to be submitted to the staff.

22 Q Well there was this discussion about the
23 documentation on Foxboro transmitters that Judge
24 Harbour asked a question on transcript page 481, and the
25 other item was RayChem 8KV motor connection kits, and

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Sim 5-12

1 his question was the work was incomplete in this respect
2 and when would it be completed?

3 What I want clarified is your question on
4 page 2 of your prefiled testimony in which you ask your-
5 self the question has the staff determined whether the
6 applicants have included in their environmental qualifica-
7 tion program all electrical equipment important to safety,
8 et cetera, and you make your answer on the top of page
9 3 in pertinent part, yes, the staff is satisfied that
10 the applicants have included in their environmental
11 qualification program all electrical equipment important
12 to safety, and I put the emphasis on "all."

13 Somehow in my mind there seemed to be still
14 items missing and I would like that clarified.

15 THE WITNESS: My understanding of ---

16 JUDGE WOLFE: Excuse me just a moment,
17 Mr. Walker. Do you need to read the page that Judge
18 Leubke was referring to?

19 THE WITNESS: I believe I understand what
20 the question is.

21 It is my understanding that there have been
22 two items of equipment that are no longer qualified
23 for only 30 days, that those items are now qualified
24 for one year. The information justifying that change
25 is in the applicants' file and available for NRC

Sim 5-13

1 inspection.

2 I don't know if it was stated in that manner,
3 but that is my understanding as to the status of those
4 two items of equipment.

5 BY JUDGE LEUBKE:

6 Q To summarize your answer then, it is a change
7 of time duration that is in process?

8 A That is correct, and that change is based,
9 from what I understand, is based on a new analysis by the
10 applicant or reanalysis, I am not sure which.

11 JUDGE LEUBKE: Thank you, Mr. Walker. I think
12 that explains it.

13 BOARD EXAMINATION

14 BY JUDGE HARBOUR:

15 Q Mr. Walker I just have one question, and that
16 is can you explain how the discrepancies in the application
17 of the uranius equation, which were cited in the INEL
18 reports have been disposed of, or do you know?

19 A The discrepancies that were discovered had to
20 do with the extrapolation of data that resulted from using
21 that equation.

22 We felt that the manner in which that extrapola-
23 tion was conducted was outside the intent of that equation
24 and therefore did not represent a realistic view of the
25 qualified life.

1 We explained to the applicant what we thought
2 or what we believe is the intent of the equation and the
3 way it should be used. They agreed and did some recalcula-
4 tion and determined what we think is the proper qualified
5 life of the equipment involved.

6 Q And are those redeterminations in the equipment
7 files presently?

8 A I have been informed by the applicant that
9 that is the case, yes.

10 JUDGE HARBOUR: Thank you.

11 That is all I have.

12 JUDGE WOLFE: Mr. Witness, turning to page 6
13 of your written testimony, Mr. Walker, the first full
14 paragraph on page 6. I am particularly interested in
15 your testimony, and I quote, "While the staff has not
16 independently verified the test results and analyses
17 submitted by applicants, the staff evaluated the applicants'
18 submittals in light of comparable information submitted
19 by applicants and licensees at other nuclear power plants
20 and exercised engineering judgment in reaching its
21 conclusion that the applicants' determination is acceptable."

22 Would you sort of flesh that out for me. I
23 understand what you are saying, but would you flesh it
24 out for me a bit perhaps by giving an example in this
25 case on how that sort of evaluation and judgment is arrived

Sim 5-15

1 at.

2 THE WITNESS: What is meant by that statement
3 is that when we review a submittal made by the applicant
4 we look at test results and the results of analyses.

5 We do not recalculate all the -- we do not
6 redo all the calculations that the applicant has completed.

7 BOARD EXAMINATION

8 BY JUDGE WOLFE:

9 Q You accept those?

10 A We accept those. We occasionally spot check
11 those. As for the qualification of any particular components
12 we see basically the same equipment in most plants. We
13 generally know basically what is in a lot of test reports.

14 When I receive information from an applicant
15 that is maybe grossly different from what I have seen
16 before it gets special attention.

17 When it is quite similar to what I know to be
18 in test reports by virtue of having reviewed it for other
19 plants, then it is more readily accepted.

20 Q And when you say you exercise engineering
21 judgment in reaching a conclusion that the applicants'
22 determination is acceptable, what judgment is exercised?

23 A Well, that is the judgment. When I see com-
24 parable results from various applicants, then my judgment
25 is that it is probably the same as what I have seen before

Sim 5-16

1 if I am looking at a new applicant.

2 There are instances where our analyses or
3 justification is provided for doing something different
4 than what the standard may specify meaning the IEEE
5 standard or what the reg. guide may recommend, and we
6 use the engineering judgment to decide whether what was
7 done is acceptable.

8 JUDGE WOLFE: All right.

9 Is there any cross-examination on the Board's
10 questioning, Ms. Curran?

11 MS. CURRAN: I have one question.

12 FURTHER CROSS-EXAMINATION

13 BY MS. CURRAN:

14 Q Mr. Walker, correct me if I am wrong, but I
15 believe that you have stated that the staff has not
16 independently verified the test results and analyses
17 submitted by the applicants based on your judgment that
18 these -- not based on your judgment, but perhaps as long
19 as these results are consistent with other qualification
20 results you have seen for the same components in other
21 plants; is that correct?

22 Would you like for me to restate it?

23 A Yes, please.

24 Q Okay. You have stated that the staff hasn't
25 independently verified the test results and analyses

INDEX

Sim 5-17

1 submitted by applicants. That is in your testimony on
2 page 6.

3 A That is correct.

4 Q Now do I understand that the basis for not
5 going over those analyses for their correctness is that
6 this information submitted by the applicants isn't very
7 different from information that you have seen in other
8 plants and therefore doesn't lead you to question the
9 veracity of the information?

10 A That is one of the reasons why we don't do
11 it. An independent verification of a test simply means
12 you conduct a similar test to what has been conducted.

13 The office I work for does not conduct such
14 a test. It is occasionally done in the Office of Research.
15 So independent verification is not always practical, and
16 in my opinion not necessary.

17 Q Is it correct to say that while you don't
18 verify the test through your own tests, do you evaluate
19 the test reports themselves and evaluate the test methodology
20 used?

21 A Yes, we do. That is done on the audit.

22 Q On the audit?

23 A Yes. We review test reports.

24 Q But you don't do that for each piece of
25 equipment in the qualification program?

Sim 5-18

1 A No, we do not.

2 Q And basically if you feel satisfied for these
3 components that you don't review on an audit, that if the
4 specifications for a component are basically equivalent
5 to what you have seen for other plants, then you can
6 assume that you have already been over this ground and
7 you don't need to go over it again?

8 A If the test results are equivalent, then the
9 answer to your question is yes.

10 Q Okay. And in these other licensing reviews
11 have you typically reviewed the test methodology and
12 analyses?

13 A That is always part of the test report, yes.

14 Q For each component?

15 A We do not review every component in any program
16 that I am aware of.

17 MS. CURRAN: Thank you.

18 JUDGE WOLFE: Redirect, Mr. Turk?

19 MR. TURK: Yes, very limited.

20 REDIRECT EXAMINATION

21 BY MR. TURK:

22 Q Mr. Walker, I believe you have in front of
23 you Staff Exhibit 5, which is our SER Supplement to No.5.

24 A Yes.

25 Q Would you please turn to page 3-34. This is

INDEX

Si m 5-19

1 Table 3.1 which lists "Equipment item types and their
2 post accident qualification periods."

3 I believe you will see on this list the first
4 and third items. The first one is EQ file 174-00-01,
5 the Foxboro transmitters. The third item group listed
6 here is file 600-01-04, RayChem 8KV motor connector kits.

7 Do you see those items?

8 A Yes.

9 Q Could you tell us the qualified post-accident
10 operating time indicted for those two item groups as it
11 appears on this table?

12 A For the Foxboro transmitter the qualified
13 post-accident operating time is 100 days, for the RayChem
14 8KV motor connection kit the qualified post-accident
15 operating time is also 100 days.

16 Q All right. Is that a correct statement then
17 of the qualified post-accident operating time for those
18 two items, at least to the extent that the staff has
19 been made aware prior to this?

20 A That is correct.

21 Q And is it the staff's conclusion that those
22 items, the Foxboro transmitters and the RayChem 8KV
23 motor connector kits are environmentally qualified and
24 that the time duration has been properly specified by
25 the applicant to be 100 days to the best of your knowledge?

Sim 5-20 1

A That is correct.

2

Q So what would be the effect then of this

3

new information from the applicants as presented in their

4

testimony which indicates that these items are qualified

5

for a period of one year?

6

A My understanding of the information presented

7

in the applicants' testimony is that these particular

8

pieces of equipment have now been determined to be

9

qualified for one year because they have either been moved

10

to a new location or are no longer required in the program

11

for the area in which they were analyzed for.

12

I believe these pieces of equipment are still

13

a part of the qualification program where they analyze

14

them for the most harsh area, and now they are no longer

15

using this equipment in those areas and therefore they

16

were able to qualify them for one year because the environ-

17

ment that they are now being used in is less harsh than

18

it was at the time the determinations in this table were

19

made.

20

Q Does the applicants' prefiled and oral testimony

21

here concerning these items in any way change your conclusions

22

concerning whether these items have been properly and

23

environmentally qualified?

24

A No. it does not. In the sense of whether they

25

are qualified or not, it does not change my conclusion.

#6-1-SueW 1

MR. BACKUS: I presume we are now ready to move
2 on to SAPL Supplemental Contention 6?

3 JUDGE WOLFE: That's correct.

4 MR. BACKUS: And, while the witnesses are taking
5 their position I would like to, if I may, to make a very
6 brief opening statement on this issue.

7 JUDGE WOLFE: All right. I thought you had made
8 one earlier.

9 MR. BACKUS: No. I spoke to the issue of the
10 motion to produce the Project Managers as witnesses.

11 JUDGE WOLFE: All right.

12 MR. BACKUS: Mr. Chairman, as the record has
13 already reflected, I am here representing the Seacoast
14 Anti-Pollution League, a citizens' organization centered
15 here in Portsmouth, as an Intervenor in this proceeding.

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16 We are here to litigate that portion of New
17 Hampshire Contention 10 that was not summarily dismissed by
18 the Board's memorandum and Order issued on September 15, 1986.
19 This contention was originally sponsored by the New Hampshire
20 Attorney General.

21 The New Hampshire Attorney General, however, with-
22 drew its sponsorship of this contention shortly before the
23 Applicants filed their motion seeking the granting of an
24 operating license. However, since this Board ruled on
25 July 21, 1986 that since SAPL had joined in pursuing this

#6-2-SueW

1 contention some time ago, the contention would go forward to
2 hearing with the contention to now be denominated as SAPL
3 Supplemental 6.

4 SAPL Supplemental 6 states that the Seabrook Sta-
5 tion control room design does not comply with general
6 design criterion 19 through 22 in 10 CFR Part 50, Appendix A,
7 and NUREG 0737, Items 1.B.1 and 1.B.2.

8 As a result of this Board's memorandum and Order
9 of September 15th, this contention, as admitted, for the
10 purposes of this hearing, involves the claim that the
11 Seabrook Station control room does not comply with NUREG
12 0737, Item 1.D.2. That requirement has to do with the
13 need for all operating plants to have a safety parameter
14 display system meeting certain criteria.

15 It also makes clear, set forth in Supplement 1,
16 that Item 1.D.2, the SPDS requirement, is indeed a regulatory
17 requirement.

18 Now, the requirement for safety parameter display
19 systems derives from the Three Mile Island accident. That
20 accident revealed serious control room deficiencies at the
21 plant, including problems with the man/machine interface.
22 As a result, the Nuclear Regulatory Commission has determined
23 that deficiencies needed to be addressed, both deficiencies
24 needed to be addressed in part, by having a concise, continuous
25 and convenient display of critical plant safety functions to

#6-3-SueW

1 "assist operators in rapidly and reliably determining the
2 safety status of the plant."

3 In short, the safety parameter display system is
4 to provide important assistance to operators, particularly
5 in accident environment.

6 The NRC Staff has conceded that the Seabrook
7 Station SPDS is not now optimum and does not today fully
8 meet the requirements of NUREG 0737, Supplement 1. However,
9 the Staff claims that correction of the acknowledged de-
10 ficiencies can be deferred to the end of the first refueling
11 outage, which would be presumably after approximately one
12 year of full power operation.

13 This position was set forth in the draft license
14 prepared by the Staff, NPF 56, and issued on June 21st, 1986.

15 Given the fact that as of the end of this month,
16 Seabrook Station will be more than seven years behind schedule,
17 and given the fact that further substantial delay in
18 commercial operation are a certainty, and given the directive
19 in NUREG 0737, Supplement 1, that the SPDS is a "essential
20 element in operator training," and that "installation of the
21 SPDS should not be delayed by slower progress on other
22 initiatives," and "prompt implementation of an SPDS can
23 provide an important contribution to plant safety," it is
24 SAPL's position in this proceeding that deferral of the SPDS
25 should not be allowed for two reasons.

#6-4-SueW 1 First, we contend it is contrary to the NRC's own
2 regulatory requirements, given the facts of this case. And,
3 second, that the SPDS in its present state, does not provide
4 the requisite degree of assurance of nuclear safety, parti-
5 cularly since there is no justification for believing that
6 the first year of full power operation -- that is, before the
7 first refueling outage -- will present any risk less than
8 operation thereafter.

9 Therefore, SAPL believes, and will argue, and will
10 demonstrate we believe through our examination of the wit-
11 nesses to be offered, that no operating license should be
12 authorized by this Board in light of this safety deficiency.

13 That concludes my opening statement. Thank you,
14 Mr. Chairman.

15 MR. PERLIS: Excuse me, Mr. Chairman. Just for
16 the record, I'm Robert Perlis. I will be representing the
17 NRC Staff on this issue.

18 I also have a very brief opening remark, and that
19 would be to note for the record that the Staff has the
20 continuing objection to the hearing of this issue for
21 reasons which we made clear earlier. We just want that
22 objection noted for the record.

23 MR. DIGNAN: Your Honor, at this time, for the
24 convenience of the Board and the parties, I am distributing
25 in written form the corrections the witnesses will make in

#6-5-SueW 1 their testimony. They will read it into the record formally.

2 (Copies of the document referred to are
3 distributed to the Board members and the parties.)

4 MR. DIGNAN: Mr. Chairman and members of the Board,
5 at the witness table now is Mr. George Thomas, who has
6 previously been sworn. I would like to introduce to the
7 Board, Lawrence A. Walsh, who will be the other witness on
8 this panel.

9 And, Mr. Chairman, I ask at this time that Mr.
10 Walsh be sworn.

11 JUDGE WOLFE: Mr. Walsh, would you stand and raise
12 your right hand?

13 (Mr. Walsh is sworn by Judge Wolfe.)

14 Whereupon,

15 LAWRENCE A. WALSH,

16 AND

17 GEORGE S. THOMAS

18 were called as witnesses on behalf of the Applicants and,
19 having been duly sworn, were examined and testified as
20 follows:

21 DIRECT EXAMINATION

22 BY MR. DIGNAN:

23 Q Mr. Walsh, I have caused to be placed before
24 you a two-page document headed "Resume of Qualifications of
25 Lawrence A. Walsh." And, I ask you, is that a statement of

#6-6-SueW

1 your professional background and qualifications, sir?

2 A (Witness Walsh) Yes, it is.

3 MR. DIGNAN: Your Honor, at this time I ask that
4 there be incorporated in the transcript as if read, and
5 admitted into evidence, a two-page document entitled, "Resume
6 of Qualifications of Lawrence A. Walsh."7 Sufficient copies have been submitted to the
8 Reporter for this purpose.

9 JUDGE WOLFE: Any objection?

10 (No response.)

11 JUDGE WOLFE: Absent objection, the professional
12 qualifications are incorporated into the record as if read.13 (The document referred to follows.)
14
15
16
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18
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22
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24

RESUME OF QUALIFICATIONS

LAURENCE A. WALSH

Have worked in the nuclear field since early 1961. Previous job held covered the full range of operations. With two commercial and one Navy new construction plants behind me, Seabrook construction is no stranger. Will complete training necessary to hold any management position in a Nuclear Complex.

POSITION

Operations Manager

EDUCATION

St. Thomas Grammar Graduated 1955

Sacred Heart High School Graduated 1959

Navy Schools:

Basic Electronics and Electricity School
Intercommunication Technicians School
Submarine School
Nuclear Power Training School
Oxygen Generator Operations & Maintenance
H₂ Analyzer Operations & Maintenance
Vibration Analysis
Motion Projection Operation & Maintenance

Connecticut Yankee Startup Training Course
Central Maine Vocational Institute Instructor Training
Maine Yankee Startup Training Course
Central Maine Vocational Institute Technical Writing
American Management Association Communications Course

Psychology 401	University of New Hampshire	Four credit hours
Mathematics 1211	Memphis State University	Three credit hours
Physics 2511	Memphis State University	Four credit hours
Physics 2512	Memphis State University	Four credit hours
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Radiation Protection	Memphis State University Biol. 4080	Three credit hours
Calculus I	Memphis State University Math 1321	Four credit hours
Calculus II	Memphis State University Math 2321	Four credit hours

Additionally, Memphis State University has been contracted for an additional 51 credit hours of Shift Technical Advisor courses.

Management training - PSNH 280 hours

L. A. WALSH - RESUME
Page Two

EXPERIENCE

- 1956 to 1958 Worked in shipping, receiving, display and advertising for local department store. (Grive, Bisset & Holland, Waterbury, Connecticut)
- 1958 to 1959 Worked in an eyelet manufacturing shop as a machine operator and started an apprentice program for tool making. (Westbury Mfg. Co., Waterbury, Connecticut)
- 1959 to 1961 After completion of service schools associated with my rate, served aboard USS Sea Owl (SS408) for approximately nine months. Duties performed while aboard were operation and maintenance of all communications systems, electronic compasses and ships batteries.
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- 1964 to 1966 Was employed by Connecticut Light and Power Company at their 600 MWe fossil fuel generating station in Devon, Connecticut. While awaiting startup crew assignment at Connecticut Yankee Atomic, served as operating assistant.
- 1966 to 1970 Transferred to Connecticut Yankee Atomic Power Company and was a member of the staff during construction and startup of the station. Was elected business agent of the local union and received AEC reactor operating licenses OP-2438 and OP-2438-1.
- 1970 to 1978 Transferred to Maine Yankee Atomic Power Company to assist with plant acceptance from the NSSS and AE. Assisted with instruction of prospective license holders and formulated initial procedures for plant operations. Promoted to Assistant Department Head for Plant Operations and also represented company as Project Engineer for a backfitted system to complement the cooling water outlet diffuser. While at Maine Yankee, I held an NRC Senior Operating License # SOP 1693, SOP 1693-1 and SOP 1693-2, the latter being current until August 1973.
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L. A. WALSH - RESUME
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#6-7-SueW

BY MR. DIGNAN:

1
2 Q Members of the panel, I have caused to be placed
3 before you an eight-page document entitled, "Testimony of
4 L. A. Walsh and G. S. Thomas, SAPL Supplemental Contention 6
5 (formerly NH-10) (as modified by the ruling on summary
6 disposition)."

7 And, the question is: Are you the sponsors of
8 that document?

9 A Yes, we are.

10 Q Are there any additions or corrections you wish
11 to make at this time?

12 A Yes, there are.

13 Q Would you do so, please, Mr. Walsh?

14 A Yes, I will. On Page 2, Line 5, NUREG is misspelled,
15 spelled N-V-R-E-G. It should be N-U-R-E-G.

16 On Page 2, Line 6, you should insert the word
17 "room" after the word "control."

18 On Page 2, Lines 15 to 17, delete all of Lines 15
19 and 16 and the words "their information and by themselves"
20 from Line 17.

21 Q Excuse me. Is that "their information, of and
22 by themselves?"

23 A I'm sorry. Yes, "their information, of and by
24 themselves."

25 Page 3, Line 8, "display" is misspelled. It should

#6-8-SueW

1 read d-i-s-p-l-a-y.

2 And the last item, on Page 4, delete the words,
3 "The subcriticality and core cooling" from Line 14 and
4 all of Lines 15 through 18 and replace them with the
5 following: "The enhancement to the subcriticality and
6 core cooling screens requested by the Staff have been
7 implemented."

8 Q Gentlemen, I will ask each of you to answer the
9 following questions separately.

10 Do you wish to adopt this document as corrected
11 as your testimony in this proceeding, Mr. Thomas?

12 A (Witness Thomas) Yes, I do.

13 Q Mr. Walsh?

14 A (Witness Walsh) Yes, I do.

15 Q And, are the statements set forth therein true
16 and correct to the best of your knowledge, Mr. Thomas?

17 A (Witness Thomas) Yes, they are.

18 Q Mr. Walsh?

19 A (Witness Walsh) Yes, they are.

20 MR. DIGNAN: Your Honor, at this time I ask that
21 an eight-page document, entitled "Testimony of L. A. Walsh
22 and G. A. Thomas, SAPL Supplemental Contention 6 (formerly
23 NH-10) (as modified by the ruling on summary disposition)"
24 be incorporated into the transcript of this proceeding, as
25 if read at this point, and admitted into evidence.

#6-9-SueW

1 MR. BACKUS: Well, I have an objection to its
2 admission at this point. I do have voir dire for these
3 witnesses.

4 I have no objection to its being incorporated
5 or marked for identification at this point.

6 JUDGE WOLFE: I understand your request for
7 voir dire. You say you have no objection to this document
8 being incorporated into the record at this time?

9 MR. BACKUS: Well --

10 JUDGE WOLFE: I'm just seeking clarification. I
11 thought you said something else with respect to --

12 MR. BACKUS: I guess what I should say at this
13 point is that I have no objection to marking it for
14 identification.

15 MR. DIGNAN: I'm not marking things for
16 identification, Your Honor, because we are not putting our
17 testimony in as exhibits. We are just having it incorporated
18 into the record.

19 JUDGE WOLFE: Do you object to the incorporation
20 into the record?

21 MR. BACKUS: I would like to have that deferred
22 at least until the voir dire is completed.

23 JUDGE WOLFE: All right, proceed.

24 MR. BACKUS: All right.

25 VOIR DIRE EXAMINATION

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BY MR. BACKUS:

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Q Mr. Walsh, as I read your statement of qualifications -- and if I'm not mistaken -- we are looking at something that is designated as part of Amendment 58 to the FSAR; is that correct?

Just to make sure that I've got the same two pages that you do here.

A (Witness Walsh) That's correct.

Q As I understand your statement of qualifications on your resume, you have neither a college nor any Masters or higher level degree; is that right?

A That's correct.

Q As I look at the statement of courses which you have taken, I would not see what would appear to me to be any courses in human factors engineering; is that correct?

A From what you have in front of you, that's correct.

Q Okay. Is there something that is not in front of me to indicate you do have -- you have taken courses in the field of human factors engineering?

A Yes, sir.

Q What would that be?

A There has been courses that have non-credit ratings that I have taken, one week at the University of

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Wisconsin.

2 Q A one week course at the University of Wisconsin,
3 when did you take that?

4 A To the best of my recollection, it was somewhere
5 in '82.

6 Q Have you any experience in designing safety
7 parameter display systems or similar control systems in
8 light of human engineering factors?

9 A I'm not sure to what reference that is to.

10 Q Have you ever been involved in the design of
11 instrumentation, with particular emphasis to safety parameters
12 control systems?

13 A Yes.

14 Q You have?

15 A Yes.

16 Q Which systems have you designed?

17 A Seabrook.

18 Q That's the only one?

19 A Yes, sir.

20 Q Now, I notice on your resume that you list one
21 course in psychology for four credit hours taken at the
22 University of New Hampshire, said to be Psychology 401.

23 Did this psychology course deal with issues
24 raised in interface between man and machine?

25 A Not to my recollection.

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1 Q Have you ever been responsible for gathering
2 human performance data in relation to control systems?

3 A Yes.

4 Q And, where was that?

5 A In Seabrook Station.

6 Q So, would it be accurate to say that other than
7 your experience and participating in Seabrook Station start-up
8 activities that you have not participated in the design of
9 any control systems related to safety functions at nuclear
10 power plants?

11 A That's not exactly true either.

12 Q In what respect is that not exactly true?

13 A I have been a member of the Westinghouse Owners
14 Group Subcommittee for Procedures for four years, and in doing
15 so we have created controls for operators generically
16 throughout the country. But, I have not been in charge
17 of that system.

18 Q I am correct, am I not, that there is a specific
19 field in which one can get training in degrees called
20 "Human Factors Engineering?"

21 A I am not aware of that, but I believe there is.

22 Q Are you a member of any professional societies
23 dealing particularly with human factors engineering?

24 A Other than the Owners Group I spoke of, no.

25 Q Mr. Thomas, let me turn to you. Mr. Thomas, I

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1 believe that when Mr. Dignan first introduced you as a member
2 of a panel, he said that your purpose in being on these panels
3 was primarily to provide a management perspective on the
4 issues; is that correct?

5 A (Witness Thomas) That's correct.

6 Q Do I take it from that, sir, then that you would
7 not claim to be the witness with particular expertise in
8 the field of human factors engineering on this particular
9 panel?

10 A That is correct.

11 MR. BACKUS: I think that's all the questions
12 I have. I would respectfully submit, Mr. Chairman, that these
13 witnesses are not qualified in this field.

14 I, therefore, object to the offer of the testimony.

15 MR. DIGNAN: Your Honor, there are two problems
16 with the objection. The first is, the lack of a degree is
17 not much of an objection with Mr. Walker.

18 If you review his qualifications, the man held an
19 AEC reactor operating license at Connecticut Yankee. He held
20 another one at Maine Yankee. I know of no people who are
21 better qualified to figure out where you want a display system
22 in a control room and what you want on it than people who have
23 actually had hands-on experience operating reactors for any
24 number of years.

25 It's true, he does not have a college degree, although

#6-14-SueW 1 he has, as Operations Manager for Seabrook Station, a number
2 of people with college degrees working for him.

3 Now, the fact of the matter is, the testimony is
4 directed at something that has nothing to do with human
5 factors engineering. The question that is being addressed
6 by this panel -- and I think both witnesses are more than
7 qualified to answer it -- is the one that is set forth on
8 Page 1, which is whether or not, assuming the items that the
9 Staff is concerned about are not put in the SPDS, would
10 reasonable assurance still exist.

11 This isn't a piece of testimony on design. This
12 is a piece of testimony of assuring the Board that assuming
13 these matters are not put on the SPDS before the first refuel-
14 ing outage there will still exist reasonable assurance. And,
15 the thrust of the basic testimony is that the information
16 is available elsewhere in the control room, and indeed that
17 some of the items have been put in.

18 These witnesses aren't here to testify about
19 human factors engineering. And, that's not the issue they
20 are addressing. So, I think the witnesses are totally
21 qualified to testify on the items that they are testifying
22 on.

23 MR. BACKUS: Mr. Chairman, if I may respond, I
24 suppose the witnesses are qualified to testify about what
25 is and what is not in the Seabrook control room. However,

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1 that's not a very big issue. I think there is agreement on
2 that.

3 The bottom line of these witnesses' testimony on
4 Page 8 is: In summary, Seabrook Station has a safety
5 parameter display system which fully meets the goals of
6 safe and efficient power operation.

7 That means that these witnesses are testifying
8 that in their opinion a certain degree of safety has been
9 achieved, despite acknowledged deficiencies in the SPDS.
10 And, for that they are necessarily purporting to offer
11 expertise in human factors engineering, the relationship
12 between man and machine and what is required for an operator
13 to adequately perform functions.

14 Now, the fact that Mr. Walsh is a reactor operator
15 may make him qualified to talk about reactor operations. It
16 does not qualify him in this field of instrumentation design
17 for human factors elements.

18 MR. DIGNAN: Well, we've got a real problem,
19 because then he designed the system. So, I suppose I could
20 offer him simply on the basis that he designed it.

21 If Mr. Backus wants to demonstrate he doesn't know
22 how to design a system on cross-examination, that goes to
23 weight rather than admissibility, in any event.

24 MR. BACKUS: I think the issue is not whether or not
25 a system was designed but whether, in the light of the fact

#6-16-SueW 1 that it does not presently meet the requirements of the
2 regulatory requirement, there is still reasonable assurance
3 of safe operation.

4 That is the question, right on Page 1, which the
5 testimony that is proffered says is being addressed, whether
6 or not there is reasonable assurance that deferring improve-
7 ments to the SPDS until the first refueling outage the
8 safety of the population in the immediate vicinity of the
9 plant will be protected.

10 Then, these witnesses purport to offer an
11 opinion on that. I submit there has been no showing of
12 qualifications to support such a position by these witnesses.

13 JUDGE WOLFE: I think we are getting into the
14 merits and argument on the merits of the testimony.

15 FROM THE FLOOR: Talk in the microphone. We
16 can't hear you.

17 JUDGE WOLFE: I had occasion yesterday I believe
18 to allude to the federal rules of evidence, in particular
19 Rule 702. And I had occasion to read the contents of that
20 rule.

21 And, the Board is satisfied with Mr. Walsh's
22 experience that he would be technically qualified and
23 technically competent to testify --

24 FROM THE FLOOR: We can't hear you.

25 FROM THE FLOOR: Talk in the mike.

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JUDGE WOLFE: If you have any -- if you wish to explore this matter further on cross-examination, certainly you may do so. But, we find the witnesses, to our mind, qualified and competent to testify.

Therefore, they may testify. With that ruling then, and absent any other objection, we will incorporate the testimony of Messrs. Walsh and Thomas into the record, as if read, and it is so admitted in evidence.

(The documents referred to follow.)

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Dated: September 19, 1986

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
before the
ATOMIC SAFETY AND LICENSING BOARD

_____)	
In the Matter of)	
)	
PUBLIC SERVICE COMPANY OF)	Docket Nos. 50-443-OL-1
NEW HAMPSHIRE, et al.)	50-444-OL-1
)	On-site Emergency Planning
(Seabrook Station, Units 1 and 2))	and Safety Issues
)	
_____)	

TESTIMONY OF L.A. WALSH
AND G.S. THOMAS

SAPL SUPPLEMENTAL CONTENTION 6 (FORMERLY NH-10)
(as modified by the ruling on summary disposition)

This testimony addresses the following question:

Whether or not in light of the fact that the SPDS is not currently at an optimum, i.e. incomplete, because of the certain deficiencies enumerated by the Staff in a draft license and an Affidavit of Richard H. Eckenrode of August 18, 1986 (Eckenrode Affidavit) there is reasonable assurance that in deferring improvements to the SPDS until the first refueling outage the safety of the population in the immediate vicinity of the plant will be protected.

At the outset it should be understood that the Safety Parameter Display System (SPDS) is not considered a safety

system. Operator actions are not taken at the SPDS. Rather, the purpose of the SPDS is to provide operators with a concise display of certain information about certain relevant plant variables.

As indicated in NVREG-0737, Supplement 1, the SPDS is to be used in addition to existing control instrumentation and serves to aid and augment this instrumentation. Moreover, Supplement 1 also provides that operators should be trained to respond to accident conditions with and without the SPDS available. Therefore, even if there were no SPDS at all, the necessary information would be available to the operators from other sources within the control room and the operators would be capable of taking the appropriate action based on this information. As will be seen below, these other sources within the control room and the operators would be capable of taking the appropriate action based on their information. of and by themselves, provide reasonable assurance that the health and safety of the public in the vicinity of the plant will be protected.

Set forth below are discussions of the particular items proposed to be deferred under the June 26, 1986 draft of License NPF-56.

1. Continuous display of the top level critical safety

function summary at the assigned SPDS control room location.

This issue raises the concept of continuously displaying the top level critical safety functions instead of calling them up when desired. Until a mutually acceptable resolution to this concern is reached, the result sought may be accomplished by having the SPDS/STA Console CRT continuously display the top level critical safety functions during normal plant operation.

2. Addition of, or satisfactory justification for, not adding RHR flow and hydrogen concentration parameters to appropriate SPDS screens.

These parameters are presently indicated on the main control board in more than one location and are considered when using emergency procedures to respond to the plant upset conditions. Thus, the data is available to the operators even without the SPDS.

3. Addition of a containment isolation status screen on SPDS, or improvement to the current containment isolation display to be satisfactorily recognizable from the assigned SPDS location in the control room.

This indication is also present on the main control board in a location other than the SPDS.

4. Addition of radiation monitoring screen to display at least steam generator (or steam line) and stack radiation.

This information is available to the operators at the RDMS console. Thus, the data is available to the operators even without the SPDS.

5. Improvement of the heat sink screen for consistency in labeling, and the subcriticality and core cooling screens for mode dependency so as not to mislead operators.

The heat sink screen has been changed and is now consistent in labeling. The subcriticality and core cooling screens, without any of the changes required by Staff, will function properly below 5% power. Although not required, we intend to implement this enhancement prior to exceeding 5% power.

6. Addition of approved isolation devices between the Reactor Vessel Level Instrumentation System (RVLIS) and SPDS.

These isolation devices have been installed. Qualifying tests have been completed with satisfactory results.

Set forth below are discussions of the five additional deferrals which will be listed in Supplement 6 of the SER.

1. The display call-up method appears awkward.

The awkwardness referred to by the Staff derives from the fact that currently the call up of these displays requires the operator to position a cursor and then press two buttons simultaneously. Staff recommends that the SPDS be changed so that only a single operator action is necessary. The Staff recommendation will, if adopted, simplify the procedure, but the procedure presently available is certainly adequate to the task, and thus the necessary "reasonable assurance" exists.

2. The data validation algorithms appear unsophisticated.

As stated by the Staff in SSER No. 6 § 18.2 at p. 4:

The audit indicated that the data validation methodology includes only range checking, averaging, and auctioneering. Concern was raised that a parameter value could be within an acceptable range but significantly different from other measures of the same parameter, causing the average value to be incorrect and possibly misleading. A more sophisticated data validation algorithm, to ensure display of

more valid data, is being pursued by the applicant.

In short, the Staff is recommending a more sophisticated methodology; the present methodology is not inadequate for the task. Moreover, by procedure, the operators are required to validate any SPDS conclusions prior to implementing any corrective action. Thus the necessary "reasonable assurance" exists.

3. The usefulness of the lower level display formats is in question.

SSER No. 6 states: "top-level CSF summary display appears to aid operators in rapidly determining plant status, but lower-level display formats do not seem to be as useful." (SSER No. 6 § 18.2 at p. 6.)

The combination of SPDS top level display with operator training makes it possible to satisfactorily monitor plant status without SPDS lower-level displays being available on the main plant computer system. The staff's comments indicate a disagreement on specific usage of the SPDS lower level displays; however, the ability of the SPDS to aid the operators is not in question.

4. The availability calculations do not include RVLIS or the RDMS.

The availability calculation cannot be completed prior to the actual interface of both units with the SPDS. In any case, the availability percentage does not affect the safety of the public because there is a backup instrumentation for the computerized SPDS.

5. A system load test is needed to verify system response time.

SSER No. 6 states: "system response time appears to be satisfactory but the staff observations were made during a lightly loaded sequence." (SSER No. 6 § 18.2 at p.6.)

A meaningful system load test, which will give representative SPDS response times, will be performed when the main plant computer system is loaded to support an operational plant. Performance of a system load test under nonrepresentative main plant computer conditions will not help to ensure the health and safety of the public.

CONCLUSION

Like the SPDS itself, none of the above-discussed items is necessary to assure safe operation. Each is, rather, an enhancement to a satisfactory extant system. Moreover, this system, without the above-described enhancements, was accepted by a nation-wide group composed of utility

personnel and Westinghouse Electric Corp Engineers. Seabrook Station hosted the verification and validation program for the Westinghouse Owners Group Emergency Response Guidelines. As part of this test, Seabrook Station was allowed to use the SPDS system on three of the five days of testing to monitor critical safety parameters. Seabrook supplied two operating crews which were presented with 35 randomly selected accident scenarios. These scenarios ranged from simple reactor trips to multiple pressure boundary failures with coincident multiple equipment and control failures. The conclusions were that SPDS facilitated prompt identification of developing challenges and directed the operator to appropriate recovery procedures. The criteria that "the plant be placed in a safe, stable condition regardless of imposed structural and equipment failures" was adequately satisfied. In summary, Seabrook Station has an SPDS which fully meets the goals of safe and efficient power operation.

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JUDGE WOLFE: Anything else, Mr. Dignan?

MR. DIGNAN: The witnesses are available for
cross examination and questions by the Board, Your Honor.

end #6

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1 JUDGE WOLFE: Cross examination, Mr. Backus?

2 MR. BACKUS: Yes, sir. I will not my exception
3 on the record to the Board's ruling on qualifications.

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4 CROSS EXAMINATION

5 BY. MR. BACKUS:

6 Q Mr. Thomas, When did the Applicant here become
7 aware of the SPDS requirement now embodied in NUREG 0737,
8 Supplement 1?

9 MR. DIGNAN: Objection, irrelevant. The question
10 before the house is whether or not there is reasonable
11 assurance that assuming the Staff requested items are not
12 put in the system operation until the first refueling
13 outing will be in such a manner that there will be reasonable
14 assurance of protection of the public health and safety.

15 When the Applicants became of requirements is,
16 I submit, totally irrelevant to this issue.

17 MR. BACKUS: Mr. Chairman, I submit that the issue
18 is inextricably bound up with the question of timing. In
19 fact, we based a motion on summary disposition from the
20 Staff on the issue, and it was plain that that was the only
21 issue and it wasn't included within our contention, so I
22 think it is very much bound up within the fact that there
23 has not been a schedule, enforceable schedule, arrived
24 at between the Staff and the Applicant that would have seen
25 this thing was done before the first refueling outage.

1 And it bears on that as to when the Applicant's
2 were aware of the need to meet this requirement.

3 JUDGE WOLFE: Mr. Backus, once again, your
4 question. I can have it read back if you don't recall.

5 MR. BACKUS: Or I can repeat it, whichever is
6 more expeditious. The question, Mr. Thomas, is when did
7 the Applicants become aware of the SPDS requirement for
8 NUREG 0737. Sup 1?

9 MR. DIGNAN: Objection.

10 JUDGE WOLFE: I understand you are objecting.
11 I am going to sustain the objection.

12 We are not interested in the background, or
13 leading up to the agreement between the Staff and Applicant.
14 That is history. It is not of the moment in this litigation
15 which we are now considering.

16 MR. BACKUS: Mr Chairman, --

17 JUDGE WOLFE: What we are interested in and what
18 we will hear testimony and cross examination upon, and that
19 which is relevant, is that which we stated in our memorandum
20 and order of September 15th, as being a surviving issue of
21 the motion for summary disposition, and I will read this
22 once again into the record, that SAPL may, and the Staff and/
23 or Applicants shall, present written explanatory testimony
24 upon the issue of whether or not in light of the fact that
25 the SPDS is not currently at an optimum.

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1 In other words, incomplete because the afore-
2 mentioned deficiencies, there is reasonable assurance that
3 in deferring the improvements to the SPDS until the first
4 refueling outage, the safety of the population in the
5 immediate vicinity of the plant will be protected.

6 That is the relevance, and the sole issue before
7 this Board, and this is what we want explored, and not
8 any history. .

9 Period.

10 MR. BACKUS: Mr. Chairman, may I point out that
11 Footnote 11 of the Memorandum and Order from which you have
12 been reading, says: The Staff does not argue, and we are
13 unaware that any scheduling agreement arrived at by the
14 Staff and an Applicant pursuant to Supplement 1 is not
15 probably subject to challenge and to judicial review.

16 JUDGE WOLFE: That is right, and we have laid
17 that aside. Any past history. And that is what we said
18 in that footnote. We said we wanted judicially to review
19 this issue, and we have given no element of saccracantness
20 if there is such a word to the agreement entered into
21 between the Staff and the Applicant.

22 That is the history. So, we set that aside. We
23 said it has been challenged, and the Staff never argued
24 that we couldn't look at it, and we did look at it, and we
25 said we are not paying any attention to the sanctity of

1 that agreement, and we want to hear evidence upon that
2 portion of the surviving issue that we did set forth in our
3 memorandum and order.

4 So, we are not going into background. That is
5 running up a rabbit trail, and the Board is not going to
6 sit and listen to that.

7 We are more interested in the issue as we have
8 framed it.

9 All right. Objection sustained.

10 BY MR. BACKUS: (Continuing)

11 Q Gentlemen, you do agree that the requirement for
12 a safety parameter display system is a regulatory require-
13 ment as a result of the TMI action documents that we are
14 talking about, NUREG 0737 and Sup. 1, right?

15 MR. DIGNAN: Objection, is calls for legal
16 conclusions from the witnesses. The cases are legion.
17 Regulatory NUREG's and Regulatory Guides are not regulations
18 of the Commision, and the only extent to which they become
19 regulatory requirements in the technical sense of the word
20 is when as, and if they are adopted into a regulation or
21 referenced therein, or there is a decision.

22 It is a pure question of law as to whether there
23 is a regulatory requirement.

24 JUDGE WOLFE: Sustained.

25 BY MR. BACKUS: (Continuing)

7-~~6~~⁵-gjlw

1 Q Do you recognize that under NUREG 0737, Supplement 1,
2 that the safety parameter display system should provide a
3 concise display of critical plant variables to the control
4 room operators to aid them in rapidly and reliably determining
5 the safety status of the plant?

6 A (Witness Thomas) I recollect words like that
7 in there, but without having that document in front of me,
8 I couldn't say those are the exact words.

9 Q Wouldn't you agree that the rapid and reliable
10 determination of the safety status of the plant is important
11 to overall plant safety?

12 A (Witness Walsh) Yes.

13 Q Would you agree that cross implementation of a
14 safety parameter display system is a design goal, and of
15 primary importance?

16 A I agree it is of primary importance. I am not
17 to sure of the aspect of a design goal.

18 Q But you would agree that prompt implementation of
19 a safety parameter display system is of primary importance?

20 A Yes, sir.

21 Q Gentlemen, can you tell me when operator training
22 for operation of the Seabrook Station began?

23 MR. DIGNAN: Could I have that question back,
24 Your Honor.

(Reporter reads back the question.)

1 MR. DIGNAN: It is my understanding of the
2 original issue, as emphasized by the Chairman earlier,
3 that we are here to discuss one question, and that is the
4 Staff has suggested certain additions and changes in the
5 SPDS.

6 The Staff has agreed with the Applicant that
7 these can be accomplished as late as the first refueling
8 outage. The issue before the house is assuming that takes
9 place, will there be protection for the public health and
10 safety during the plant during that interim period, and
11 provide reasonable assurance of that protection.

12 How it is relevant to find out when the general
13 training of the Seabrook Station operators started is
14 beyond me in terms of relevance, and I object on the grounds
15 of relevance.

16 MR. BACKUS: Mr. Chairman, in NUREG 0737, Sup. 1,
17 Item 3.5C, on page 5, it states: The SPDS and control room
18 improvements are essential elements in operator training
19 programs. And the upgraded plant specific emergency
20 operating procedure.

21 It seems to me there can be no question of the
22 relevance as to what extent operator training has been
23 integrated with the required SPDS.

24 MR. DIGNAN: : What was your reference, Mr. Backus?

25 MR. BACKUS: I am looking at NUREG Supplement 1,

1 page 5, Item 3.4C.

2 MR. DIGNAN: Thank you.

3 May I address that argument, Your Honor.

4 (Pause.)

5 JUDGE WOLFE: Yes.

6 MR. DIGNAN: No one, I guess, denies that SPDS
7 and control room improvements are essential elements in
8 operator training programs.

9 The problem is, that is not the contention or the
10 issue before the house. The issue before the house is
11 assuming this SPDS does not have certain items, is there
12 reasonable assurance without them.

13 Nobody brought up a contention on whether the
14 operators had been trained in the SPDS, at least not one
15 that survived the summary disposition.

16 JUDGE WOLFE: I agree. The contention is not
17 addressed or implicitly or expressly relate to operator
18 training.

19 Now, I have not finished my ruling. I am only
20 speaking to the various -- the contention, that part of the
21 contention which survived the motion for summary disposition.
22 It merely states certain discrepancies.

23 Whether there is reasonable assurance that in
24 deferring corrections or improvement to these deficiencies
25 until the first refueling outage, as to safety there is

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1 reasonable assurance that the safety of the population in
2 the immediate vicinity of the plant will be protected.

3 Therefore, the question is not relevant to the
4 issue before us now. Objection sustained.

5 BY MR. BACKUS: (Continuing)

6 Q Mr. Chairman, I feel it necessary to say on the
7 record in regard to that ruling, and I wish to have additional
8 opportunity to make a statement before you did rule.

9 JUDGE WOLFE: Oh, all right. I take back the
10 ruling, but I thought it was so clear that there could
11 be no --

12 MR. BACKUS: I am very anxious that it will be
13 cleared at a higher tribunal that will get that too, Mr.
14 Chairman.

15 We did not raise an issue of operating training,
16 but the SPDS requirement refers to it in relation to
17 operator training, and I fail to see how we can be excluded
18 from questioning about the failure to have a fully compliant
19 SPDS when it is the regulatory requirement that we
20 specifically referenced in our contention refers to the SPDS
21 as being an essential element in operator training.

22 I agree with you it is very clear, but I suggest
23 it is not clear in the way that supports the Chair's ruling.

24 JUDGE WOLFE: That portion of the SAPL's Contention
25 Supplemental 6, which survived the motion for summary

1 disposition only relates to certain specific deficiencies.

2 It has nothing whatsoever to do with operator
3 training, and once again I rule and sustain the objection.

4 BY MR. BACKUS: (Continuing)

5 Q Gentlemen, I am having put in front of you a
6 letter from Public Service of New Hampshire, dated
7 April 14, 1983, designated SBM 499. Can you identify
8 that as a letter that was sent out from project management
9 in regard to the Seabrook project?

10 A (Witness Thomas) Yes, we can.

11 Q On page 5 thereof, in the last paragraph, as I
12 read it, the statement says: Verification and validation
13 of the SPDS will be accomplished by December 1983, at which
14 time operator training will be initiated and an NRC-post
15 implementation review can begin.

16 Is that correct?

17 A (Witness Walsh) That is the statement.

18 Q Now, I take it verification and validation was
19 not completed by December of 1983, is that right?

20 MR. DIGNAN: Objection. I let the preliminary
21 questions go, because counsel always has a right to
22 interrogate as to is the document what I say it is, and
23 is this statement contained, but now we are down into the
24 history with the subsequent question.

25 Object for the same reasons I articulated earlier.

1 JUDGE WOLFE: Sustained for the same reason.

2 BY MR. BACKUS: (Continuing)

3 Q Okay. At this point I am going to offer for
4 identification copies of this letter to be marked, and I
5 offer three copies to the Court Reporter.

6 MR. DIGNAN: Could I ask is it offered for
7 identification, or is it being marked for identification?

8 ME. BACKUS: It is being marked for identification,
9 but I don't understand the distinction. If it is marked,
10 it is offered for identification.

11 MR. DIGNAN: You are not offering it in evidence.

12 MR. BACKUS: No, I don't think I can do that in
13 light of the Chair's ruling, but I am marking it for
14 identification because there may be another tribunal
15 somewhere that would be interested in it.

16 SAPL Exhibit No. 1 will be fine.

XX

17 (Above mentioned document is marked
18 SAPL Exhibit No. 1 for identifi-
19 cation.

20 JUDGE WOLFE: You furnished three copies of that
21 to the reporter?

22 LEGAL AIDE: Yes, I did.

23 JUDGE WOLFE: Do you have a copy for the other
24 parties and for the Board?

25 MR. BACKUS: We have furnished copies to the

1 Applicant, and we will be happy to furnish copies to the
2 Board and the other parties.

3 BY MR. BACKUS: (Continuing)

4 Q Now gentlemen, on page 8, your testimony states
5 that Seabrook Station hopes that the verification and
6 validation program for the Westinghouse Owners Group are
7 ERG Emergency Response Guideline, is that right ?

8 A (Witness Walsh) That is correct.

9 Q And you state as part of this test, Seabrook
10 Station was allowed to use the SPDS System on three of
11 five days of testing to monitor critical safety parameters,
12 correct?

13 A That is correct also.

14 Q Now, which one of the SPDS displays was used; the
15 one on the simulator, or the one in the control room?

16 A The one in the simulator.

17 Q And you state that the conclusions of this test
18 were that the stimulator SPDS facilitated prompt identifi-
19 cation of developing changes, and directed the operator
20 to appropriate recovery procedures, is that right?

21 A I did not highlight simulator. I took the SPDS.
22 They are identical systems.

23 Q But it was, in fact, the one on the simulator
24 that was used as I understand it, correct?

25 A That is correct.

1 Q Now, have you reviewed the NRC's audit report
2 from Lawrence Livermore Lab attached to the Staff's
3 testimony?

4 A I have read through it once, yes.

5 Q Okay. Did you find there the statement that
6 PSNH stated that the SPDS reduced the time required to
7 respond to up-start conditions.

8 At the time of the audit, however, no documentation
9 or other information was available to provide details of how
10 this conclusion was reached, and I would refer you to page
11 5 of the attachment to the Staff's direct testimony. It is
12 the audit.

13 A (Witness Thomas) And as I understand the question,
14 it is whether you have read the statement correctly?

15 Q Yes.

16 A (Witness Walsh) Could you please repeat the
17 page that you quoted from?

18 Q Page 5. It is 3.3.1, under Audit Team Observations.

19 MR. PERLIS: Excuse me, Your Honor. Just so the
20 record is clear, there are two lengthy attachments to the
21 Staff's testimony. The SPR Supplement 6 input, -- it is
22 an additional document is attached to our testimony. It
23 might aid the parties in finding it.

24 WITNESS WALSH: Can you please repeat the question?

25 BY MR. BACKUS: (Continuing)

1 Q The question, Mr. Walsh, was a very preliminary
2 one. Whether or not you were aware of this statement we
3 are directing you to at page 5 of the Lawrence Livermore
4 verification and validation audit, that at the time of the
5 audit, however, no documentation or other information was
6 available to to provide the details of how this conclusion
7 was reached.

8 A (Witness Walsh) Yes, I am aware of the statement.

9 Q Is there now such documentation or other information
10 to support the conclusion you arrive at on Page 8 of your
11 direct testimony?

12 MR. DIGNAN: Objection. May I be heard. Same
13 grounds. Same grounds, Your Honor. I don't see how this
14 is relevant. To this very precise question the Board has
15 set the hearing, and again to repeat myself, assuming certain
16 things are left out, is there reasonable assurance.

17 This is a question of whether there is documentation
18 and details and conclusion with respect to an audit. That
19 is the Staff's testimony. I don't see that it is relevant
20 to the issues before us.

21 MR. BACKHUS: Mr. Chairman, if I may, this is cross
22 examination, and it is cross examination about the conclusions
23 which the Applicants support on Page 8 of their testimony.

24 JUDGE WOLFE: Objection overruled. Proper
25 cross examination.

1 MR. PERLIS: Excuse me, Mr. Chairman. I have been
2 asked by members of the press to please ask you to speak
3 up because they can't hear you back there.

4 JUDGE WOLFE: This is proper cross examination.
5 And it is relevant to the issue before us. Objection
6 overruled.

7 A (Witness Walsh) Can I restate your question in
8 my words and see if I am trying to answer what you desire?
9 You say we draw the conclusion on page 8 that says we have
10 had satisfactory v and v on the SPDS system, and you want
11 to know because of Livermore's report that they saw no
12 documentation how we can make such a statement?

13 BY MR. BACKUS: (Continuing)

14 Q Well, not quite, Mr. Walsh. The question was
15 to your conclusion in your testimony, that the SPDS
16 facilitated cross identification of developing changes,
17 challenges, and directed the operators to appropriate
18 recovery procedures.

19 And in light of the NRC's contractor audit, that
20 there was no documentation of information available for
21 detail or conclusions, -- the detail of how the conclusion
22 -- that the SPDS reduced the time required to respond to
23 upset conditions.

24 The NRC having said there was no documentation
25 or other information to support that conclusion, I am

7-15-gjw

1 now asking you if that conclusion, which seems to me to be
2 the conclusion that you are making on Page 8 of your testimony
3 is now documented and supportable?

4 A (Witness Walsh) We believe it is.

5 Q What document supports it?

6 A At the time of the audit, we submitted a
7 Westinghouse W-Cap on our whole validation program, which
8 is a very large and lengthy document which covered the two
9 week period of validation of the Seabrook Station.

10 Due to the format that the NRC wanted to hold
11 the review, they were not at that time ready to accept
12 experts other than documentation through validation,
13 therefore, it has been our responsibility to go back and
14 extract portions of that validation W-Cap and resubmit.

15 JUDGE WOLFE: When you use W-Cap, Washington Cap,
16 will you explain that? Try not to short term it. Be more
17 specific.

18 WITNESS WALSH: A W-Cap is just a Westinghouse
19 pre-identification for a document that is issued by the
20 Westinghouse, particular engineering service group.

21 BY MR. BACKUS: (Continuing)

22 Q Going again to the Lawrence Livermore audit
23 attached to the Staff testimony, page 14, Section 4.4.2,
24 do you see there the statement that at the time of the
25 Staff's audit, mention is made of the fact that no use

1 was made of displays during the drill indicate that the
2 operators do not find the system to be of satisfactory
3 aid.

4 Therefore, the audit teams cannot conclude that
5 the Seabrook STBS provides the required operator aid in the
6 determination of the safety status. Do you see that?

7 A (Witness Walsh) Yes, sir.

8 End 7.
9 MS fols.

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Sim 8-1

1 Q Now are you saying that at the time when you
2 had the Westinghouse Owners Group there, which I gather
3 was a prior time, that the situation was different, that
4 the staff did get benefit from the SPDS during those
5 exercises?

6 A (Witness Walsh) Could you rephrase that,
7 please. I am not too sure that I understand what the
8 real question is.

9 Q Sure. During the time when the Westinghouse
10 Owners Groups emergency response people were there that
11 you mention on pages 7 and 8 of your direct testimony,
12 is it your testimony that during those times when you were
13 running tests, and you that three out of five days were
14 devoted to Seabrook Station, that the operators did get
15 assistance and use the SPDS?

16 A Yes, sir.

17 Q By the way, were you there when the Lawrence
18 Livermore audit was being done on May 20 and 21 of this
19 year?

20 A For portions of it I was, yes.

21 Q Would you agree that for those portions that
22 when you were there that the observation made in this audit
23 attached to the NRC testimony is correct, that the staff
24 made no use of the system?

25 A I am sorry, I was absent at that portion, but

Sim 5-2
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2 to my information that I have received, I don't believe
3 that is an adequate statement.

4 Q The purpose of this system, as I understand
5 it, is to aid operators in assessing plant conditions
6 and making the necessary decisions; is that right?

7 A That is correct.

8 JUDGE HARBOUR: Mr. Backus, when you referred
9 to the staff in that question, were you referring to the
10 plant staff or the NRC staff? *

11 MR. BACKUS: The plant staff. Thank you.

12 BY MR. BACKUS:

13 Q On page 6 of the direct testimony, Item 3,
14 you discuss the usefulness of the lower-level display
15 formats on the SPDS, right?

16 A (Witness Walsh) Yes, sir.

17 Q And you state the conclusion that "The staff
18 comments indicate a disagreement on specific usage of the
19 SPDS lower-level displays. However, the ability of the
20 SPDS to aid the operators is not in question." Right?

21 A I took the question to be the ability of the
22 operators to use the lower-level displays.

23 Q You mean you took the question to be do the
24 operators know the displays exist and know what they are
25 supposed to display?

A No. I took it literally meaning that they used

Sim 3-3

1 a lower-level display on the computer only.

2 Q Well, are you saying there that the top level
3 displays were sufficient for the staff, meaning the
4 plant staff, to do what needed to be done?

5 A No, sir.

6 Q Well, let's assume for the minute that the
7 staff judgements about the inadequacy of the lower-level
8 displays are valid and substantial. When you say the
9 ability of the SPDS to aid the operators is not in question,
10 what do you mean?

11 A At the of this audit we were reviewing the
12 SPDS system and not the integrated system with the emergency
13 procedures.

14 As part of my directions to the operators for
15 the emergency procedures uses, any SPDS indication that
16 they see must be manually observed by parameters on the
17 board by instrumentation individually.

18 Therefore, they were using a hard copy or
19 a paper reproduction of the lower level trees in their
20 hands. I don't believe the NRC knows this, and therefore
21 they said we didn't use them.

22 Q In that answer were you referring to these
23 comments we just discussed about the audit staff not
24 observing the Seabrook operators using the system?

25 A That is correct, sir.

Sim 5-4

1 Q And you are saying that is an incorrect
2 observation on their part?

3 A I believe it is.

4 Q You would agree that one very good test of
5 whether a system is appropriate, especially one designed
6 to aid operators of a nuclear plant, is whether it is
7 in fact used in conditions in which its use is intended,
8 right?

9 A I would agree with that, yes, sir.

10 Q Going back to the Lawrence Livermore audit,
11 where we just were, Mr. Walsh, page 14, at 4.4.1, the
12 last paragraph of that section, it says "The audit team
13 observed a simulator drill conducted by PSNH to demonstrate
14 the use of the SPDS under plant upset conditions. The
15 audit team noticed that during the entire course of the
16 drill critical safety functions status was monitored by
17 the Shift Technical Adviser using hardwired instruction
18 and hard copies of the CFS ---

19 (Interruption due to telephone ringing.)

20 Are you with me so far? Have I read that
21 correctly?

22 A Yes.

23 Q Now is that the same thing you just referred
24 to when you said you thought the operator staff at Seabrook
25 station had made use of the system?

Sim 5-5

1 A That is correct.

2 Q So you are not quarreling with the staff's
3 report here that they did not use the actual CRT displays?

4 A No, sir. I just don't think the staff
5 understands the process by which we use our emergency
6 procedures. That's all.

7 Q And when you make that statement, you are
8 referring to the NRC staff and not your staff?

9 A That is correct.

10 JUDGE WOLFE: Mr. Backus, would not be a good
11 time to break for lunch, unless you had a few more questions
12 that you wished to ask.

13 MR. BACKUS: Let me just check this.

14 (Pause.)

15 Yes, this is fine.

16 JUDGE WOLFE: We will recess until 1:30.

17 (Whereupon, at 12:25 p.m., the hearing
18 recessed, to reconven at 1:30 p.m., the same day.)

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AFTERNOON SESSION

Sim 5-6

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Whereupon,

(1:35 p.m.)

LAWRENCE A. WALSH

and

GEORGE S. THOMAS

resumed the witness table and, having been previously duly sworn, were further examined and testified as follows:

JUDGE WOLFE: The hearing is resumed.

You may continue, Mr. Backus.

MS. CURRAN: Judge Wolfe, before cross-examination resumes, my microphone doesn't work at all, I wondered, NECNP does not have any more cross-examination on the contentions before the Board, and, I wondered if Ms. Silbaugh and I might be excused at 5 o'clock from the hearing so that we might be able to get back to Washington tonight?

I have arranged for Mr. Back us to represent the interests of the coalition on any procedural matters that might come up at the end of the hearing.

JUDGE WOLFE: Yes, but it will make it a bit difficult in that as we close the record the parties will be directed to file proposed findings and obviously the State entities may propose findings.

We are going to have to not only direct that, and you are put on notice, but also we would like for the

Sim 5-7

1 parties to get together and discuss the timing for the
2 filing of proposed findings and briefs and also to
3 discuss and come back to us with respect to how to bring
4 together the findings that were proposed some time back
5 after the close of the initial hearing, how to bring those
6 findings in close, in tight with the supplementary
7 findings that you will be proposing after the close of
8 this record.

9 I don't know. You say that Mr. Backus will
10 represent you on those discussions?

11 MS. CURRAN: Yes.

12 MR. BACKUS: Yes.

13 JUDGE WOLFE: All right. Well, if you wish
14 to be excused now, certainly you may be.

15 MS. CURRAN: I would like to stay until
16 5 o'clock.

17 JUDGE WOLFE: Oh, all right. Fine.

18 MS. CURRAN: Thank you.

19 JUDGE WOLFE: All right, Mr. Backus.

20 CROSS-EXAMINATION (Resumed)

21 BY MR. BACKUS:

22 Q Mr. Walsh, on page 3 of the applicant's
23 testimony you say that -- and this is up in the top para-
24 graph, the top full paragraph, "The results of continuous
25 display of the top-level critical safety functions can

1 be accomplished by having the SPDS Shift Technical
2 Adviser CRT continuously display the critical safety
3 functions during normal plant operation."

4 Does that mean that the company is committing
5 to accomplishing this continuous display of critical
6 safety functions?

7 A (Witness Walsh)

8 Q When?

9 A We propose that until the continuous display
10 is produced to an acceptable degree to the NRC that we
11 just constantly keep one screen selected to that panel
12 display.

13 Q Well how long is it the applicant's position
14 that this situation should be continued?

15 A I cannot give you a time. I don't run the
16 people's schedule that input things into the computer. We
17 are going to satisfy the Commission's desire and satisfy
18 their requirements.

19 Q Can Mr. Thomas speak to that as a representative
20 of management here?

21 A (Witness Thomas) If I understand your question,
22 it is how long are we going to have this display on the
23 STA screen; is that correct?

24 Q Yes.

25 A That is until the other software is developed

Sim 5-9

1 so that we can have a continuous display.

2 Q And when do you anticipate that that will
3 occur?

4 A I am not sure when the software will be
5 developed. I can find out and have an estimate. I do not
6 know.

7 Q Mr. Walsh, you say that this will be done,
8 that is the display will be made during normal plant
9 operation. What about during off-normal operation, will
10 the top-level critical safety functions still be displayed?

11 A (Witness Walsh) Can you further describe
12 off-normal to me, please?

13 Q Well, I guess all I can say is you have used
14 the words here "during normal plant operation," and
15 during anything not encompassed within those words, will
16 the top level safety functions still be displayed?

17 A When the plant is in a cold shutdown condition
18 applicable display doesn't really give you much indication
19 of the things that are happening in the plant because it
20 is not designed for that area of operation.

21 Q Well, does your reference to during normal
22 plant operation encompass within it what has sometimes
23 been called upset conditions or accident conditions?

24 A Yes, sir.

25 Q Now the sentence that we have been discussing

Sim 5-10 1

2 discussing here starts out by saying "Until a mutually
3 acceptable resolution to this concern has been reached,
4 the results that may be accomplished by adding the SPDS/
5 STA console CRT to continuously display the top-level
6 critical safety functions during normal plant operation."

7 I guess this would be for you, Mr. Thomas.

8 What do you mean, a mutually acceptable
9 resolution, mutually acceptable to who or whom?

10 A (Witness Thomas) That is mutually acceptable
11 to ourselves and the staff.

12 Q Well the draft license that the staff issued
13 in June, NPS-56 at C-9 said that this would be accomplished
14 in the manner to meet the criteria prior to restart
15 following the first refueling outage.

16 A Does the reference in your testimony, until
17 a mutually acceptable resolution, indicate that that
18 might be beyond the first refueling outage as far as
19 the applicant is concerned?

20 A No.

21 Q So the applicant has no quarrel with a
22 license being issued with that as a condition?

23 A Not that I am aware of.

24 Q Is there somebody who might be aware of that
25 other than you?

A The draft license was issued by the Commission.

Sim 5-11

1 for comment. I do not have a copy of the comments that
2 were sent by us back to the Commission in front of me.
3 To my knowledge, there is none, and I would like to check
4 that document before answering totally in the affirmative.
5 To my knowledge, I am not aware of any problems associated
6 with that.

7 Q Well, would you be willing to verify by
8 reference to the company or the applicant's comments on
9 the draft license that that is not an acceptable condition
10 in the event of a license?

11 A Yes, I would.

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#9 - SueW

1 Q And, assuming that you can't confirm that, can we
2 then take the use of a language about a mutually acceptable
3 agreement with the Staff being reached, would not mean that
4 the Applicant would be reserving the right to defer the
5 meeting of this criteria beyond the first refueling outage?

6 A (Witness Thomas) That certainly is not the
7 meaning of this statement in our testimony.

8 Q By the way, does the Applicant take the position
9 that there is any more assurance of safety during the first
10 year of plant operation than there is during subsequent
11 years?

12 A No, we do not.

13 Q Now, when do the Applicants -- when are the
14 Applicants committing to have an RHR, residual heat removal,
15 flow added to the SPDS?

16 A (Witness Walsh) We have yet to determine ourselves
17 as to the need of that indication on our SPDS. We are still
18 in conference with the NRC on this item. And, we have not
19 concluded our discussions.

20 Q Do I take it from that, Mr. Walsh, as far as
21 the Applicants are concerned, there may never be an RHR flow
22 added to the SPDS?

23 A That's correct.

24 Q Now, when do the Applicants commit to have containment
25 hydrogen concentration added to the SPDS?

#9-2-SueW

1 MR. DIGNAN: I'm going to object to this
2 continued line of questioning. Again, the issue before the
3 Board is assuming these items are not around until the
4 first refueling outage, is there still reasonable assurance.

5 We are now, it seems to me, conducting a bargain-
6 ing session with the Applicant of when it will make a commit-
7 ment. These matters are, as the witnesses have indicated,
8 in conference between the Staff and the Applicant. There
9 are disagreements obviously between the Staff and the
10 Applicant, professional disagreements.

11 But, those are not relevant to the issue that
12 is before the Board. We are not here to bargain out the
13 license condition on each of these items.

14 The question is, assuming we aren't required to
15 have them until the first refueling outage, is the public
16 health and safety still protected.

17 (The Board members are conferring.)

18 JUDGE WOLFE: Objection overruled. I think this
19 is important to the Board's consideration of these matters.
20 And, it may result in a precautionary measure being taken
21 by the Board in conditioning any license.

22 Proceed.

23 WITNESS WALSH: Would you repeat the question,
24 please?

25 MR. BACKUS: Yes.

#3-SueW 1 BY MR. BACKUS:

2 Q When are the Applicants committing to have
3 containment hydrogen concentration added to the SPDS?

4 A That is the same situation. We are in negotiations
5 or conference with the NRC, I should say. We have not
6 determined yet that it is necessary.

7 Q And, I take it implicit in that answer is the
8 possibility that it may be some time after the first refueling
9 outage?

10 A I doubt that, in that our discussions should be
11 completed prior to licensing and whichever schedule falls
12 into the remaining items on this list would probably be
13 inclusive.

14 Q Now, which SPDS screen will it be added to, and
15 how will it fit in with the display logic diagram?

16 A Since I have not concluded my technical arguments
17 with the NRC, I can't give you an answer to that.

18 I had not planned on putting it there.

19 Q And, I take it from that, Mr. Walsh, if it was
20 solely up to you and you didn't have to worry about the NRC,
21 you wouldn't put it in; is that correct?

22 A That's a true statement.

23 Q But, then the NRC asks for a lot of things that
24 you wouldn't put in, I suppose, right?

25 MR. DIGNAN: I object.

#9-4-SueW

1 WITNESS WALSH: That's not a true statement.

2 BY MR. BACKUS:

3 Q Now, when do the Applicants -- when are the
4 Applicants committed to correcting the deficiencies regarding
5 the containment isolation display?

6 A We feel that we have rearranged those displays
7 sufficiently for the NRC to agree that we have a proper
8 display.

9 Q Does that mean that the testimony that we have
10 from the Staff -- and I guess I would again particularly
11 refer to the Lawrence Livermore verification and validation
12 audit -- been obsoleted by something that has happened in
13 the control room since that was filed?

14 A There have been corrective actions taken. We have
15 had no conference with the NRC to see if it meets all their
16 requirements.

17 Q Has the containment isolation display been
18 added to the SPDS screen where those screens are now
19 located?

20 A No, sir.

21 Q So, have you upgraded the hard wire display to
22 the main control room?

23 A Yes, sir.

24 Q Can you describe those corrective measures?

25 A Yes, I can.

#9--5-SueW

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Q Okay. Please do so.

A We have individual indications for all components that need to develop a certain positioning during accident conditions. As part of the normal makeup of the control board, there were spare window boxes or light boxes in that display that had no function at this present time. And, they were scattered intermittently along these displays.

The NRC felt that this would be difficult for the operator to tell whether the displays he was looking at were blank or, in fact, components that did not reach their satisfied state. Therefore, what we have done is ganged these spare boxes into one location and created a situation where the operator will no longer be confused whether they are spare indicators or indicators of actual components.

Q It presents a question of human engineering factors to determine whether or not the operators will, in fact, be misled by this new arrangement.

Is that right, Mr. Walsh?

A It will be something that needs to be added to their training, if that's what you mean.

Q Now, Mr. Walsh, let me turn to Page 4 of the direct testimony, Item 5, in which as I understand it you were discussing the subcriticality display in the SPDS; is that right?

A Item 5 discusses three displays, subcriticality,

#9-6-SueW

1 core cooling and heat sink.

2 Q Okay. With regard to the subcriticality display,
3 I understand the situation to be that this is a display
4 related to a critical safety function; is that right?

5 A It's a display that makes up a portion of the
6 SPDS system, yes.

7 Q And, it's related to one of the critical safety
8 functions intended to be displayed and made available to
9 operators at the SPDS, right?

10 A That's correct.

11 Q In fact, hasn't the company taken the position
12 that it is the highest priority critical safety function?

13 A Yes, it has.

14 Q And, at the present time, it will tell you what
15 you want to know if the plant is below five percent of
16 power, but above that power level -- or sometimes referred
17 to as mode -- it will always be registering in the red; is
18 that right?

19 MR. DIGNAN: Mr. Backus, I object. Mr. Backus,
20 I think you haven't noted the corrections made to the
21 testimony.

22 MR. BACKUS: Yes.

23 MR. DIGNAN: The testimony, Your Honor, was
24 corrected. And that question was premised on the theory
25 that the correction was not made.

#9-7-SueW

1 MR. BACKUS: Okay. All right. I'm sorry. You
2 are quite correct.

3 BY MR. BACKUS:

4 Q Does the correction to the testimony, which now
5 describes an enhancement being implemented, now mean that
6 the subcriticality display now functions at all power
7 levels?

8 A Yes.

9 Q Now, when are the Applicants committing to have
10 the steam generator or steam line radiation and stack monitor
11 radiation added to the SPDS?

12 A The last schedule I observed was February of
13 this coming year.

14 Q I noted in your interrogatory responses, Number
15 6, Page 3, you said these parameters would be included on
16 the SPDS system prior to exceeding five percent power. But,
17 you did not repeat that statement in your direct testimony.

18 Was there some reason for that?

19 MR. DIGNAN: Mr. Backus, what's the reference to
20 the interrogatory, please?

21 MR. BACKUS: Interrogatory Response Number 6,
22 Page 3.

23 (The witnesses are looking at the document.)

24 WITNESS THOMAS: There was no reason why it was
25 not included in there.

#9-8-SueW

BY MR. BACKUS:

1
2 Q So, whether or not the date of February of '87 --
3 the date that Mr. Walsh just testified to -- was met, would
4 the Applicants have any problem with a condition on the
5 license to reflect that -- in the interrogatory answer --
6 that this would be corrected before exceeding five percent
7 power?

8 A Would you please repeat the question?

9 Q Would the Applicants have any question or disagree-
10 ment with the license condition incorporating Interrogatory
11 Response Number 6, that this will be corrected before exceed-
12 ing five percent power?

13 A We would not.

14 Q How many people are in the control room at a
15 minimum when the plant is operating?

16 A (Witness Walsh) When the plant is operating,
17 there is a minimum of three licensed operators in the control
18 room.

19 Q Now, where on the main control board is the
20 information available on residual heat removal flow?

21 A There are two locations on the board to the left
22 of the main control board front facing panels about eyeview
23 for a normal person's height. And, there is alarms that
24 show up on three of the CRT screens that are embedded into
25 the main control board. There are three locations on that side

#9-9-SueW

1 of the main control board also.

2 Q Okay. And, where is that parameter indication
3 in relation to the location of the SPDS/CRT at the
4 shift technical advisor's station?

5 A In the summary testimony L, a layout of the
6 main control board for the purposes of containment isolation
7 panel. And, I believe it's almost the same location.

8 MR. DIGNAN: I think, Mr. Backus, the witness is
9 referring to answers to interrogatories, not the summary of
10 the testimony.

11 MR. BACKUS: Oh.

12 WITNESS WALSH: Excuse me. It's approximately
13 26 feet 6 inches to that board, and it's approximately 3 feet
14 down that board.

15 BY MR. BACKUS:

16 Q Is the residual removal heat flow provided as a
17 direct indication or a calculation and/or inferences required
18 to derive information about this parameter?

19 (The witnesses are conferring.)

20 A There are direct indications right on the main
21 control board of gallons per minute.

22 Q Does the residual heat removal information give
23 an actual measure of flow or does it indicate that the RHR pump
24 has been activated?

25 A It is actual flow.

#9-10-SueW 1 Q And, you would agree that knowing the RHR flow is
2 an important indicator so the plant operators will quickly
3 know if the RHR pump is functioning properly, correct?

4 A Yes.

5 Q And, the residual heat removal flow also gives an
6 early indication of development of an interfacing system, or
7 may, give an early indication of developments of an interfacing
8 systems loss of coolant accident, right?

9 A I don't think I agree with that.

10 Q Now, in regard to the residual heat removal flow,
11 the -- excuse me. Let me start again.

12 You say in regard to this RHR flow, I believe,
13 that -- I'm sorry. The heat sink screen, I'm sorry. The heat
14 sink screen has been changed and is now consistent to labeling.

15 Could you explain that?

16 A Yes. The Commission, in its review of our heat
17 sink, found that on the lower level screens we had seven
18 indications on that screen and six of the seven had their
19 parameters reading out at the bottom of the box. One was on
20 the top.

21 We changed it around so now they are all reading
22 on the bottom of the box.

23 Q Okay. Would you agree that the residual heat
24 removal display has not yet been integrated into the Seabrook
25 SPDS?

#9-11-SueW

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A Yes, I would agree with that.

2

Q Okay. Now, is containment hydrogen concentration

3

provided as a direct indication or are calculations or

4

inferences required to derive the information?

5

A It's a direct indication.

6

Q And, it would certainly be correct that containment

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hydrogen concentrations would given an important indication

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that fuel cladding is being damaged, correct?

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A Yes.

end #9

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1 A No, sir. That is not one of the items we use
2 for initiation of containment spray.

3 Q Maybe I asked the question correctly . Isn't it
4 something you need to know in order to know whether it is
5 safe to initiate the containment spray?

6 A No, sir.

7 Q Couldn't the initiation of containment spray under
8 certain conditions enhance the risk of hydrogen explosion
9 or hydrogen degradation?

10 A No, sir; our pumps are located outside of
11 containment.

12 Q By the way, does the radiation data monitoring
13 system monitor radiation from the steam, or from the
14 steam generator?

15 A From the steam line.

16 Q The information on the steam line then would be
17 available on the radiation data monitoring system or RDMS,
18 is that right?

19 A That is correct.

20 Q Would it be available anywhere else in the control
21 room?

22 A No, sir.

23 Q Well, how far is the RDMS, or that radiation
24 data monitoring system, from the primary SPDS CRT?

25 A About an arm's length.

1 Q Are the steam line radiation parameters displayed
2 as direct indications or calculations or inferences needed
3 to arrive at necessary information?

4 A They have the capability of being direct, but
5 on an overview monitor that the operator normally would
6 call up, all of it would be an indication there is an
7 amount of radiation below a set-point of alarm, or not.

8 Upon seeing an alarm, they would retune the
9 screen to get direct reading.

10 Q Would your answer be the same from the stack
11 monitor?

12 A Yes, sir.

13 Q Well, the stack monitor could be of assistance
14 in letting one know that a containment isolation valve may
15 have been left open, can it not?

16 A Can I just make one correct.

17 Q Sure.

18 A The stack monitor is an instrument that is necessary
19 for more reasons than just reviewing. A 1.E classification,
20 it does have another location at the main control board other
21 than the screen. It has a recorder and a viewer in the
22 back of the main control board.

23 And I missed your second question, I am sorry.

24 Q Okay. So, just to make sure I got the record
25 clear here. You are saying that the steam line radiation

10-3-gjw

1 indicator is available at one location in the control --
2 control display -- but that the stack radiation monitor
3 is available in two locations, is that what you are saying?

4 A That is correct.

5 Q All right. Now, the question I have pending
6 before your correction was, in the stack -- is not the
7 stack monitor of assistance in letting an operator know
8 that a containment isolation valve may have been left
9 open?

10 A Not isolated to, but yes, it could.

11 Q And you would agree, would you not, that stack
12 monitor readings are of value when performing population
13 dose projections during accidents?

14 A Yes, I would.

15 Q And steam line radiation can let you know when you
16 have primary or secondary leakage, does it not?

17 A Yes, it can.

18 Q And normally, there should not be radiation in
19 a secondary system, should there?

20 A There should not be radiation in steam generation
21 systems, no.

22 Q Now you touched on this before I got to the
23 particular point, so we will come back again to the contain-
24 ment isolation briefly.

25 I take it you are now saying that in your opinion

10-4-gjw

1 the containment isolation display on the main control board
2 is plainly readable from the vantage of the primary SPDS
3 location?

4 A Yes.

5 Q Okay. And when was that change implemented?

6 A Just a second? I am sorry. I thought I had
7 the initiation date for the correction, but I have a best
8 guess estimate of completion. It is the 25th of October
9 that the situation will be corrected.

10 Q So, if your prior testimony indicated that this
11 had been done, are you now correcting that testimony?

12 MR. DIGNAN: Could you point out where he said
13 it had been done.

14 MR. BACKUS: That is my recollection; I don't
15 have today's transcript yet, but that is my recollection. If
16 I am in error, the record will show it.

17 WITNESS WALSH: I am in error, sir.
18 This is the sheet that we had a couple of weeks ago. It
19 said best guess was 25th October. Now, my recollection
20 recalls it has been completed.

21 BY MR. BACKUS: (Continuing)

22 Q When was it completed, and is there some document
23 that you have that has been forwarded to Staff that
24 documents that?

25 A (Witness Walsh) There have been no documents

1 forwarded to the Staff as yet.

2 The document from which we can find when it was
3 completed is a work request that was issued to do the work.

4 Q Once again, Mr. Walsh, if you could, would you
5 explain what this fix did to enhance the situation regarding
6 the containment isolation display?

7 A It took a matrix of light boxes, which if you
8 could picture a rectangular light window that is divided
9 up into seven rows down and five rows across.

10 That is a fictitious number, not accurate. But
11 just to give you an idea, the light windows that were not
12 used for some component, were not ganged together; they
13 were distributed throughout that light box.

14 So if they didn't have a pattern or identification
15 purpose to them, they were just blank. Randomly put in.

16 We have taken these blanks, rewired the component
17 system. They will now be in a systematic order, so that
18 the blanks are all in one location in a light box, and shut
19 off to one side so it doesn't confuse the operator trying
20 to determine from the 26 feet away whether it is a real
21 blank or whether a piece of equipment did not reach its
22 final conclusion.

23 Q And as I understand it at this point there has
24 been no review by Staff, NRC staff, of this installation,
25 is that right.

10-6-gjw

1 A That is correct.

2 Q How many valve lights are there that are
3 associated with this display?

4 A I couldn't give you an accurate count. I believe
5 there are fifteen rows on top, and seven down the side,
6 and there are approximately ten blanks in that section.

7 That is all subjective.

8 Q If the containment isolation valve were to be
9 left open, it would compromise at least in part as to some
10 of the valves, a good degree of the containment's intended
11 function, would it not?

12 A That is a possibility, yes, sir.

13 Q Does having the five missing parameters from
14 the SPDS at other locations in the control room, in the
15 opinion of the Applicant meet NUREG 0737, Supplement 1's
16 requirement for a, 'concise display of critical plant
17 variables that is located to convenient control room
18 operators.'

19 A I am not too sure which file you are talking
20 about.

21 Q Well, I am talking about the ones we have just
22 been discussing and been identified by the Staff in their
23 review?

24 A That was RHR H-2 as far as I recall.

25 Q Well, as I understand it, we have steam line and

1 stack radiation monitor. We have the containment isolation
2 status, although I understand you claim that there has been
3 a fix there. RHF flow and containment hydrogen concentration.

4 So, I guess those are the fine I was intending
5 to encompass within the question.

6 A I believe the SPDS system the way it is presently
7 designed satisfies the requirement of 0737.

8 Q So, do I take it from that as far as the Applicant
9 is concerned, the system as presently designed -- and I
10 assume functioning, should be sufficient for the life of the
11 plant?

12 A At this time, yes, although we have agreed to add
13 the radiation -- for further information enhancement to
14 the operator's ability to counteract or mitigate accidents.

15 Q What priority does the SPDS have on the process
16 of the main plant computer?

17 A I am not sure I understand your priority, but
18 if you mean if things fail on the main point computer, would
19 it be the last to fail, and I don't think I can answer that
20 question.

21 Q I guess what I am trying to get at is, I assume
22 in an accident situation there could be a lot of demands
23 on the main plant computer. And there must be somewhere
24 a system of priorities for deciding which displays will be
25 first getting their information from the main plant computers.

1 As I understand it, the SPDS is a subset of the main plant
2 computer, and I am wondering what the priority would be
3 for SPDS display, in light of that?

4 A To the best of my knowledge, we do some relocating
5 of alarms at certain typewriters, but there are no stoppages
6 in the computer usage due to heavy load.

7 SPDS is one of the loads that would be always --
8 trying to be used or trying to be shown.

9 Q Who is the manufacturer of the main plant
10 computer?

11 A A company known as Monacorp.

12 Q Is that firm still in business?

13 A I do not know.

14 Q Do you know from whom you get the spare parts?

15 MR. DIGNAN: Objection. I think we are far beyond
16 the contention at this point.

17 MR. BACKUS: Mr. Chairman, I think that the
18 testimony here is that the SPDS is a subset of the main
19 plant computer, and the Staff audit indicates some question
20 about the priority under heaving loading conditions, and that
21 is all the reason this is a relevant insight.

22 JUDGE WOLFE: That question does not bear on the
23 issue here, and we sustain the objection.

24 BY MR. BACKUS: (Continuing)

25 Q Let me just make sure I get a full panel answer

1 to a prior question, then.

2 Do you know if the computer manufacturer is still
3 in business, Mr. Thomas?

4 A (Witness Thomas) To my knowledge, it isn't.

5 Q Now, who was actually -- who actually did the
6 design of the Seabrook Station SPDS?

7 A (Witness Walsh) There were several people that
8 were involved, but if you are talking the basis of the
9 concept, it was actually a duplication of the Westinghouse
10 Owners Group Emergency Procedures Critical Safety Function.

11 Q Well, is there any one person with the Seabrook
12 Station organization, Yankee, or New Hampshire Yankee, or
13 whatever it is now, that had primary responsibility for the
14 design of the SPDS?

15 A Yes, I was.

16 Q And who was primarily responsible for its
17 implementation?

18 A All of the departments within the station that
19 had a function to get it working; the computer people,
20 the instrumentation people, reactor engineering people. It
21 is a team effort, not just an individual.

22 Q Were you the captain of the tam?

23 A I was senior manager involved, yes.

24 Q Who was the manufacturer and supplier of the
25 radiation data monitoring system?

1 A That was the General Atomic Product.

2 Q And who was the supplier and manufacturer of the
3 inadequate core cooling monitor, the ICCM?

4 A I am not too sure I understand that. We don't
5 have anything with ICCM that has a manufacturers code name
6 to it.

7 Q Is the SPDS in the control room fully installed
8 with the exception of the additional parameter displays
9 being required by the NRC Staff at this time?

10 A Yes, sir, I believe it is.

11 Q You don't have any equipment that is associated
12 with this system which you call an inadequate core cooling
13 monitor?

14 A That title is foreign to me, I am sorry.

15 Q All right. Is the verification test that will
16 include an end-to-end test of all portions of the main
17 plant computer radiation data monitoring system, and any
18 other components that perform SPDS functions going to be
19 done?

20 A If by that do you mean are we going to evaluate
21 all inputs to the SPDS, the answer is, yes.

22 Q And are you going to do a verification field
23 test?

24 A That is not always possible, since we do calculations
25 with the computer. The basic premise is that the output

10-11-gjw

1 indication meets the requirements that the operators can
2 observe what conditions are going on in the plant, and that
3 sometimes a single parameter does no good to field verify,
4 because the resultant conclusions are necessary in SPDS,
5 and not single parameter.

6 Q Surely the ultimate conclusion is dependent upon
7 individual parameters validity, is it not?

8 A Yes, sir, but it is very difficult to dry up a
9 steam generator and have an overpressure at the same time.
10 Just to prove a point, you can do that with simulation.

11 Q Now, I am going to go back to your conclusion on
12 page 8 of the direct testimony.

13 There, you state as I understand it, based on the
14 fact that three of five days testing was allowed to be
15 used by Seabrook, when the Westinghouse Owners Group were
16 there, for verification and validation for their own
17 emergency response guidelines, that, and according to your
18 testimony, in summary, Seabrook Station has an SPDS which
19 fully meets the goals for safe power operation, right?

20 A That is correct.

21 Q Now, it is true, is it not, in your opinion the
22 entire SPDS could be eliminated without defeating, 'the
23 goal of safe and efficient power generation,' right?

24 A No, sir, just the computerized portion.

25 Q Does the system do anything without its computerized

1 portion?

2 A Seabrook Station SPDS is an integrated portion
3 between the emergency operating procedures, the computer,
4 and the possible hand-held backup if we lose the computer.

5 If the computer is lost, the SDAs function is
6 to leave the screen, pick up hard copies of low level
7 screen, do constant monitoring of the board. Therefore,
8 the computer is not really necessary for safe operation
9 of the station during an accident condition, because he
10 has a hot-wired backup system that he reviews on the board
11 on a constant patrol.

12 Q Well, the computer is necessary to drive the SPDS,
13 right?

14 A The computer draws logical conclusions without the
15 operator controlling the board. If the computer is not
16 available, he has a hand-held sheet that can draw those type
17 conclusion.

18 Q So, he has an SPDS?

19 A He has a sheet that is identical of the SPDS. If
20 the SPDS, although the computer system is really more than
21 that, it is an integrated system of how we function at
22 -- during emergency conditions at Seabrook.

23 Q Well, at the very beginning of your testimony, Mr.
24 Walsh, that you or Mr. Thomas have furnished here, you say
25 at the outset it should be understood that the safety

1 parameters of the display system, SPDS, is not considered
2 a safety system.

3 A That is correct.

4 Q Do you know what it is called a safety parameter
5 display system?

6 A That is the label that 0737 put on it, sir.

7 Q And you say that that is so because operator
8 actions are not taken at the SPDS, correct?

9 A That is also correct.

10 Q But there are many important safety components
11 of this plant at which operator actions are not taken,
12 correct?

13 A I am not sure I understand that question, sir.

14 Q There are many important safety components of
15 this plant at which operator actions are not taken, isn't
16 that true?

17 A If the automatic systems work, yes.

18 Q And lastly, Mr. Thomas, can you tell me, as of
19 December 1982, what was the Seabrook Station estimated date
20 for commercial operation?

21 MR. DIGNAN: Can I have that question back,
22 Your Honor?

23 MR. BACKUS: I can repeat it, if that is more
24 easy.

25 MR. DIGNAN: Thank you, Mr. Backus.

1 BY MR. BACKUS: (Continuing)

2 Q As of December 1982, what was the Seabrook Station
3 estimated date of commercial operation?

4 MR. DIGNAN: Objection. Irrelevant.

5 MR. BACKUS: Mr. Chairman, I would point out that
6 in Mr. Luebke's dissenting opinion to the memorandum and
7 order of September 15th, Judge Luebke raised the question
8 of why the safety parameter display system might not be
9 considered for upgrading to all requirements during what
10 he referred to as the Massachusetts Delay.

11 It seems to me that a member of this has, himself,
12 indicated that this is obviously pertinent, and since we
13 are talking about a system that is admittedly not in
14 compliance with the regulations, it seems to me appropriate
15 for this Board to know what time period may be available
16 even with the Applicants estimate of schedule for recontrol
17 compliance, so that whatever degree this Board finds there
18 is risk in having a system that does not meet the compliance,
19 we can avoid that risk.

20 It seems to me it is directly pertinent on the
21 issue before this Board.

22 MR. DIGNAN: I will point out, that if I recall
23 correctly, that learned Judge's dissent it was that he
24 disagreed with the other two judges, because he would have
25 thrown this whole issue out, and we wouldn't be sitting here

1 today.

2 So, if it is of concern of the dissenting Judge,
3 I would suggest the question be relevant for that reason,
4 too.

5 End 10
6 MS fols.

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1 like to withdraw it and reask it, if I can.

2 (Laughter.)

3 BY MR. BACKUS:

4 Q The steam in the containment can serve to
5 cause the inerting of the hydrogen in the containment,
6 can it not?

7 A (Witness Walsh) I think I understand what
8 you are saying. It can cause a dilution of the hydrogen
9 in a concentration that is not inerting but, yes.

10 Q Okay. And if the steam is condensed by turning
11 on the containment building sprays, you could increase the
12 hydrogen burn danger, could you not?

13 A I think that is somewhat subjective since the
14 water droplets from the containment spray would replace
15 the steam. It would cause turbulence which would cause
16 mixing, and I think that is just argumentative myself.

17 MR. BACKUS: That is all I have.

18 JUDGE WOLFE: Your cross-examination is finished?

19 MR. BACKUS: Yes. In light of the Board's
20 rulings, that is all I have.

21 JUDGE WOLFE: All right. Would you hand to
22 the Board reporter a copy of your cross-examination plan
23 for applicants on SAPL Supplemental Contention No. 6.

24 MR. BACKUS: I forget, how many copies is that?

25 JUDGE WOLFE: One.

Sim 11-11

(Board conferring.)

2 JUDGE WOLFE: In case you are interested,
3 Mr. Backus, there is no disagreement amongst the members
4 of the Board when we sustained the objection as not
5 being relevant.

6 BY MR. BACKUS:

7 Q Mr. Thomas, what was the estimated commercial
8 operation date on April 14, 1983 when SAPL Exhibit 1 for
9 identification was sent to the staff?

10 MR. DIGNAN: Objection. The same grounds.

11 JUDGE WOLFE: Mr. Backus, anything more?

12 MR. BACKUS: I await the Chair's ruling.

13 JUDGE WOLFE: Sustained.

14 BY MR. BACKUS:

15 Q What is the estimated commercial operation for
16 Seagook Station today?

17 MR. DIGNAN: Objection. I see no relevance
18 to the estimated commercial operation date to the issue
19 at hand.

20 JUDGE WOLFE: Before the Board rules on the
21 objection, when you speak of the best estimate now that
22 applicants having for beginning commercial operation, do
23 you mean full power or up to five percent power?

24 MR. BACKUS: Full power.

25 (Board conferring.)

1 JUDGE WOLFE: Objection sustained.

2 MR. BACKUS: Plase note my exception.

3 BY MR. BACKUS:

4 Q I would like to go back to a couple of things
5 that came up a little earlier just to clarify a few
6 things.

7 I was discussing with you, Mr. Walsh, some
8 time ago about the possibility that the initiation of
9 containment sprays under certain conditions could enhance
10 the risk of a hydrogen explosion or a hydrogen deflagration,
11 and you mentioned something about the pumps are outside
12 of the containment. Have I got that correct?

13 A (Witness Walsh) That is correct, sir.

14 Q Now by that did you mean to indicate that
15 insofar that the pumps might put out a source of ignition
16 or a spark and that couldn't happen because they were
17 outside of the containment?

18 A That is correct, sir.

19 Q You would agree that steam can inert the
20 hydrogen in the containment, can it not, and that if you
21 withdraw the steam you might not have an inert condition?

22 MR. DIGNAN: Can we have that question read
23 back, please?

24 (The pending question was read by the reporter.)

25 MR. BACKUS: Now that I have heard it, I would

Sim 11-4

1 MR. BACKUS: The record will reflect that I
2 am complying with the Chair's instructions as to the
3 cross-examination plan, copies of which were previously
4 furnished to the Members of the Board.

5 JUDGE WOLFE: I would refer to our memorandum
6 and order of July 25th, 1986 to paragraph (g) appearing
7 at page 12 in requiring that each cross-examiner submit
8 to the Board three copies of their cross-examination plans.

9 The Board stated that these plans must set
10 forth the cross-examination questions to be asked and
11 explain what is being attempted to be established through
12 asking a discrete question or pursuing a series of questions.

13 I would point out that SAPL's cross-examination
14 plan was of the very barest minimum assistance to the Board.
15 The questions were not fleshed out and there was no showing
16 or explanation of what was being attempted to be established
17 by asking a question.

18 I merely point that out, and I would hope
19 that in future NRC litigation when you are asked to submit
20 a full-fledged cross-examination plan that such a plan be
21 submitted.

22 All right, we will now proceed.

23 MR. BACKUS: I would just say, Mr. Chairman,
24 I note that I believe there is some sort of a proposed
25 rule to make one lay out the entire cross-examination

Sim 11-5

1 question by question, or practically so, but I didn't
2 understand the Commission to have adopted that requirement
3 yet.

4 JUDGE WOLFE: The requirement was in our
5 order of July 25th.

6 I would point out with some satisfaction that
7 NECNP submitted a cross-examination plan that detailed
8 the questions and indicated to the Board its line of
9 questioning and what was the purpose of the lines of
10 questioning or cross-examination. This was of great
11 assistance to the Board and it assisted the Board in being
12 able to, we hope, to make good rulings upon objections.

13 (The SAPL cross-examination plans follows:)

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SEACOAST ANTI-POLLUTION LEAGUE'S
CROSS EXAMINATION PLAN FOR APPLICANTS
ON SAPL SUPPLEMENTAL CONTENTION NO. 6

Docket No. 50-443-OL
50-444-OL

- I. Safety Relevance of the SPDS
 - NUREG - 0737 Requirements
 - NUREG - 0737 Statement of SPDS purpose and function
- II. Applicants' Commitments to Correct Deficiencies Identified by NRC Staff Review
 - Timing
 - Means of correcting deficiencies
- III. Present Availability of Information in the Control Room Not Yet Displayed on SPDS
 - RHR Flow
 - Containment hydrogen concentration
 - Stack Monitor
 - Steam Generator (or Steamline) Radiation
 - Containment Isolation
- IV. Priority of SPDS in Main Plant Computer Process
 - Is it the highest priority system
 - What does it do to other operating requirements
- IV. Supplier of SPDS System and Interfacing Systems
- VI. Level of Installation Completed and Verification Test

Sim 11-6

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JUDGE WOLFE: We will have a 10-minute recess.

(Recess taken.)

JUDGE WOLFE: The hearing is resumed.

Off the record and at side bar the Board has been talking with counsel for the parties and the interested States and we have requested them to confer over the next half hour or so or perhaps less and to advise us of their proposed time schedules for the filings of prooposed findings of fact and conclusions of law after we close the record.

We have also asked them for their suggestions and input on how and in what form their proposed findings should take.

It is our suggestion to them that we prefer having a new set of findings, an integrated set of findings and not borrowing or incorporating by reference earlier proposed findings made after the close of the original record.

We have asked them to make their recommendations to us. So we are going to recess now, and in light of Ms. Curran's having to leave at 5, we would like her input as well.

So we will recess for a half an hour, and if the parties come to some recommendations earlier, why then we will resume earlier.

MR. DIGNAN: Your Honor?

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JUDGE WOLFE: Yes.

MR. DIGNAN: Before recessing there was an inquiry that came from Mr. Backus and the Board evidenced interest also in the status on the applicants' attitude towards draft license conditions.

We have obtained the documents that Mr. Thomas needed to state our position on that, and if it would be agreeable, we could put that in the record at this time.

JUDGE WOLFE: All right.

WITNESS THOMAS: In response to NRC letter dated August 20th, 1986 that forwarded draft license for Seabrook Station, Unit 1 we have agreed to the following: Before restart following the first refueling outage, PSNH shall have operational a safety parameter display system (as described in PSNH's submittals dated January 6th, 1986 and April 2, 1986 and as modified by the staff's audit findings) that is acceptable to the NRC.

JUDGE WOLFE: Oh, another thing, Mr. Dignan. You were to furnish a copy of NECNP's Exhibit 7. Have you secured that?

MR. DIGNAN: I gave it to Ms. Curran, and I believe she has given it to the reporter, Your Honor.

MS. CURRAN: That's right. I did.

JUDGE WOLFE: All right. So now we have full sets of exhibits.

Sim 11-8

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We will recess for a half an hour or until the parties advise us.

(Recess taken.)

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(3:40 p.m.)

#12-1-SueW 1
2 JUDGE WOLFE: All right. The hearing is
3 resumed. Has someone been delegated to speak for the parties
4 as to what, if any, consensus there is on the filing of
5 proposed findings of fact, et cetera?

6 MS. CURRAN: I can speak for the parties.

7 JUDGE WOLFE: All right.

8 MS. CURRAN: We have agreed to file integrated
9 findings on the 1983 hearings and the 1986 hearings, and we
10 would just like to go by the rule, which I can't remember the
11 number of the rule.

12 MR. DIGNAN: 10 CFR 2.754, Your Honor.

13 JUDGE WOLFE: Yes.

14 MS. CURRAN: Which would give the Applicants 30,
15 the Intervenors 40 days, and the NRC Staff 50 days to file
16 proposed findings.

17 JUDGE WOLFE: All right. Well, then at the close
18 of the record I will so direct. And that will be it, then.

19 MS. CURRAN: Judge Wolfe, I have another scheduling
20 matter that I would like to raise.

21 JUDGE WOLFE: Yes.

22 MS. CURRAN: As I understand it right now, the
23 Applicants have two motions before the Board. One is for
24 a zero power license and one is for a low power license up
25 to five percent power.

#12-2-SueW

1 JUDGE WOLFE: Yes.

2 MS. CURRAN: Now, I believe that one of the
3 results of the hearing may be that this Licensing Board
4 issues a low power license for up to five percent power for
5 this plant.

6 JUDGE WOLFE: May issue.

7 MS. CURRAN: Yes, it's a possibility that it may
8 issue. We are concerned -- of course, we filed an opposition
9 to the issuance of a low power license before your Board, and
10 we are concerned that we may not receive such a decision in
11 time to file an appeal with the Appeal Board and a motion for
12 a stay.

13 So, seeing as you have the authority to stay the
14 immediate effectiveness of such a decision, I would request
15 that if you do decide to issue a low power license to Seabrook
16 that you stay the immediate effectiveness of the decision for
17 five days to give us time to file any appeal that we may want
18 to file.

19 JUDGE WOLFE: You mean, from the date of the
20 issuance of our partial initial decision if it does
21 authorize the Director of Nuclear Reactor Regulations to
22 issue a low power license up to five percent, you would appreciate it and so move that we suspend the immediate effectiveness rule for five days; is that your request?

24 MS. CURRAN: That's right. I think that will give
25

#12-3-SueW

1 us time to receive the Order in the mail, file the
2 necessary appeals. And, I don't believe it will work any
3 unusual hardship on the Applicant since there is generally
4 some turnover time between the partial initial decision and
5 the issuance of a license by NRR.

6 JUDGE WOLFE: I don't know that any such request
7 has been made in -- it certainly hasn't been made in any
8 case that I've presided over. I don't know that such a
9 motion and/or request is premature or is barred by the rules.

10 Perhaps counsel can advise me. Is there any
11 reason why the Board may not, upon its own motion, suspend
12 the immediate effectiveness rule?

13 Mr. Perlis?

14 MR. PERLIS: Judge, I would direct the Board's
15 attention to 10 CFR 2.764, which I believe is the applicable
16 regulation governing the immediate effectiveness of any
17 initial decision. 2.764.A does provide that the authoriza-
18 tion to issue an operating license shall be effective
19 immediately upon issuance unless the presiding officer finds
20 a good cause why the initial decision should not become
21 immediately effective.

22 JUDGE WOLFE: Yes. Well, I would prefer actually,
23 inasmuch as there must be some showing of good cause, that
24 you put this in the form of a written motion upon your return
25 to your office. And, show the good cause. There will be

#12-4--SueW

1 time for the parties to respond. And the Board would be in
2 a better position to rule at that time after receiving
3 written responses from the other parties.

4 I would hate to -- at this early date certainly --
5 rule on an oral motion without input from other parties.
6 So, would you do that, Ms. Curran?

7 MS. CURRAN: Certainly.

8 JUDGE WOLFE: Was there anything else?

9 MR. BACKUS: Just a matter of clarification. The
10 parties in this colloquy and the Board has been referring to
11 a low power license.

12 But, my understanding is that what we have before
13 us here is authorization for a cold power license but
14 limited to five percent. And, the only remaining issue
15 would be the emergency planning issue.

16 That's my understanding. So, I sometimes think
17 it is a little misleading to talk about a low power license.

18 JUDGE WOLFE: Well, that is before the Board
19 now. And, we must -- in issuing our partial initial decision
20 upon the three issues that are in contention now, must make
21 a determination in our partial initial decision whether or
22 not to grant a low power license up to five percent of rated
23 power.

24 It's for the Hoyt Board to issue it's initial
25 decision upon off-site emergency evacuation issues, to make

#12-5-SueW 1 a determination whether or not to authorize the Director of
2 Nuclear Reactor Regulations to issue a full power license.

3 All right. Anything else?

4 (No response.)

5 JUDGE WOLFE: All right. We will go back now to
6 cross -- well, let's see here.

7 Ms. Sneider, representing Massachusetts, the
8 State of -- the Commonwealth of Massachusetts, will now
9 proceed with her cross-examination.

10 FROM THE FLOOR: We can't hear you back here.

11 JUDGE WOLFE: Ms. Sneider of the Commonwealth of
12 Massachusetts will now proceed to cross examine the witnesses.

13 CROSS EXAMINATION

14 BY MS. SNEIDER:

15 Q I have a couple of questions. You stated earlier
16 that the Applicants intended to keep the main SPDS display
17 continuous on the primary display console?

18 A (Witness Walsh) I think my statement was that if
19 we could not meet Staff's requirements for a continuous
20 display we would select a single screen and keep it there
21 continuously, yes.

22 The Staff has requested that we have a location
23 that does not require the full use of a CRT screen and just
24 dedicate it.

Q Oh, so that would not necessary be at the primary

#12-6-SueW

1 SPDS location?

2 A Yes, it would be. If we cannot complete the
3 required modifications that we would have it located on all
4 the CRTs within the control room.

5 Q Have you adopted any administrative procedures
6 to ensure that that display is continuous?

7 A No, we have not because we feel we have another
8 solution and will clear that problem up and not need an
9 administrative procedure. We presently have a test function
10 and a test computer that will have an SPDS display on every
11 CRT in the control room and will be part of the screen show
12 and no matter what you are selecting on the CRT, this
13 monitor will be shown.

14 Q And, when do you think that will be in place?

15 A I don't know the schedule. I know it's working
16 on a test computer right now. It takes some finite amount
17 of time to load it into the main plant computer, but it's
18 not a hardware or software problem that we are talking about,
19 just a transfer problem.

20 Q So, you would expect that would be in place prior
21 to full power operation?

22 A Oh, definitely, prior to proceeding to five
23 percent I think.

24 Q And you will also be implementing radiation
25 monitoring on the -- that will be integrated into the SPDS?

#12-7-SueW 1

A Yes.

2 Q How now will the radiation monitoring screen be
3 integrated into the SPDS system?

4 A We have developed an additional screen. There
5 will be a selection button to be able to pick up that screen,
6 and it will show the status of all the radiation monitors.

7 Q The Staff noted in their testimony and also in
8 the FDR, Supplement 6, that the data validation algorithms
9 may not be sophisticated enough to ensure valid data displayed
10 to the operator; is that correct?

11 A I don't have it in front of me, but that's a
12 correct statement. Yes, they noticed that we had some
13 differences in how we averaged our equipment from our
14 readings.

15 Q And, it appears to me from your testimony that
16 you don't agree with that conclusion, or agree that more
17 sophisticated methodology is needed because operators are
18 required to validate any SPDS conclusions prior to implement-
19 ing any correction actions; is that correct?

20 A Yes.

21 Q Well, I guess then my question is, the Lawrence
22 Livermore audit report states: Use of average values --
23 this is at Page 13. The use of average values without
24 additional validation checks does not guarantee the operator
25 will be consistently misled in the conservative direction.

#12-8-SueW

1 The way I understand it, that means in that
2 situation there would be nothing -- there would be no
3 indication at all on the SPDS display that anything was wrong
4 and, therefore, there would be no other -- in that instance,
5 there would be nothing to validate.

6 I mean, the conclusion, when you say that the
7 operator is required to validate any SPDS conclusions prior
8 to implementing any corrective action, it just wouldn't
9 apply in such a circumstance; is that correct?

10 A If the offset was conservative and did not, because
11 of the offset, cause the SPDS to indicate an abnormal
12 situation, it would be no validation by the gentlemen or
13 the persons involved in reviewing the SPDS. That's not
14 the only function that goes on during an accident condition.

15 The SPDS is supposed to be the eyes beyond the
16 situation. The operators are working off a set of procedures
17 that should have them review things that could cause them
18 problems.

19 And only if they misinterpret what they see would
20 the SPDS bring them back into the straight and narrow, so
21 to speak.

22 Q Well, do you --

23 A What we are saying --

24 Q -- have --

25 A The only thing that we --

#12-9-SueW

1 JUDGE WOLFE: Wait. Wait. You go ahead.

2 MS. SNEIDER: I'm sorry.

3 WITNESS WALSH: The only thing that would --
4 our objection to, or our statement to, excuse me -- our
5 statement within the context is that we don't let the
6 computer decide what actions that we are going to perform
7 on the plant. Therefore, we have an operator to validate
8 what he sees off the SPDS.

9 MS. SNEIDER: Thank you. That's all the
10 questions.

11 JUDGE WOLFE: Redirect, Mr. Dignan?

12 MR. PERLIS: Excuse me, Judge Wolfe. The Staff
13 did not file a cross-examination plan but I do have a
14 couple of brief questions based on the cross-examination
15 of the other parties.

16 Might I be permitted to ask the questions?

17 (The Board members are conferring.)

18 JUDGE WOLFE: The Board's orders were straight-
19 forward. If you don't file cross-examination plans, you
20 may not take part in any cross-examination.

21 Request refused.

22 Mr. Dignan?

23 MR. DIGNAN: I have no redirect.

24 JUDGE WOLFE: Are there Board questions?

25 JUDGE HARBOUR: Yes.

#12-10-SueWj

BOARD EXAMINATION

BY JUDGE LUEBKE:

2
3 Q A clarification for the record. On the discussion
4 of the algorithm not being sophisticated, I don't think the
5 rest of us on the Board quite understand the circumstances
6 surrounding the Staff's objection in your response to it.

7 Could you simply explain a little bit more about
8 what the objection is about as far as the algorithm was
9 concerned?

10 A (Witness Walsh) I will attempt to. In some
11 of the parameters observed by our SPDS systems, we take
12 several components, the steam generator level being one. We
13 look at steam generator level in many different ways.

14 I believe Lawrence Livermore pointed out that if
15 we were looking at a low level situation and one of our
16 instruments failed towards the high end but not completely
17 enough to be distinguished by our computer systems, it would
18 offset the low average of the other three sufficiently where
19 we may not see low level conditions.

20 JUDGE HARBOUR: Thank you.

BOARD EXAMINATION

BY JUDGE LUEBKE:

22 Q I would like to ask the panel with respect to
23 their prefiled testimony on Pages 7 and 8, you speak of
24 extent or existing SPDS systems. My question is: Do you have
25

#12-11-SueW 1 knowledge of such systems, similar systems, being used at
2 other plants by virtue of your association with the
3 Westinghouse Owners Group or any other information you
4 might have?

5 A Yes, sir. I know personally of three.

6 Q And, would there be any record or documentation
7 that might describe the effectiveness or how satisfactory
8 that operation might be, or those operations might be?

9 Perhaps you could even name the plants?

10 A To the best of my knowledge, Millstone Point
11 Number 3, Shearon Harris and Comanche Peak have similar
12 systems to Seabrook.

13 As far as the reliability, I believe you asked,
14 I have no knowledge of those.

15 Q Then, to go on to a similar line, I gather that
16 the discussion between you and the Staff involves advanced
17 systems or enhancements of the existing system.

18 Do you have knowledge of other plants in which
19 such advanced systems are being discussed or installed?

20 A I'm not too sure I followed it. Let me try to
21 rephrase it and see if you agree. The parameters that we
22 seem to be technically hung up on with the Commission and
23 the other stations also --

24 Q The additional parameters.

25 A I believe Comanche Peak just accepted the

#12-12-SueW 1 Commission's request and added them. Millstone Point, I'm
2 not sure of. Shearon Harris, I'm not sure of. I think
3 Shearon Harris is in a likewise position with us, not having
4 them presently on their system. But, I'm not positive of
5 that fact.

6 I am sure that Comanche Peak has added them.

7 Q I guess what I was getting at is whether you
8 were pioneering in this effort. And, I take it from your
9 response you are not the only one, you are not essentially
10 pioneering?

11 A I don't believe so, no.

12 JUDGE LUEBKE: Thank you, sir.

13 BY JUDGE WOLFE:

14 Q Turning to Page 2 of your testimony and the
15 second sentence in that first full paragraph, "Moreover,
16 Supplement 1 also provides that operators should be trained
17 to respond to accident conditions with or without the SPDS
18 available."

19 What is the specific citation to NUREG 0737,
20 Supplement 1, as to which you conclude there is such an
21 indication?

22 A I'm sorry, sir. Do you want me to tell you what
23 we can see, or do you want me to quote page and verse in
24 0737, Sup 1?

25 Q Yes.

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1 A (Witness Walsh) In Supplement 1, of 0737, page
2 7, paragraph 4.1C, the last two sentences: It says in
3 that paragraph: The procedures which describe timely
4 correct safety standards assessment on the SPDS is, and
5 if not available, will be developed by the Licensee in
6 parallel with the SPDS.

7 The completion of that paragraph says: Further-
8 more, operators shall be trained to respond to accident
9 conditions both with and without the SPDS available.

10 JUDGE WOLFE: All right. This is just another
11 case where, as I have warned the parties when they file
12 briefs with the Board, they say, for example, NUREG 0737,
13 Supplement 1, shows the following: Point one, point two,
14 point three.

15 That is not very helpful to the Board, because
16 it is not that clear in the particular document. I would
17 suggest in your proposed findings, as to each significant
18 proposed finding, you cite the record and page of the
19 transcript. You cite the Exhibit by number and the page.

20 So, that the Board doesn't have to scramble
21 around trying to find out what the basis for your proposal
22 is.

23 Turning to page 8 of your written direct testimony,
24 the next to the last line reads: The criteria that, quote,
25 the plant be placed in a safe, stable condition regardless

1 of imposed structural and equipment failures, close quote,
2 was adequately satisfied. What is the citation for the
3 language in the quotation marks.

4 A That is a direct quote off of the validation
5 write-up of the Westinghouse Owners Group. I am sorry, I
6 did not include that either.

7 JUDGE WOLFE: Mr. Perlis, the Board, particularly
8 myself, and of course the other members don't want to be
9 unfair, that is when you made your request I should have
10 opened that up for comment by the parties.

11 I am aware that even though Mr. Dignan had not
12 submitted cross examination plans, I permitted him to
13 cross examination -- to cross examine upon certain documents
14 which I believe Ms. Curran had offered into evidence, and
15 because you hadn't seen them before, I had allowed you cross
16 examination on those -- that new documentation that you had
17 not seen before.

18 I will retract my ruling, pending comments from
19 the other parties. Are there any objections to Staff making
20 some limited cross examination upon the cross examination, or
21 derived from the cross examination of other parties?

22 MR. BACKUS: Mr. Perlis had already asked me, and I
23 said I had no objection.

24 MS. SNEIDER: I have no objection.

25 JUDGE WOLFE: Mr. Dignan?

1 MR. DIGNAN: No, Your Honor. It has always been
2 my understanding that you are allowed without a plan to
3 cross on matters that came up for the first time under
4 new examination in the hearing.

5 It was only the actual filed direct you were
6 precluded from cross examining.

7 JUDGE WOLFE: All right. The Board retracts its
8 ruling. You may proceed with cross examination.

9 MR. PERLIS: Thank you, Judge Wolfe.

10 CROSS EXAMINATION

11 BY MR. PERLIS:

12 Q Mr. Walsh, you made a correction this afternoon in
13 your prefiled testimony. I direct you to page 4 of your
14 prefiled testimony. I direct you to page 4 of your prefiled
15 testimony.

16 Paragraph 5, and I believe you indicated that
17 the enhancement to the subcriticality and core cooling
18 screen requested by the Staff has now been implemented?

19 A (Witness Walsh) Yes, sir.

20 Q Are you planning on documenting that implementation
21 to the Staff?

22 A Yes, we are.

23 Q Do you know now when you are planning on filing
24 that documentation?

25 A We are going to try to complete all the requests that

XXX

1 the staff has that we have no technical argument with, and
2 when those are all complete, we will file in a package.

3 Q Thank you. Now, on cross examination by counsel
4 for SAPL earlier, there was some question about the use of the
5 lower level display during the Lawrence Livermore audit.

6 And the conversation left me somewhat confused.
7 Is it your testimony that the operators are instructed to
8 use hard copy instead of using the CRT lower level displays?

9 A No, sir, but when we asked the operators to take
10 reaction because of an SPDS indication, we asked them to
11 verify it, and as is normal with thirty-six different people,
12 everyone has their own methodology for doing it.

13 It appears that I need to channel that a little
14 better than I have.

15 The screens show the same thing that he has on a
16 piece of paper. I guess it saves a few steps if he used
17 the paper and walked around the board and keep referring
18 with the TV screen to see if your conclusions are accurate.

19 Q Let me ask it this way: When are your operators
20 instructed to use the lower level displays?

21 A When the SPDS indication indicates something he
22 should react to, he is supposed to select lower level screen,
23 or obtain a lower level screen and verify just what he is
24 seeing is factual.

25 Q And that would be before going to the hard copy ?

1 A I did not specify. All I said was verify that the
2 indication you are seeing is true before you react with the
3 plant control. Some people use the screen, and walk the
4 board to check it; some people pick up the hard copy, which
5 is a duplicate of the screen, so in case they forget what
6 they are looking at. I would imagine they would have them
7 right in front of them, because the indicators are all around
8 the panel, versus the CRT section is right in the center of
9 the Board, or on the SPDS panel.

10 Q Thank you. One final question. Counsel for the
11 State of Massachusetts asked you about the radiation monitoring
12 function, and you indicated was going to be added to the
13 system.

14 Do you plan on including those in the top level
15 continuous display?

16 A I have not at this moment.

17 MR. PERLIS: Thank you. I have no further
18 questions.

19 JUDGE WOLFE: Re-direct, Mr. Dignan?

20 MR. DIGNAN: No, Your Honor.

21 JUDGE WOLFE: Any other?

22 MR. BACKUS: I have a couple of questions following
23 up on your questions.

24 JUDGE WOLFE: We are now on cross examination on
25 Board questions.

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1 FURTHER CROSS EXAMINATION

2 BY MR. BACKUS:

3 Q Mr. Walsh, Judge Wolfe asked you about your
4 testimony on Page 2, and the reference -- you made reference
5 there to NUREG 0737.4.1.C.

6 And you quoted the section providing that
7 operators should be trained to respond to accident conditions
8 with and without the SPDS, right?

9 A (Witness Walsh) Yes, sir.

10 Q And then you go on and say: Therefore, even if
11 there were no SPDS at all, the necessary information would
12 be available, correct?

13 A That is correct.

14 Q Well, I guess I am a little bit bothered by the
15 use of the word, 'therefore.' Are you suggesting when you
16 say, 'therefore,' even if there is no SPDS at all, that the
17 information would be available, that you are interpreting that
18 language from NUREG 0737 to mean that the operators can
19 respond to accident conditions with or without the SPDS?

20 A The operators are trained to respond to accident
21 conditions without the SPDS.

22 Q But you recognized that the requirement is as you
23 have quoted in here, that they respond with and without the
24 SPDS, right?

25 A The statement in here is to indicate that the operator

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1 would respond with an SPDS if it were available; if it were
2 unavailable, they would also respond.

3 MR. BACKUS: Okay.

4 JUDGE WOLFE: Ms. Sneider, do you have any cross
5 on the Board questions.

6 MS. SNEIDER: No, sir.

7 JUDGE WOLFE: Redirect, Mr. Dignan, on Board
8 questions.

9 MR. DIGNAN: No, Your Honor.

10 JUDGE WOLFE: All right. Are the witnesses to be
11 excused now permanently?

12 MR. DIGNAN: They are, Your Honor.

13 JUDGE WOLFE: Thank you. You are excused
14 permanently.

15 WITNESSES STAND ASIDE.

16 MR. DIGNAN: Your Honor, with the excusing of these
17 witnesses, that completes the Applicants Case in Chief. The
18 Applicants will not rest until the last witnesses have
19 testified from the Staff, but our Case in Chief has not been
20 completed.

21 JUDGE WOLFE: All right. Mr. Perlis?

22 MR. PERLIS: Thank you, Judge Wolfe. At this point,
23 the NRC calls Richard Eckenrode to the stand.

24

25

1 Whereupon,

2 RICHARD J. ECKENRODE,

3 was called as a witness for the NRC Staff, and having been
4 first duly sworn, testified as follows:

XX INDEX 5 DIRECT EXAMINATION

6 BY MR. PERLIS:

7 Q Mr. Eckenrode, will you please provide for the
8 record your full name and your position with the NRC Staff?

9 A My name is Richard J. Eckenrode. I am a Human
10 Factors Engineer on the Electrical, Instrumentation and
11 Control Systems Branch, in the division of PWR Licensing0A
12 to the Nuclear Regulatory Commission.

13 Q I will be asking you a couple of questions about
14 a document entitled: NRC Staff Testimony of Richard J.
15 Eckenrode on the SPDS Portions of Contention SAPL SUPP. 6.

16 Do you have that document in front of you?

17 A Yes, I do.

18 Q I am going to ask you to turn to an attachment
19 which begins after page 11 of the document.

20 In shorthand, it is entitled Richard J. Eckenrode
21 Professional Qualifications. Do you see that document in
22 front of you?

23 A Yes, I do.

24 Q Is that a correct copy of your professional
25 qualifications?

1 A Yes, it is.

2 Q I had planned on introducing this whole package into
3 the record at one time. If there is any voir dire, it might
4 be appropriate to take that at this point.

5 JUDGE WOLFE: All right. Is there any voir dire?

6 MR. BACKUS: I have no voir dire for this witness.

7 MS. SNEIDER: I have none, Your Honor.

8 JUDGE WOLFE: All right. Proceed.

9 BY MR. PERLIS: (Continuing)

10 Q Turning to the first 11 of this package, is that
11 the testimony you prepared for this proceeding?

12 A Yes, it is.

13 Q Do you have any changes you would like to make
14 to that testimony?

15 A No, I don't.

16 Q And is that testimony true and correct to the best
17 of your knowledge and belief?

18 A Yes, it is.

19 MR. PERLIS: Your Honor, at this point I would like
20 to enter into the record the whole package, which consists
21 of the following. An eleven page document, which is Mr.
22 Eckenrode's testimony. A two page document which is his
23 professional qualifications. I believe the Staff indicated
24 earlier that it would be submitting into the record SER
25 Supplement 6. That was not quite correct. What we offer into

1 the record as an attachment here, which is the Section 18
2 input to Supplement 6. Appended to the Supplement 6 input
3 is the Lawrence Livermore Audit Report which has been
4 referenced earlier today, as well as an appendix to the
5 Supplement 6 input, which reflects later staff input to that
6 supplement.

7 We can denominate Supplement 6 and the attachment
8 and the Appendix as Exhibit 6, and identify the other
9 supplements as exhibits, but I would like it attached to
10 the testimony if possible.

11 JUDGE WOLFE: Any objection?

12 MR. BACKUS: No objection.

13 MR. DIGNAN: No objection.

14 JUDGE WOLFE: The testimony of Richard Eckenrode
15 -- Judge Harbour wants to ask a question. Judge Harbour
16 raised a good question.

17 Mr. Perlis, will you represent to the Board that
18 Section 18 to the SER 6, which is attached to the Eckenrode
19 testimony will be identical to that section which appears
20 in Supplement 6 to SER when published?

21 MR. PERLIS: With one following qualification.
22 What appears attached to his testimony will be printed
23 verbatim in the SER. The Appendix 18A which is the final
24 portion of this package, will also appear in the SER as an
25 update.

1 Now, the utility had indicated that they made
2 additional changes to the SPDS. As soon as those changes
3 have been documented to the staff, and should the Staff review
4 of those changes be completed before SER-6 is published in
5 final form, there may be an additional appendix to Section 18,
6 documenting new additions to it.

7 But the material that is appended to Mr. Eckenrode's
8 testimony will appear verbatim in the SER. There just may
9 be an additional appendix to it when the SER finally gets
10 published, and when we see the additional documentation the
11 utility indicated today they are going to be providing for us.

12 JUDGE WOLFE: With Mr. Perlis' representation to the
13 Board, I will ask anew from Mr. Backus and Ms. Sneider whether
14 they have any objection to the incorporation of the testimony
15 of Mr. Eckenrode, plus the attachments into the record?

16 MR. BACKUS: I have no objection.

17 MS. SNEIDER: No objections.

18 JUDGE WOLFE: Accordingly, the testimony of
19 Mr. Eckenrode on SPDS portion of Contention SAPL
20 Supplemental 6, plus the attachment are incorporated into
21 the record as if read.

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(Testimony of Mr. Eckenrode follows)

23

24

25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	
PUBLIC SERVICE COMPANY OF)	Docket Nos. 50-443 OL-1
NEW HAMPSHIRE, <u>et al.</u>)	50-444 OL-1
)	On-site Emergency Planning
(Seabrook Station, Units 1 and 2))	and Safety Issues

NRC STAFF TESTIMONY OF RICHARD J. ECKENRODE
ON THE SPDS PORTION OF CONTENTION SAPL SUPP. 6

Q.1 Please state your name and position with the NRC Staff.

A.1 My name is Richard J. Eckenrode. I am a Human Factors Engineer in the Electrical, Instrumentation and Control Systems Branch of the Division of PWR Licensing-A, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission. I have the lead responsibility for the NRC review of the Seabrook Station's compliance with NUREG-0737 Item I.D.2. I was the principal author of the Section 18 input for Supplement 6 to the Seabrook Safety Evaluation Report (SER). A copy of my professional qualifications is attached.

Q.2 What is the purpose of your testimony?

A.2 The purpose of my testimony is to address the safety parameter display system (SPDS) for the Seabrook facility, and particularly to

address the question of whether the complete SPDS need be in place before the completion of the first refueling outage.

Q.3 What is the safety parameter display system (SPDS)?

A.3 The SPDS is designed to provide a concise display of critical plant variables to the control room operators to aid them in rapidly and reliably determining the safety status of the plant. The SPDS itself is not considered a safety system; no operator actions are to be taken at the SPDS or based exclusively on information displayed on the SPDS. The SPDS is instead used to refer operators to various other displays and controls in the control room where corrective actions are to be taken if needed. In the absence of the SPDS operators can still acquire the necessary information from these other displays.

The specific requirements for SPDS are set out in Item I.D.2 of Supplement 1 to NUREG-0737. According to that Item, SPDS must contain the following elements:

- a) SPDS should provide a concise display
- b) SPDS should display critical plant variables
- c) SPDS should aid operators in rapidly and reliably determining the safety status of the plant
- d) SPDS shall be located convenient to control room operators
- e) SPDS shall be a continuous display
- f) SPDS shall be suitably isolated from safety-related systems
- g) SPDS shall be designed to incorporate accepted human factors principles
- h) Procedures and training shall address plant safety status and accident conditions with and without SPDS

Q.4 Is there a required time for implementation of the SPDS?

A.4 According to Supplement 1 of NUREG-0737, implementation of the SPDS is determined by a schedule that is negotiated with the Staff. Guidance provided to the Staff by the Director of the Division of Licensing stated that, for those plants that had not yet received an operating license, the SPDS Safety Analysis and Implementation Plan should be submitted by a license applicant six months prior to the fuel load date. This was meant to provide the Staff sufficient time to complete its licensing review. The Director's guidance further stated that, in those instances where proposed implementation dates were after the date for fuel load, license conditions were to be imposed for all those commitments that were not yet implemented at the time of issuance of an operating license.

Q.5 Did the Seabrook Applicants submit the required SPDS documentation to the Staff for review?

A.5 Yes. The Applicants submitted their SPDS report to the NRC by letter dated January 6, 1986 (SBN-920).

Q.6 Please describe the nature of the Staff's review of the Applicants' submittal.

A.6 The Staff and its consultants from Lawrence Livermore National Laboratories reviewed the report against the requirements of Supplement 1

to NUREG-0737 and the guidance contained in Section 18.2 of the Standard Review Plan (NUREG-0800). As has been the case in the majority of Staff SPDS reviews, additional information was requested by the Staff and was submitted by the Applicants on April 2, 1986 (SBN-987). The Staff and its consultants reviewed this information and conducted an on-site design verification and validation audit on May 20-22, 1986.

Q.7 What were the Staff's conclusions with respect to the Seabrook SPDS?

A.7 The Staff's conclusions on the Seabrook SPDS are set out in detail in Section 18 of Supplement 6 to the Seabrook SER (a copy of the Section 18 input to Supplement 6 is attached hereto). The Staff found that the Seabrook SPDS is not at this time in complete compliance with Item I.D.2 of NUREG-0737, Supplement 1. The Staff also found, however, that this noncompliance does not present a serious safety question at Seabrook. The SPDS in its current design should not provide erroneous or misleading information to plant operators and therefore will not increase the potential for operator error in the event of an abnormal occurrence at Seabrook (see Answer 9.c below); the current Seabrook SPDS does provide useful information to the plant operators (albeit not all the information called for in NUREG-0737, Supplement 1); and the information not presently available on the SPDS is available elsewhere in the control room. All this, combined with the fact that NUREG-0737, Supplement 1 does not require that SPDS be implemented before full power operation, led the Staff to conclude that implementation of the additional SPDS

requirements at Seabrook can await the completion of the first refueling outage.

Q.8 In what respects did the Staff find the Seabrook SPDS to be in noncompliance with Supplement 1 to NUREG-0737?

A.8 The items of noncompliance are discussed in Supplement 6 to the SER. Briefly, those items are:

- 1) The SPDS display is not continuous
- 2) Residual heat removal (RHR) flow and hydrogen concentration variables are considered by the Staff to be part of the minimum information required to assess the critical safety functions (CSFs) and are not displayed on the SPDS
- 3) The containment isolation display is not satisfactorily readable from the prime SPDS location to be considered part of the SPDS
- 4) The SPDS does not display sufficient radiation variables
- 5) Several human engineering discrepancies have been identified
- 6) Two CSF status trees are not mode dependent and have the potential for misleading the operator
- 7) Isolation devices between the Reactor Vessel Level Instrumentation System (RVLIS) and the SPDS were not yet approved
- 8) Data validation algorithms may not be sophisticated enough to ensure valid data are displayed to the operator
- 9) The usefulness of the lower-level SPDS display formats to the operator is in question
- 10) RVLIS and the Radiation Data Management System (RDMS) availability has not yet been factored into overall SPDS availability calculations
- 11) System response time appears to be satisfactory, but a system load test is needed to verify the worst condition

Q.9 Please describe the Staff's findings as they relate to the 8 review criteria in NUREG-0737, Supplement 1. Please include in your answer references to the 11 items of noncompliance identified in your last answer.

A.9.a Concise Display: With the exception of the containment isolation panel (Item 3), which is a separate display and needs to be more readable from the SPDS location, the SPDS cathode ray tube (CRT) formats provide a concise display of plant conditions as required by NUREG-0737, Supplement 1.

A.9.b Critical Plant Variables: The Staff has identified a minimum set of approximately 20 plant parameters it believes to be sufficient to provide plant operators with information about the critical safety functions specified in NUREG-0737, Supplement 1. The Seabrook SPDS currently contains all but five of these parameters. Two of these five, steam line and stack radiation (Item 4), are currently displayed on the RDMS display, and will be added to the SPDS with the implementation of a radiation monitoring screen. Another parameter, containment isolation status (Item 3), is currently provided on a separate display that will be improved for better readability from the primary SPDS location. The final two parameters, RHR flow and containment hydrogen concentration (Item 2), are currently under study by the Applicants to determine how the information concerning these parameters can best be obtained and displayed on the SPDS. Both parameters are currently available

elsewhere in the control room, and procedures and training address their proper use. They have not yet, however, been integrated into the Seabrook SPDS.

A.9.c Aid Operators in Rapidly and Reliably Determining Safety

Status: Rapid and reliable safety status indication is made up of many factors. The Staff audit identified five potential deficiencies that could affect the speed and/or the reliability of the SPDS: (1) Although the system response time appeared to be satisfactory (most factors are updated every five seconds), the Staff observations were made during a lightly loaded sequence (Item 11); (2) The Staff audit indicated that the data validation methodology includes only range checking, averaging and auctioneering. A more sophisticated data validation algorithm may be required to ensure valid information (Item 8); (3) System availability data indicated an acceptable (over 99%, availability for the SPDS, but these calculations did not include the availability of RVLIS or RDMS data input (Item 10); (4) The subcriticality and core cooling status trees are not mode dependent and the SPDS displays will indicate that these functions are being challenged during normal power operations (Item 6) (plant operators have been made aware of this through their training); and (5) Observation of an accident simulation indicated that the top-level CSF summary display appears to aid operators in rapidly determining plant status, but lower-level display formats do not seem to be as useful (Item 9).

A.9.d Convenient Location: The location of the primary SPDS CRT at the Shift Technical Advisor (STA) station near the center of the control room and the ability to call up the SPDS at other operator locations satisfies the requirement to place the SPDS in a convenient location. Although its current location in the control room is appropriate for its intended usage, the containment isolation display as it is currently configured (Item 3) can not be easily read from the location of the primary SPDS CRT and hence that display does not meet the convenient location requirement.

A.9.e Continuous Display: Although SPDS is continuously accessible to the STA, the capability to call up display formats other than the SPDS on the STA's designated SPDS CRT violates the requirement that the SPDS be a continuous display (Item 1). Either the CSF summary display must be added to all CRT formats accessible on the STA's CRT, or a dedicated CSF summary display needs to be added to the STA station.

A.9.f Electrical and Electronic Isolation: Three types of isolation devices are used at Seabrook: Westinghouse 7300 Series instrumentation; General Atomics RM 80 isolators; and additional Westinghouse isolators used in the RVLIS. The 7300 Series isolators were approved by the Staff by means of Westinghouse Topical Report WCAP-8892A. The RM 80 isolators have been approved for use through the first refueling outage; at that time, the isolators are to be replaced by isolators that do not have fuses in their output

circuit. The Westinghouse RVLIS isolators, which were previously identified as unapproved (Item 7), have recently been approved by the Staff based on a test conducted by Westinghouse in August of 1986. Thus the Seabrook SPDS now meets the requirement of electrical and electronic isolation from safety equipment.

A.9.g Incorporate Accepted Human Factors Principles: The SPDS generally incorporates accepted human factors principles, with the following exceptions: (1) The heat sink format displays the flow data value above the decision block instead of below the block as do all the other formats (Item 5); (2) The display callup method is acceptable, but awkward. The Staff recommends a single operator action for callup of each of the second-level displays (Item 9); (3) The containment isolation display is located a significant distance from the primary SPDS location so that it is difficult to read the legends from the SPDS location (Item 3).

A.9.h Procedures and Training: An audit of the SPDS procedures and operator training program indicated that both satisfy the requirements of NUREG-0737.

Q.10 In Supplement 6 to the SER, the Staff identified a problem with the isolators between the RVLIS and the SPDS. Has that problem been resolved?

A.10 At the time of the writing of the SER input, the RVLIS isolators (used to protect the RVLIS from the SPDS) had not been tested to the maximum credible fault (MCF) voltage and current. This test was conducted by Westinghouse in August of 1986. The RVLIS isolators successfully passed the MCF test, and are therefore acceptable to the Staff. An Appendix to Section 18 of Supplement 6 documents the acceptability of the RVLIS isolators; a copy of that Appendix is attached.

Q.11 In your input to Supplement 6 of the SER, you established a license condition that would allow the Applicants to operate until the first refueling outage before making various modifications to the SPDS to resolve the open items identified earlier in your testimony. Do you believe that deferral of these modifications poses a threat to the public health and safety.

A.11 No, I do not believe that deferral of the remaining modifications to the Seabrook SPDS poses a threat to the public health and safety. It should be pointed out that the situation with the Seabrook SPDS is by no means uncommon. In its review of SPDS at other plants, the Staff has found that most utilities have experienced more than anticipated difficulties in the design, development and installation of a system that fully meets the SPDS requirements of NUREG-0737, Supplement 1. The Staff has extended the SPDS implementation dates for a number of plants in order to assure the development of a quality SPDS. As to the safety implications of the Seabrook interim SPDS, the Staff review found that Seabrook currently has a functional, usable SPDS; the plant just does not yet fully meet the requirements of NUREG-0737,

Supplement 1. All the information that will be added to the SPDS is currently available to the operators elsewhere in the control room. While the modifications will improve the quality of the SPDS, these modifications are not critical from a health and safety standpoint. The Staff therefore believes these modifications can safely await the end of the first refueling outage.

RICHARD J. ECKENRODE
PROFESSIONAL QUALIFICATIONS
ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEMS BRANCH
DIVISION OF PWR LICENSING-A

From December 1980 when I was hired by the U.S. NRC, to November 1985, I was assigned to the Human Factors Engineering Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation. My initial responsibilities included: (1) participation in the development of NUREG-0700, "Guidelines for Control Room Design Reviews," and (2) participation in the onsite control room design reviews required for operating licenses. Subsequently, I have participated in over 25 control room design reviews, 15 of which I directed. I was a member of the NRC Task Forces which reviewed the steam generator tube rupture event at R. E. Ginna Nuclear Power Plant and the ATWS event at Salem Generating Station. I am a qualified member of the NRC Incident Investigation Team. Since December, 1985, I have been assigned to the Electrical, Instrumentation, and Control Systems Branch, Division of PWR Licensing-A and have been assigned as Multi-Plant Action Manager for the Safety Parameter Display System (SPDS). I have conducted or participated in four SPDS reviews, including Seabrook Station.

Since 1960, I have been active in the application of the human factors discipline to manned systems and have directed or participated in more than 30 major human factors projects before joining the NRC. I am a member of the Human Factors Society.

I hold a Bachelor of Science degree in Aeronautical Engineering from St. Louis University and have completed several NRC sponsored courses including Nuclear Reactor Concepts, Radiation/Contamination Protection, Pressurized Water Reactor Fundamentals, BWR Technology, PWR Simulation, and Incident Investigation.

From 1963 until joining the U.S. NRC in 1980, I was a Principal Associate with Dunlap and Associates, Inc., of Norwalk, Connecticut. Dunlap and Associates, Inc. is a research and consulting firm in the areas of systems and operations analyses and the behavioral sciences including human factors.

Some of my major projects included:

- Development of human factors guidelines for designing CRT color display formats for a large electrical power distribution control room. Subsequently designed a major portion of the displays.
- Development of a task analysis methodology for determining training requirements and training device requirements and characteristics, as applied to military systems.
- Conducted human factors and systems analyses resulting in man/machine interface design recommendations, procedures development and training requirements recommendations for the following systems and programs:

- Optical lens manufacturing facility
- Hematology laboratory
- Navy AEGIS combat system program
- Trident submarine missile system
- Remotely piloted aircraft
- UTTAS and research helicopters
- Antisubmarine Warfare attack team trainer
- Landing helicopter assault ship
- Chemical/ biological warfare protective clothing
- Manned orbital laboratory
- Apollo/Saturn prelaunch checkout system

From 1960 to 1963 I was with the Life Sciences Department of McDonnell Aircraft Corporation. During that time I participated in the human factors analysis and design work on projects Mercury and Gemini and on mechanical ground support equipment for the F4 Tactical Fighter aircraft. I also participated in the Mercury astronaut acceleration training program and gathered human performance data to assist in verifying mission reliability estimates.

In Supplement No. 4, the staff described the safety parameter display system (SPDS) purpose and requirements and presented an initial status review of the Seabrook SPDS.

By letter dated January 6, 1986, the applicant submitted the SPDS design report for staff review. The applicant submitted additional information on the design by letter dated April 2, 1986. In addition to the staff review, the staff, assisted by consultants from Lawrence Livermore National Laboratory, conducted an onsite design verification and validation audit of the Seabrook SPDS on May 20-22, 1986. Attached is the consultant's Technical Evaluation Report (TER) of that audit. The staff agrees with the technical positions and conclusions contained in the TER. The following evaluation was prepared, based on the findings of the TER, to establish a basis for a license condition to ensure completion of items pertaining to the Seabrook SPDS.

SPDS Description

The Seabrook SPDS is incorporated as a function within the main plant computer. The displays are presented on cathode ray tubes (CRTs) that are an integral part of the control room. The designated primary SPDS CRT is located near the center of the control room at the shift technical advisor (STA) station. The SPDS displays may be selected and presented at any of six other CRTs in the main control board. Operator access is through the existing keyboards used for accessing all plant programs and displays.

The top-level SPDS display format consists of six color- and position-coded bars representing the summary status of the six critical safety functions (CSFs). Each CSF status tree is displayed on the second-level format, which includes parameter values and a color- and shape-coded status circle for each tree branch. The color-coded summary bar for the six functions appears in the lower left corner of each CSF status tree.

Variable Selection

Section 4.1(f) of Supplement No. 1 to NUREG-0737 states:

The minimum information to be provided shall be sufficient to provide information to plant operators about:

- (i) Reactivity control
- (ii) Reactor core cooling and heat removal from the primary system
- (iii) Reactor coolant system integrity
- (iv) Radioactivity control
- (v) Containment conditions.

For review purposes, these five items have been designated as CSFs.

The applicant has defined the CSFs for Seabrook from a different perspective. They are based on the maintenance of the following three physical barriers to radiation release:

- (1) Fuel matrix and fuel cladding
- (2) Reactor coolant system (RCS) pressure boundary
- (3) Containment

The applicant has defined the following six CSFs to maintain these barriers:

- (1) Subcriticality
- (2) Core Cooling
- (3) Heat Sink
- (4) RCS Integrity
- (5) Containment Integrity
- (6) Reactor Coolant Inventory

Staff review of the parameters selected by the applicant to support these functions indicates that the six CSFs defined by the applicant do not fully cover the five CSFs specified in Supplement 1 to NUREG-0737. Specific findings of the staff review are:

- (1) Residual heat removal (RHR) flow and hydrogen concentration are not included in the Seabrook CSF status trees and are not displayed on the SPDS.
- (2) Radiation parameters are to be displayed but are not yet implemented.

- (3) Containment isolation is not displayed on the SPDS but is accessible, to a limited extent, from the prime SPDS position (see section entitled "Human Factors Program" below).

The staff finds all other variables selected acceptable in satisfying the above requirement of NUREG-0737, Supplement No. 1.

Display Data Validation

The audit indicated that the data validation methodology includes only range checking, averaging, and auctioneering. Concern was raised that a parameter value could be within an acceptable range but significantly different from other measures of the same parameter, causing the average value to be incorrect and possibly misleading. A more sophisticated data validation algorithm, to ensure display of more valid data, is being pursued by the applicant.

Human Factors Program

The applicant's human factors program for the SPDS was not well described in the Seabrook SPDS description report. Information provided in the letter of April 2, 1986, described three basic ways in which human factors was involved in the SPDS development. First, the individual status trees (second-level formats) were developed as part of the Westinghouse Owners Group guidelines and had both human factors input into the display design and human factors review of the final format. Second, Seabrook operators exposed to human factors

engineering, through participation in the detailed control room design review (DCRDR), developed the top-level display used in the SPDS. Finally, the SPDS display system was evaluated as part of the DCRDR program and no human engineering discrepancies were identified.

During the onsite audit, the staff conducted a human factors review of the Seabrook SPDS against the requirements of Supplement No. 1 to NUREG-0737. The writeup below addresses the degree of acceptability of the Seabrook SPDS with respect to these requirements.

Concise Display: With the exception of the containment isolation panel, which is a separate display and is to be improved, the SPDS CRT formats provide a concise display of plant conditions as required by NUREG-0737, Supplement No. 1.

Convenient Location: The location of the prime SPDS CRT at the STA station near the center of the control room and the ability to call up the SPDS at other operator locations satisfy the NUREG-0737, Supplement No. 1 requirement for placing the SPDS in a convenient location. The containment isolation display as it is currently configured and located does not meet this requirement of NUREG-0737, Supplement No. 1.

Continuous Display: The capability to call up display formats, other than the SPDS, on the STA's designated SPDS CRT does not satisfy the NUREG-0737, Supplement No. 1 requirement for the SPDS to be a continuous display. Either the CSF

summary display must be added to all CRT formats accessible on the STA's CRT, or a dedicated CSF summary display needs to be added to the STA station.

Aid Operator in Rapidly and Reliably Determining Plant Status: Observation of an accident simulation indicated that the top-level CSF summary display appears to aid operators in rapidly determining plant status, but lower-level display formats do not seem to be as useful. The staff suggests a strong man-in-the-loop test program to identify drawbacks to the usefulness of the lower-level formats.

The system response time appears to be satisfactory, but the staff observations were made during a lightly loaded sequence.

System availability data indicate over 0.99 availability for the SPDS. The applicant needs to determine how the availability of the Reactor Vessel Level Instrumentation System (RVLIS) and the Radiation Data Management System (RDMS) will be factored into the system availability calculation.

The Subcriticality and Core Cooling status tree displays are not mode dependent. The displays will indicate that these CSFs are being challenged during normal power operations.

This condition has the potential for misleading operators and needs improvement.

Incorporate Accepted Human Factors Principles: The SPDS generally incorporates accepted human factors principles with the following exceptions:

- (1) The heat sink format displays the flow data value in an unconventional location.
- (2) The display callup method is acceptable but awkward. The staff recommends a single operator action for callup of each of the second-level displays.
- (3) The containment isolation display is located a significant distance from the primary SPDS location so that it is difficult to read the legends. Unused cells appear to be randomly located so that pattern recognition is not a viable method of determining containment isolation. Furthermore, the display cells were designed to use two light bulbs each, but heat produced by two bulbs has caused the applicant to remove one bulb per cell. This one-bulb condition reduces brightness and readability and eliminates the redundancy in indication provided by two bulbs.

Procedures and Training: Audit of the SPDS procedures and operator training program indicates that both satisfy the requirements of Supplement No. 1 to NUREG-0737.

Electrical and Electronic Isolation

The SPDS description report did not address isolation devices. Further information was provided by the letter of April 2, 1986. The following types of isolation devices are used at Seabrook:

- (1) Westinghouse 7300 Series instrumentation
- (2) General Atomics (GA) RM 80 isolators
- (3) Westinghouse isolators used in the RVLIS

The Westinghouse 7300 Series isolators have been approved by the staff by means of Westinghouse Topical Report WCAP-8892A.

The GA RM 80 isolators, with the temporary fix of their fused output circuit, have been approved by the staff for use before the first refueling outage. At that time, the isolators are to be replaced with isolators that do not have any fuses in their output circuit.

The Westinghouse RVLIS isolators, used to protect RVLIS from SPDS, have not yet been approved by the staff. In the meantime, the staff approves the use of SPDS on an interim basis at reactor power levels less than 5%. The likelihood of core damage at this low reactor power level is remote because the new fuel has not had a chance to build up significant radioactive decay products and therefore the amount of decay heat and the radiological source terms would both be low. In addition the Reactor Protection System instrumentation, including pressurizer level and pressure, would be available to provide an indication that the system is filled or is voiding.

The Westinghouse test report covering qualification of the RVLIS isolators is due in September 1986. Since the circuitry in these isolator boards is identical to that used in an earlier approved Westinghouse product, Westinghouse believes the isolation capabilities to be sufficient. The staff concurs in the above and will confirm that the isolator capability is established prior to exceeding 5% power.

Conclusions

On the basis of its documentation review and information gathered at the onsite audit, the staff concludes that the Seabrook SPDS does not fully meet the applicable requirements of Supplement No. 1 to NUREG-0737. The conclusion is based on the following:

- (1) The SPDS display is not continuous.
- (2) RHR flow and hydrogen concentration variables are considered by the staff to be part of the minimum information required to assess the CSFs and are not displayed on the SPDS.
- (3) The containment isolation display is not satisfactorily readable from the prime SPDS location to be considered part of the SPDS.
- (4) The SPDS does not display sufficient radiation variables.
- (5) Several human engineering discrepancies have been identified.
- (6) Two CSF status trees are not mode dependent and have the potential for misleading the operator.

- (8) Data validation algorithms may not be sophisticated enough to ensure valid data are displayed to the operator.
- (9) The usefulness of the lower-level SPDS display formats to the operator is in question.
- (10) RVLIS and RDMS availability has not yet been factored into overall SPDS availability calculations.
- (11) System response time appears to be satisfactory, but a system load test is needed to verify the worst condition.

Implementation of the SPDS is not required under NUREG-0737 before full power and is determined by a schedule that is negotiated with the staff. The applicant had proposed a June 30, 1986, implementation date for the Seabrook SPDS, and the staff found this acceptable. However, as noted in Supplement No. 4, a schedule for resolution of open items identified in the staff's review and on-site audit would be established as a license condition to be implemented by the applicant before restart following the first refueling outage.

The staff did not identify any serious safety questions concerning the Seabrook SPDS. However, the staff did determine that the isolators between RVLIS and SPDS have not yet been approved. Accordingly the staff concludes that SPDS will be acceptable as an interim installation up to 5% reactor power. Following approval of the isolators, the interim SPDS may be used until the other open items identified above

have been resolved, or up to the end of the first refueling outage. At a minimum, resolution of the open items shall include:

- (1) continuous display of the top-level critical safety function summary at the assigned SPDS control room location
- (2) addition of, or satisfactory justification for not adding, RHR flow and hydrogen concentration parameters to appropriate SPDS screens
- (3) addition of a containment isolation status screen on the SPDS, or improvement of the current containment isolation display to be satisfactorily recognizable from the assigned SPDS location in the control room. The second option must also include a commitment by the applicant that the relative position and orientation of the containment isolation display with respect to the SPDS station be maintained or improved.
- (4) addition of a radiation monitoring screen to display at least steam generator (or steamline) and stack radiation
- (5) improvement of the Heat Sink screen for consistency in labeling and the Subcriticality and Core Cooling screens for mode dependency so as not to mislead operators
- (6) addition of approved isolation devices between the RVLIS and the SPDS, prior to exceeding 5% reactor power.

In addition, the applicant shall satisfactorily resolve the other open items identified above or demonstrate to the staff's satisfaction that the open items will not degrade the performance of the SPDS.

The staff proposes that the following license conditions be imposed to ensure satisfactory resolution of the open issues:

Prior to exceeding 5% reactor power, the applicant shall have installed qualified isolation devices, approved by the staff, between RVLIS and SPDS.

Before restart following the first refueling outage, the applicant shall have operational a safety parameter display system (SPDS) (as described in its submittals dated January 6, 1986, and April 2, 1986, and as modified as a result of the staff's audit findings) that is acceptable to the NRC.

DESIGN VERIFICATION AND DESIGN VALIDATION AUDIT
OF THE
SAFETY PARAMETER DISPLAY SYSTEM
FOR
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
SEABROOK STATION

August 1, 1986

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Lawrence Livermore National Laboratory

for the

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Nuclear Regulatory Commission

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DESIGN VERIFICATION AND DESIGN VALIDATION AUDIT
OF THE
SAFETY PARAMETER DISPLAY SYSTEM
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SEABROOK STATION

1. INTRODUCTION

On May 20 and 21, 1986, an on-site audit of the Seabrook Station Safety Parameter Display System (SPDS) was conducted by the NRC. This NRC audit examined the Seabrook Verification and Validation program and reviewed the operation of the SPDS. Thus, the audit specifically addressed the points of both a Design Verification Audit and a Design Validation Audit as described by Sec. 18.2 of NUREG-0800.² The audit team was composed of one individual from the Nuclear Regulatory Commission Electrical Instrumentation and Control Systems Branch, an individual from the Lawrence Livermore National Laboratory, and an individual from EG&G acting as consultants to the NRC.

The audit was based upon the recommended criteria of NUREG-0800 Sec. 18.2. In accordance with that guidance, up to three separate audit meetings/site visits, as described below, may be arranged.

Design Verification Audit. The purpose of this audit meeting is to obtain additional information required to resolve any outstanding questions about the V&V program, to confirm that the V&V program is being correctly implemented, and to audit the results of the V&V activities to date. At this meeting, the applicant should provide a thorough description of the SPDS design process. Emphasis should be placed on how the applicant is assuring that the implemented SPDS will: provide appropriate parameters, be isolated from safety systems, provide reliable and valid data, and incorporate good human engineering practice.

Design Validation Audit. After review of all documentation, an audit may be conducted to review the as-built prototype or installed SPDS. The purpose of this audit is to assure that the results of the applicant/licensee's testing demonstrate that the SPDS meets the functional requirements of the design and to assure that the SPDS exhibits good human engineering practice.

Installation Audit. As necessary, a final audit may be conducted at the site to ascertain that the SPDS has been installed in accordance with the applicant/licensee's plan and is functioning properly. A specific concern is that the data displayed reflect the sensor signal which measures the variable displayed. This audit will be coordinated with and may be conducted by the NRC Resident Inspector.

Based on the advanced state of the Seabrook SPDS design, the NRC staff carried out a combined Design Verification and Design Validation audit at the plant site.

During the course of this audit, the NRC audit team discussed aspects of the Seabrook SPDS program with Public Service Company of New Hampshire (PSNH). Additionally, the Seabrook control room was visited to ascertain the location of SPDS displays in

relation to plant control boards and a response to a simulated plant upset was witnessed at the unit simulator to observe how the SPDS is used by the plant operating staff.

2. SAFETY PARAMETER DISPLAY SYSTEM DESIGN OVERVIEW

The Seabrook Station SPDS is a feature of the station's Main Plant Computer system (MPC). The SPDS consists of seven MPC displays and one hardwired display that reflect the status of the six Critical Safety Functions (CSF) defined by the Seabrook Emergency Operating procedures. These eight displays consist of:

- o An overview display showing the status of all CSFs.
- o Six logic tree displays, one for each of the CSFs defined by the EOPs. Each display shows the current value of the parameters used to assess the CSF and the logic used to determine the status of the CSF.
- o A hardwired display of containment isolation status.

PSNH has committed to add a Radiological Control CSF display that shows the current value of the radiation monitoring parameters used to determine the status of the Radiological Control CSF.

SPDS displays can be called up on any of seven MPC CRTs located around the control room. In addition, the MPC is used to generate alarm displays and is capable of displaying historical trends of any parameter input to the MPC or of any calculated value derived by the MPC.

The MPC receives inputs from plant instrumentation via nine Intelligent Remote Terminal Units (IRTU) that convert the input signals to digital format and transmit the data to two host computer units. Each IRTU contains redundant central processing units (CPUs). PSNH has organized MPC inputs such that redundant inputs are processed by different IRTUs.

The host computer consists of redundant CPUs. The hosts check each input value to verify it is within the range of the measuring instrument and is within reasonableness limits established by PSNH. The host computer also performs SPDS calculations, logic, and develops SPDS displays in addition to other MPC and visual alarm system functions.

The MPC also receives input of SPDS parameters from the Inadequate Core Cooling Monitor (ICCM) and the Radiation Data Management System (RDMS). Unlike parameters input via IRTUs, parameters received from ICCM and RDMS have had range and reasonableness checks by these systems; therefore, additional checking is not performed by the host computer.

One Safety Parameter Display System Critical Safety Function Display that was not originally planned to be included in the Seabrook SPDS system is radiological control. In response to NRC's identification of the need for a Radiological Control CSF, the RDMS will be modified to input to the SPDS. This system uses redundant central processor units and a loop data bus data acquisition system to continuously monitor area and effluent radiation levels around the station. The system periodically collects data from

approximately 170 sensors, all with different addresses on the loop data busses. This information is presently displayed on a console in the control room. Linking this RDMS system by data bus to the Main Plant Computer will enable the display of current radiological data at any MPC work station, at the emergency response facility (ERF), the meteorological workstation (MET), and on the SPDS. Seabrook plans to link the MPCs to the RDMS by use of a vendor recommended interface.

3. ASSESSMENT OF THE VERIFICATION AND VALIDATION PROGRAM

A Verification and Validation (V&V) Program is concerned with the process of specification, design, fabrication, testing, and installation associated with an overall system's software, hardware, and operation. For the SPDS, verification is the review of the requirements to see that the right problem is being solved and a review of the design to see that it meets the requirements. Validation is the performance of tests of the integrated system to see that it meets all requirements.

Verification and Validation activities are not a regulatory requirement for the SPDS. Nevertheless, a V&V program performed by the applicant/licensee during design, installation, and implementation of an SPDS will facilitate the NRC staff review of the system. The staff would then evaluate the program for the results of the design V&V program. On the basis of an effective V&V program, the staff would reduce the scope and detail of the technical audit of the design.

The purpose of the NRC Design Verification Audit was to obtain additional information required to resolve the outstanding questions about the PSNH V&V Program, to confirm that the V&V Program is being correctly implemented, and to audit the results of the V&V activities to date. The criteria suggested in NUREG-0800, Sec. 18.2, Appendix A were used as a basis for this audit. The recommendation of NSAC/39⁶ provided additional guidance to the audit team.

The remainder of this section presents the audit team's observations and assessments of the PSNH V&V Program for the following four items: System Requirements Review, Design Verification Review, Validation Tests, and Field Verification Tests. The observations and assessments were obtained through an examination of the available documentation.

3.1 SYSTEM REQUIREMENTS REVIEW

Section 18.2 of NUREG-0800 recommends that the SPDS development process include a review of desired system capabilities to determine that the functional needs will be satisfied. The principal goal of this activity is to independently determine if the requirements will result in a possible and usable solution to the entire problem. The requirements are reviewed for correctness, completeness, consistency, understandability, feasibility, testability, and traceability. The requirements review also provides the basis for developing the system validation test plan.

3.1.1 Audit Team Observations

Since the Main Plant Computer design was completed before the development of requirements for a Safety Parameter Display System, PSNH could not conduct a formal review of planned MPC/SPDS capabilities against functional needs.

An informal requirements review of the SPDS display contents and format was conducted during the development of SPDS software. This review, however, did not include other attributes such as the requirements for data validation, continuous display, or user interface. Section 4 of this report discusses a number of deficiencies noted by the audit team. These deficiencies indicate that the SPDS development would have benefited from a thorough system requirements review to insure the system completely fulfilled the requirements of NUREG-0737, Supplement 1.

PSNH has implemented procedures to require a requirements versus planned capability design review for future modifications to the Main Plant Computer including the SPDS software.

3.1.2 Audit Team Assessment

Public Service of New Hampshire did not implement the recommendation of Sec. 18.2 to NUREG-0800 to perform a verification that planned system capabilities will accomplish the functional needs for an SPDS. Given the advanced state of the system design, the audit team believes there would be little benefit in conducting a review of this type at this time.

The existence of formal design review requirements for future software modifications should help PSNH avoid similar problems as a result of future modifications.

3.2 DESIGN VERIFICATION REVIEW

Section 18.2 of NUREG-0800 recommends that the SPDS development process include a design verification review performed after the system is initially designed to verify that the design will satisfy functional needs. This activity is intended to verify the hardware and software design against the system requirements. This review covers both the hardware and software specifications as well as the design. The specifications and the designs are reviewed to ensure that the system requirements decomposition into hardware and software is complete and that there are no ambiguities or deficiencies.

3.2.1 Audit Team Observations

As with the system requirements review, NRC recommendations regarding review of system design against functional needs were not available to support the development of the Main Plant Computer system and Radiation Data Management System. Therefore, the review process suggested by Sec. 18.2 of NUREG-0800 was not fully implemented by PSNH. The SPDS software development process did, however, incorporate a review of software routines against a set of functional requirements for each SPDS display. These display functional requirements were developed by the system engineer in conjunction with plant operations. The specific scope and findings of these reviews were not documented except for ultimate approval of the routines by the reviewer.

Testing of the SPDS software routines has also been conducted to verify that test combinations of data input to the MPC data base produce the expected parameter value, and proper validity flag. At the time of the audit, plant SPDS software development had not yet proceeded to the point where validation testing of the CSF status determination logic could be conducted.

3.2.2 Audit Team Assessment

PSNH did not fully implement the recommendations of Sec. 18.2 of NUREG-0800 regarding review of the system design versus system functional requirements. Although Verification and Validation reviews are not a requirement of Supplement 1 to NUREG-0737, the design problems identified by the NRC audit indicate that the Seabrook SPDS design would benefit from a thorough design verification review. The audit team, therefore, recommends that the process for correcting the identified system design problems should include a formal, complete, independent, and documented system design verification review to ensure that any systems shortcomings will be acceptably resolved.

3.3 VALIDATION TESTS

Section 18.2 of NUREG-0800 recommends the SPDS development process include validation tests performed after the system is assembled to confirm that the integrated system satisfies the functional needs when combined with the plant control room and plant operators who have received the normal plant specific training in the use of the SPDS. The foundation for this activity lies in the information derived from the requirements review, the design review, and the hardware, software, and system tests performed by the system supplier. The system validation tests follow the system integration tests performed by the supplier to demonstrate that the hardware and software function acceptably.

3.3.1 Audit Team Observations

The Seabrook SPDS was operable in the Seabrook control room simulator when the simulator was used to conduct validation testing of the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERG) and Functional Response Guidelines (FRG). This testing included response to plant upsets both with and without the use of the SPDS. PSNH stated that the SPDS reduced the time required to respond to upset conditions. At the time of the audit, however, no documentation or other information was available to provide the details of how this conclusion was reached. Furthermore, there was no indication that any other measures of SPDS effectiveness were considered or observed.

3.3.2 Audit Team Assessment

Sufficient information was not available at the audit to allow a conclusion that the overall system validation testing conducted as part of the WOG ERG validation program satisfies the intent of Sec. 18.2 of NUREG-0800 in this regard. The fact that operators did not choose to access lower level SPDS screens during the drill witnessed by the audit team would seem to indicate a need for further system validation testing. PSNH should reevaluate the adequacy of the previous validation testing to insure that the usefulness of the Seabrook SPDS was thoroughly established. If PSNH concludes that the previous efforts represented an adequate test, the basis for this conclusion should be described to NRC. This basis should include:

- o Identification of the specific simulated plant upsets for which the SPDS effectiveness was evaluated.

- o Discussion of the applicability of the testing to the Seabrook plant SPDS given the differences between the simulator system and the plant system (e.g., the simulator does not provide redundant inputs to the SPDS; therefore, input of combinations of invalid data could not be simulated.)
- o Description of any differences between the philosophy and training for using the SPDS during the procedure validation process and the Seabrook specific training and philosophy.
- o Identification of the specific data gathered to evaluate SPDS effectiveness and the data collection techniques.
- o Description of the method and criteria used to evaluate the data.
- o Discussion of the results of the validation testing.

3.4 FIELD VERIFICATION TESTS

Section 18.2 of NUREG-0800 recommends the SPDS development process include field verification tests performed after the system is installed to verify that the validated system was installed properly. As a minimum, field verification will consist of verifying that each input signal is properly connected and that the signal range is consistent with the design. Stated differently, it must be verified that the information displayed is directly correlated with the sensor data being input. It is expected that an independent review of the installation tests may fulfill a portion of the field verification test plan.

3.4.1 Audit Team Observations

As part of Main Plant Computer system acceptance testing PSNH confirmed that each MPC input point was properly connected by verifying that the current value of each instrument input was accurately stored by the MPC. This process will be repeated as part of each instrument loop calibration by verifying that each calibration input is accurately displayed by the MPC. The final SPDS software has not yet been installed in the plant so verification testing of this SPDS is not complete.

3.4.2 Audit Team Assessment

PSNH has not yet completed all verification testing and has not developed an overall test plan that identifies the verification testing yet to be done. However, during the audit PSNH did exhibit an understanding of the purpose of field verification testing; therefore, if PSNH follows through on the validation testing process in a manner that is consistent with the testing to date, they are expected to satisfy the intent of Sec. 18.2 to NUREG-0800 in this regard. The audit team suggests that this verification testing include an end-to-end system test of all portions of the MPC, RDMS, and ICCM that perform SPDS functions.

Once SPDS field verification testing is complete, PSNH should provide NRC with a description of the system attributes tested, the test methodology, and test results so that a final conclusion regarding the acceptability of the testing can be reached.

4. ASSESSMENT OF SPDS DESIGN

The NRC audit team assessed the SPDS system with respect to the requirements of Supplement 1 to NUREG-0737 using the specific review criteria suggested by NUREG-0800, Sec. 18.2, Appendix A. This portion of the audit addressed the points of a Design Validation Audit. The following provides a discussion of the Seabrook Station SPDS design features relative to the provisions of Supplement 1 to NUREG-0737, and the corresponding audit team assessment in each area.

4.1 "THE SPDS SHOULD PROVIDE A CONCISE DISPLAY ..."

4.1.1 Audit Team Observations

The Seabrook SPDS provides an overview of the status of all seven Critical Safety Functions. This overview display consists of a seven section horizontal bar. Each section corresponds to a CSF and is displayed in one of four colors that indicates the current degree of challenge to the safety function. The color coding scheme is:

Red - CSF under extreme challenge.

Orange - CSF under severe challenge.

Yellow - CSF off normal.

Green - CSF satisfied.

Each color is displayed in a different section of the CSF bar so that position coding of CSF status is available in addition to color coding. A condensed version of the overview display is incorporated into each of the other SPDS displays. This version presents only the color code to indicate CSF status.

Lower level displays provide the specific information used by the SPDS in determining the status of each Critical Safety Function. With the exception of the Radiological Control CSF, this information is displayed in logic tree format. The current parameter value used at each decision point is displayed near the decision block that describes the logical decision made by the SPDS. Each logic path is color coded to show the degree of CSF challenge represented by that path. The terminus point flashes on the logic path that corresponds to the current status of the Critical Safety Function.

Not all of the information needed to assess the Containment CSF is included on the CRT displays. The status of Containment Isolation is provided on a hardwired status light display across the control room from the primary SPDS display. Most, but not all, status lights are illuminated by containment isolation and the lights are not arranged or labeled such that an operator at the primary SPDS CRT can readily determine whether an unlit status light corresponds to a failed containment isolation valve or to an unused light.

The Radioactivity Control CSF display consists of five horizontal intensity bars. Four of the bars are for steam generator radiation levels and one for radiation level at the containment vent. Each bar is titled on the display under the bar. The readout also shows the range of the detector channel that it displays. As the level of the channel goes

up, the bar fills in—progressing from left to right. When the channel is in alarm, as determined by the RDMS setting, the bar color turns red. It is cyan for normal values. The alarm condition will be carried through to the overview display.

4.1.2 Audit Team Assessment

With the exception of the difficult to interpret containment isolation status display, the Seabrook SPDS meets the requirements of Supplement 1 to NUREG-0737 regarding concise display of critical safety function status. The Seabrook SPDS will totally satisfy this requirement if the containment isolation status display is modified such that an operator at the primary SPDS console can readily determine if all required containment isolation valves have closed. Two possible modifications that would accomplish this purpose would be to light the spare indicators on a containment isolation signal or to rearrange the indicators such that the ones that should be lit on containment isolation form an easily recognized pattern. PSNH should describe to NRC how the containment isolation status display will be corrected.

4.2 "THE SPDS SHOULD ... DISPLAY ... CRITICAL PLANT VARIABLES"

4.2.1 Audit Team Observations

The following plant parameters are inputs to the Seabrook SPDS

Reactivity Control Critical Safety Function

- o Intermediate range reactor power; source range through 200 percent.
- o Start-up rate.

Core Cooling Critical Safety Function

- o Core exit temperatures.
- o Reactor coolant pump status.
- o Reactor vessel level indication.
- o Wide range reactor cooling system (RCS) pressure (used with core exit temperature to calculate the displayed variable subcooling).

Heat Sink Critical Safety Function

- o Steam generator wide and narrow range water level.
- o Emergency feed water flow.
- o Steam generator pressure.
- o Containment pressure (used in determining decision criteria for steam generator water level).

Reactor Cooling System Integrity Critical Safety Function

- o RCS cold leg wide-range temperatures.
- o RCS wide-range pressure.

Containment Critical Safety Function

- o Containment pressure.
- o Containment recirculation sump level.
- o Containment radiation level.
- o Containment isolation valve status.

Reactor Coolant System Inventory Critical Safety Function

- o Pressurizer level.
- o Reactor vessel water level.

PSNH has also committed to establish a Radiological Control CSF screen on the SPDS. It will provide steam generator radiation level and stack monitor radiation level.

The parameters selected for display and the groupings of parameters into CSFs are based upon the Critical Safety Functions monitored by the Westinghouse upgraded Emergency Operating Procedures. Two exceptions are containment isolation valve status indication and the Radiological Control CSF which are being added to the SPDS to resolve minor differences in philosophy behind the safety functions evaluated by EOPs and the CSF parameter selection for the SPDS.

The CSFs displayed by the Seabrook SPDS correspond in the following manner to the five safety functions identified by Supplement 1 to NUREG-0737.

NUREG-0737, S1
CSF

Seabrook SPDS
CSF

Reactivity

Subcriticality

Reactor core cooling and heat removal from the primary system.

Core cooling
Heat sink

(Except that the Seabrook SPDS has no parameter inputs which can be used to monitor the status of heat removal when post accident cool down has progressed to the point where cool down via steam generators is no longer desirable.)

RCS integrity

Integrity
Inventory

Radiation control

Radiation control

Containment

Containment

(Except that the challenge to the containment safety function posed by high hydrogen concentration is not monitored by the SPDS.)

4.2.2 Audit Team Assessment

With two exceptions, the parameters displayed by the Seabrook SPDS are sufficient to provide operators with information regarding the status of the five safety functions identified by Supplement 1 to NUREG-0737. The two exceptions are:

- o The Seabrook SPDS has no inputs that allow the evaluation of the status of heat removal from the primary system after the post accident cool down has progressed to the point where the Residual Heat Removal (RHR) system provides the primary heat removal path. RHR flow is one parameter that would provide the needed information.
- o The Seabrook SPDS does not account for high hydrogen concentration in containment as a challenge to containment integrity.

PSNH should submit a discussion to NRC of how these two items will be addressed by the SPDS. This discussion should also confirm PSNH's commitment to include containment isolation status and Radiological Control CSF in the SPDS and should document the content, format, data validation methodology, and CSF evaluation logic used in the Radiological Control CSF display.

4.3 "THE SPDS SHOULD ... AID THEM (OPERATORS) IN RAPIDLY AND RELIABLY DETERMINING THE SAFETY STATUS OF THE PLANT"

4.3.1 Audit Team Observations

Most parameter values displayed by the SPDS and SPDS logic trees are updated every five seconds. The update rate is controlled by the MPC program scheduler in which SPDS programs are assigned a higher priority than most other MPC routines; therefore, the update interval should remain relatively independent of MPC workload. Two exceptions to the five-second update rate are the calculation of core heat-up and cool-down rate for the RCS integrity status tree and the information on the Radioactivity Control CSF display. The heat-up rate calculation is updated every thirty seconds. More frequent recalculation of this value is unnecessary because the status tree decision criterion is based upon change in temperature over the last sixty minutes rather than upon the instantaneous value of the heat-up or cool-down rate. The RDMS remote processors acquire data continuously and are polled every 30 seconds on the bus by the RM-11 host. One line connects each of the RM-11 hosts to the plant computer. Every 30 seconds, the plant computer can request the current radiological data. In this manner, the screen data can be updated every 30 seconds for the current radiological conditions.

The SPDS parameters input via the Intelligent Remote Terminal Units receive a gross validity check as part of the process for inserting instrument readings into the MPC data base. This gross check includes:

- o Verification that the IRTU is scanning the instrument loop in question.
- o Operability verification of the communications link between the input processor and the host computer.
- o IRTU operability verification.
- o Verification that the input parameter value is within the capability of the associated instrument loop.
- o Verification that the parameter value is within a reasonable range as defined by PSNH engineering and operations.

These checks form the basis of an instrument validity status word that is associated with the reading in the MPC data base.

For Radioactivity Control CSF information, the RDMS performs data and operability checks at remote processors located with the radiation detector. The remote processor monitors data quality and operability status and encodes this information, along with the current radiation data, on the data bus to the RDMS host computers. The data are flagged questionable if:

- o There are inconsistent values more than 50 percent of the time (drop out in link).
- o There is any operate failure.

- o The integrated calculations are not accurate enough (95 percent confidence of value within 6 percent of mean).
- o There is less than 85 percent response to the automatic check source.
- o An operate failure is reported for a loss of counts.
- o Sample flow is lost.
- o A channel is out of service.
- o A check source test failed.
- o A filter is torn or clogged.

The data quality and operability status is passed up the bus to the RDMS display where the data display is color coded to indicate data validity. This validity data will be transferred, along with current radiation data, to the main plant computer and subsequently to the SPDS display system.

In cases where redundant measurements of plant parameters are input to the MPC, the SPDS synthesizes a single value of the parameter by either averaging all valid inputs or by selecting the highest or lowest reading from among the valid inputs. The use of high, low, or average was selected in each case to insure a conservative interpretation of the CSF status trees. If no valid inputs are available for a given parameter, the parameter value will be displayed with a question mark. If a lack of valid information prevents the evaluation of a tree under current plant conditions the affected status tree will not be evaluated, the status tree will not display an active evaluation path, and the overview display will display the status of the affected tree as black for unable to evaluate.

The Seabrook SPDS does not currently make use of interchannel comparison of redundant instrumentation in the data validation scheme.

The audit team noted that two status trees appear to provide incorrect status information during power operation. The subcriticality status is indicated red (under extreme challenge) whenever reactor power exceeds 5 percent. Since no plant mode information is used by this SPDS logic tree, the CSF will be continuously indicated to be under extreme challenge during normal power operation. A similar problem exists with the indication of core cooling CSF status because the RCS subcooling criteria used by the status tree may not always be met during power operation. This will cause the status of core cooling to be erroneously indicated as orange, under severe challenge.

Indication of SPDS and MPC operability is provided by a real-time clock located in the upper left-hand corner of the display. When the SPDS and MPC are operating, the clock updates every second; if the computer goes down, the clock reading will no longer increment.

PSNH has conducted a reliability analysis of the Main Plant Computer system which includes most SPDS functions. This analysis estimated system availability will exceed 0.99. This analysis assumed component mean-time-to-repair would be on the order of 1/2

to 2 hours. During the audit, PSNH stated that this assumption is supported by their plans to maintain a complete set of MPC spare parts on site and to have qualified maintenance staff available on all shifts. PSNH has also been keeping system availability data since December 1985. The availability records show that MPC availability has significantly exceeded 0.99 over this period. Neither the availability analysis, nor the availability records address the effect upon SPDS availability of data processing systems, other than the MPC, that provide input data to the SPDS (i.e., Inadequate Core Cooling Monitor and Radiological Data Monitoring System).

Data on the availability of the Radiation Data Management System was not available at the time of the audit. The similarity of design to the Main Plant Computer system, with dual processors and dual or ring data busses, would lead one to expect high availability of the RDMS. It is not known how the numeric reliability of the data components of the RDMS compare with the comparable components of the MPC. The components of both systems are proven products of established manufacturers. The RDMS was originally designed to be a stand-alone plant radiation monitoring system required to supply data on critical plant levels during demanding plant conditions.

4.3.2 Audit Team Assessment

The Seabrook SPDS does not completely satisfy the provisions of Supplement 1 to NUREG-0737 regarding rapid and reliable display because the data validation techniques used are insufficient to provide a highly reliable synthesized value of SPDS parameters and because the SPDS displays incorrectly indicates that the reactivity control and core cooling CSFs are under challenge during normal power operation. The use of high or low values provided by redundant instrumentation may result in a conservative estimation of the status of Critical Safety Functions but it also ensures that the operator will be misled about safety function status in the event of large instrument errors or on-scale instrument failures. Use of average values without additional validation checks does not guarantee the operator will be consistently misled in the conservative direction. PSNH must implement data validation methodology that makes more effective use of redundant information available via the MPC. PSNH could also improve the usefulness of the existing validity screening of input data by tightening the reasonableness band applied to some parameters. For example, at the time of the audit, PSNH was using 0°F as the lower limit for reasonableness check of temperature inputs and 200 percent as the upper limit for the reasonableness check of reactor power. The audit team believes more meaningful bounds could be established in both cases.

The precision to which plant variables are indicated on the SPDS displays and the update rates for the SPDS data base and displays are acceptable. PSNH system verification testing should confirm that the SPDS update rate is not seriously affected when a large number of nearly simultaneous processing demands are made on the MPC as may occur during the response to a severe accident.

The MPC system availability has been demonstrated to be sufficient to support the high SPDS availability goal set by Supplement 1 to NUREG-0737. PSNH has not, however, demonstrated high availability for the SPDS as a whole, since neither the availability analysis nor the availability history address the effect of the RDMS or the ICCM reliability upon overall SPDS availability. PSNH should include these items in their procedures for monitoring of SPDS availability.

PSNH should provide a discussion for NRC review of the actions planned to improve the data validation methodology and an assessment, based either on calculation or operating experience data, of the overall availability of the SPDS including the Inadequate Core Cooling Monitor and the Radiological Data Monitoring System inputs.

4.4 "THE PRINCIPLE PURPOSE AND FUNCTION OF THE SPDS IS TO AID THE CONTROL ROOM PERSONNEL DURING ABNORMAL AND EMERGENCY CONDITIONS IN DETERMINING THE SAFETY STATUS OF THE PLANT AND IN ASSESSING WHETHER ABNORMAL CONDITIONS WARRANT CORRECTIVE ACTIONS BY CONTROL ROOM OPERATORS TO AVOID A DEGRADED CORE."

4.4.1 Audit Team Observations

The Seabrook SPDS displays the current value of input SPDS variables and provides the operator with a visual indication of the status of each Critical Safety Function. This status takes the form of an overview display that shows the status of all CSFs. A detailed display for each CSF is also available. The detailed display shows the CSF status, the value of each variable used to determine CSF status, the logic to determine CSF status, and references the procedure to be used to return the CSF to a normal condition.

The variables displayed, logic, logic set points, and logic display formats are based upon the Critical Safety Function evaluation process contained in the Seabrook Emergency Operating Procedures which were based upon the Emergency and Functional Response Guidelines developed for the Westinghouse Owners Group. Therefore, the basis for the existing CSF displays is directly traceable to the System Function and Task Analysis conducted during the development of the WOG guidelines.

The Seabrook Main Plant Computer is capable of displaying historical trends for any variable input to the MPC including all SPDS variables. However, since PSNH does not consider the trending capability to be an SPDS feature, no prearranged trend displays have been established to simplify access to historical trend information. Since the trending capability was not considered as part of the SPDS function, the audit team did not review the capabilities of the trending function.

The audit team observed a simulator drill conducted by PSNH to demonstrate the use of the SPDS under plant upset conditions. The audit team noted that during the entire course of the drill, Critical Safety Function status was monitored by the Shift Technical Advisor using hardwired instrumentation and hard copies of the CSF status trees. At no time during the drill did any operator select for display an SPDS CSF status tree.

4.4.2 Audit Team Assessment

Although the Seabrook SPDS appears to display the information required to evaluate CSF status in an easily understood manner that should aid the operators in the determination of plant safety status, the fact that no use was made of the logic tree displays during the drill indicates that the operators do not find the system to be a satisfactory aid. Therefore, the audit team cannot conclude that the Seabrook SPDS provides the required operator aid in the determination of safety status. PSNH should investigate the basis of the operator's reluctance to use the lower level SPDS displays and report to NRC the system changes made to make it useful from the operator's point of view.

4.5 "(THE) SPDS (SHALL BE) LOCATED CONVENIENT TO THE CONTROL ROOM OPERATORS"

4.5.1 Audit Team Observations

The SPDS displays can be accessed at any one of four locations in the control room.

- o On any of four CRTs located near the center of the main control board, between primary system and secondary system controls and displays.
- o On a CRT located among Service Water and Emergency Safety Feature controls and displays on the left side of the main control board.
- o On a CRT located among the Component Cooling Water controls and displays on the right side of the main control board.
- o On a CRT located at the Shift Technical Advisor's desk.

The shift technical advisor has been designated as the primary user of the SPDS under upset conditions.

4.5.2 Audit Team Assessment

PSNH has clearly satisfied the requirement of Supplement 1 to NUREG-0737 that the SPDS be located convenient to operators.

4.6 "THE SPDS SHALL CONTINUOUSLY DISPLAY INFORMATION FROM WHICH THE SAFETY STATUS OF THE PLANT ... CAN BE ASSESSED ..."

4.6.1 Audit Team Observations

The Seabrook SPDS provides a summary overview display of the status of each Critical Safety Function. This overview display consists of a full screen display of a seven segment bar, each segment of which corresponds to one CSF. Each bar segment contains a color and position code to represent the current status of the corresponding safety function. When an individual CSF status tree is selected for display, a reduced version of the overview is displayed in the lower left portion of the status tree display. Safety function status information is not incorporated into any of the MPC displays that are not designated as SPDS displays. Furthermore, PSNH has not implemented procedures to insure the SPDS is always displayed on at least one control room CRT.

4.6.2 Audit Team Assessment

Under the current Seabrook procedures, all control room displays could be selected such that no SPDS display is provided in the control room. Therefore, PSNH has not satisfied the requirement of Supplement 1 to NUREG-0737 to continuously display safety status information. Two possible ways to resolve this deficiency would be to include the CSF status bar on all MPC displays, or to implement administrative procedures that require an SPDS display to be on at least one control room CRT whenever the plant is above mode 5. PSNH should report to NRC on the ultimate resolution to this item.

4.7 "THE SPDS SHALL BE SUITABLY ISOLATED FROM ELECTRICAL OR ELECTRONIC INTERFERENCE WITH EQUIPMENT AND SENSORS THAT ARE IN USE FOR SAFETY SYSTEMS"

4.7.1 Audit Team Observations

PSNH uses three different models of isolators to electrically isolate the SPDS from safety related inputs. Type test data for two of these models has already been submitted to and reviewed by NRC. Type testing of the remaining model and the results will be submitted in the near future.

4.7.2 Audit Team Assessment

The adequacy of electrical isolation devices used by the SPDS is being separately reviewed by NRC.

4.8 "PROCEDURES WHICH DESCRIBE THE TIMELY AND CORRECT SAFETY STATUS ASSESSMENT WHEN THE SPDS IS AND IS NOT AVAILABLE WILL BE DEVELOPED BY THE LICENSEE IN PARALLEL WITH THE SPDS. FURTHERMORE, OPERATORS SHOULD BE TRAINED TO RESPOND TO ACCIDENT CONDITIONS BOTH WITH AND WITHOUT THE SPDS AVAILABLE."

4.8.1 Audit Team Observations

Operator training in the use of the SPDS is incorporated into training on the use of plant Emergency Operating Procedures. This training is required for operator licensing and requalification. The Seabrook SPDS basically provides an automated means to continuously evaluate the Critical Safety Function Status Trees contained in the plant Emergency Operating Procedures. If the SPDS is unavailable, the operators will perform the same status tree evaluation manually using paper copies of the status trees and hardwired plant instrumentation located on the main control boards.

4.8.2 Audit Team Assessment

PSNH has satisfied the requirements of Supplement 1 to NUREG-0737 in this regard.

4.9 "THE SPDS DISPLAY SHALL BE DESIGNED TO INCORPORATE ACCEPTED HUMAN FACTORS PRINCIPLES SO THAT THE DISPLAYED INFORMATION CAN BE READILY PERCEIVED AND COMPREHENDED BY SPDS USERS."

4.9.1 Audit Team Observations

The basic format of the Critical Safety Function Status Trees was developed by Westinghouse using their human factors design criteria and input from utility representatives participating in the Westinghouse Owners Group. Except for use of control room color coding and nomenclature conventions, PSNH did not establish formal human factors criteria for use in the development of the Main Plant Computer or implementation of the SPDS on the MPC. However, a complete human factors review of the SPDS displays and operator interfaces was incorporated into Seabrook's Detailed Control Room Design Review and no human engineering discrepancies were noted.

During the audit the audit team operated the SPDS to access and observe all displays. The following human engineering discrepancies were noted:

- o The Containment Isolation Status indication is not arranged such that an operator at the primary SPDS user's (STA) station can readily determine if all automatic containment isolation valves have closed.
- o Access from the overview display to the first two CSF status trees is relatively awkward. The operator must traverse the cursor across a large portion of the CRT screen to address the desired tree then simultaneously push two keyboard buttons to display the tree. Access to subsequent displays is easier because after the second status tree is selected, the cursor remains in the area of the screen used to address status trees.
- o On one tree, a parameter value is displayed in a location that is inconsistent with the standard format.
- o Although the CSF status trees provide both a color and pattern coding of the CSF status, the overview display on the status trees only provides color coding.

4.9.2 Audit Team Assessment

Seabrook's SPDS will satisfy the NUREG-0737, Supplement 1 requirement to incorporate human factors principles provided the above noted problem with the layout of the Containment Isolation Status display is corrected. The remaining human engineering deficiencies noted during the audit are not severe problems. Nevertheless, PSNH is encouraged to correct these discrepancies. PSNH should describe to NRC the corrective action taken in this area.

The noted difficulty in accessing the lower level SPDS displays should be evaluated as a potential source of the operators' reluctance to use the status tree displays.

5. SUMMARY

The Seabrook Station Safety Parameter Display System only partially fulfills the SPDS requirements of Supplement 1 to NUREG-0737. The system deficiencies that lead to this conclusion are:

- o The status of containment isolation valves is not displayed concisely so that an operator at the primary SPDS terminal can readily determine if containment isolation has been satisfactorily completed.
- o The SPDS does not allow assessment of heat sink status during post accident-cool down after the steam generators are no longer the desired heat sink for the primary system.
- o The SPDS does not provide indication if hydrogen concentration in containment poses a challenge to the Containment Critical Safety Function.

- o Indication of the status of the Radiological Control Critical Safety Function has not yet been implemented.
- o The data validation algorithms used do not take advantage of redundant information to provide the operator and SPDS logic with highly reliable values of SPDS parameters.
- o During normal power operation, the SPDS provides an erroneous status indication for the subcriticality and core cooling CSFs.
- o PSNH has not demonstrated that SPDS update and response times will not be unacceptably affected by the high Main Plant Computer loading conditions expected to occur during response to a severe plant upset.
- o The simulated response to a plant accident witnessed by the audit team indicated that the Seabrook operators do not find the Critical Safety Function Status Trees to be a significant aid.
- o Information from which the safety status of the plant can be assessed is not continuously displayed by the SPDS.

In addition to the above problems, the audit team noted a few items which would not by themselves inhibit acceptance of the SPDS. Nevertheless, PSNH should consider these items for correction.

- o The limits selected for use in checking data reasonableness are in some cases well outside of the reasonable range of the variable.
- o The first two Critical Safety Function Status Trees called up after display of the CSF overview are somewhat awkward to address.
- o On one status tree, one parameter is displayed in a location that is inconsistent with the convention used for all other parameter values.
- o The Critical Safety Function overview provided on status tree displays does not incorporate redundant coding of safety function status as a backup to color coding.

PSNH should report to NRC on the actions taken to correct the problems listed above.

Although Verification and Validation of the SPDS design and implementation is not a regulatory requirement, the SPDS development process at Seabrook would have benefited significantly from a formal, rigorous V&V program. It is recommended that PSNH's process for correcting the NRC audit team's findings include a formal, complete, independent, and documented verification of SPDS capabilities against the requirements of Supplement 1 to NUREG-0737. This will ensure that adequate corrective actions are implemented. The methodology and results of this review should be made available for NRC review.

Although SPDS validation testing was incorporated into the verification and validation process for the Westinghouse Owners Group Emergency Response and Functional Response Guidelines, insufficient information was available during the audit to allow assessment of the suitability of this testing. The fact that the Seabrook operators did not choose to access any Critical Safety Function Status Trees during the simulator drill witnessed by the audit team implies the existence of difficulties with the use of the system that were not detected by the original validation testing. It is recommended that PSNH review the adequacy of the original validation testing. PSNH should provide the details of this testing or any additional validation testing for NRC review. Specific information that should be included is discussed in Sec. 3.3.2 of this report.

Subsystem and field installation verification testing of the Seabrook SPDS has not been completed and PSNH has not documented the plans for the completion of this testing. Therefore, a final conclusion regarding the suitability of this testing could not be reached. Testing conducted to date, however, indicates that PSNH understands the need for, and purpose of, verification testing. Consequently, if subsystem and field installation verification testing proceeds in a manner that is consistent with the testing to date, PSNH will comply with the intent of Sec. 18.2 of NUREG-0800 and NSAC/39 in this regard. The audit team recommends that a sensor-to-display test of all SPDS inputs be included in the field verification test program. PSNH should provide NRC with a discussion of the remaining system and field installation verification activities.

6. REFERENCES

6.1 GENERAL REFERENCES

1. U.S. Nuclear Regulatory Commission, NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980, Supplement 1, December 1982.
2. U.S. Nuclear Regulatory Commission, NUREG-0800, "Standard Review Plan for Review of Safety Analysis Reports for Nuclear Power Plants," Sec. 18.1, Control Room, Rev. 0, September 1984 and Sec. 18.2, Human Factors Review Guidelines for the Safety Parameter Display System (SPDS), Rev. 0, November 1984.
3. Verification and Validation for Safety Parameter Display Systems, NSAC/39, Science Applications, Inc., December 1981.
4. U.S. Nuclear Regulatory Commission, NUREG-0700, "Guidelines for Control Room Design Reviews," September 1981.
5. U.S. Nuclear Regulatory Commission, Draft NUREG-0835, Human Factors Acceptance Criteria for the Safety Parameter Display System."
6. U.S. Nuclear Regulatory Commission, NUREG-0696, "Functional Criteria for Emergency Response Facilities," February 1981.
7. Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs During and Following an Accident, Regulatory Guide 1.97, Rev. 2, Nuclear Regulatory Commission, Office of Standards Development, December 1980.

6.2 DOCUMENTATION EXAMINED DURING THE AUDIT

8. PX09-7, Rev. 1, "Main Plant Computer System Hardware Configuration Manual," January 24, 1986.
9. PX09-1, Rev. 0, "Main Plant Computer System Functional Description," April 12, 1984.
10. DWG M-510004, Rev. 48, "Computer Input-Output Parts List," May 9, 1986.
11. GT-I-42, Rev. 11, "General Test Procedure, Station Computer," October 31, 1984.
12. GT-I-07, Rev. 11, "General Test Procedure Indicating/Control Loops," December 19, 1984.
13. GT-I-101, Rev. 0, "Main Plant Computer System," May 12, 1983.
14. "Computer Program Test, Inventory Critical Safety Function Status Tree," Rev. 0, May 19, 1986.

15. "SPDS Inventory Critical Safety Function Status Tree Subroutine," Rev. 0, May 20, 1986.
16. "Inventory Critical Safety Function Status Tree Program Description," Rev. 0, May 19, 1986.
17. "SPDS Functional Requirements for Seabrook Unit 1 Main Plant Computer Software Development, Inventory Status," no revision or date.
18. "Background Information for Westinghouse Owners Group Emergency Response Guidelines; Critical Safety Function Status Tree FP0.6; Inventory," HP/LP-Rev. 1, September 1, 1983.
19. Main Plant Computer Program Subroutine, (Engineering Units Conversion).
20. Main Plant Computer Program Subroutine, (data checks against reasonableness limits).
21. "New Hampshire Yankee Nuclear Production Computer Control Program Manual," Rev. 0, December 24, 1985.
22. Test procedure, "SPDS Graphics Test."
23. Seabrook Station General Test Procedure, TPI-62-F01, Rev. 2, "Radiation Monitoring System and Adjacent-to-Line Radiation Monitors."
24. "Gulf General Atomic Model RM-80, E-115-870 Microprocessor Software Design Document."
25. PSNH SS#20110, IMS D05.05.01, Sec. 5, "Radiation Data Management System Link (RDMS)."
26. "Seabrook Station Emergency Response Facility Functional Description."

APPENDIX 18A

ELECTRICAL AND ELECTRONIC ISOLATION OF SAFETY PARAMETER DISPLAY SYSTEM

At the time Section 18 was written for this sixth supplement the information provided in the material that follows was not yet available. Therefore, it is being added to the Seabrook SER at this time in this appendix.

Background

In order to satisfy the NRC requirements concerning the safety parameter display system (SPDS), Public Service Company of New Hampshire (PSNH) submitted a Safety Analysis Report by letter dated January 6, 1986 (J. DeVincentis, PSNH, to V. S. Noonan, NRC). This report provided a description and a safety analysis of the SPDS at the Seabrook Station. However, the report did not address the requirement that the SPDS must be isolated from equipment and sensors that are used in safety systems to prevent electrical and electronic interference. On March 11, 1986, a request for additional information, which included specific questions on these isolators, was sent to the applicant (V. Nerses, NRC, to R. J. Harrison, PSNH). The staff held several telephone conferences with the applicant, which resulted in submittals from the applicant (J. DeVincentis to V. S. Noonan) dated February 14, 1986, April 2, 1986, and August 28, 1986. These submittals documented the various agreements and commitments reached in the telephone conferences.

The staff's evaluation addresses the qualification and documentation of the isolators as acceptable interface devices between Class 1E safety-related instrumentation systems and the SPDS.

Discussion and Evaluation

The SPDS developed at the Seabrook Station is an integral part of Seabrook's Emergency Response Procedures (ERPs) and Radiological Emergency Plan. The ERPs are based on the Westinghouse Owners Group Emergency Response Guidelines. The SPDS utilizes the main plant computer to accept information from plant instrumentation and to display critical functions to the plant operator. All inputs to the plant computer that are used by the SPDS and which come from Class 1E instrumentation are isolated by Class 1E electrical isolation devices.

These isolation devices are:

- (1) Westinghouse Series 7300 equipment supplied by Westinghouse
- (2) RM-80 microcomputer, supplied by GA Technologies, Inc,
- (3) RVLIS isolator Model No. 2343D63G02 supplied by Westinghouse

The Westinghouse Series 7300 isolators have been reviewed and approved by the staff via Westinghouse report WCAP-8892A. The GA RM-80 isolators have been conditionally approved by the staff as reported in a staff memorandum dated June 14, 1986 (C. E. Rossi, NRC, to V. Nerses). The GA RM-80 isolators will be replaced with non-fuse-dependent isolators before startup after the first refueling outage.

The RVLIS isolation device uses an opto-coupler as the isolation barrier. Analysis shows that the maximum credible fault (MCF) voltage and current that the isolator could be subjected to are 240 V ac and 140 V dc, respectively, at a 20-ampere source. The pass/fail criteria established by PSNH state that the system must be in a normal operation mode and must provide normal information within the execution cycle time of the microprocessor. The isolation devices are located in a mild environment; therefore, they are not covered by 10 CFR 50.49 conditions.

The reactor vessel level instrumentation system (RVLIS) isolators have been seismically qualified for the plant and have been subjected to several different types of noise testing without affecting the system output.

The MCF voltage and current were applied to the non-Class 1E output of the isolator in the transverse mode. In accordance with the pass/fail criteria, there was no adverse effect on the Class 1E input side of the isolator.

Conclusion

On the basis of the staff's review and evaluation of the information supplied by the applicant with respect to the electrical isolation devices to be used with the SPDS, the staff has concluded that:

- (1) The Westinghouse 7300 Series isolators are acceptable as previously approved by the staff.
- (2) The interim fix for the RM-80 system for isolating safety-related data channels from the SPDS is approved.
- (3) Replacing the RM-80 devices with approved non-fused devices shall remain a confirmatory issue to be resolved during the first refueling outage.
- (4) The RVLIS isolation devices are acceptable for isolating Class 1E equipment from the SPDS.

The staff further concludes that this equipment meets the Commission's requirements in NUREG-0737, Supplement No. 1, and that the following proposed license condition (Memorandum dated June 14, 1986, from Rossi to Nerses) has been satisfied:

Prior to exceeding 5% reactor power, the applicant shall have installed qualified isolation devices, approved by the staff, between RVLIS and SPDS.

1 JUDGE WOLFE: Anything more, Mr. Perlis?

2 MR. PERLIS: No, Your Honor. At this point Mr.

3 Eckenrode is available for cross examination and Board

4 Examination.

5 JUDGE WOLFE: All right. Mr. Backus?

6 CROSS EXAMINATION

7 BY MR. BACKUS: (

8 Q Good afternoon, Mr. Eckenrode.

9 A Good afternoon, sir.

10 Q The NUREG 0737, Supplement No. 1, which gives rise

11 to this contention, contains an introductory statement that

12 under emergency response capability -- this supplement was

13 prepared as a result of a review by the Committee to review

14 generic safeguards.

15 Are you a member of that committee?

16 A No, sir.

17 Q Did you have any role in determining the require-

18 ments that eventually became incorporated in NUREG 0737,

19 in regard to Item 1.B.2?

20 A Quite a few of us had an input into this. The

21 final results, no, I did not.

22 Q Were you involved in any way with the lessons learned

23 task force, the forces that the Commission set up to assess

24 the Three Mile Island accident, and what actions needed to be

25 taken as a result?

XXX INDEX

1 A No, sir, I was not with the NRC at that time.

2 Q Now, the last sentence of paragraph 1, page 1, of
3 NUREG 0737, Supplement 1, indicates that, quote: The funda-
4 mental requirements, unquote, in this document will be
5 translated into binding legal requirements in the manner
6 as specified.

7 You are aware of that, correct.

8 A Pardon me. What was the page?

9 Q Paragraph 1, of page 1. Under intruduction.

10 A Yes, sir.

11 Q And the requirements for safety parameters display
12 system are set out on page 7 of NUREG 0737, Supplement No. 1,
13 is that correct?

14 A That is correct.

15 end 13
16 MS fols.

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Sim 14-1

1 Q Now going back to page 1, the last paragraph
2 says "The letter which forwards this supplement requests
3 that licensee submit a proposed schedule for completing
4 actions to comply with the requirements," does it not?

5 A Yes, it does.

6 Q Now turning to the letter just referred to,
7 the transmittal letter of December 17th, 1982 from Mr.
8 Eisenhut, Director, Division of Licensing, Office of
9 Nuclear Reactor Regulation, do I quote paragraph 2 accurately
10 to provide "Accordingly pursuant to 50.54(f) -- the last
11 paragraph on page 2 -- "Accordingly, pursuant to 50.54(f),
12 operating reactor licenses and holders of construction
13 permits are requested to furnish no later than April 15th,
14 1983 a proposed schedule for completing each of the
15 basic requirements for the items identified in the enclosures
16 to this letter," right?

17 A That is correct.

18 Q And at the top of page 2 does it not indicate
19 that "Each licensee's proposed schedule will then be
20 reviewed by the assigned NRC project manager who will
21 discuss the subject with the licensee and mutually agreed
22 on schedules and completion dates. The implementation
23 dates will then be formalized into an enforceable document,
24 right?

25 A It says that, yes, sir.

Sim14-2

1 Q And then it goes on in this paragraph to state
2 that the proposal to formalize implementation dates in
3 an enforceable document reflects the level of importance
4 which the NRC staff attributes to these requirements,
5 correct?

6 A Yes.

7 Q Now going to the top of page 5, Item C, do
8 I correctly read that the SPDS and control room improvements
9 are essential elements in operator training programs and
10 the upgraded plant specific emergency operating procedures?

11 A Yes, sir.

12 Q And going on on page 5 at Section 3.5, it
13 further requires that specific implementation plans and
14 reasonable achievable schedules for improvements that
15 will satisfy the requirements will be established by
16 agreement between the NRC project manager and each indi-
17 vidual licensee, correct?

18 A Yes, sir.

19 Q And do I understand that you are the person
20 on the NRC staff who would have provided advice or
21 recommendations to the Seabrook Station project managers
22 in regard to carrying out this provision?

23 A Yes, sir.

24 Q And for how long a period have you had that
25 role?

Sim 14-3 1

A Since prior to your April 15th, 1983 letter.

2

Q Now Part 6 of Section 3.5 just referred to,

3

do I correctly read that procedural methods and enforcement

4

measures that could be used to ensure NRC's staff and

5

licensee attention to meeting mutually agreed upon

6

schedules without significant delays in extensions?

7

A Yes.

8

Q Now you would agree that the date mentioned

9

in Mr. Eisenhut's letter of December 17th, 1982 for

10

furnishing a proposed schedule for implementation of these

11

NUREG 0737 Supplement No. 1 requirements was April 15th,

12

1983?

13

A That is correct.

14

MR. PERLIS: Your Honor, at this point I am

15

going to object. The document speaks for itself. I have

16

been willing to grant counsel leeway in leading up to

17

asking a question, but since he hasn't yet gotten into

18

any relevant grounds, at this point I am going to object.

19

I think we are wasting a lot of time here without getting

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into any relevant areas.

21

MR. BACKUS: Mr. Chairman, I think the objection

22

may be -- well, the next question goes on to something

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other than the document itself. Those were foundation

24

matters.

25

JUDGE WOLFE: All right.

1 MR. BACKUS: If the objection is anticipatory,
2 it may be unnecessary.

3 JUDGE WOLFE: All right. We will hold off on
4 your objection.

5 BY MR. BACKUS:

6 Q Now did not Public Service submit its letter,
7 SBN-499 which we have marked SAPL 1 for identification,
8 signed by Mr. DeVincentis in response to Mr. Eisenhut's
9 letter on April 14th, 1983?

10 A That is correct.

11 Q Now if we turn to that letter, SBN-499 marked
12 SAPL Exhibit 1 for identification, and turn to pages 4 and
13 5, that is the section that describes the applicants'
14 response to the requirements relative to the SPDS; is it
15 not?

16 MR. DIGNAN: Objection. We are into that
17 letter that we already went over. We are into history,
18 and I thought I understood the Board's ruling at least fairly
19 clearly that history was not relevant here.

20 JUDGE WOLFE: Is that where you are going,
21 Mr. Backus, despite the Board's earlier ruling?

22 MR. BACKUS: Yes. I am attempting to preserve
23 my position on the record in regard to what is obviously
24 a legal issue that I wish to have preserved for the future.
25 What I can perhaps do, Mr. Chairman, that would speed things

So, 14-5

1 up is simply make a further offer of proof on this, and
2 that might be more expeditious.

3 JUDGE WOLFE: Further offer of proof?

4 MR. BACKUS: Let me just review this.

5 (Pause.)

6 Well, I will outline the questions that will
7 follow this, Mr. Chairman, so it will be clear. We would
8 be interested in exploring through Mr. Eckenrode, who we
9 were told would be able to supply answers that we might
10 otherwise have directed to project managers the history
11 of the staff's efforts to arrive at an enforceable schedule
12 for implementation of SPDS requirements.

13 JUDGE WOLFE: The witness is here to respond
14 to any question as to why he believes on behalf of the NRC
15 staff that there is reasonable assurance in deferring
16 improvements to the SPDS until the first refueling outage
17 and the safety in the population in the immediate vicinity
18 of the plant will be protected.

19 You may pursue that line of questioning in
20 cross-examination with this witness. I have explained in
21 some detail, and I will go over it again. In our memorandum
22 and order of September 15th we indicated that any agreement
23 entered into between the applicant and the staff with
24 respect to scheduling implementation was not sacrosanct.
25 It could be challenged and was challenged, and from our

Sim 14-6

1 judicial review we said that there was nothing to indicate
2 that such an agreement pursuant to NUREG 7037 was sacrosanct,
3 and that is history. We have thrown that aside and we have
4 opened up the cross-examination of this witness and you
5 may interrogate him within the confines of that issue which
6 survived the motion for summary disposition.

7 So in light of the staff's objection, the
8 objection is sustained.

9 MR. BACKUS: Just for the record, I believe
10 that was the applicant's objection that was sustained.
11 I didn't hear objection by the staff.

12 JUDGE WOLFE: The staff had an earlier one and
13 I held off ruling on that. I believe then Mr. Dignan
14 joined. So I will take one at a time. The staff's initial
15 objection is sustained, and the subsequent follow-up
16 objection by the applicants is sustained.

17 BY MR. BACKUS:

18 Q Mr. Eckenrode, as of today, October 1st, 1986,
19 is there a mutual agreement between the staff and the
20 applicant for implementation of the requirements of NUREG
21 0737, Supplement 1?

22 A Is that complete implementation of of the entire
23 SPDS, all things corrected?

24 Q Yes.

25 A No, that is to be a license condition I believe

Sim 14-7

1 that we are working on right now that you heard read
2 earlier I believe, the items to be completed prior to
3 startup from the first refueling outage.

4 Q And until there is agreement or a license with
5 a condition, am I correct that the staff has no legally
6 enforceable basis for taking action in regard to the SPDS?

7 MR. DIGNAN: Objection, and I wish to be
8 heard.

9 MR. PERLIS: Objection ---

10 MR. DIGNAN: I am sorry, Mr. Perlis?

11 JUDGE WOLFE: You accede to Mr. Perlis,
12 Mr. Dignan?

13 MR. DIGNAN: I will accede to Mr. Perlis.

14 JUDGE WOLFE: All right.

15 MR. PERLIS: That question calls for a legal
16 conclusion from the witness as to what the NRC's enforcement
17 rights are. Not only is it a legal question, but I don't
18 believe this is the proper gentlemen from the NRC who can
19 answer that question. It does call for a legal conclusion
20 on that ground and I object.

21 MR. DIGNAN: I have a more mundane and far
22 less sophisticated ground. We haven't got a license. We
23 are trying to get a license, and you can't enforce anything
24 until we get a license. And if somebody gives us a license
25 with a condition, then we they will have something enforceable.

Sim 14-8

1 But since there isn't any license, and the
2 question is whether one is going to issue, I don't see how
3 the staff can be expected to have an enforceable document
4 in its hands when no license is outstanding.

5 So the question just has no foundation.

6 MR. BACKUS: Well, as to the first objection,
7 we have only been offered one witness by the staff. It
8 is evident that this is the only witness that is going
9 to be presented, and I think that I will have to direct
10 questions that should be directed to the staff to this
11 witness.

12 As to the second objection from the applicant,
13 my understanding is that there are requirements that the
14 NRC has that do apply regardless of the existence of a
15 license. I certainly would hope so.

16 MR. DIGNAN: There is no requirement that you
17 have an operable SPDS before you get a license.

18 MR. BACKUS: If the applicant would agree to defer
19 its request for a license until there is a fully complied
20 with SPDS, we would agree.

21 (Board conferring.)

22 JUDGE WOLFE: The staff's and the applicants'
23 objections are sustained.

24 BY MR. BACKUS:

25 Q Mr. Eckenrode, the TMI Action Plan requirements

1 and the clarification thereof in NUREG 0737, that is
2 regulatory requirements that are applicable as they may
3 be determined to be applicable by appropriate tribunals
4 to operating and well as plants under construction or
5 plants seeking operating licenses, are they not?

6 A Yes, they are.

7 Q Now Mr. Eckenrode, at page 4 of your testimony
8 you state that the Seabrook safety parameter display system
9 is not at this time in complete compliance with the
10 requirements of 1-B-2 of NUREG 0737, Supplement No. 1,
11 right?

12 A That is correct.

13 Q You note, however, that -- or you say there that
14 this compliance does not present a serious safety question.
15 at Seabrook, right?

16 A That is correct.

17 Q Now what are the reasons the staff takes the
18 position that additional SPDS requirements refernced at
19 pages 5 and 6 of your testimony need not be met until the
20 first refueling outage or at the end of the first refueling
21 outage?

22 MR. PERLIS: I object insofar as that asks
23 for a legal conclusion. If it is asking for a factual
24 answer, I don't object.

25 MR. BACKUS: I don't think that called for a

Sim 14-10

1 legal conclusion. It was not intended to.

2 JUDGE WOLFE: Well it was not intended to. So,
3 therefore, it is not calling for a legal conclusion.

4 Proceed to answer.

5 THE WITNESS: May I have the question again,
6 Mr. Backus?

7 MR. BACKUS: Yes, sir.

8 BY MR. BACKUS:

9 Q Why does the staff take the position that the
10 additional SPDS requirements, which you described at pages
11 5 and 6 of your testimony, may not be met until the end
12 of the first refueling outage?

13 A We don't feel that these additional requirements
14 will have any effect on safety of the Seabrook plant. These
15 are improvements to the system to make it better for
16 operation.

17 Q Mr. Eckenrode, how long a period of time
18 typically elapses for a pressurized water reactor such as
19 Seabrook is proposed to be between initial startup and the
20 first refueling?

21 A Twelve to 18 months.

22 Q And as I understand it, these reactors have a
23 40-year license period under the present licensing scheme?

24 A I believe that is correct.

25 Q Now just to go back a minute, you just said

Sim 14-11 1

2 that the reason the staff took the position that additional
3 SPDS requirements did not need to be met until the end
4 of the first refueling was that they did not present any
5 safety questions, correct?

6 A That is correct.

7 Q On page 4 of your testimony your answer to
8 question 7, in the third sentence you say here "The staff
9 also found, however, that this non-compliance does not
10 present a 'serious' safety question at Seabrook." Are you
11 now amending that testimony?

12 A No, sir, I am not. The requirement of 0737
13 states that we have to determine a serious safety question.
14 When I review a plant for an SPDS, the instructions I
15 give to my subcontractors is to attempt to identify any
16 safety questions, and that is what we did on Seabrook.

17 Q I just would give you a chance to leave it
18 the way you want here and make sure it is real clear.
19 Are you saying that the failure to require this prior to
20 the 12 to 18 months to full-power operation does not
21 present a serious safety question or does not present any
22 safety question in your opinion?

23 A In my opinion?

24 Q Yes.

25 A It does not present any safety question.

Q So should we amend this testimony to substitute

Sim 14-12

1

"any" for "serious"?

2

A I don't believe so. I am simply following the 0737 requirement.

3

4

Q Could you direct me to the provision of 0737 to which you have reference in that last response?

5

6

(Pause.)

7

A Page 8, paragraph 4-2-(b), the last sentence. "Based on the results of the NRC review, the Director of I&E or the Director of NRR may request or direct the licensee to cease implementation if a serious safety question is posed by the licensee's proposed system or if the licensee's analysis is seriously inadequate."

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Q I may not understand these documents as well as you do, Mr. Eckenrode. In fact, that is a clear assumption that I don't, but isn't that saying that the Director of Inspection and Enforcement or the Director of Nuclear Reactor Regulation may direct the licensee to cease implementation if a serious safety question is posed?

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A That is correct.

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Q I thought we were talking here about not ceasing implementation but rather increasing or speeding up or enhancing implementation, aren't we?

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A I think you may have a little confusion in the purpose and so forth of the SPDS. What we look for in our review is to make sure that adding this new system into

Sim 14-13

1 the control room doesn't cause a safety question or a problem
2 because it gives improper information.

3 Q Well, in that regard, wouldn't it be better,
4 and I will try to use a non-judgmental word here other than
5 safety, wouldn't it be better to have it done before we
6 start the thing up?

7 A It is always better to have it done before
8 you start it up, yes.

9 Q Forgive me, Mr. Eckenrode, but it sounded
10 like from what you said that one of the things that we
11 should be concerned about is trying to put these further
12 enhancements of the SPDS in place when we have a fully
13 operational plant and it may cause interference with
14 established procedures.

15 A The enhancements that we are discussing that
16 are not complete, the staff does not, and I do not feel
17 and my consultants do not feel will cause any further problems
18 regarding safety but that they will make it even better.

19 In other words, it will make it better for
20 operations regardless of the safety problem.

21 Q In any event, Mr. Eckenrode, it is clear that
22 when you refer to reliance on 0737 for your reference to
23 having to meet a serious safety problem it is this sentence
24 in Section 4.02 that you have directed us to that you rely
25 on?

1 A Yes, sir.

2 MR. PERLIS: Excuse me. Just for the record,
3 I believe it was 4-2-(b).

4 MR. BACKUS: Thank you. It was.

5 THE WITNESS: Yes.

6 MR. BACKUS: Page 8, the last sentence.

7 BY MR. BACKUS:

8 Q Now I take it that the period of plant operation
9 from initial startup to the first refueling is not considered
10 by the staff to be safer than any other similar period of
11 plant operation at full power, right?

12 A I believe I answered that in my direct testimony
13 here. As far as I am concerned, since I am reviewing the
14 SPDS with regard to the SPDS, no, there is not difference.

15 Q In fact, it is my understanding, Mr. Eckenrode,
16 that the Three Mile Island Unit 2 accident happened before
17 the first refueling; is that right?

18 A I am not positive of that.

19 Q How about the Browns Ferry fire?

20 A I am not positive of that either.

21 Q You don't know either one of those?

22 A Not at the time that they occurred, no.

23 (Pause.)

24 Q The next questions I had for you, Mr. Eckenrode,
25 had to do with the mode dependency of the criticality

Sim 14-15

1 status display. However, I assume you are aware that the
2 applicants have filed corrected testimony on this date
3 indicating that that status display malfunctions above five
4 percent and, therefore, in all power modes. Is that your
5 understanding?

6 A That is my understanding, yes.

7 Q I take it the staff has not been offered
8 verification of that yet; is that right?

9 A That is correct.

10 Q And I gather that you also heard the correction
11 to their testimony offered today with regard to the core
12 cooling display, correct?

13 A I am sorry, which one was that?

14 Q Core cooling.

15 A You will have to give me the specific.

16 Q I am referring to the correction to the applicants'
17 testimony which we got handed today I believe. On page
18 2,, and I don't know if you have seen it, but they say on
19 page 4, they say "The enhancement to the subcriticality
20 and core cooling screens requested by the staff has been
21 implemented.

22 A Oh, I'm sorry. I thought you had indicated
23 both of those together on the first thing.

24

25

end Sim
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#15-1 -SueW 1

2 Q And, likewise I take it, the Staff has not had
verification of that?

3 A That's correct.

4 Q Okay. Now, at Item 8 on Page 5 of your testimony,
5 you state that the data validation algorithms may not be
6 sophisticated enough to ensure valid data are being displayed
7 to the operator, right?

8 A Correct.

9 Q How then is there assurance that invalid data
10 may not be displayed and increase the potential for operator
11 error in the event of an abnormal occurrence?

12 A The -- as was discussed with the previous witness,
13 the concern we had was when multiple sensors are used in
14 a single parameter averaging different readings or taking
15 the highest value or the lowest value, depending on the
16 system or the parameter, may give an incorrect indication
17 to the operator.

18 However, as was also discussed by the previous
19 witness, the operators, in all cases, are instructed and
20 trained to operate only on the Class 1E equipment. The
21 SPDS is to give them an indication.

22 If an indication was incorrect and still within
23 bounds, they would have no reason to do anything. The
24 first indications of a problem would come through their
25 Class 1E equipment.

#15-2-SueW

1 Q Do I take it, Mr. Eckenrode, that it is your
2 opinion that the SPDS is to serve mainly as a confirmatory
3 item for the operators who are trying to assess plant
4 status in an accident environment?

5 A I believe it's the reverse of that, sir. I
6 believe it is to give them a first indication of things
7 that might be occurring. They can then verify with their
8 Class 1E instrumentation.

9 Q In fact, it's my understanding that one of the
10 lessons that the NRC learned from the accident at Three
11 Mile Island was precisely the need for that, isn't that right?

12 That there was misleading indications on the main
13 control panel, confusing displays on the main control panel,
14 obscured displays on the main control panel. And, the SPDS
15 is part of the solution to all of those things, is it not?

16 A The purpose of SPDS is to bring together a lot
17 of dispersed instrumentation into a single picture of
18 safety.

19 Q And, part of that is the recognition that if we
20 are having an accident and we hear, "This is no drill," there
21 is going to be a very stressful environment, and it's of
22 high importance to have critical safety functions displayed
23 clearly -- well, in the words of 0737: Concisely, continuously
24 to be of a direct and prompt assistance to operators.

25 Right?

#15-3-SueW 1

A As one part of an indication, yes.

2

Q Okay. Now, does not the use of the high or low

3

values provided by the redundant instrumentation assure

4

that the operator will be misled about safety functions

5

status in the event of large instrument errors or on-scale

6

instrument failures?

7

A I didn't understand the question in that

8

statement.

9

Q I'm referring to Page 13 of the Lawrence Livermore

10

audit that is attached to your testimony.

11

MR. PERLIS: Excuse me. Would counsel indicate

12

where on Page 13 he is referring to?

13

MR. BACKUS: Yes. Section 4.3.2, the second

14

sentence.

15

MR. PERLIS: Thank you.

16

BY MR. BACKUS:

17

Q Have you got that, Mr. Eckenrode?

18

A Yes, sir.

19

Q Okay. Now, it states there that the use of high

20

or low values provided by redundant instrumentation may

21

result in a conservative estimation of a status of critical

22

safety functions, but it also ensures that the operator will

23

be misled about safety function status in the event of large

24

instrument errors or on-scale instrument failures. Use of

25

average values without additional validation checks does not

#15-4-SueW

1 guarantee the operator will be consistently misled in the
2 conservative direction. Right?

3 A Correct.

4 Q Okay. By the way, with regard to the Lawrence
5 Livermore audit that you attach, it identifies on the cover
6 two authors, James Cooper and Gary L. Johnson from Lawrence
7 Livermore. But, I believe it indicates that there was
8 somebody else on this audit.

9 Was that you?

10 A Yes, sir.

11 Q So, you were actually there on May 20/21 when this
12 was done?

13 A Yes, sir.

14 Q Thank you.

15 MS. CURRAN: Judge Wolfe, I would like to take
16 advantage of this break to excuse myself.

17 JUDGE WOLFE: Yes.

18 MS. CURRAN: Thank you.

19 (Ms. Curran leaves the courtroom.)

20 BY MR. BACKUS:

21 Q Now, the Seabrook SPDS, as I understand it, does
22 not currently make use of interchannel comparison of
23 redundant instrumentation in the data validation scheme;
24 is that right?

25 A That's the statement of the Lawrence Livermore,

#15-5-SueW

1 yes.

2 Q And, do you agree with it?

3 A I am not positive of that. I didn't look at
4 that part when I was here. I trust my consultants for that
5 piece.6 Q Okay. Incidentally, Mr. Eckenrode, is your
7 testimony supposed to be an elucidation and consistent with
8 the exhibit you furnished with it, namely this audit from
9 Lawrence Livermore?

10 A I certainly believe it is.

11 Q Okay. Now, you note in your testimony that the
12 usefulness of the lower level SPDS display formats to the
13 operators is in question.14 Isn't it true that during a simulated drill,
15 you observed in the audit team on May 20 and 21 at Seabrook,
16 that at no time during the drill did any operator select
17 or display any of the safety parameter display system
18 critical status functions status trees?

19 A That's correct.

20 Q And, wouldn't you agree that that is an indication
21 that the operators did not find the system to be a
22 satisfactory aid?

23 A If you will notice --

24 MR. DIGNAN: I object, to the extent that question
25 asks the witness to describe what was in the operator's mind

#15-6-SueW

1 and the witness is not competent to do so.

2 MR. BACKUS: It's not asking what was in the
3 witness' mind. It's asking him as a professional offered
4 by the Staff if he is not, from that, able to form an
5 opinion that the system as presently installed, or as
6 installed at the time of the audit on May 20 and 21, is
7 not particularly useful to the operators.

8 MR. DIGNAN: That, wasn't the question, Your Honor.
9 The question and the form was precisely what I said it was.

10 He was asked if that didn't mean the operators
11 weren't finding the systems useful. And that makes him put
12 his mind in the mind of an operator.

13 JUDGE WOLFE: All right. I take it you have
14 withdrawn your first question, then?

15 MR. BACKUS: Well, I'm not sure about that caveat
16 but, yes.

17 JUDGE WOLFE: You may answer the second question.

18 WITNESS ECKENRODE: May I have the second question,
19 please?

20 MR. BACKUS: I will withdraw them both and try
21 again.

22 BY MR. BACKUS:

23 Q Mr. Eckenrode, isn't one of the best measures of
24 the usefulness of a piece of equipment whether or not those
25 it's intended to be used by actually use it?

#15-7-SueW

1 A That is quite different than the first question.
2 Yes. The answer is correct.

3 Q If I look at it, they eventually get simply enough
4 so we both understand them.

5 And, in this particular case, which was the audit
6 that gave rise to this report, the operators didn't use
7 the equipment.

8 A That's not true.

9 Q Oh, that's not true?

10 A That's not true. You misinterpreted the response
11 there. They did use the top level display frequently.

12 Q Okay. They did not use --

13 A The lower level displays specifically they
14 didn't select.

15 Q Yeah.

16 A And part of the reason for that is that they
17 were using hard copy of those lower level displays.

18 Q Okay. Now, when you say they used hard copy of
19 the lower level displays, I would like you to explain that
20 a little bit.

21 Where do they get this hard copy from?

22 A I have no idea where they get it. It's supplied
23 with their -- in the control room, someone provides the
24 blanks which are the critical element -- critical safety
25 function diagrams that are all pre-drawn and so forth. All

#15-8-SueW 1 they need to do is put in the dynamic data from the instru-
2 mentation.

3 Q One of the things the SPDS does, as I understand
4 it, is it's a little bit like the computer of the movie,
5 "2001?" Did you ever see that?

6 A A long time ago.

7 Q I would be very surprised, as a human factors
8 engineer, if you hadn't seen that. Do you remember the
9 HAL 9000?

10 A Yes, sir.

11 Q Do you remember the computer, when it went hay-
12 wire went yellow, for light functions, critical, and then
13 red for light functions, terminated?

14 A Yes, sir.

15 Q And this --

16 JUDGE WOLFE: You've lost the Board now. I did
17 not see it.

18 (Laughter.)

19 JUDGE WOLFE: I did not see it, so let's keep the
20 questions directed to the testimony and the exhibits in this
21 case.

22 MR. BACKUS: Oh, this is quite relevant I think.
23 The HAL 9000 computer, it's a great character.

24 BY MR. BACKUS:

25 Q In any event, the Seabrook Station SPDS has something

15-9-SueW

1 of a similar function. I understand that when the critical
2 function status tree is under extreme challenge, it's red,
3 right?

4 A When the status tree is, yes.

5 Q Then, what is it, under challenge, it's orange,
6 right?

7 A There is another level between there, yes.

8 Q Does the hard copy do that?

9 A Pardon me?

10 Q Does the hard copy do that?

11 A The hard copy is used only to maintain a dynamic
12 value.

13 Q Okay. In any event, as a result of what you
14 observed about the operators not using lower level displays
15 at all, it would be fair to say, would it not, that the
16 audit team was not able to conclude that the Seabrook SPDS
17 provided the required operator aid in the determination of
18 safety status; is that right?

19 A No, that's not correct.

20 Q That's not correct?

21 A For the top level display, we felt it did.

22 Q Well, the question --

23 A Subsequent more detailed displays, we felt it
24 did not.

25 Q Okay. But I think the question, Mr. Eckenrode,

#15-10-SueW

1 asked about the SPDS which would include both levels of
2 display, would it not?

3 MR. PERLIS: Your Honor, I think that question
4 has been answered. Mr. Eckenrode has indicated how each
5 level display fit into his response.

6 MR. BACKUS: Let me withdraw it and ask another
7 question.

8 BY MR. BACKUS:

9 Q I'm turning to Page 14 of the audit team
10 assessment, Section 4.4.2, next to the last sentence which
11 follows on the sentence we have already been discussing
12 about the fact that the operators did not use the lower level
13 displays.

14 Does that there say, Mr. Eckenrode: Therefore,
15 the audit team cannot conclude that the Seabrook Station,
16 SPDS provides the required operator aid in the determination
17 of safety status?

18 A That's what it says, yes, sir.

19 Q Okay. Now, you were there when this audit was
20 performed. Did you have any part in the actual writing of
21 this audit report that is attached to your testimony?

22 A No, sir.

23 Q Well, do you agree with that statement in the
24 audit report?

25 A The statement I've made is in my SER, which is

#15-11-SueW 1

slightly different from that based on those conclusions.

2

Q Well, the question was: Do you agree with this statement that we just read from the audit report? Or, do you take a different position?

3

4

5

MR. DIGNAN: Objection as to form. The statement that the witness has been asked to comment on is, "Therefore, the audit team cannot conclude that this Seabrook SPDS provides the required operator aid in the determination of safety status."

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That obviously is what the audit team did conclude. The question that is literally being asked is, does the witness agree that that's what the audit team concluded.

11

12

13

14

JUDGE WOLFE: But, wasn't the witness one member of the audit team?

15

16

17

WITNESS ECKENRODE: The audit team is considered to be the -- my contractors. I'm part of that --

18

19

JUDGE WOLFE: You were an observer, then, and not part of the team?

20

21

WITNESS ECKENRODE: Oh, no. I do certain parts of the audit, as they do. This part essentially is theirs.

22

23

JUDGE WOLFE: All right.

24

MR. BACKUS: Well, the question was a very simple one. There may still be an objection outstanding. The question is whether the witness agrees with that statement

25

#15-12-SueW 1

2 made by the audit team, whether he was an observer or part
of the audit team, as to that statement.

3 JUDGE WOLFE: Does someone have an objection?

4 Do you object?

5 MR. PERLIS: If no one has an objection, I'm
6 going to raise one now. If he's asking whether the witness
7 is making the conclusion that the Seabrook SPDS provides
8 the required operator aid, that's a fine question.

9 I do not believe he has stated whether he is
10 asking the witness to agree that the audit team made a
11 conclusion, or if he's asking the witness whether the
12 witness agrees with the audit team's conclusion.

13 There is a distinction there.

14 JUDGE WOLFE: Well, that was something that I was
15 trying to clarify. Now that I hope I've clarified it, ask
16 your question, one or the other.

17 MR. BACKUS: Shall I try again?

18 JUDGE WOLFE: Try again.

19 MR. BACKUS: All right.

20 BY MR. BACKUS:

21 Q All I'm trying to find out, Mr. Eckenrode, is
22 whether you would agree with the conclusion that the audit
23 team stated here, that the Seabrook SPDS -- that you -- I'm
24 sorry. Let me start it over again.

25 Whether you are in accord with the audit team's

#15-13-SueW

2 assessment, that it is not presently possible to conclude
3 that the Seabrook SPDS provides the required operator aid
4 in the determination of plant status?

5 MR. DIGNAN: Objection until a time frame is
6 put on the question.

7 When the audit report was written or today? Is
8 that the opinion we are looking for?

9 MR. BACKUS: All right, let's try it -- I will
10 stand on the question.

11 MR. DIGNAN: And, I will object to the form at
12 this point. The question does not make clear if the witness
13 is being asked what was his opinion at the time the report
14 was written or what his opinion is sitting on the witness
15 stand today, and the two opinions may well be different.

16 MR. BACKUS: Chairman Wolfe, Mr. Dignan is not
17 the counsel for this witness. Neither the witness nor his
18 counsel has indicated that the witness will be unable to
19 answer this question.

20 JUDGE WOLFE: I agree. I think the witness is
21 perfectly able to thread his way through this. Answer in
22 one, two, three or more ways, but answer the best you can.

23 Go ahead.

24 WITNESS ECKENRODE: The statement that you read
25 here is the opinion of two members of the audit team, the
authors of this item. I do not totally agree with it, and I

#15-14-SueW 1 don't believe they totally agree with it now either. There
2 is some part of this SPDS which we do feel does provide the
3 initial safety information. And, that is the top level
4 display.

5 MR. BACKUS: Mr. Chairman, I am going to move
6 to strike that. So much of that answer is purported to say --
7 speculate on what the authors of this audit would say now as
8 opposed to what is in evidence from the.

9 I don't think there is any basis for guessing as
10 to that.

11 MR. PERLIS: Your Honor --

12 MR. BACKUS: I move to strike that portion of
13 the answer.

14 MR. PERLIS: I object to that motion. It's not
15 at all clear if the witness is speculating on that. That
16 hasn't been established by cross-examination.

17 Insofar as it might be hearsay, that would be
18 admissible here. If Mr. Backus wants to develop a foundation
19 to establish if its speculation he is entitled to do that.

20 But, as the record presently stands I don't
21 believe there is any grounds to strike that statement.

22 MR. BACKUS: Well, if I may --

23 JUDGE WOLFE: There was the objection on what you
24 meant by your question. You said you wanted the question
25 answered.

#15-15--SueW 1 FROM THE FLOOR: We can't hear you.

2 JUDGE WOLFE: You posed the question. There was
3 an objection by Mr. Dignan as to how you wanted to parse
4 that question, was it your feeling or was that the feeling
5 of the team or the conclusion of the team.

6 And, I denied Mr. Dignan's objection and said,
7 answer the question. Answer it in all respects, in every
8 way.

9 He proceeded to do so. It was responsive to your
10 question.

11 MR. BACKUS: I don't --

12 JUDGE WOLFE: And, now you -- now, wait a moment.
13 It was responsive to your question. You had an open-end
14 question. He answered it. Now, if you want to pursue it,
15 you may pursue it.

16 You can discredit whatever he says by saying:
17 Well, you certainly don't know, do you, what the team's
18 opinion presently is, do you.

19 And, here we have a witness under oath. Ask him
20 the question.

21 The motion to strike is denied.

22 BY MR. BACKUS:

23 Q Mr. Eckenrode, when you say you are not in total
24 agreement with that statement that I've read to you from
25 the audit team assessment, is that based upon subsequent

#15-16-SueW 1 enhancements to the Seabrook SPDS?

2 A No, sir, it's not.

3 Q Okay. Is it based upon some disagreement you
4 had with the other members of the audit team then but you
5 believe no longer exists?

6 Is that what you are saying?

7 A With regard to the difference between the top
8 level display and the lower level displays, that is correct.

9 Q Let me ask you, Mr. Eckenrode, are you aware
10 at this time, having come before us sponsoring direct
11 testimony which includes this audit team report, are you
12 aware of any other places where you disagree with the audit
13 team report?

14 A No. But, then I really hadn't thought that I
15 disagreed entirely with this one.

16 Q Are you indicating you disagree entirely with
17 this one?

18 A No.

19 Q Okay. Mr. Eckenrode, would you set out for us
20 in some detail the human engineering discrepancies you
21 refer to at Page 5, Item 5, of your direct testimony?

22 MR. PERLIS: Your Honor, I'm going to object to
23 the form of that question. If Mr. Backus wants to ask
24 particular questions on the testimony, that's fine.

25 I don't know what he means by just describe.

#5-17-SueW

1 JUDGE WOLFE: Is that the question, a general
2 question of that nature?

3 MR. BACKUS: The witness says here --

4 JUDGE WOLFE: On Page 5?

5 MR. BACKUS: -- Page 5, Item 5, he is listing
6 items of non-compliance as discussed in Supplement 6 of the
7 SER. Briefly, those items are -- and Number 5 is several
8 human engineering discrepancies have been identified.

9 And, I want him to testify what they are.

10 JUDGE WOLFE: Any objection now, Mr. Perlis?

11 MR. PERLIS: No. If he is referring to Item 5
12 I withdraw the objection.

13 JUDGE WOLFE: All right.

14 WITNESS ECKENRODE: One of the human engineering
15 discrepancies was discussed earlier, it is the location of
16 the data values on the heat sink display, which has been
17 corrected.

18 A second one, we discovered, was the method in
19 which displays were -- the lower level displays were --
20 accessed. We found that that was more difficult than we
21 thought it should be.

22 The lower level displays certainly are accessible.
23 There are several ways of doing it better.

24 Several of the other human engineering problems
25 are really embodied in other of these items here. For instance,

#5-18-SueW 1 the two items that showed incorrect -- not incorrect, but
2 incorrect for the mode indications. That's the core cooling
3 and the subcriticality displays. They have been corrected.

4 The containment isolation display also contains
5 human engineering discrepancies which we discussed earlier,
6 and I assume you will continue to discuss, there is a
7 correction of.

8 It's my recollection they are the only human
9 engineering problems we had.

10 BY MR. BACKUS:

11 Q Now, there was some testimony from Mr. Walsh
12 this morning about the containment isolation displays.

13 Did you hear that?

14 A Yes, sir.

15 Q And, again has there been any Staff verification
16 or analysis of that?

17 A No, there has not.

18 Q Now, are those all of the human engineering
19 discrepancies that have been identified with regard to the
20 Seabrook SPDS?

21 A I would have to go back to my SER to look to
22 see if I have forgotten any. But, I don't believe it.

23 Q Now, I am going to turn to the issue of system
24 response time under heavy load, which is discussed at Page 18
25 of the Lawrence Livermore audit. Public Service has not

#5-19-SueW 1 demonstrated that the SPDS update and response times will
2 not be unacceptably affected by the high main plant computer
3 loading conditions expected to occur during response to a
4 severe accident upset, has it?

5 A You want an answer to something?

6 Q Yeah.

7 A I didn't hear a question out of that.

8 Q I think there was a question. Okay. I will re-
9 ask it.

10 The Applicants have not demonstrated that SPDS
11 updated and response times will not be unacceptably affected
12 by the high main plant computer loading conditions expected
13 to occur during response to a severe plant upset?

14 A That's a correct statement.

15 Q Okay. Thank you. Therefore, there can be no
16 assurance, can there, that the SPDS will be available or
17 fully available during an accident situation when it is
18 most needed; is that right?

19 A I believe it will certainly be available. I'm
20 not sure that the update rate and so forth will be in the
21 time that is desirable.

22 As long as the computer is running, it will be
23 available.

24 Q But, it's a question of how rapidly information
25 will be available to the SPDS from the computer, as I

#15-20-SueW

1

understand it.

2

A That's right.

3

Q Is that right?

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A That's correct.

end #15

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16-1-gjw

1 Q And NUREG 0737 calls for continuous as well as
2 concise displays, right?

3 A As well as rapid.

4 Q As well as rapid.

5 A One has to define, 'rapid.'

6 Q Is it correct that for certain of the critical
7 status functions rapid, in your view, should mean a very
8 short time?

9 A What do you mean by, 'very short time?'

10 Q Well.--

11 A If you want a good human engineering answer to
12 that, five seconds is a good time. Or less.

13 JUDGE WOLFE: From a human engineering design
14 factor, what would be a long time?

15 WITNESS: You don't want an operator to wait for
16 a response of more than about eight or ten seconds. What
17 happens then, is he feels he has asked for something wrong,
18 and he tries it again, and it causes him to make mistakes.

19 BY MR. BACKUS: (Continuing)

20 Q I take it that more rapid --- I take it that
21 the rapidity with which information needs to be updated may
22 vary from mode to mode, right? Certain things you may need
23 information on more quickly than other things?

24 A In this case I don't think there is anything less
25 than five seconds there would be a problem.

1 Q But as I understand it, because the system has not
2 been tested or validated under heavy load conditions, is there
3 assurance at this point that that five second update can be
4 met under anticipated accident conditons?

5 A No, there is not assurance. That is why we asked
6 the question.

7 Q Now, turning to page 6 of your testimony, A.9.b,
8 you say, quote, the Staff has identified a minimum set of
9 approximately 20 plant parameters it believes to be
10 sufficient to provide plant operators with information about
11 the critical safety functions specified in NUREG 0737,
12 Supplement 1; correct?

13 A That is correct.

14 Q You then went on to state: The Seabrook SPDS
15 currently contains all but five of these parameters,
16 correct?

17 A That is correct.

18 Q So that indicates that the Seabrook SPDS does
19 not contain about a quarter of the information it should?

20 A That is correct until you read further.

21 Q And by saying, 'reading further,' you would be
22 discussing the text, and that would relate to the updated
23 testimony from the Applicants through their corrections
24 today?

25 A Reading further indicates that the radiation

1 parameters will be added, that the containment isolation
2 display is there. That is three of the five that will be
3 there, and you have heard testimony today, yes, that they
4 will be in at an early date.

5 Q Although as of the time the testimony was written,
6 and as far as you know, except from what you heard today,
7 the containment isolation has some problems, right?

8 A Human engineering problems, yes, sir.

9 Q Okay. In your testimony on page 5, Answer 8,
10 Item 2, you state that: Residual heat removal (RHR) and
11 hydrogen concentration variables are considered by the Staff
12 to be part of the minimum information required to assess the
13 CSFs, and are not displayed on the SPDS; is that right?

14 A That is correct.

15 Q And, therefore, the SPDS does not supply some of the
16 minimum information needed to access the critical functions,
17 right?

18 A Under specific circumstances, yes.

19 Q Now you note that the residual heat flow and
20 and containment hydrogen concentration parameters are
21 available elsewhere in the control room, right?

22 A Correct.

23 Q Where on the main control room is the information
24 available on the residual heat removal flow?

25 A I am not positive. My recollection is it is on the

1 left hand wing of the panel. I am not positive exactly where.

2 Q Okay. Where is it in relation to the location of
3 the designated SPDS, CRT, and the shift technical advisor
4 station, if you know?

5 A I do not know.

6 Q Do you know if the information provided on the
7 main control board is a direct indication of the parameters,
8 or whether it is subject to inferences or calculations in
9 order to derive it?

10 A I don't know that.

11 Q With regard to the hydrogen concentration, do you
12 know where on the control board that information is
13 available?

14 A No, I do not.

15 Q Okay. Is the information provided on the main
16 control board as a direct indication of the parameter, or
17 is it provided through inference and calculations, or do
18 you know?

19 A I do not know, sir.

20 Q So, you would have no knowledge as to how long
21 it would take to obtain the information on hydrogen concen-
22 tration from the main control board, is that right?

23 A No, I do not, but I don't assume that the STA
24 would be the man to do it. One of his licensed operators
25 who is at the board.

1 Q There is no containment isolation screen on the
2 SPDS, is that correct?

3 A That is correct.

4 Q And at the time of the audit, the display on the
5 main control board could be seen from the primary SPDS display,
6 but was not satisfactorily readable, but there has apparently
7 been a change that has not been assessed, right?

8 A That is correct. I think you might want to
9 understand, 'readable.' We are not talking readable here.
10 It is identifiable. Where the STA is interested in whether
11 or not he has containment isolation, period, not whether or
12 not which items are not -- which valves are not closed.

13 All his function is at that point is to know whether
14 or not he has containment isolation. That can be done in a
15 pattern recognition mode. You don't have to read the display
16 to see that.

17 Q How many lights are there in the containment
18 isolation?

19 A I have no idea. There is matrix of lights, like
20 your overheads.

21 Q You would agree, would you not, that there could
22 be a serious safety problem if the containment purge valve
23 for example, were inadvertently left open during an accident
24 situation?

25 A If it is to be displayed on the containment isolation

16-6-gjw

1 display, I am sure the operator who is there would know
2 that.

3 Q And I am just asking that you agree that is a very
4 important piece of information for an operator to have?

5 A I do.

6 Q And insofar as the SPDS does not display this,
7 or does not display it adequately, does this not contribute
8 to a lesser assurance that the health and safety of the
9 public will be protected in the event of an accident at
10 Seabrook?

11 A I don't feel so.

12 Q Now, were you responsible for the responses to
13 our interrogatories to the NRC Staff that were made pursuant
14 to the Board ruling of September 10th?

15 A Which interrogatories?

16 Q The responses are dated September 12th 1986. I
17 think they are the most recent update of the responses to
18 our interrogatories.

19 A I will have to look through here.

20 (Witness peruses documents.)

21 What is the date on that, sir?

22 Q September 12th. It is covered -- it is dated
23 September 12th, and we got it by means of a cover letter
24 also dated September 12th.

25 MR. PERLIS: Does counsel have a copy he could

16-7-gjw

1 furnish to the witness?

2 BY MR. BACKUS: (Continuing)

3 Q And the question, Mr. Eckenrode, is whether or
4 not you were responsible for those responses, with the
5 assistance of Staff Counsel, I assume.

6 A Yes, I was.

7 Q You say at page 7, in response to Roman IV, that
8 radiological control is one function required to be included
9 in an SPDS as specified by Supplement 1 to NUREG 0737.

10 The Staff considers steam generator or steam
11 line radiation and stack radiation to be the minimum
12 status indicators of the radiological control function.

13 Have I read that correctly?

14 A Yes, sir.

15 Q Okay. And these radiation parameters are not
16 yet displayed on the SPDS as I understand it, is that
17 correct?

18 A That is correct.

19 Q Now, I understand it to be the case that somewhere
20 else provided in the control room as part of the radiation
21 data management system?

22 A That is correct.

23 Q Is there only one location?

24 A I believe it is; it is a full panel of radiation
25 parameters.

1 Q So these particular parameters will be displayed
2 in one location in the control room is your understanding?

3 A At least one, yes.

4 Q Do you know whether it is one or more than one?

5 MR. PERLIS: Excuse me. The original question
6 was whether the radiation data management system was
7 displayed in one location, and then the question changed
8 to parameters.

9 I just wonder whether counsel could clarify whether
10 he is talking about the RDMS itself, or whether he is talking
11 about paramters which are included in the RDMS.

12 MR. BACKUS: Parameter.

13 MR. PERLIS: Thank you.

14 WITNESS: I only know of the location on the RDMS.

15 BY MR. BACKUS: (Continuing)

16 Q Where is this RDMS display in relation to the
17 prime SPDS display at the shift technical advisor station?

18 A My recollection as -- being in the control room
19 and the simulator, it is directly behind the STA. There is
20 a full panel there. Almost within arm's reach.

21 Q From your -- to your recollection, were you last
22 there at the time of this audit in May, or have you been
23 in the control room since?

24 A I was there in May.

25 Q That was your last visit?

1 A Yes.

2 Q Do you know if the RDMS display provides direct
3 indication of plant stack radiation and steam generator
4 radiation, or whether inferences or calculations are
5 required to arrive at the information desired?

6 A It is my understanding that it is direct, but
7 it is steam line, not steam generator.

8 Q Steam line, yes; thank you. How many people are
9 available in the control room at minimum to gather information
10 necessary for keeping the plant under control?

11 A I believe the minimum crew is three. Licensed
12 operators.

13 Q And you would agree that plant stack radiation
14 data would be important in performing population dose
15 projections?

16 A That is my understanding, yes.

17 Q The steam line radiation would be an important
18 variable in dealing with a scenario including steam generator
19 tube rupture, would it not?

20 A Yes, it would.

21 Q Now, returning to the NRC's responses to the
22 interrogatories dated September 12th, going to page 8,
23 you identify yourself as the person who was principally
24 responsible for the recommendation that the modifications
25 to the SPDS system, as well as others, could be deferred until

16-10-gjw

1 the first refueling, and handled in licensed conditions,
2 is that right?

3 A Yes, sir.

4 Q And you say that this recommendation was based
5 on the onsite audit of May 20 and 21, and on review of the
6 contractor draft technical evaluation report, is that right?

7 A Yes, sir.

8 Q Is the contractor draft technical evaluation report
9 the Lawrence Livermore audit that is attached?

10 A It is a draft version of that. An early version.

11 Q Does the final differ from the draft?

12 A Yes.

13 Q By this answer, you were referencing the draft
14 technical evaluation report, is that right?

15 A Yes, sir.

16 Q Do you have a copy of the draft available?

17 A No, I don't.

18 MR. BACKUS: Does the Staff counsel have a copy
19 of the draft report here?

20 MR. PERLIS: No, I do not.

21 MR. BACKUS: Well, I would be very interested in
22 seeing a draft as compared to the final, and I wonder if that
23 could be arranged.

24 WITNESS: If it would resolve the situation, I
25 can make the same statement for the final report.

1 MR. BACKUS: Okay.

2 BY MR. BACKUS: (Continuing)

3 Q Okay. So, the draft and the final do not differ
4 in any substantive way so far as your conclusions are
5 concerned?

6 A I don't believe they did. I see so many draft
7 reports, but I think this one was pretty clean.

8 MR. BACKUS: Mr. Chairman, if I could, I would
9 like to request that the Staff would furnish me with a copy
10 of the draft so I could compare it with the final for myself.

11 MR. PERLIS: I will be happy to supply him with a
12 copy of the draft. I don't know that we have a copy.

13 MR. BACKUS: I understand that, and I understand
14 it would be a post-hearing thing, and I don't anticipate anything
15 in particular. I would just like to have an opportunity
16 to compare it, and if counsel is willing to do that, I would
17 appreciate that.

18 MR. PERLIS: We will certainly furnish a copy
19 of the document.

20 MR. DIGNAN: Before we go down that road, do I
21 understand the record will be held open in light of that
22 request, Your Honor? Are is counsel content to have the
23 record closed?

24 JUDGE WOLFE: I understood that the request was
25 made that it could be furnished after the record is closed,

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because the record is going to be closed.

MR. BACKUS: If the record is going to be closed,
the record is going to be closed.

As I said, I am not anticipating anything here, but
I would like to check the draft against the final, since
the interrogatory refers to the draft.

If something dramatic happens, we might have to
file a motion to re-open. I am not anticipating.

JUDGE WOLFE: Well, when will you be able to furnish
a copy of the draft of that document?

End 16.
MS fols.

Sim 17-1

1 MR. PERLIS: We may be able to get a copy
2 telefaxed or expressed mailed up here by Friday. I can't
3 guarantee it. If not, we can certainly get it -- we should
4 be able to get one here by Friday. I will certainly attempt
5 to do so.

6 MR. BACKUS: If that could be done, it would
7 certainly moot any issue about this and we could close
8 the record.

9 MR. DIGNAN: Why don't we close the record
10 tonight.

11 JUDGE WOLFE: Well, I don't plan to close the
12 record tonight.

13 (Applause from the audience.)

14 MR. PERLIS: Before I make any commitment to
15 get it here Friday, could I have a word with the witness
16 as to the document's availability?

17 JUDGE WOLFE: As to what?

18 MR. PERLIS: The document's availability back
19 in Bethesda. I am assuming we can get it easily there,
20 but I don't know that for a fact.

21 JUDGE WOLFE: You may ask the witness.

22 MR. PERLIS: Mr. Eckenrode, do you have a copy
23 of the draft back in your office that someone could get
24 access to?

25 THE WITNESS: I sure hope so.

Sim 17-2

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(Laughter.)

MR. PERLIS: Assuming that we can track it down with Mr. Eckenrode here, we will have it up here Friday.

JUDGE WOLFE: Mr. Eckenrode, is there anyone at the office now that could search for that?

THE WITNESS: No, sir, there would be no one there now.

BY MR. BACKUS:

Q Mr. Eckenrode, I assume that the audit team consisted of the two identified authors of the report, and you said yourself that you were there. Were there any other members of the audit team?

A No, I don't believe so.

Q There is some reference to an individual from EG&G acting as a consultant to the NRC there on page 1. Do you recall that person?

A I believe that is James Cooper, one of the authors.

MR. BACKUS: Okay. Thank you.

(Pause.)

BY MR. BACKUS:

Q Now I am turning to page 3 of the Lawrence Livermore report, Section 3.1 which describes the systems requirement review, correct?

Sim 17-3

1 Do you have that?

2 A Yes, sir.

3 Q On page 4 under Section 3.1.2, Audit Team
4 Assessment, doesn't it say that Public Service did not
5 implement the recommendation of Section 18.2 to NUREG 0800
6 to perform a verification that planned system capabilities
7 will accomplish the functional needs of an SPDS?

8 A Yes, sir, that is correct. You understand it is
9 a recommendation and not a requirement.

10 Q Section 18.2 of the standard review plan, which
11 as I understand it, is NUREG 0800 states at page 18.2-2
12 that the Procedures and Systems Review Branch reviews the
13 adequacy and basis of the parameters selected for display
14 by the applicant to represent the critical plant functions
15 identified in NUREG 0737, Supplement 1.

16 Who performed this Procedure and Systems Review
17 Branch function for the NRC?

18 A You have to understand that that portion of the
19 standard review plan was written prior to reorganization
20 of the NRC. There is no longer a Procedures and Systems
21 Review Branch. We now use the contractor to perform that
22 function. However, in this case we also went back to the
23 member of the Procedures and Systems Review Branch who
24 had done those reviews before to have him verify our work.

25 Q Okay. You say that now the NRC has been

Sim 17-4

1 reorganized so that a contractor performs that function?

2 A Well, it is my responsibility through a
3 contractor, yes.

4 Q And did a contractor perform that function for
5 this?

6 A Yes, the Lawrence Livermore Labs did it as
7 part of their audit.

8 Q So that would be part of the function that
9 their audit performed?

10 A Yes.

11 Q And then you say that although this was
12 transitioned to a new organization that somebody within
13 the NRC also some role here?

14 A We had them verify their findings, yes. I had
15 them verify their findings.

16 Q Who was that?

17 A His name is Frank Ore.

18 Q Do you know if there were any areas of
19 disagreement between the contractor and Mr. Ore as to the
20 review?

21 MR. PERLIS: I am going to object on the
22 grounds of relevance. I think we are getting pretty far
23 afield here. The contention that remains, as I understand
24 it, is whether certain items need to be implemented before
25 the first refueling outage. I don't believe what counsel

Sim 17-5

1 is addressing now falls within that area.

2 MR. BACKUS: Well, I am examining the testimony
3 that has been offered which includes this document, and
4 I think I am entitled to inquire about it.

5 MR. PERLIS: Just so that the record is clear,
6 this document is offered because the staff is required
7 by regulation to offer into evidence all SERs. The scope
8 of the SER does not determine the relevant line of
9 questioning. I believe the relevant line of questioning
10 must be determined by the scope of the contention.

11 JUDGE WOLFE: I agree with staff. The SER
12 is not offered for all purposes and it does not expand
13 the scope of the contention. It is a requirement of the
14 Commission's rules.

15 So you have that rule in mind by number,
16 Mr. Perlis?

17 MR. PERLIS: I believe it is 2.743(g).

18 JUDGE WOLFE: That sounds right, which requires
19 that the staff's SER and FES be offered into evidence.

20 Your question does indeed expand the scope
21 of the issue which the Board has framed in its memorandum
22 and order of September 15th, 1986.

23 Objection sustained.

24 MR. BACKUS: Okay. I am going to now turn to
25 the design verification review, Section 3.2 of the audit

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report.

MR. PERLIS: Excuse me. Your Honor, in view of the lateness of the hour, if we are not going to finish this evening, I am wondering if counsel could find a suitable breaking place so that we might take the evening recess at this time. It is getting late.

JUDGE WOLFE: Along those lines, is there some way tonight, Mr. Perlis, that Mr. Eckenrode might contact someone in his office so that bright and early tomorrow morning they can start searching files for that draft?

MR. PERLIS: Mr. Chairman?

JUDGE WOLFE: Yes.

MR. PERLIS: Mr. Turk is flying back to Washington tonight and has kindly agreed to try and track the document down tomorrow morning.

JUDGE WOLFE: All right. Is this a convenient time in your cross-examination to recess for the evening?

MR. BACKUS: It is, sir.

JUDGE WOLFE: All right. We don't have use of the hearing room tomorrow. So we will recess until Friday morning at 9 a.m.

MR. TURK: Mr. Chairman?

JUDGE WOLFE: And we do have to, because the room is being used by someone else, we should take all of our documents and whatever, take them with us and we have

Sim 17-7

1 to bring them back on Friday morning.

2 MR. TURK: Mr. Chairman, I would like to ask
3 the Board's permission to be excused from the remainder
4 of the proceeding this week. The SPDS issue is being
5 covered by Mr. Perlis, and he has also agreed to be present
6 for the limited appearance statements on behalf of the
7 NRC staff.

8 JUDGE WOLFE: All right. Certainly. You are
9 excused.

10 MR. TURK: Thank you.

11 JUDGE WOLFE: We will stand in recess.

12 (Whereupon, at 5:50 p.m., the hearing recessed,
13 to reconvene at 9:00 a.m., Friday, October 3, 1986.)

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CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceedings before the UNITED STATES NUCLEAR REGULATORY COMMISSION in the matter of:

NAME OF PROCEEDING: Public Service Company of New Hampshire,
et al

(Seabrook Station, Units 1 & 2)

DOCKET NO.: 50-443-OL-1
50-444-OL-1

PLACE: Portsmouth, New Hampshire

DATE: Wednesday, October 1, 1986

were held herein appears, and that this is the official transcript thereof for the file of the United States Nuclear Regulatory Commission.

(sig) *Garrett J. Walsh, Jr.*
(TYPED) Garrett J. Walsh

(sig) *Sue Walsh*
(TYPED) Sue Walsh

(sig) *Mary Simons*
(TYPED) Mary Simons

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