NUCLEAR REGULATORY COMMISSION

In the Matter of:

HOUSTON LIGHTING & POWER COMPANY) Allens Creek Nuclear Nuclear Generating) Station, Unit 1)

73

DATE: August 26, 1981 AT: HOUSTON, Texas TROV JI ALDERSON 400 Virginia Ave., S.M. Wasnington, D. C. 20024 Telephone: (202) 554-2345

PDR ADOCK 05000466

0

		15940
	1	UNITED STATES OF AMERICA
	2	BEFORE THE
	3	NUCLEAR REGULATORY COMMISSION
	4	
2	5	In the Matter of:)
54 234	6	COMPANY) Docket No. 50-466 CP
(202)	7	Allens Creek Nuclear Generating)
20024	8	Station, Unit 1)
D.C.	9	Capricorn Room
ON.		Ramada Inn 7787 Katu Process
CON	10	Houston, Texas
HIL	11	nouscon, rexus
NAS		Wednesday,
INC. 1	12	August 26, 1981
BUILD	13	PURSUANT TO ADJOURNMENT, the above-entitled
LERS 1	14	matter came on for further hearing at 9:00 a.m.
LEPOR	15	APPEARANCES :
. W. F	16	Board Members:
EET, S	17	SHELDON J. WOLFE, Esq., Chairman
H STR	18	Atomic Safety and Licensing Board Panel
11 00	19	Washington, D. C. 20555
97	20	GUSTAVE A. LINENBERGER
	21	Atomic Safety and Licensing Board Panel
		U. S. Nuclear Regulatory Commission
	22	Washington, D. C. 20555
	23	DR. E. LEONARD CHEATUM
		Administrative Judge
	24	Route 3, Box 350A
	25	watkinsville, Georgia 306/7

.

	1	APPEARANCES: (Continued)
	2	For the NRC Staff:
	3	STEPHEN SOHINKI, Esq.
	4	LEE DEWEY, Esq.
2345	5	Washington, D. C. 20555
0 554 2	6	For the Applicant - Houston Lighting & Power Company:
1 (202	7	A ADDAODU GODDIAND Neg and GGODD DOGADIL Dag
2002:	8	Baker & Botts
, D.C.	9	One Shell Plaza Houston, Texas 77002
ICTON.	10	BOB CULP, Esq.
ASHIN	11	-and- DAVID POWELL, Esq.
NG, W	12	Lowenstein, Reis, Newman, Axelrad & Toll 1025 Connecticut Avenue, N. W.
(ITDI)	13	Washington, D. C. 20037
ERS BI	14	For the Intervenors:
PORTI	15	JOHN F. DOHERTY
V. , RE	16	4327 Alconbury Houston Texas 77021
ςΤ, S.V	17	nouscon, isnus from
STREE	18	
HILL (19	
308	20	
	21	
	22	
	23	
	24	
	25	
	2.5	

	1	<u>i n d e x</u>								
	2	VOIR WITNESSES DIRECT DIRE CROSS REDIRECT RECROSS	BOARD EXAM.							
	3	CLOIN G. ROBERTSON								
	4	(Resumed) and								
45	5	(Resumed)								
554-23	6	(A Fallel)								
202)	7	By Mr. Donerty 15,946 By Judge Cheatum	16,036							
0024 (8	By Judge Linenberger By Judge Wolfe	16,041							
) C. 21	0	By Mr. Doherty 16,075 By Mr. Doherty 16,075								
0N, I	9	By Judge Wolfe	16,077							
LONII	10	By Judge Cheatum	16,085							
WASH	11	By Mr. Doherty 16,088 By Judge Linenberger	16,101							
MNG.	12									
BUILI	13	ROBERT C. CHENG								
FERS	14	Ry Mr. Powell 16 109								
EPOR	15	By Mr. Doherty 16,110								
W. , H	16	By Mr. Donerty 16,112 By Judge Linenberger	16,114							
ET, S.	17									
STRE	18	JOHN J. BOSEMAN, ROBERT L. HUANG and								
HTT I	19	JACK N. BAILEY (A Panel)								
308	20	Pr Mr. Concland 16 123								
	21	By Mr. Doherty 16,128								
	21	By Mr. Donerty 10,147								
	22									
	23									
	24									
	25									

.

PROCEEDINGS

9:00 a.m.

JUDGE WOLFE: All right.

In attendance this morning, representing Applicant is Mr. Powell; representing Staff are Messrs. Sohinki and Dewey; and Mr. Doherty.

We will resume now with the cross-examination of Ms. Ranzau.

MR. POWELL: Mr. Chairman, if I may, before we start, I believe we have worked this panel down to Contention 28 and Contention 52.

I would ask that Mr. Cheng be excused from the panel at this time, if the Board has no further questions of him. I believe we have completed that Board question. He will remain here, of course, for his other piece of testimony on Board Question 10.

JUDGE WOLFE: All right. The witness is excused then temporarily.

(Witness Cheng was temporarily excused.)

MR. DOHERTY: Mr. Chairman, there was a matter that was brought up by Judge Linenberger the very first day with regard to Table S.3. I was requested -- or the parties were requested, if they had any comments to present them this morning.

I did want to make some input. The timing of

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

of the hearing has worked out rather badly. There has been no accessible law library to me for two weeks -- or the whole duration.

1-2

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

5.W.

300 7TH STREET,

REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

And I'm -- There are some things that I could do in the way of oral argument, but I kind of would hate to start with the idea I wanted to do that, and then ... you know, stop and just suddenly say, "Well, I haven't had enough time." I don't think that's very - I don't think I should do that, unless I at least say that's what is likely to happen before I start in. And --JUDGE WOLFE: What are you requesting? MR. DOHERTY: Well, it's just the deadline is not noted ... it's just ... poor practice. I mean I'm aware this morning that something was to be done about 6.3. JUDGE WOLFE: Yes, we will hear oral argument on that matter. You indicated that you thought you could be ready by this morning.

MR. DOHERTY: That's right.

JUDGE WOLFE: I take it you're not ready.

22 MR. DOHERTY: Well, I'm not certain I'm not 23 ready; that's the problem.

JUDGE WOLFE: Well, I wouldn't know that.
MR. DOHERTY: That's what -- I have read what

appears to be the most relevant part of the ALAB 640, 1 which was loaned to me. 2 And if the other parties --3 (Bench conference.) 4 MR. SOHINKI: If I might, Mr. Copeland indicates 5 to me that if we're going to discuss ALAB 640 or 6 radon the first thing, that he would like to be present. 7 And I understand that Mr. Powell has sent somebody to get 8 him. 9 JUDGE WOLFE: Well, certainly we want to pro-10 ceed first with the -- finish the cross-examination of 11 these remaining witnesses and excuse them. 12 Then we can proceed to oral argument, that is, 13 if everyone is ready. I would have hoped that there had 14 been some off-the-record discussion between Applicant and 15 Staff, and I guess the only party interested in this at 16 all is Mr. Doherty, indicating his interest by being 17 here and indicating that he did not want to participate 18 19 in oral argument. But I would hope before oral argument began 20 that these parties would consult and define the issues 21

1 - 3

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

300 7TH STREET.

22

15945

23 earlier, if the Board, after hearing oral argument, 24 thinks that written briefing is required, we would so 25 request that that be done.

and proceed today sometime to argue it. As indicated

	1	In any event, let's proceed. Hopefully, during
	2	the recess, Mr. Doherty, you and Mr. Copeland and Mr.
	3	Sohinki and Mr. Dewey will sit down and exchange ideas
	4	on this on the thrust of the oral argument, so we'll
2	5	have something pinpointed here.
554-234	6	In the meantime or first off, we will proceed
(202)	7	with the cross-examination of Ms. Ranzau on TexPirg's
20024	8	Additional Contention 28.
D.C.	9	Is there cross, Mr. Dewey?
ICTON	10	MR. DEWEY: No, Your Honor, there's no cross-
ASHIN	11	examination.
NG. W	12	JUDGE WOLFE: All right, Mr. Doherty.
SUILDI	13	MR. DOHERTY: Yes, Your Honor, I do have some
FERS 1	14	cross.
EPOR	15	Whereupon,
S.W., F	16	PATRICIA A. RANZAU
EET, S	17	-and-
H STR	18	CLOIN G. ROBERTSON
300 71	19	resumed the stand as witnesses, and, having been previously
	20	duly sworn, were examined and testified further as
	21	follows:
	22	FURTHER CROSS-EXAMINATION
	23	BY MR. DOHERTY:
	24	Q. Just so I can get an idea of what this is,
	25	what's the general shape of this room in which operators

ALDERSON REPORTING COMPANY, INC.

1 - 4

•

0

6

will work?

1

2

20024 (202) 554-2345

WASHINGTON, D.C.

S.W., REPORTERS BUILDING.

300 7TH STREET,

14

17

1-5

BY WITNESS RANZAU:

3 A. The entire control room is rectangle. The pria mary --

5 MR. POWELL: Excuse me, Mr. Chairman, I'd like 6 to ask the witness to get a little cozier with the micro-7 phone.

g JUDGE WOLFE: Can you lift it and bring itg towards you. Speak directly into it.

WITNESS RANZAU: The primary shape of the control room is a rectangle. The operators -- the main operator will be in an area that looks like a horseshoe. BY MR. DOHERTY:

Q. Is the room about this size?

15 JUDGE WOLFE: That doesn't say anything on the 16 record.

MR. DOHERTY: All right.

18 BY MR. DOHERTY:

19 Q. Is the room ... oh, 35 feet, roughly, something 20 of that order?

21 BY WITNESS RANZAU:

A. No, the room is larger. The exact dimensions
I will have to obtain for you. I don't have them off the
top of my head.

25 Q. Okay. Well, don't seek those out. I don't

		15948
	1	think that will be critical. I think it's available
	2	the actual
	3	BY WITNESS RANZAU:
	4	A. Yes, it is.
45	5	Q footage. If I could just have an estimate,
554-23	6	a ballpark figure is what I was hoping for.
(202)	7	How about the width? Is the width about half
20024	8	the length then?
N, D.C.	9	BY WITNESS RANZAU:
NGTON	10	A. No, it's larger.
WASHI	11	Q. So it's more close to a square?
JING,	12	BY WITNESS RANZAU:
BUILI	13	A. (Nods head.)
RTERS	14	JUDGE WOLFE: The witness is hodding her head
REPO	15	WITNESS RANZAU. Yes
. S.W.	16	JUDGE WOLFE: Yes or no, please.
TREET	17	And she did indicate yes.
TTH S	10	BY MR. DOHERTY:
300	20	Q. And about how many people are planned to be
	21	working in this room?
	22	BY WITNESS RANZAU:
	23	A. That decision has not been finalized.
	24	Q. Do you have an approximation of about how many
	25	people would be working there during the most active

1-6

•

a

.

shift, let's say?

1 - 7

1

2

3

4

5

6

7

8

9

10

11

12

13

14

16

17

20

300 7TH STREET.

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BY WITNESS RANZAU:

A. During normal conditions, one person is required to operate in the horseshoe area. During accident conditions, there will be more people in that area.

15949

Q. Okay. How many people are within -- well, how many people have work stations, say, one doorway -- with a doorway to the control room?

BY WITNESS RANZAU:

A. The Technical Support Center is outside the control room about a doorway away. The shift supervisor is within the control room. His office is within the control room.

Q. It's a partitioned office?

15 BY WITNESS RANZAU:

A. Yes.

BY WITNESS ROBERTSON:

18 A. Can I perhaps clarify some of your question 19 concerning staffing level?

Q. Certainly.

21 BY WITNESS ROBERTSON:

A. Normally you would expect two operators and a supervisor routinely on duty within the control room conplex.

25

There may be another one or two operators who are



1-8

24 Q. Uh-huh. So that would mean if others were
25 needed that were not at local duty stations, they'd have

	1	to be summoned in some other manner; is that correct?
	2	They'd have to be paged or
	3	BY WITNESS RANZAU:
(202) 554-2345	4	A. Yes.
	5	Q. Okay. Now, on Page 14 at Line 4, you say
	6	that the room uses human factors principles in design.
	7	That may be covering a lot of territory.
20024	8	Can you tell us what you mean, maybe in your own
, D.C.	9	language a little bit, by that?
GTON	10	BY WITNESS RANZAU:
VIHSE.	11	A. By "human factors principles"?
NG. W	12	Q. In design. What did you mean by that?
UILDI	13	BY WITNESS RANZAU:
FERS I	14	A. Okay. What it means is that the flow of the
EPOR	15	system the instruments on the control boards are
. W. , H	16	in a logical and orderly fashion that there's mimics
EET, S	17	to aid the operator in his work; there's lines of de-
H STR	18	marcation possibly to separate the systems; that the
300 TT	19	switch handles are consistent; the color coding is con-
1.7	20	sistent; abbreviations are consistent; nameplates are
	21	consistently above or below an instrument.
	22	Q. I see. When you say "an instrument," you mean
	23	the instrument control, right?
	24	BY WITNESS RANZAU:
	25	A. The actual instrument, whether it be a recorder,

1-9

.

•

an indicator. switch.

Q. So in that example then, by "human factors," you mean the human tendency to expect the next label to be, say, beneath an item's readout because that's where it was for the one previous or something like that? BY WITNESS RANZAU:

A. Yes. If all the nameplates -- we have to be consistent in the control room. We will either have all the nameplates above the instrument, or they will be below the instrument. You will not find some above and some below.

Q. Now, for example, one thing that has come up that can be used as an example, and that's water level indicators. Would all of the recorders for water level indicators be in the same location, would you expect? BY WITNESS RANZAU:

They are on the same panel.

18 Q. Uh-huh. Okay. So a parel -- Let's see what 19 a panel is for a minute.

20 Is a panel always flat in your --21 BY WITNESS RANZAU:

A. No, a panel is in the shape of a benchboard, whereas there's a -- the top of it comes down where it has the annunciators, and there's a straight portion that has your indicators and meters; then there's an

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1-10

1

2

3

4

5

7

8

9

10

11

12

13

14

15

16

17

1-11	1	apron part that has your switches.
•	2	The panel is approximately 90 inches tall.
	3	Q. Say it again. Ninety?
۲	4	BY WITNESS RANZAU:
45	5	A. Ninety.
554.23	6	Q. Yes. And if you stand in front of a panel,
(202)	7	will any of the panel be out of view, assuming there's no
20024	8	obstacles in the way, like another person or something
4, D.C.	9	like that?
NGTON	10	BY WITNESS RANZAU:
VASHE	11	A. No.
ING, V	12	Q. Is it meant to be visible entirely?
• BUILD	13	BY WITNESS RANZAU:
TERS	14	A. Yes.
REPOR	15	
S.W	16	
ŒĔŤ,	17	
ULS HJ	18	
300.7	19	
	20	
	21	
۲	22	
	23	
	24	
	25	

1-12		
	1	BY MR. DOHERTY:
•	2	Q. Okay. Without It's meant to be visible
	3	entirely without movement or changing where one is stand-
۲	4	ing, for example?
45	5	BY WITNESS RANZAU:
554-23	6	A. It would depend on what particular section you
(202)	7	are looking at, because the panels are there's systems
20024	8	on each panel.
, D.C.	9	Q. Is the aim generally though to make everything
VGT0N	10	happening in a system available in one eye's view?
ASHIN	11	BY WITNESS RANZAU:
NG, W	12	A. Yes.
	13	Q. And is that Okay. Now, when was the
TERS 1	14	NUCLENET/1000 designed, what year? Do you know?
EPOR	15	BY WITNESS RANZAU:
. W.	16	A. I believe the concept was in the late sixties,
EET, S	17	is when General Electric started working with it.
H STR	18	Q. Do you know when Well, do you know roughly
300 7T	19	when the company decided that that was what they wanted
	20	and chose that system or that
	21	BY WITNESS RANZAU:
•	22	A. I would say approximately 1971, 1972.
	23	Q. Is this Do you know if this system is in
0	24	use now? It's nine years, apparently, that it has been
	25	available at least. Do you know if it's in use anywhere?

	1	BY WITNESS RANZAU:
	2	A. There are no operating BWR-6's.
	2	Q. Yes. And none of the other BWR's have this
	3	
() 554 2345	4	system; is that correct?
	5	BY WITNESS RANZAU:
	6	A. Not this one, no.
(202)	7	Q. Is there any plant, do you think, that has
20024	8	something which you would call close or highly comparable
D.C.	9	in operation?
TON,	10	BY WITNESS RANZAU:
SHING	11	A. Susquehama is the closest available now. There
WAS	10	is a BWR-6 that has been shipped with the NUCLENET
DING	12	is a built of that has been shipped with the househilt
BUII	13	complex. It's Illinois Power's Clinton plant. It is
CLERS	14	not operational, however.
(EPOF	15	Q. Do you plan to get any input as to how the
W	16	Susquehanna room is working out before I mean, do you
ET, S	17	plan to follow the progress of those lead plants or
STRF	18	A. We have been following Susquehanna, as well as
HTT 0	19	Clinton.
30	20	Q. Okay. I think in your voir dire which we did
	21	vesterday the questions, I asked you about advance
	22	abata of the art design which is a phrase used to
	~~	State-of-the-art design, which is a philade about to
	23	describe the NUCLENET on Page 14 at Line /.
	24	And you indicated that CRT's (which is assume
	25	is cathode ray tubes)

1-13

.

•

G

776 2.8	10.00	100 5. 1 100	100 100	MA 10. 10.	PR 18 P. 11	
BI	WL	TNE	33	KAN	ZAU	5
		the second second	are are			۰.

1-14

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

2	A. Yes.
3	Q. And some other visual things which, in your
4	mind, made it state-of-the-art. Is that a correct
5	Is that what you meant to say yesterday?
6	BY WITNESS RANZAU:
7	A. Yes. I said computers.
8	Q. "Computers" was the other word?
9	BY WITNESS RANZAU:
10	A. Yes.
11	Q. How many CRT displays will be necessary in
12	normal operation for the operator in the horseshoe?
13	BY WITNESS RANZAU:
14	A. There are ten CRT's on the operator's console.
15	There are three additional ones in the horseshoe area.
16	None of the CRT's are necessary to operate the plant be-
17	cause there is hardwired instrumentation as backup for
18	the CRT's.
19	0. Is the operator expected to use the CRT's for
	g to the sperator expected to age and the set
20	kind of like getting certain details he's interested
21	in, or is he expected to keep an eye on them regularly
22	or survey them continually?
23	BY WITNESS RANZAU:
24	A. He keeps an eye on them regularly because they
25	contain valuable information, that he would otherwise have



ALDERSON REPORTING COMPANY, INC.

1-16 Q. All right. What I'm trying to get at: Is 1 that the monitoring radiation in one of the radwaste 2 systems, or is it monitoring the radiation as power pro-3 duction in the reactor core? 4 BY WITNESS RANZAU: 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 A. It is radiation throughout the plant, whatever 6 systems are on the radiation monitoring system, which is 7 yet to be defined. It will be a computer-based 8 system. 9 Q. Now, the computers, will their output be print-10 out, or will their output be displayed on a screen of some 11 kind? 12 BY WITNESS RANZAU: 13 A. Both. 14 Will there be computer output available to the 0. 15 operator at that set main work station in the horseshoe? 16 BY WITNESS RANZAU: 17 The line printer is not located in the main Α. 18 horseshoe area. It's located in the computer room, which 19 is adjacent to the main control room. 20 Q. Okay. 21 BY WITNESS RANZAJ: 22

A. That's only the hard copy display.
Q. There's a second display? It comes in two ways then?

1-17	1	BY WITNESS RANZAU:
•	2	A. You can get it on the CRT, or you could get a
	3	hard copy of the same thing. It will come up on the
•	4	CRT. And if he desires a hard copy of it, then he requests
5	5	it on the line printer.
554 23	6	Q. Isn't his CRT the one you spoke of that would
(202)	7	be available to him?
20024	8	BY WITNESS RANZAU:
D.C.	9	A. There's the dedicated CRT that you can display
NOTON	10	whatever you want on it. The other nine CRT's have
ASHIN	11	dedicated displays for the system they represent.
NG. W	12	Q. One is wort of dedicated to the operator, in
n	13	the sense that "I can get what I want from the others
LERS 1	14	on this one"?
EPOR	15	BY WITNESS RANZAU:
. м.	16	A. Right.
EET, S	17	Q the other nine are "You can only get this
H STR	18	kind of information and he can't switch around"?
17 001	19	BY WITNESS RANZAU:
	20	A. No, he can switch around.
	21	Q. On one of the other nine?
•	22	BY WITNESS RANZAU:
	23	A. Right.
	24	Q. Do they all have the same facility, all ten of
	25	these then?

1-18 BY WITNESS RANZAU:

A No. The nine CRT's on the horseshoe are dedicated to a particular system that they represent. One CRT is the performance monitoring system's CRT, which allows the operator to call up any information from the computer system on that CRT, or he can call up another display that is on one of the nine CRT's. He can put it on ten, if he so desires.

9 Q. Okay. You have a statement on Line 14 that
10 the design was based on a methodology virtually identical
11 to that set out in Appendix B to NUREG-0659, which reflects
12 current NRC recommendations.

What I had -- Well, first of all, you say virtually identical." Do you know -- Did you have in mind the differences when you wrote this? There are some differences, I gather. What are they?

17 BY WITNESS RANZAU:

18 A. I didn't write this. This was supplied by
19 General Electric ... this portion.

20 Q. This portion of the testimony?
21 BY WITNESS RANZAU:
22 A. Not of the testimony. This is identical to the

23 Appendix O in the PSAR.

Q. Uh-huh.

25 ///

24

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

300 7TH STREET,

BY WITNESS RANZAU: 1 A. General Electric did --2 Q. -- Appendix O? 3 BY WITNESS RANZAU: 4 A. -- the methodology similar to NUREG-0659, 5 20024 (202) 554-2345 Appendix B. 6 Q. Okay. Now, what I'm trying to get at is: 7 What is the difference though? You say it's virtually 8 D.C. identical. 9 S.W., REPORTERS BUILDING, WASHINGTON, BY WITNESS RANZAU: 10 A. When General Electric did this, Appendix B of 11 0659 did not exist. That way you cannot say that it is 12 identical. 13 0. Well, you could say it was identical; if, in fact, 14 it was identical, couldn't you -- the fact of the timing 15 wouldn't matter? 16 What I'm trying to find out is: You have the STREET. 17 statement here. What is it that you're saying is not 18 HTT 008 identical? That's all. 19 Is it the timing? Is that the problem? 20 MR. POWELL: Your Honor, I believe the witness 21 just answered that question. She stated that in her 22 view that since the NUREG-0659 did not, in fact, exist 23 at the time that GE developed this methodology, it's her 24 understanding that -- her testimony says that, "Well, it's 25

1-19

virtually identical because it simply didn't exist, so she didn't think she could state that it was, in fact, identical."

1-20

1

2

3

4

6

10

13

14

15

16

17

18

19

20

21

22

23

24

25

300 7TH STREET.

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

The NUREG didn't exist at the time. She has already testified to that. 5

MR. DOHERTY: Well, are you saying that the NUREG didn't exist at the time she wrote her testimony? 7 MR. POWELL: She stated that it did not exist 8 at the time that GE developed the methodology for the 9

NUCLENET/1000 control complex. That was her testimony.

And she explained what she meant by "virtually 11 identical." 12

She has answered it once; I don't see the need to answer it again.

.

1-21		1	MR. DOHERTY: I don't think she has answered
•		2	it once.
		3	JUDGE WOLFE: I'll allow the question. Objection
•		4	overruled.
	345	5	WITNESS RANZAU: When General Electric con-
	554.23	6	ceived
	(202)	7	BY MR. DCHERTY:
	20024	8	Q. Would you speak up a little, please? I think
	(, D.C.	9	the mike needs to be closer; I think it would help. You
	OLDN	10	can push it righ up very close. There's no problem.
	ASHIN	11	BY WITNESS RANZAU:
	NG, W	12	A. When General Electric conceived the NUCLENET/
•	IGHU	13	1000 complex, NUREG-0659, Appendix B did not exist.
	ERS B	14	They did, in their eyes, what was virtually identical, not
	EPORT	15	I can't say that it was identical to NUREG-0659.
	.W. , R	16	The concepts are there. The fact that whether
	EET, S	17	they did it in the exact same manner as set out in 0659
	H STR	18	is unknown to me, since General Electric did the work.
	J.L 009	19	Q. Okay. Well, will the Allens Creek Let's
	59	20	see here a minute.
		21	Did you review the PSAR?
		22	BY WITNESS RANZAU:
		23	A. Yes.
		24	Q. All right. Now, do you have any of the PSAR
		25	with you with regard to Appendix 0?

	1	BY WITNESS RANZAU:
	2	A. Yes, I do.
	3	Q. Okay. You have it with you. Could we look at
	4	Page 039, please?
45	5	(Pause.)
554-23	6	Q. What I'm trying to get at is: There is a
(202)	7	sec ion there, Section 1 - Functional Analysis, "Definition
20024	8	of Function 102."
4, D.C.	9	It states that Well, let me ask you this
NGTON	10	instead of my reading.
VASHIZ	11	Is this the comparison that you're speaking
INC. V	12	of? Isn't one of these sections NUREG-0659 and the
BUILD	13	other the General Electric definition of "functions"?
LERS	14	BY WITNESS RANZAU:
(EPO-C	15	A. Item I.D.l in the PSAR is the methodology of
. W.	16	0659, Appendix B.
EE1.	17	Q. All right. I'll read this to you Let me
H SI H	18	ask you this.
11 005	19	It states up here in Part 1.2, "Definition of
	20	Function," "Once having identified these activities, the
	21	next step was to corbine activities under functional
	22	groupings."
	23	And then there's an additional description of
	24	what they did. Who did that? Who were they describing?
	25	111

1-22

•

•

	1	BY WITNESS RANZAU:
D.C. 20024 (202) 554-2345	2	A. Can you back up for a second? What page did you
	3	say you were on?
	4	Q. 039.
	5	(Pause.)
	6	BY WITNESS RANZAU:
	7	A. I'm using Amendment 57. That's the copy I've
	8	got.
	9	Q. Uh-huh.
OLON	10	BY WITNESS RANZAU:
ASHIN	11	A. 039 doesn't have on there what you're talking
NG. W	12	about.
ERS BUILDIN	13	MR. POWELL: Your Honor, I have the Amendment
	14	59 here, if I might hand it to the witness, in the PSAR.
EPORT	15	MR. DOHERTY: Sure.
W., B.	16	(Document handed to Witness Ranzau.)
EET, S	17	(Pause.)
FIRE	18	WITNESS RANZAU: Okay.
300.711	19	BY MR. DOHERTY:
	20	Q. Have you ever read this reviewed this
	21	before this part?
	22	BY WITNESS RANZAU:
	23	A. Yes.
	24	Q. Okay
	25	111

1-23

a

	1	or mrinood mmano.
	2	A. It's identical to 57.
	3	Q. Well, what is the difference in your mind
	4	the most significant difference between these two groupings
24.2	5	and the definition of function?
554-20	6	BY WITNESS RANZAU: '
(202)	7	A. I don't understand your question.
20024	8	Q. There are in "Definition of Function, 1.2," two
4, D.C.	9	listings. One is of six topics; isn't that correc
NGTON	10	BY WITNESS RANZAU:
VASHL	11	A. Yes.
ING. V	12	Q. The other falls on the next page as seven. What
BUILD	13	is the most significant difference in your mind between
TERS	14	those two?
REPOR	15	BY WITNESS RANZAU:
S.W	16	A. The way they're worded. The functions are
RET.	17	there, the same functions are there. It's just the wording
H STF	18	is not identical.
300-71	19	Q. Uh-huh. Well, one is six and one is seven.
	20	Was one subgrouped into the other? Is that how you came
	21	up with that difference?
	22	BY WITNESS RANZAU:
	23	A. The seven functions from NUREG-0659 are all
	24	are found in the grouping of six
	25	Q. Uh-huh.

1-24

.

Y

)

.

?

0

BV WITNESS RANZA

BY WITNESS RANZAU:

1-25

-- that we say that for normal operation, the A. 2 activities were grouped under the following functions. 3 Q. All right. Now, when a decision is made to 4 group something in a function, what is the -- What is 5 20024 (202) 554-2345 the outcome in terms of the plant's control room con-6 struction of having made that decision? Will that result 7 in those particular groupings occurring in the same 8 D.C. location in the plant? 9 WASHINGTON, BY WITNESS RANZAU: 10 The location was not part of the responsibility A. 11 300 7TH STREET, S.W., REPORTERS BUILDING, that I had. The location of the instruments was done by 12 General Electric and Ebasco. 13 14 Q. So then you don't know the answer to that question? Is that what you mean? 15 BY WITNESS RANZAU: 16 17 No, that's not what I said. Α. 18 Well, you told me who might know. 0. 19 BY WITNESS RANZAU: 20 I said that is out of my scope of responsibility. Α. 21 Uh-huh. And you didn't offer any other answer, 0. 22 SO --23 BY WITNESS RANZAU: 24 I said that the location of the instruments Α. 25 was determined by General Electric for the N 'S system and

1-26

1

2

3

4

5

6

7

8

9

10

11

13

15

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

by Ebasco for the balance-of-the-plant systems.

Well, would it be typical of good industrial 0. design to place instruments by these functions in the same locale in the room?

BY WITNESS RANZAU:

A. Yes, it would. That is what General Electric did in designing the NUCLENET/1000 control complex.

These seven then are the recommendations of 0. this Commission publication. Now, when you read this material over, was it your opinion that these -- both these listings were done with the most important item placed at the top, in declining order of significance to plant 12 safety?

BY WITNESS RANZAU: 14

> A. Yes.

Where is -- Under what function is primary 0. 16 reactor containment integrity in the NUCLENET system? 17 18 BY WITNESS RANZAU:

19

25

It's in the horseshoe area. A.

Uh-huh. Well, in terms of the way these 20 0. functions are set up in the NUCLENET, where would that 21 In comparing these two, that appears to be -- the 22 be? one in NUREG-0659, it doesn't visibly appear in the list 23 24 for the NUCLENET.

They've apparently -- Go ahead. Do you have

1-27			
	1	an answer to that?	
•	2	BY WITNESS RANZAU:	
	3	A. Are you looking for a location of this in t	he
•	4	control room?	
45	5	Q. No. I'm looking for where the function that	t
554-23	6	the NRC publication identified would be in the if	at
(202)	7	all in the NUCLENET functions.	
20024	8	BY WITNESS ROBERTSON:	
b.c.	9	A. May I answer part of that?	
VGTON	10	Q. Well, I would prefer her answer at this mon	ent.
AIHSA	11	At least take a minute more to look it over	
ING, W	12	(Pause.)	1
•	13	BY WITNESS RANZAU:	
LERS I	14	A. In my opinion, the primary reactor containm	ient
EPOR	15	integrity falls under the top four that are listed un	der
. W	16	our activities.	
EET, S	17	Q. Well	
H STR	18	BY WITNESS RANZAU:	
300 7.L	19	A because the systems are contained in the	
	20	horseshoe area, and there's not one particular definit	tion
	21	one particular instrument for reactor containment in-	
•	22	tegrity.	
	23	Q. Is that what you meant by just the words ar	е
	24	different?	
	25	- 111	

	1	BI WIINESS RANZAU:
	2	A. Yes. The concepts are still there.
	3	Q. Well, then, by that do you mean that the controls
	4	that control primary reactor containment integrity are
45	5	distributed among those top four?
554-23	6	BY WITNESS RANZAU:
(202)	7	A. They are on two panels in the horseshoe area.
20024	8	Q That are on two panels should a control
. D.C.	9	primary reactor containment integrity the operators
GTON	10	would conceivably need two panels to work that; is that
ASHIN	11	right?
NG, W	12	BY WITNESS RANZAU:
UILDI	13	A. No, he doesn't need two panels. The primary
ERS B	14	control of the reactor is Panel 580, which is the operator's
EPORT	15	console.
W. , RI	16	The secondary functions or the emergency core
ET, S	17	cooling functions are on Panel P-601.
I STRI	18	There is some similar information on those
00 7TI	19	panels that would assist him in an emergency condition
ς.	20	only.
	21	He can get information from the emergency core
	22	cooling benchboard on his CRT's, on his 680 panel.
	23	Q. Did you still want to contribute something, Mr.
	24	Robertson, or has it sort of gone past? It's all right
	25	with me. I guess it's presume it's all right with

ALDERSON REPORTING COMPANY, INC.

1-28

•

•

JUDGE WOLFE: This is your cross-examination, Mr. Doherty. If you want to hear something from another witness, you so indicate --

WITNESS ROBERTSON: I simply wanted to note 4 that there is a division of responsibility between GE 5 and Ebasco that relates to containment integrity, and 6 that GE would not normally do any -- provide any detail of 7 control room design relative to the containment shell 8 itself, and that if you were looking for that type of --9 location of that type of information, that would be 10 established by, in this case, Ebasco recommendation. 11 BY MR. DOHERTY: 12

Q. By Ebasco what?

14 BY WITNESS ROBERTSON:

A. By Ebasco recommendations, since the containment
shell and the provisions that protect its integrity
directly are their responsibility, so that you might find
that that may be part of the confusion as looking to GE
for the wrong informational base here.

20

25

1 - 29

D.C.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

13

Q. So --

21 BY WITNESS RC ERTSON:

A. There are balance-of-plant panels that are
at the back end of the horseshoe. Those are Ebasco
responsibilities.

Some of those functions may come from either GE

or Ebasco that show up on the panels, but there are other
 panels than just those established by GE NUCLENET that
 act in this overall system that the operator is using to
 control the plant.

5 Q. Well, the picture I'm getting is that since 6 Ebasco is a different entity, that General Electric will 7 have a little trouble accommodating their part in this 8 thing. And this disturbs me a little bit.

BY WITNESS RANZAU:

10

9

25

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1-30

A. That's not true.

Well, there's no truth or falsity in all of this. But that's just the feeling that I'm getting right now, and I'm wondering if anybody can fill in ... panel -how the containment integrity will be integrated into these functions so that the operator will not have to go to, say, the back of the horseshoe to take care of this detail in the event of an accident.

18 This is -- What does GE provide in the way 19 of taking care of this system? They don't build it, 20 but do they provide something to help you out with that, 21 or what?

22 BY WITNESS ROBERTSON:

23 A. I have to ask a question at this point. What 24 do you mean by "containment integrity"?

G By that I mean the ability in case of an

accident to isolate the containment.

BY WITNESS ROBERTSON:

A. That function is done automatically. The operator isn't doing that. He only monitors it.

All right. Well, he has got to monitor it 0. then. Let's consider that a minute. I would want him to monitor it certainly as well, to be certain if it, in fact, had occurred.

BY WITNESS RANZAU:

A. There is space provided on the GE panels -- the GE-design panels, which there are three of them in the horseshoe area that GE has prime responsibility for. But they have made provisions for each utility to put this type of information on those panels. Space is allocated for the function in the horseshoe area.

I think a minute ago I asked you how high or --Q. it came out that a panel was 90 inches high. How wide is it? When you say "panel," how big -- how great a width do you have in mind?

BY WITNESS RANZAU:

A. Approximately three feet is the width at the apron. 22

20024 (202) 554 2345 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

1-31

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

23

24

25

Q. Reading a little further on, the term "design 1 process," can you tell me what that means in just -- I 2 think those two words are -- it looks like a term of art. 3 Am I correct, "design process"? 4 BY WITNESS RANZAU: 5 20024 (202) 554 2345 Are you referring to the testimony --6 A. Your testimony at line 11 there. 7 0. 8 BY WITNESS RANZAU: D.C. 9 Okay. Α. 900 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, Used in that sentence, what does that mean, 10 0. 11 just that phrase, just in a word or two? 12 BY WITNE'S RANZAU: A. It's just the method that they used to set up 13 how the plant was going to be operated, functions. 14 15 How was "a qualitative verification of the 0. 16 functional allocation" done? 17 BY WITNESS RANZAU: That is basically like a time and motion study. 18 Α. You determine what -- you have already determined what 19 20 functions have to be taken care of. 21 You have determined who has to do these, 22 whether the machine does it or the operator does it. 23 You look at the layout that you have made. You bring in operators, you use operator procedures, you use 24 25 industry standards, and you just do it basically like a

ALDERSON REPORTING COMPANY, INC.

15974

2-1
20024 (202) 554-2345

D.C.

000 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

6

7

8

9

10

16

25

2-2

1 time and motion study to make sure that the operator is not 2 required to do too many things at one time.

And you go back and assess this data to find out
that you have in fact done the right thing. If not, you
make the necessary corrections, go back and redo it.

Q. So it comes different from a functional allocation that in the functional allocation you sort of say, "What do we need to get done," and in this verification you ask, "Is the way we're going to do it going to work?" Is that a fair --

11 BY WITNESS RANZAU:

A. Almost. In your analysis you decide what the system has to do, its functions, its interrelationships, and you decide who you are going to allocate the functions to, whether it's going to be the man or the machine.

Q. Okay.

17 BY WITNESS RANZAU:

18 A. And then in your allocation of functions you 19 assign it to one or the other or possibly both; and then 20 in the verification of it you make sure that what you've 21 done previously is correct.

22 Q. And it's the various Regulatory Guides and 23 things like that that tell you if you have done it 24 correctly, at least in part?

2 - 3		1	BY WITNESS RANZAU:	
•		2	A. In part.	
		3	Q. That's where they would come in?	
•		4	BY WITNESS RANZAU:	
	345	5	A. Yes.	
	554.2	6	Q. Okay. Is there a presumption that machines	are
	(202)	7	better at surveillance tasks in this control room?	
	20024	8	BY WITNESS RANZAU:	
	N, D.C.	9	A. Would you define what you mean by "surveill	Lance
	NGTO	10	tasks" so I make sure I understand what you're getting	g at?
	WASHI	11	Q. Essentially, monitoring.	
	ING,	12	BY WITNESS RANZAU:	
•	BUILD	13	A. Yes.	
	FERS 1	14	Q. Well, I know this doesn't quite follow, but	t it
	REPOR	15	would, I think, logically, just thinking about somethi	ing
	S.W. 1	16	else.	
	tEET,	17	What monitoring tasks does the operator hav	ve,
	H STF	18	the main operator have?	
	300-73	19	BY WITNESS RANZAU:	
		20	A. Okay. He monitors the reactor water clean	up
		21	system. He has the control over that.	
•		22	He has some control over the condensate and	d
		23	feedwater system. However, this system is basically	
•		24	automatic.	
		25	Q. Well, let's see now. I meant to keep the	

	1	question to monitoring, not controlling.
	2	BY WITNESS RANZAU:
	3	A. Well, he's monitoring the reactor water.
	4	Q. To me it just means say again.
345	5	BY WITNESS RANZAU:
554-2	6	A. He's monitoring the reactor water when he's
4 (202)	7	starting up.
2002	8	Q. All right, but when he's in
N, D.C	9	BY WITNESS RANZAU:
NGTO	10	A. Not necessarily controlling it.
WASHI	11	Q. Then I think you know what I mean. A monitor
DING,	12	looks at something supposedly being controlled. Controlling
FHOR	13	is the act, to my at least, of a direct connection between
CLERS	14	the driver or the operator and whatever that person does
REPOF	15	next, that machine, or whatever it is, will happen.
S.W.	16	For ins ice, if I'm driving and I have a heart
REET,	17	attack and pull my foot off the gas pedal, I will certainly
TH ST	18	be controlling that car, not monitoring it.
300.7	19	But if I watch the television set in the lobby
	20	of the inn to make sure no one is breaking into cars in
	21	the parking lot, then I'm monitoring, because I can't
	22	unless I do something. I could just sit there and watch
	23	someone break into a car and all I would have done is
	24	monitor.
	25	

•

-

.

1 BY WITNESS RANZAU:

2-5

•

.

2	A. That's right. Well, he's monitoring the
3	reactor, the pressure, the temperature, the water level.
4	Q. Okay. Did you say "cleanup system" a minute
5	ago?
6	BY WITNESS RANZAU:
7	A. Reactor water cleanup, yes.
8	Q. Why does he monitor that; do you know?
9	BY WITNESS RANZAU:
10	A. At startup he has to, because that's where he's
11	getting the water for the reactor. To keep a constant
12	level in there ne either opens the valves or closes the
13	valves.
14	JUDGE WOLFE: Mr. Robertson, is that microphone
15	active or not? We are not hearing too well.
16	WITNESS ROBERTSON: You are just going to have
17	to keep it tight.
18	JUDGE CHEATUM: Without screaming.
19	MR. POWELL: I think that other microphone may
20	be more sensitive. Maybe it would help. Try them both.
21	BY MR. DOHERTY:
22	Q. So he has let's see now. Is there during
23	operation one operator who is responsible for operation of
24	the plant?
25	In other words, in the event of an emergency, is
	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 20 21 22 23 24 25

	1	there one operator who is supposed to make the first
	2	moves procedurally, and that person knows that that's the
	3	person?
	4	BY WITNESS RANZAU:
345	5	A. Yes.
) 554-2	6	Q. Okay, and that's the person in the horseshoe,
4 (202	7	I gather, as well?
2002	8	BY WITNESS RANZAU:
N, D.C	9	A. Yes.
NGTO	10	Q. Now, is this allocation of functions between
WASHI	11	operator and machine, has General Electric essentially done
DING.	12	this already?
BUILI	13	BY WITNESS RANZAU:
RERS	14	A. Yes.
REPOI	15	Q. Did you look at what they used to make this
S.W.	16	choice, whether it would be a man job or excuse me,
REET.	17	a parson job or a machine job?
TH ST	18	BY WITNESS RANZAU:
300.7	19	A. That was done before we bought the NUCLENET
	20	concept. We have reviewed it and have had no problems with
	21	it, and it's explained in the Appendix O to the PSAR.
	22	Q. Uh-huh. So in your opinion there's nothing
	23	there that you feel you disagree with on the allocation.
	24	BY WITNESS RANZAU:
	25	A. No, I don't.

2-6

.

•

6

.

	1	Q So is that your conclusion at the bottom of
	2	page 14 there, "Once the allocation is made, the design
	3	permits efficient and effective manipulation of controls
	4	by the operator"?
345	5	BY WITNESS RANZAU:
55+2	6	A. I accept that, yes.
4 (202	7	Q. At the top of 15 is what I'm referring to; did
2002	8	GE develop these guidelines prior to the decision by ${\tt HL\&P}$
N, D.C	9	to use NUCLENET/1000?
INGTO	10	BY WITNESS RANZAU:
WASH	11	A. Did GE develop regulatory guidelines or just
DING,	12	guidelines? They have a set of guidelines
BUIL	13	Q. Yeah, when did they
RTERS	14	BY WITNESS RANZAU:
REPO	15	A in the design specifications.
S.W.	16	Q. Are those from the 1971, or whatever that year
REET	17	was, time?
IS HIZ	18	BY WITNESS RANZAU:
300	19	A. They have been constantly updated.
	20	Q. Originally they were '72; is that right?
	21	BY WITNESS RANZAU:
	22	A. I believe so, yes.
	23	Q. How were they updated? What procedurally
	25	happens there?
	23	

•

.

ALDERSON REPORTING COMPANY, INC.

15980

a

1 BY WITNESS RANZAU:

	2	A. That's an internal GE procedure, but it's based
	3	on changes that have occurred because of operating
	4	experience, because of new requirements that have come out
345	5	from the government, new technology that's come out.
554.2	6	Q. Have you been the recipient of these updates?
4 (202	7	BY WITNESS RANZAU:
2002	8	A. Wes.
N, D.C	9	Q. Do you recall if any of them were as a result
INGTO	10	of the Three-Mile Island experience?
WASH	11	MR. POWELL: Mr. Chairman, I object to that.
OING.	12	I believe she has explained in her prepared testimony that
BUILI	13	TMI considerations were factored in to the control room
RTERS	14	design.
REPOI	15	MR. DOHERTY: Well, I've asked her specifically
S.W.	16	from what Counsel said, I can't determine what factoring in
REET.	17	was done, and that's what I want to find out.
TH ST	18	This question would get to that. It's sort of
300 2	19	a track to go down.
	20	I don't know if General Electric has noticed
	21	anything.
	22	JUDGE WOLFE: Overruled.
	23	WITNESS RANZAU: First, you have to realize that
	24	the control boards for TMI and the control boards for
	25	the NUCLENET/1000 complex are as different as night and

ALDERSON REPORTING COMPANY, INC.

15981

1 day.

3

D.C.

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

25

2-9

2 BY MR. DOHERTY:

Q. Hopefully.

4 BY WITNESS RANZAU:

A. Changes that have been made from General Electric are layouts on the panels so that even though the same instruments are on the same panel, they have regrouped some of them to make them closer together in location.

9 They have added mimics to aid the operator. It's 10 not that they have to be there. It's just an operator 11 aid.

Consistency in nameplate location. In fact, they 12 have changed some of the types of switches that they had 13 been using so that we've got the same handle size that 14 we're talking about, the same force that has to go on one. 15 Do they indicate in any of these updates that 16 0. as a result of the TMI experience and investigation they 17 are making changes, and did they give you anything 18 specifically aimed at a problem that had been uncovered as 19 20 a result of the investigation of TMI?

21 BY WITNESS RANZAU:

22 A. Nothing has directly stated that, "Because of 23 TMI, we did this." It's just we get engineering changes 24 through that they are updating what they have.

It doesn't specifically say that, "Because of

2-10	1	Three-Mile Island we are doing this."
0	2	Q. Uh-huh. Did you say, though, that there had
	3	been some grouping on one panel, a change like that?
•	4	BY WITNESS RANZAU:
345	5	A. Yes, they have moved indicators and recorders
554.2	6	closer together.
1 (202)	7	Q. For what systems; do you recall?
20024	8	BY WITNESS RANZAU:
V. D.C.	9	A. This was primarily on the emergency core
NGTON	10	cooling bench board.
IHSEV	11	That way the layout for the two RHR trains are
ING. V	12	identical instead of they were what had happened,
I I I I I I I I I I I I I I I I I I I	13	instead of being mirror image, they were slide along on
LERS	14	the location.
(EPOR	15	
. w .	16	
EEL.	17	
HI STR	18	
300 71	19	
	20	
	21	
•	22	
	23	
•	24	
	25	

2-11		1	Q. They were slide along?
•		2	BY WITNESS RANZAU:
		3	A. Yes.
•		4	Q. Can you tell me what that means?
	345	5	BY WITNESS RANZAU:
	554.2	6	A. Okay. Mirror image means they are just the
	1 (202)	7	opposite, where a slide along, if you have it, say, on the
	2002	8	left-hand corner of a panel, it would be on the left-hand
	N, D.C.	9	corner of the next panel.
	NGTO	10	Q. That's slide along?
	VASEI	11	BY WITNESS RANZAU:
	ING, 1	12	A. That's slide along. You could look at it and
•	BUILD	13	what it would be is if you had one panel and you just
	TERS	14	moved it right next to it.
	REPOR	15	Whatever is left will be left there, whereas
	S.W. , 1	16	mirror image it congregates back towards the center.
	teet,	17	Q. Okay. On the dashboard in my car there is a
	fH STI	18	drawing of a cigarette over the place on the dashboard
	300.7	19	where the ashtray is.
		20	Is that a mimic, that cigarette smoking there?
		21	BY WITNESS RANZAU:
•		22	A. No.
		23	Q. What is a mimic?
•		24	BY WITNESS RANZAU:
		25	A. A mimic is it's not in the term of mimic that



ALDERSON REPORTING COMPANY, INC.

2-12

2-13	1	Q. Now, that first question there on page 15 says,
0	3	"Has HL&P reviewed the ACNGS design to assure compliance
		with current regulatory guidelines?"
•	4	Were you complying with Reg Guide 1.97 at that
	5 12	point? Was that the
	554.23	BY WITENSS RANZAU:
	(202)	A Yes.
	20024	Q. Were there any other Regulatory Guides applicable
	6 D.C.	to this?
	101.51	BY WITNESS RANZAU:
	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	A. Nothing other than the NUREG's.
	5 12	Q. Now, you state in the body of the answer,
•	0711.13	particularly at line 19, you built somewhere, "a full size
	14	mockup of the front row panels."
	NO 15	Now, the front row panels, is that the horseshoe,
	16	essentially, that you are speaking of there?
	17 17 17	BY WITNESS RANZAU:
	H STR	A. Yes.
	12 19	Q. Okay. So then you didn't try to do the whole
	20	control room set of panels?
	21	BY WITNESS RANZAU:
•	22	A. No. The same criteria was used for the design
	23	of the back row panels as were for the front row panels.
•	24	Q. But you studied the front row this way?
	25	11

ALDERSON REPORTING COMPANY, INC.

2-14	1	BY	WITNESS	RANZAU:

•

•

	2	A. Yes, that's the primary operator's responsibility.
	3	Q. And you were one of the evaluators; is that
	4	right? You did this?
10	5	BY WITNESS RANZAU:
554-23	6	A. Yes, I did.
(202)	7	Q. Well, is the question above there first, I
17.007	8	kind of skipped it. Around line 8, the design review
, D.C.	9	consisted of yourself I assume you are an instrumentation
10LON	10	and control engineer?
ASHIN	11	BY WITNESS RANZAU:
NC: N	12	A. Yes.
GHEDI	13	Q. And Ebasco people, Brown & Root people, a
F.H.S. F	14	human factors consultant and two plant operating personnel
LHOP44	15	from HL&P.
W., K	16	Now, the two plant operating personnel, were
EET. 2	17	these people who operated other plants for HL&P? These
H STR	18	would be non-nuclear plants, I would guess, right?
11 068	19	BY WITNESS RANZAU:
52.	13	A. No. These people are operators assigned to the
	21	South Texas Project. They both have come from other
	22	operating nuclear plants.
	23	Q. Okay. Was there either one of them or anyone
	24	in that group who is sort of at the rookie level of
	25	experience for an operator?

2-15 1 BY WITNESS RANZAU:

A. No. Both these operators had Navy nuclear 2 experience, as well as operating experience from other 3 utilities. 4 Q. What about the other people from Brown & Root 5 20024 (202) 554-2345 and Ebasco? Were they people who had been working on 6 control systems for the plant? 7 BY WITNESS RANZAU: 8 D.C. A. Yes. 9 WASHINGTON I guess what I'm getting at is was there any 10 0. reason not to have someone who was at the absolute minimum 11 level of experience an operator could have and operate? REPORTERS BUILDING. 12 BY WITNESS RANZAU: 13 A. The people that were used on this had 14 instrumentation and controls experience. The four 15 engineers, one from Brown & Rout, one from Ebasco and two 16 S.W. STREET, HL&P, have no operating experience. 17 We have totally done our work in instrumentation 18 HTT 008 19 and controls. Q. So they had a level of sophistication about 20 what they were doing, right? I mean, they were familiar 21 with looking at panels and that sort of thing? 22 23 BY WITNESS RANZAU: . Yes. Our prime responsibility was to hit the 24

25 human factors concept on these panels, to check the layout,

S.W., REPORTERS BUILDING, WASHINGTON, D.C.

00 7TH STREET.

6

7

8

9

10

the mimics, the shape of the switches, the color coding;
 whereas the operators assisted us in how the actual system
 worked. Plus, they had some background in human factors,
 because they had also worked on the design of the South
 Texas control boards.

Q. Did you all think that there really was no good input that someone who was at the minimum level, but stil' could conceivably have control some night, did you act ally think such a person really couldn't contribute anything to the study?

11 BY WITNESS RANZAU:

12 A. The purpose of the study was it was an internal 13 study. We were getting ready to submit the design of the 14 control room to General Electric.

15 The purpose of the study was internal. We 16 wanted to see if we had any problems that should have been 17 corrected, these human factors deficiencies, that we could 18 have corrected before the information was submitted to 19 General Electric before the panels were built, before it 20 was very costly to make these changes to the panels, before 21 the NRC came in and reviewed the panels for human factors 22 concerns.

There is no excuse to let a panel get built and not have the color coding the same or not have all the nameplates in the same location. That's just bad

,

2-17	1	engineering, and we wanted to correct things like that
۲	2	should they so exist.
	3	It was to satisfy no requirements other than
9	4	HL&P.
	918	But it was pretty much a group of professionals
	6 554.5	evaluating something that people who were not professionals
	4 (202	would eventually be working with, right?
	. 2002	Professional engineers who would not be
	N. D.C	operators.
	015NI	BY WITNESS RANZAU:
	HSAW 1	A. I consider the operators just as professional
	'01NG	2 as
•	1108	3 Q. No, I don't mean that in an adjective sense. I
	RTERS 14	4 mean it in the sense of engineers with engineering degrees
	11 III	5 is not the required educational level for an operator; isn't
		6 that right?
	REET.	7 BY WITNESS RANZAU:
	IS HI	8 A. At present, yes.
	300 1	9 BY WITNESS ROBERTSON:
	2	0 A. May I add something to that, please?
	2	Q. Certainly, go ahead.
٠	2	2 BY WITNESS ROBERTSON:
	2	A. I would disagree with your characterization in
٠	2	4 several ways, Mr. Doherty.
	2	Q. Which characterization is it? I don't understand.

9

,

ALDERSON REPORTING COMPANY, INC.

1 .

D.C.

REPORTERS BUILDING, WASHINGTON,

300 7TH STREET, S.W.,

6

7

8

12

13

14

15

16

25

| I didn't mean to characterize anyone.

2 BY WITNESS ROBERTSON:

3 A. Two of them. First, your characterization of
4 some individual at the beginning level of experience who
5 might some night be on the controls.

By the time anybody is licensed and allowed to be that individual that you described, he is not a beginner. He is a long ways from being a beginner.

9 He's had an extensive training program, many, 10 many hours on a simulator in addition to a lot of hand's-11 on supervised training on plant.

So that individual that you described, as I understood your description, doesn't exist.

Q. Well, the person I was describing, I was trying to find -- there is obviously a first day on the job for an operator. That's what I'm trying to get at.

17 The first day on the job operator has to come 18 because the operators simply have to be replaced. That's 19 what I meant.

I didn't mean an inexperienced person would be there. I meant someone who had reached that plateau at which he was ready to go, or she was ready to go.

23 So it was not meant to characterize or to cast 24 aspersions.

1.94

2-19 BY WITNESS ROBERTSON: 1

R SA I

	2	A. No, I didn't take it as casting aspersions, but
	3	there is no such animal, to use that phraseology, as you
	4	describe as a guy the first day on the job in that sense.
345	5	His first day on the job was many, many days
554-2	6	ago as a trainee, and he has worked his way in a rather
4 (202)	7	routine fashion, so that the day that he is assigned to
2002	8	that position in a given category is just no different than
N, D.C	9	the day before in that sense.
NGT0	10	The second part that I wish to differ with your
WASHI	11	characterization slightly is whether or not one would
ING. 1	12	consider operators professional in the sense of an
BUILI	13	engineer.
TERS	14	I have personally supervised quite a few
REPOF	15	individuals who have been operators of the type we're
s.W	16	talking about in an engineering environment.
REET,	17	Some of them had engineering degrees; some did
TH ST	18	not. But it made no difference, as best I could determine,
300.7	19	whether or not they had that degree or not.
	20	Their knowledge concerning nuclear matters, just
	21	because they had had to study a very large number of these
	22	areas in order to become operators, most of them in the
	23	Navy, gave them the capability, as far as I could
	24	determine, that was indistinguishable from that which a
	25	new engineer would come out of school with in terms of

ALDERSON REPORTING COMPANY, INC.

5

1

)

.

).

1

2-20 1 backgr

2

20024 (202) 554-2345

D.C.

WASHINGTON.

300 7TH STREET, S.W., REPORTERS BUILDING,

background knowledge. Perhaps a slight more sophistication in mathematics by that graduate engineer, but that's all.

So I quess I cannot, myself, distinguish between 3 the professional engineer and that operator, as we relate 4 it to engineering matters dealing with plant control. 5 Ö. Ms. Ranzau, would you say that in this 6 interdisciplinary team of instrumentation and control 7 engineers that these people were as a group more 8 sophisticated in this subject than an operator? 9 BY WITNESS RANZAU: 10

11 A. The people that were on this interdisciplinary 12 team, their prime responsibility had been control room 13 design, working with the control panels, depending on which 14 project you were talking about.

The fact that they didn't have any operating experience did not hinder them, I don't feel, because that was the purpose of the interdisciplinary team, to have some people that were knowledgeable in the control system, some that were knowledgeable in the control room design, some that were knowledgeable in operating experience.

21 I don't feel like you can characterize them 22 being any better, any worse, than operators.

23

24

25

MR. DOHERTY: Your Honor, I don't think the answer is responsive. I ask the Board to direct her to respond to the question of whether she thought they were more sophisticated in this than a group of operators, or operators.

2-21

20024 (202) 554-2345

D.C.

WASHINGTON.

REPORTERS BUILDING.

5.W.

00 7TH STREET.

20

25

6 MR. POWELL: Your Honor, it seems to me that she 7 has explained in both her oral and written testimony that 8 there was an interdisciplinary team of people, which 9 included licensed operators and people who were not 10 licensed operators.

The review team that actually did the job had all of the above on it, and he's seeking to elicit from the witness some relative ranking and degrees of sophistication.

I think she gave an answer to the question. I don't believe there's any necessity to direct the witness to answer a question that she's answered.

17 If Counsel does not happen to personally agree 18 with that, that's what often happens during cross-19 examination.

(Bench conference.)

JUDGE WOLFE: I think the answer was responsive, Mr. Doherty. If something you feel was not responded to, just rephrase the question so that you can get the response you want; but in my mind, she was responsive.

You may direct another question to her in that

2-22 | area once again.

D.C.

REPORTERS BUILDING, WASHINGTON,

100 7TH STREET, S.W.,

25

12

2 BY MR. DOHERTY:

3 Q. Well, what I'm trying to get at is that this 4 team was too sophisticated, and that may surprise you to 5 hear that. It might not have been apparent.

6 I can appreciate deadlines, that sort of thing, 7 made you do it a certain way; but what I'm trying to get at 8 is in your professional opinion, do you think the group 9 that did the review might have missed something that an 10 operator might have seen?

11 BY WITNESS RANZAU:

A. We had operators on the team.

JUDGE WOLFE: I'm sorry, what did you say, Ms. Ranzau?

WITNESS RANZAU: I said, we had operators on the team.

MR. DOHERTY: All right. I didn't quite get achance to put that fully. I forgot one part.

19 BY MR. DOHERTY:

20 Q. That was, operators who have their first day of 21 responsibility, that's the type of operator I want to try to 22 reach in this question.

23 Did you have operators like that? 24 BY WITNESS RANZAU:

A. We didn't have any brand-new operators, no.

D.C.

REPORTERS BUILDING, WASHINGTON,

S.W. .

STREET.

H.L.2 (00)

Q. That's what I meant. That's all.
 2 BY WITNESS RANZAU:

3 A. It shouldn't make a different whether they are
4 brand new or whether they are experienced. They've still
5 gone through licensing and training on training.
6 They are really not brand new.

7 Q. Now, is there any portion of the system, the 8 control room situation, where the various factors that would 9 be involved in a particular type of accide. Are all 10 focused in one particular place?

11 BY WITNESS RANZAU:

12 A. The horseshoe area is the prime center.
13 Q. How about a particular panel, then?
14 BY WITNESS RANZAU:

15 A. The Panel P-6.80, which is the primary operator's 16 console, is the focus of the accident. That's where he 17 scrams the reactor, trips the turbine.

18 His emergency core cooling systems, should it 19 resort to that, are on an adjacent panel.

20 0 Okay, so on two panels, then, you have -- well, 21 is there a section of the panel designated loss of coolant 23 accident parameters or something like that?

23 BY WITNESS RANZAU:

A. No. It's all broken into systems.
25 Q. Is there a way to obtain one through the computer

1 system or through one of these CRT's?

2 BY WITNESS RANZAU:

A. The displays that come up on the primary 3 operator's console are set for a particular situation. 4 There's power levels that certain displays 5 20024 (202) 554-2345 come up. There's normal operation that certain displays 6 come up. Accident condition, certain displays come up. 7 Q. When is it determined that these will come up? 8 D.C. Is that at the operator's option? 9 WASHINGTON. BY WITNESS RANZAU 10 A. No, it's built into the system. The operator 11 S.W., REPORTERS BUILDING. can change the display should he desire. 12 There's just some information that's not 13 necessary under certain conditions. He may need more 14 information at startup than he does at normal operation. 15 He has the information readily available that 16 300 TTH STREET. 17 he needs at a particular time. Q. Okay. Now, from his procedures book or -- Do 18 19 you have a procedures book kind of there, or what? 20 BY WITNESS RANZAU: A. No, we have no emergency procedures at this 21 22 time. Do you expect there will be something like that? 23 Q. 24 BY WITNESS RANZAU: 25 A. Oh, yes.

2-25		1	Q. Okay. When that eventually occurs, will that
		2	have headings or sections which would describe accidents
		3	by their names?
•		4	BY WITNESS RANZAU:
	345	5	A. More than likely. I'm not familiar with the
	554-2	6	setup on emergency procedures.
	4 (202	7	That's the way they were set up during the
	2002	8	simulator training I went through.
	N, D.C	9	Q. Okay. So you went through simulator training
	NGTO	10	that General Electric sponsored; is that right?
	WASHI	11	BY WITNESS RANZAU:
	JNG,	12	A. Yes.
•	BUILI	13	Q. Okay. So you found there that there was a
	CLERS	14	procedures manual or something along that line?
	REPOI	15	BY WITNESS RANZAU:
	S.W. ,	16	A. Numerous procédures.
	REET,	17	Q. How many?
	TH ST	18	MR. POWELL: I object, Mr. Chairman.
	300-7	19	This seems to me clearly beyond the scope of
		20	this contention. The contention goes to the design review
		21	of the control room.
۲		22	That's the portion of the testimony we're in
		23	right now, and it deals with colors, switches and things of
0		24	that nature, and not with operating procedures.
		25	This plant won't have operating procedures for

ALDERSON REPORTING COMPANY, INC.

.

2-26 1 year 2 many

1 years, and I think it's just very fruitless to pursue how 2 many operating procedures or any other question in regard 3 to operating procedures at this point.

Why don't we stick to the testimony here that's presented?

MR. DOHERTY: He objects to the question how
7 many operating procedures, which she characterized as
8 numerous a minute ago.

9 The operating -- an operating manual on a desk 10 or whatever will be there is obviously going to be an 11 integral part of the control system.

12 It's going to be there all the time, should be 13 there all the time, and will have a lot to do with what 14 happens in the event of an accident.

She says it exists, says that will be there. I
believe it's a relevant question and within the scope
because it leads on certainly to my being able to ask
additional questions on whether those procedures -- how
they will integrate to the control system itself. That
is, it's going to tell this person, this operator, to do
something.

I want to find out if he can do that, he or she can do that without roaming the room or what.

24 MR. POWELL: Well, Your Honor, I think he just 25 verified my objection. Those procedures do not in fact

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUALDING, WASHINGTON, D.C. 20024 (202) 554-2345

9

1 exist.

2 - 27

How can she answer questions along that line? 2 MR. DOHERTY: Well, she has said at the moment --3 MR. POWELL: She said the procedures exist for a 4 5 simulator. 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 6 MR. DOHERTY: Well, that should be enough. 7 MR. POWELL: The contention goes to the control 8 room design and the post-accident instrumentation for 9 Allens Creek. 10 That's what the contention says, Your Honor. It 11 seems to me we ought to stick to control room design and 121 post-accident instrument display for the Allens Creek 13 plant, not for procedures that exist for some simulator. 14 MR. DCHERTY: Well, I think the simulator 15 training was offered as experience as to what Allens Creek 16 would be like, and I think that General Electric is 17 sponsoring the simulator and the training and, therefore, 18 for the Board to decide that we should reject the question 19 on the basis that it's very unlikely this will be what's 20 going on when the plant is finally built strikes me as 21 much more speculative than the question is. 22 (Bench conference.) 23 JUDGE LINENBERGER: Gentlemen, permit me to 24 inject an observation here. 25 Whereas it is certainly true that detailed

2-28

20024 (202) 554-2345

D.C.

000 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

25

1 operating procedures for Allens Creek do not exist and 2 understandably so at this phase, it's also reasonable to 3 expect that an operator's -- or plant procedures manual 4 ultimately is going to be a rather complex voluminous 5 document.

And it seems to me that it is reasonable to 6 7 inquire at this stage and evolution of the control room design to what extent, if any, the layout of the design 8 9 or the functionality of the design lends itself to the 10 challenge that an operator will have when he has to take a 11 step that he may need to consult a procedures manual about, 12 versus whether there's something about the control room 13 itself or the panels or the mimics or whatever that lead 14 him properly through procedures without requiring his 15 going to a procedure manual.

So in that kind of context, Mr. Chairman, I find Mr. Doherty's question relevant and material here and would recommend we continue on that line, at least for a while.

20 JUDGE WOLFE: All right. Overruled. 21 BY MR. DOHERTY:

22 Q. The question was you said there were numerous 23 procedures there, and I wanted an idea of how many you 24 observed at that time?

3 approximately as long as one of these cafeteria tables in
4 here. I guess they are six, seven feet long.
5 It was full from one end to the other. How

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

2-29

many I have no idea.

BY MR. DOHERTY:

3-1 bm

1

5

6

7

8

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

21

Q. Is the plan then in your -- from what you've 2 surmised, that operators would attempt to figure out what 3 was going on if something was not ... if ... they have 4 their readings, right? They have their instrumentation in front of them.

BY WITNESS RANZAU:

A. Right.

0. They attempt to identify that by name, then 9 use the Procedures Manual to determine what to do, or 10 what to check, or that sort of thing? 11

BY WITNESS RANZAU: 12

They would have the procedures, as well as flow A. 13 diagrams, logic sense schematics, control wiring dia-14 grams ... the whole gamut of information available to 15 them to find out what a problem was, if, in fact, they 16 didn't know through experience and training. 17

18 Was it your understanding they would be trained 0. 19 to recognize some accidents ... like basic accidents? 20 BY WITNESS RANZAU:

> Α. Yes.

22 Uh-huh. And would there be in any way in this --0. 23 in the control room to present all the data needed to --24 in one panel to determine if that accident were in fact 25 occurring?

13.57	1.5 1	175 8.7	175 275 275	15 18 18 1	17 8 14	
BI	WT	1.14	233	RAN	4AU	ŝ

2	A. There's no way that one panel could possibly
3	handle that information. That was why That is why
4	the concept exists of several panels. You have a panel
5	that is for normal operation, and you have a panel
6	if there's you know, several panels, if there's
7	accident conditions.
8	Q. I see. Are there panels labeled or
9	essentially called "accident conditions" or what?
10	BY WITNESS RANZAU:
11	A. No, the panels are broken down into systems.
12	Q. So they're system panels?
13	BY WITNESS RANZAU:
14	A. Yes.
15	Q so would it be fair to say that to determine
16	if what type of accident has occurred, the operator
17	must be trained to look from one panel to another to
18	determine if that particular kind of accident has
19	occurred?
20	BY WITNESS RANZAU:
21	A. No, the operator knows what systems are on what
22	panels.
23	Q. All right
24	BY WITNESS RANZAU:

A. The panels are laid out for the flow of this

ALDERSON REPORTING COMPANY, INC.

3-2

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

25

1

system.

1

4

6

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

300 7TH STREET.

14

3-3

Uh-huh. Must he be trained to look at more than 0. 2 one panel and which places? 3

BY WITNESS RANZAU:

Under accident conditions, yes. He knows that A. 5 all his -- that his supplementary panels have accident information on it that can tell him about his control rod 7 drive system or his RHR or CIC. 8

It's not something he bothers with during normal 9 conditions. Those are emergency conditions. 10

Did they demonstrate to you at the simulator 0. 11 various accidents? 12

BY WITNESS RANZAU: 13

A. Yes.

When you did this study, what did you find 15 0. out? What was the result of your cells? Were there 16 any weaknesses you located? 17

BY WITNESS RANZAU: 18

We are in the process of evaluating the survey 19 A. that was done. We have concluded that there are --20 while there are no, quote, severe deficiencies, there are 21 ways that the panels could be improved, using additional 22 mimics, simplifying some of the nameplates so that they're 23 not quite as crowded, that the function is still there, 24 but you don't have three lines of information when he 25

1	might need one.
2	We've used hierarchial labeling, used ad-
3	ditional lines of demarcation.
4	Q. Are there any changes required as a result of
5	Three Mile Island yet?
6	BY WITNESS RANZAU:
7	A. Not yet. We are assessing the commitments that
8	we have made in the PSAR to their impact on the control
9	boards. Our design information has not been submitted
10	to General Electric, nor will the NRC allow us to go to
11	fabrication until we have submitted design information to
12	them.
13	MR. DOHERTY: Your Honor, may we take a break
14	now?
15	JUDGE WOLFE: Yes. We'll recess until 11:00.
16	MR. DOHERTY: Thank you.
17	(A short recess was taken.)
18	JUDGE WOLFE: All right.
19	BY MR. DOHERTY:
20	Q. You state on Page 16, about Line 12, Ms.
21	Ranzau about meeting the intent of two documents that
22	you've identified there. Could you state the intent
23	and what you mean there?
24	BY WITNESS RANZAU:
25	A. Okay. I have previously stated the intent of

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINCTON, D.C. 20024 (202) 554-2345

NUREG-0659 when I was talking about the methodology used 1 in designing NUCLENET/1000 complex. 2 In the NUREG document, its recommendations 3 to improve the control room, it doesn't -- it gives 4 examples of bad things that have happened in the control 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 room and suggests things -- suggests changes that can 6 be made; and that's what we mean by the intent of it. 7 It doesn't say that they have to be done; it's 3 just recommendations, guidelines to follow in draigning 9 the control room. 10 Uh-huh. 0. 11 BY WITNESS RANZAU: 12 All of them are not applicable. A. 13 You also mention the SPDS System. 0. 14 BY WITNESS RANZAU: 15 Α. Yes. 16 And how that came about and why you did it. Q. 17 Excuse me a minute. 18 (Pause.) 19 Now, at this point are you -- have you -- has 20 the company rather fulfilled the description requirement 21 for the SPDS? 22 BY WITNESS RANZAU: 23 We have committed to providing an SPDS; conceptual A., 24 design is not complete. 25

3-5

16907

	1	Q. Do you consider yourselves a new design
	2	at this point, or do you consider yourselves not a new
	3	design?
	4	BY WITNESS RANZAU:
45	5	A. I don't understand what you mean, "new design."
554-23	6	Q. Well, perhaps it is something that has to be
(202)	7	worked out. But the Section I.D.2 of NUREG-0718
20024	8	Do you have that with you?
, D.C.	9	BY WITNESS RANZAU:
ICTON	10	A. I have the requirement for NUREG-0718.
ASHIN	11	Q. All right. Doesn't that mention where new
NG, W	12	designs are involved, applicant shall somewhere in the
NILDI	13	middle of that requirement?
LERS F	14	BY WITNESS RANZAU:
EPORI	15	A. Yes.
. W. , R	16	Q. Do you think that's speaking of HL&P or not?
EET, S	17	BY WITNESS RANZAU:
H STR	18	A. We did agree to supply an SPDS, and the design
J.L 009	19	concept is responded to in the PSAR in Section 7516. But
*8	20	no system has been purchased to date. We're just
	21	evaluating all of the alternatives.
	22	Q. That, you believe, is providing a general
	23	discussion of the approach at this point?
	24	BY WITNESS RANZAU:
	25	A. Yes.

•

0

16008

	1	Q. What about the technical feasibility at this
	2	point? Did you provide the information on that, whether
	3	it was technically feasible?
	4	BY WITNESS RANZAU:
345	5	A. It is technically feasible. It's going to be
554-2	6	a computer-based system with CRT's.
4 (202	7	Q. Okay. This system would it be fair to
. 2002	8	say that it concentrates a minimum set of plant para-
N, D.C	9	meters in one place, so that plant safety status can be
INGTO	10	assessed?
WASH	11	BY WITNESS RANZAU:
DING.	12	A. The term "minimum" is a bit unfair. We have
BUIL	13	defined in the PSAR what we constitutes the minimum
RTERS	14	that we will provide. We have not said that we will
REPO	15	provide that many.
S.W.	16	We more than likely will provide more.
REET.	17	Q Uh-huh. What's a data trend? I have some
ITH SI	18	idea what that means, but
300	19	BY WITNESS RANZAU:
	20	A. It's a capability on the CRT that you can pick a
	21	point and trend the point, follow it through a pro-
	22	gression of time.
	23	Q. Pick a point?
	24	BY WITNESS RANZAU:
	25	A. Yes, pick a computer point that you're interested

3-7

•

in, you want to see what -- we'll say ... a pressure is 1 doing. The computer has the trending capability. You 2 punch in, using the keyboard, the point you're interested 3 in, the trending function and that you'll get a display 4 that follows this point, where you'll know whether the 5 pressure goes up or down or stays constant. 6 It's similar to a chart recorder, only it's on 7 a CRT. 8 Q. Does that mean you could say pressure in the 9 main steam line? 10 BY WITNESS RANZAU: 11 A. If that's one of the points that's on the com-12 puter system. 13 9. Uh-huh. And what would it do then? Just give 14 you numbers from minute to minute or something like 15 16 that? 17 BY WITNESS RANZAU: 18 A. It's a graph. 19 Q. A graph --20 BY WITNESS RANZAU: A. And it will show you what the particular point 21 22 has been doing for the time that you have requested. 23 0. You said "has been doing"? Is it sort of like 24 a recall kind of thing? 25

3-8

REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

S.W.

300 7TH STREET.

ALDERSON REPORTING COMPANY, INC.

16010
1	BY	WITNESS	RANZAU:
---	----	---------	---------

3-9

•

0

	2	A. No, it's Well, if you're going to trend
	3	it, it's not going to be what it has done that instant.
	4	You can't tell anything on a graph.
515	5	Let's say you want it for the next five
554-23	6	minutes, so you'll be able to follow that point from the
(202)	7	time you said you wanted it, until five minutes later.
2002	8	You'll have a graph of it.
χ, D.C.	9	You'll know whether it has increased, decreased,
NeTO	10	stayed the same.
VASHI	11	Q. It's like a chart recorder somewhat?
SINC.	12	BY WITNESS RANZAU:
BUILL	13	A. Yes.
CLERS.	14	Q. It's sort of a And then after that period
KEPOH	15	of time, is there any memory capability, or has that been
2.8	16	lost?
REE1.	17	BY WITNESS RANZAU:
IC HI	18	A. You can get a hard copy of that display, should
1 005	19	you so desire. You can also have it stored if you
	20	desire. Unless you have some reason to want it stored,
	21	you don't store it.
	22	Q. Uh-huh.
	23	BY WITNESS RANZAU:
	24	A because you can you can have historical
	25	data. We have that capability of having historical data.

3-10 Does it just -- It says, "displaying a full Q. 1 range of important plant paramet rs," does that mean 2 simultaneously or ... would there be more than one --3 there will be CRT's in this; is that right? 4 BY WITNESS RANZAU: 5 S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 Α. Right. 6 Will there be more than one, or just one? 0. 7 BY WITNESS RANZAU: 8 That has yet to be determined. More than likely, A. 9 we'll have a backup CRT for the SPDS. 10 Uh-huh. 0. 11 BY WITNESS RANZAU: 12 There is -- With the information that's A. 13 required, in order not to add confusion to the operator, 14 you don't want to put a lot of information on the CRT, 15 so you will have dedicated graphics for each of these 16 300 7TH STREET, different parameters -- a dedicated display, so to 17 speak, for each of these parameters that you put on the 18 19 SPDS. 20 So, essentially, you have duplication, but you 0. 21 have it all right there? 22 BY WITNESS RANZAU: 23 A. Right. Q. The purpose of this system is to get it all --24 25 the operators from having to go look other places, isn't

16012

it?

1

2

3-11

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

12

13

14

15

16

17

18

19

20

21

22

23

24

25

10	2.6	1.7	-	123	8.7	-	17	100	75	76	8.7	17	×	
B	1	W.	4	1	D.	E.	0	3	K.	A.	DV.	4	A	U
														100

:

A. Right. But you would have -- you could have like a chart of this information. If you wanted more detailed information, if you wanted to follow a trending on it, you could call up the particular page of your graphics on your SPDS and get this same information in a different form.

9 It all depends on how you have the system set
10 up.
11 Q. You haven't really -- It's kind of in the ...

I think you called it conceptual stage.

BY WITNESS RANZAU:

A. Yes.

- - -

BY MR. DOHERTY:

3-12

1

2

3

4

5

6

7

8

9

10

11

12

13

16

20024 (202) 554-2345

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

Q. The last sentence, it says, "will be capable of functioning properly in the environments that are present during transient accident conditions." Will there be any special sensors or special -- yes, special sensors -that are in the building for this system that ... BY WITNESS RANZAU:

A. No, the SPDS will be located in the control room.

Q. Uh-huh. Well, the last statement is what threw me a little bit. "Capable of functioning properly in the environments ..."

What environments? You're speaking about the control room environment? 14

BY WITNESS RANZAU: 15

A. Yes.

Okay. Now, is there a computer involved with Q. 17 this system? 18

BY WITNESS RANZAU: 19

A. Yes, there will be a computer-based system. 20 Q. Okay. Now what -- I'm trying to get an 21 idea what a computer might do in this system. Would it 22 take two -- two inputs and it may do a simple rapid long 23 division to provide some type of figure that's meaning-24 25 ful for --

3-13

1

2

3

4

5

6

7

8

9

10

11

12

13

25

I was thinking of some examples. I don't want to confuse you, but, for instance, could it calculate minimum critical power ratio and present it in the way that it's most familiarly seen? Is that the sort of thing it would do?

16015

BY WITNESS RANZAU:

A. It could. It all depends on how the system is set up, what the utility defines the system to do. Some -we've talked to several vendors. Some of them just have a simple system; others have just a whole gamut of things to -- you have the potential to confuse the operator because he has, you know, hundreds of pages of displays.

14 And that's really not the purpose of the SPDS.
15 Q. Will there be a ... like more than one screen
16 on this SPDS -- a duplicate somewhere like in the shift
17 supervisor's area?

18 BY WITNESS RANZAU:

A. No, there will be an SPDS CRT in the Technical
Support Center.

Q. In the Technical Support ... there is ...
essentially, the operator has it to help himself, right?
BY WITNESS RANZAU:

24 A. Right.

Q. -- to help themselves. But he doesn't have to

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

say, "Hey, Charlie, come in here and look at this" --1 3-14 from Technical Support? Technical Support can see what 2 he's doing? 3 BY WITNESS RANZAU: 4 A. Right. 5 20024 (202) 554 2345 0. Can Technical Support sort of take the thing 6 over and use it for themselves, or are they just bound 7 by what the operator does? 8 D.C. BY WITNESS RANZAU: 9 WASHINGTON. A. They're bound by what the operator has. They 10 have the capability of seeing another display on that. 11 They don't always have to look at the same thing he's BUILDING, 12 looking at. 13 , REPORTERS 0. Uh-huh. 14 BY WITNESS RANZAU: 15 A. They have the capability of looking at all of 16 S.W. 300 7TH STREET, the displays. If the operator in the main control room 17 wants to leave the display on a particular one, and the 18 19 Technical Support Center wants to see what other displays 20 are available --21 Q. -- they can do that? 22 BY WITNESS RANZAU: 23 A. -- they can do that, yes. 24 But the operating position dominates the 0. 25 SPDS?

0

5

.

				16017
BY WI	TNESS	RANZAU:		
	Α.	Yes.		
	Q.	Okay. Are there	any exceptions in th	e plans at
the m	oment	to Reg Guide l.	97?	
BY WI	INESS	RANZAU:		
	A.	Right now there'	s one, and it's BWR t	hermal
coupl	es wh	ich it's we'r	e bound by the decisi	on that's
made	on La	Salle with BWR t	thermal couples.	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
	Q.	Okay. Tell us a	little more about th	at, what
that	is.			
BY WI	TNESS	RANZAU:		
	А.	We did not want	to provide BWR therma	l couples.
	Q.	What are BWR the	rmal couples?	1.
BY WI	TNESS	RANZAU:		
1	A,	What are BWR the	rmal couples?	
	Q.	Jh-huh.		

BY WITNESS RANZAU: 17

BWR thermal couples measure the -- they're used 18 A. 19 to measure the heat in the reactor, as well as help in 20 reactor water level.

21 We felt like that there was enough instrumentation available to give an accurate reading on this, without 22 23 adding BWR thermal couples.

24 They really don't add anything on a BWR; it's more for pressurized water reactors that they're necessary. 25

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

3-15

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

3-16

1

2

3

4

5

6

7

8

9

10

11

12

13

17

554-2345

(202)

20024

D.C.

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

Q. The Reg Guide requires them though at the moment?

momente.

BY WITNESS RANZAU:

A. Yes. And it was the contention in our -- when we submitted our TMI amendment, and we agreed to abide by the decision that the NRC made on LaSalle, to provide them or not to provide them.

That decision has not been made.

Q. Okay. Now, in the -- in this system are there both ... uh ... or audible alarms; is that right -- some audible alarms?

BY WITNESS RANZAU:

A. Yes, there are audible alarms.

14 Q. And are there also panel-type alarms -- lights, 15 that type of thing?

16 BY WITNESS RANZAU:

A. Yes.

JUDGE LINENBERGER: Excuse me, Mr. Doherty, but you said "in this system." Now, in order to follow your discussion, I would like to know more explicitly which system you're talking about.

MR. DOHERTY: Okay. I'm sorry, I entirely
misused the words. I really meant in the control room,
not particular systems, since there are many systems with
instrumentation in the control room. I'm sorry.

BY MR. DOHERTY:

1

4

5

6

7

8

12

13

20024 (202) 554-2345

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

3-17

Q. Is there any way to acknowledge the alarm without 2 consulting the panel itself first? 3

BY WITNESS RANZAU:

A. Yes, there's a silence button on the panel -to silence the horn. Then the alarm will -- The alarm light has already lit up, and it's flashing. And when the acknowledge button is hit, the flashing stops, and the alarm light stays on until it clears. 9

Q. An alarm light stays on, so : silent --10 BY WITNESS RANZAU: 11

> A. The silence button silences the horn. 0. Uh-huh.

BY WITNESS RANZAU: 14

A. And the horn can be silenced anywhere in the 15 control room. However, the annunciator window cannot 16 be acknowledged except at that particular panel that the 17 alarm light is flashing at. 18

0. So that in a situation where there's an alarm, 19 someone shuts it off because it's loud or whatever, and 20 then another alarm goes on, there's still some record 21 22 left?

23 BY WITNESS RANZAU:

Right. The light is still flashing. 24 A. 25 The light still flashes --0.

.

1

3-18		1	BY WITNESS RANZAU:
۲		2	A on that particular panel.
		3	Q. Okay. I think a while back you spoke about
•		4	hierarchization of different things. Is there a
	45	5	hierarchization of alarms at all?
	554-23	6	BY WITNESS RANZAU:
	(202)	7	A. Yes.
	20024	8	Q. Is that done Is that with the audible
	. D.C.	9	alarms?
	IGTON	10	BY WITNESS RANZAU:
	ASHIN	11	A. All of the alarms are audible alarms.
	NG, W	12	Q. Uh-huh. But is Let's say a minor alarm
•	UILDI	13	rings something fairly small. And then a few moments
	ERS B	14	later, a major alarm rings. Would anyone be able to
	EPORI	15	determine that from the audibles?
	.w. R	16	BY WITNESS RANZAU:
	EET, S	17	A. Not from the horn itself. On the NSSS the
	H STR	18	lights are color coded. We have yellow and red and
	LL 00	19	white. Red is the most severe, and then yellow, and then
	n	20	white is just your general windows.
		21	Q. Okay. White is general windows. What's
0		22	yellow?
		23	BY WITNESS RANZAU:
0		24	A. It's just an in between. That's just a second
		25	level of alarms.

3-19	1	Q. Okay.
•	2	BY WITNESS RANZAU:
	3	A. They're less severe than the
•	4	Q. So there's two levels of visual alarms: red
345	5	alarm, yellow alarm?
) 554.2	6	BY WITNESS RANZAU:
4 (202	7	A. And white, yes.
2002	8	Q. There's a white alarm also?
N. D.C	9	BY WITNESS RANZAU:
NGTO	10	A. Well, all the almost of the windows in the
WASHI	11	control room are white alarms just general alarms,
OING.	12	general status alarms.
• III	13	Red An example of a red one is a reactor
ULERS	14	scram, depending on whatever division it is.
REPOI	15	Q. Okay. And then We're just speaking of
S.W.	16	alarm panels, some sort of thing that says "Alarm," right?
REET.	17	It's either nothing, white, yellow or red; is that
Th ST	18	correct? Or have I got one too many colors?
300.7	19	BY WITNESS RANZAU:
	20	A. No, all of the windows are white, with the
	21	exception of the red ones and the yellow ones.
•	22	Q. Uh-huh.
	23	BY WITNESS RANZAU:
•	24	A. They all
	25	Q. Is that normal lighting? Is that just normal

3-20			
		1	lighting you're describing?
•		2	BY WITNESS RANZAU:
		3	A. Yes. They don't have any lighting
•		4	There's no lighting on them when they're not in an alarm
	0	5	condition.
	54 234	6	Q. Okay.
	202) 5	7	BY WITNESS RANZAU:
	20024 (8	A. If there is an alarm if one of them alarms,
	D.C. 2	9	a white will flash white. It normally is almost a
	NOL9	0	clear. One that's in the steady state.
	ASHIN	1	The red flashes red, and the yellow flashes
	N0, W	2	yellow.
•	ICTED 1	3	Q Well, are there three locations, sort of like
	ERS B	4	a street light; or do you have three different colors
	1 ISORI	5	possible from one panel?
	ж. 1 Н	6	BY WITNESS RANZAU:
	EET, s	7	A. The only panel that has the three colors on
	I STRI	8	it is the primary operator's console.
	112 00	9	Q. Okay. That tells me where this might occur,
	2	0	but then what I'm trying to find out is do you attempt
	2	1	to alarm visually alarm from the same window, or do you
	2	2	use more than one?
	2	3	BY WITNESS RANZAU:
	2	4	A. Oh, there's 1500 annunciator windows in the
	2	5	control room,

3-21	1	Q Let's focus on one one thing that must be
•	2	alarmed. Let's say neutron flux, all right?
	3	Okay. Do you have three separate places where any
•	4	bulb may light; or do you have one place where any
15	5	three bulbs might light?
554.23	6	BY WITNESS RANZAU:
(202)	7	A. There is one window dedicated to neutron flux.
20024	8	And that will only alarm in that location.
t, D.C.	9	Q All right. And would only alarm would it
AOT DN	10	alarm in three colors in that location, depending on
VASHIP	11	the significance of the alarm or
ING, W	12	BY WITNESS RANZAU:
BUILD	13	A. No.
TERS 1	14	
REPOR	15	
S.W. 1	16	
ter.	17	
H STF	18	
300 71	19	
	20	
	21	
•	22	
	23	
	24	
	25	

BY MR. DOHERTY:

Q -- would it be like -- I'll have to demon-2 strate this.

Next to it will be the white light, and then 4 next to that will be the yellow light, and next to that 5 will be the red light? Is that how it will be? 6 BY WITNESS RANZAU: 7

A. No. There's glass that has the engraving on 8 these annunciator windows. 9

0. Uh-huh.

BY WITNESS RANZAU:

A. The glass is either red, yellow or white. 12 Q. So then you'd have three windows, right? 13 BY WITNESS RANZAU: 14

A. No, it's not the severity of the alarm. It's --15 These alarms that are colored are dedicated. They'll 16 always flash red, or always flash white, or always flash 17 vellow. There's no --18

Q. So neutron flux is always red? Is that what 19 20 you said?

21 BY WITNESS RANZAU:

22 A. It could be. I --

23 0. It could be?

24 BY WITNESS RANZAU:

25 A. I don't know what color the window is.

ALDERSON REPORTING COMPANY, INC.

20024 (202) 554 2345 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

10

11

3-22

1

3

3-23	1	Q. Okay. But you know
•	2	BY WITNESS RANZAU:
	3	A. It could be red, and if it comes on, it will
•	4	always flash red, because it's something you want to get
	g 5	the operator's attention with.
1	6	Q. So then a decision has been made that any
	7 7	neutron flux problems are major, and you want a red alarm;
- 04000	8	is that it?
	9	BY WITNESS RANZAU:
	10	A. That's possible, yes. If that is the criteria
and a start	11	General Electric set up.
1	12	Q. Then that's the way it would be?
•	13	BY WITNESS RANZAU:
1 2021	14	A. Then that's the way it would be done, yes.
avaa	15	Q. Okay. The printer now, I want to ask a
	16	question about the speed at which the printer responds.
1.13	17	It's hard to do.
ars a	18	How rapidly will printout begin well, I
100	19	guess we'll have to start with an event. We'll say there
	20	is an event, for which the printer is programmed to
	21	take note of.
•	22	How rapidly will it begin, once that's noted?
	23	Do you have any idea?
•	24	BY WITNESS RANZAU:
	25	A. It's immediate response.

3 - 2 4	1	Q. And is this what they call a buffered system	n
•	2	at all?	
	3	BY WITNESS RANZAU:	
•	4	A. I don't know what you mean by "buffered."	
45	5	Q. Okay. Can it keep going while other input i	LS
554 23	6	coming in?	
(202)	7	BY WITNESS RANZAU:	
20024	8	A. There's some confusio. here. There are	
D.C.	9	There's a line printer	
GTON	10	Q. Yes.	
ASHIN	11	BY WITNESS RANZAU:	
NG, W	12	A as well as what we call Terminet typer.	
	13	Terminet is a brand name from General Electric.	
ERS B	14	The line printer is dedicated to print. It	can
EPORT	15	print out long volumes of things, whereas the Terminet	:
W. R	16	printers are for basically scanning logging and alarmi	.ng.
EET, S	17	If you have an alarm point that comes in, it	E.
A STRI	18	will automatically be printed out on the Terminet	
00 TTI	19	typer to get a hard copy of this alarm, so that you ca	in
c,	20	go back and check the Terminet typer to see when a par	ti-
	21	cular alarm point came in.	
	22	Q. Okay. Well, what about a situation where	
	23	there's several alarms, all very close together in	
0	24	time. How will that be handled?	
-	25	111	

ALDERSON REPORTING COMPANY, INC.

1	CO	53	
-	00	4	1

3 - 2 5		
	1	BY WITNESS RANZAU:
۲	2	A. They're stored, and they print out in time
	3	order.
•	4	Q. So there's
	5	BY WITNESS RANZAU:
554 23	6	A. I mean, the computer memory keeps the alarm
(202)	7	keeps these points, and it's printed out, including the
20024	8	time that it occurs and the order that they've occurred
, D.C.	9	in.
GTON	10	Q. Uh-huh. How fast is this Did you call it
VSHD	11	a Printnet? No
NG, W	12	BY WITNESS RANZAU:
•	13	A. Terminet.
TERS :	14	Q. Terminet. How rapidly does it type, thinking
EPOR	15	of it as a typist for a minute?
W. B	16	BY WITNESS RANZAU:
EET, S	17	A. I believe it's 1200 words.
H STR	18	Q. Okay.
17 008	19	BY WITNESS RANZAU:
	20	A. 1200 words a minute.
	21	Q. Okay. And are most of the messages that are
0	22	Well yeah.
	23	Does this Terminet have a series of messages
	24	that are put in essentially in its own memory that
	25	essentially are activated if certain things occur?

BY WITNESS RANZAU:

3-26

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

20024 (202) 554-2345

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

A. No, the Terminet is just programmed to print out the time that the alarm occurred, or time the event occurred, and what point -- the point number and what the point is, whether it's Point 123, it's a neutron flux. It prints out the time that occurred and the point.

Q. Short messages?

BY WITNESS RANZAU:

A. Yes. The same message that's printed on the annunciator window.

Q. Okay. Do you know -- What is a legend switch cover?

BY WITNESS RANZAU:

A. A legend switch cover -- the General Electric control room design, they have -- their nameplates are used to go around the switch. And that -- it just has the nameplate engraving on the -- for the switch, as well as the controls for the switch where it's stop or start, or close/open.

21 Q. Uh-huh. Can those be interchanged by error 22 or ... with others?

23 BY WITNESS RANZAU:

A. They won't come off. They're attached to the
panel, once the switch is put in place.

1	6	n	2	0
-		2.0	~	. 1

3-27			
5		1	Q. They're not removable? Is that what you're
		2	saying?
		3	BY WITNESS RANZAU:
•		4	A. Not easily removable.
	42	5	Q. Okay. I didn't mean to
	554-23	6	Have you done a Control Room Design Review
	(202)	7	Report? Is that one of the reports you've done at this
	20024	8	point, or is that a final thing?
	, D.C.	9	BY WITNESS RANZAU:
	101.51	0	A. The Control Room Jesign Report is not finalized.
	AIHSA/	1	Q. Uh-huh. Does it have to be finalized much
	8 10 11	2	later or
0	1	3	BY WITNESS RANZAU:
	LERS 1	4	A. No, what it is is it's the report if I'm
	EPOR.	5	thinking of the same thing you're talking about is
	¥ 3	6	the report done by the Control Room Survey Team.
		7	And the discipline engineers responsible,
	H STR	8	including myself, have to write up the response to the
	11 000	9	contentions in this report. And then it's submitted to the
	2	0	NRC.
	2	1	Q. Is that the report you were discussing while
0	2	2	ago as sort of in progress, what you're currently
	2	3	BY WITNESS RANZAU:
0	2	4	A. Yes.
	2	5	Q. Okay. I asked you about perceptual motor

channels yesterday. And on NUREG-0659 on Page B.25 --3-28 1 if you want to look at that a minute -- I think we'll 2 be through in a few more minutes. 3 (Pause.) 4 It states here, if I may read: "Caution should 5 20024 (202) 554-2345 be used in that a 75% loading on each perceptual motor 6 channel is not equivalent to an overall 75% loading." 7 Was that part of your review -- the review of 8 D.C. the facility? 9 REPORTERS BUILDING, WASHINGTON, BY WITNESS RANZAU: 10 A. No, that was just done by General Electric 11 in the allocation of functions and task analysis. 12 Q. Okay. 13 14 BY WITNESS RANZAU: -- in the design. 15 A. So GE allocated the functions. Did you --16 0. 300 7TH STREET, S.W. You did the verification; is that correct? 17 BY WITNESS RANZAU: 18 A. Some of the verification. We are -- It was 19 done, and we went back and did it primarily on the 20 balance-of-plant systems, which are not part of General 21 22 Electric's scope. We wanted to verify that what General Electric --23 what we had done agreed with what General Electric had 24 25 done.

ALDERSON REPORTING COMPANY, INC.

16030

		Q. Uh-huh. Mr. Robertson, I'd like to ask you a
	1	question about balance-of-plant.
	2	I gather that's not the containment. What also
	3	i gather that's not the containment. What else
	4	would be involved in that, so we can get an idea of
10	5	how extensive this part of the control room would be?
54-234	6	What else What are the systems that would be
02) 5	7	involved in that that are not
024 (2	,	BY WITNESS ROBERTSON:
.C. 20	8	A. Containment is part of the balance.
ON, D	9	Q. Yes, that's what I meant to imply. What else?
INCLO	10	BY WITNESS ROBERTSON.
MASH	11	or writebook.
ING.	12	A. What else would be?
CHD	13	Q. Uh-huh. Just real quickly.
ERS B	14	BY WITNESS ROBERTSON:
PORT	15	A. Are you talking about systems now, or are you
. , RE	16	talking about instrumentation?
L. S.W	17	Q. Systems.
TREE	10	BY WITNESS ROBERTSON:
SHU	10	A. Systems. Okay.
300	19	Essentially everything outside of primary
	20	awater That means the everywhere that as the
	21	system. That means the everywhere that - the
	22	core, the pressure vessel, piping, control mechanisms,
	23	and the instrumentation and controls necessary to
	24	actually control that primary system.
	25	All of those fall under GE's scope. GE also

ALDERSON REPORTING COMPANY, INC.

0 •

3-29

0

.

3-30

1

2

3

4

5

6

7

8

9

10

11

20024 (202) 554-2345

S.W., REPORTERS BUILDING, WASHINGTON, D.C.

300 7TH STREET,

25

identifies the structural envelope -- for example, if there must be a drywell and so forth.

Ebasco has the balance of plant ... will pick up and design the actual structure, in terms of reinforcing concrete, etc., etc.

They will also pick up all of those systems which support the primary system. And -- for example, a waste treatment system would be totally outside of GE's scope in this case.

The containment, the isolation valves that isolate it ... those would be in balance-of-plant scope.

The -- Internally you'd pick up such things as we talked about yesterday ... hydrogen recombiners, containment cooling mechanisms would be belance-ofplant.

16 All of those functions that are not -- or all 17 of those systems that are not directly tied to the 18 function of the primary system fall under BOP.

19 Q. What about the safety systems? Those would be 20 General Electric, wouldn't they? The emergency core 21 cooling system --

22 BY WITNESS ROBERTSON:

A. In this particular case those are BOP systems,
24 yes.

Q. Those are BOP?

DV	WTTN	FCC	DC	DET	TTC	CON	
10 1	14 7 7 74	100	22.0		1. 1.	DUN	

3-31

1

2

3

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

	Α.	I'm	sorry.	Those	are	not	BOP.	Those	are	pri-
mary	syste	, m	yes.							

Q. Uh-huh, okay. Now, was it your understanding,
Ms. Ranzau, that General Electric worked on developing
this system on the basis of not overloading perceptual
motor channels beyond this 75% limit?
DV NTENECC DANGAN.
BI WITNESS RANZAU:
A. Yes.
Q. Uh-huh. What is the color cyan, c-y-a-n?
BY WITNESS RANZAU:
A. It's a light blue.
Q. Uh-huh. I suspected that.
RY WITNESS RANZALL.
DI WIINLOO RAWARO.
A. Abo the color of the Reg Guide or the
NUREG rather.
MR. DOHERTY: I need just a couple of minutes
to run through a couple of things. I shouldn't be
long.
MR. POWELL: I thought the cyan question was the
wrapup question.
MR. DOHERTY: It might well be.
(Pause.)
111
111

4 - 1ged 1 0. There was one other question and that came from page 054 of the PSAR. It was part of Amendment 57, so we 2 3 shouldn't have any problem with that, but it states, "The 4 accident monitoring panel and ESF status panel contain 5 specifics of the general inf_rmation displayed on the front 20024 (202) 554 2345 6 row panels. For example, the back row post-accident 7 monitoring panel displays five localized suppression pool 8 temperatures and bulk suppression pool temperature, and the REPORTERS BUILDING, WASHINGTON, D.C. 9 front row panel displays the same bulk suppression pool 10 temperature." 11 Would the same be true of the power range 12 monitors? Would the average power range monitors be 13 available to the operator at the horseshoe station, and 14 the individual monitors be back-paneled; would you know? 15 BY WITNESS RANZAU: S.W. 16 They are not back-paneled. Α. 100 7TH STREET, 17 Well, this description here, wherever they would Ö. 18 be, some other place? They wouldn't all be there, would 19 they? 20 BY WITNESS RANZAU: 21 The instrumentation is located in a cabinet in --Α. 22 on one of the back row floor sections; whereas the 23 instrumentation itself is in the horseshoe area on the 24

25 Operhaps you misspoke. Did you say the instrumentation was in two places there?

	25.27	1.1.1	125 8.7.3	15 65 65	P 3.	8.2 17 3	ATT .
- 1 - 1	BI	W 1	1 1 1 1	622	- P. P.	N 61	20.3

4-2

D.C.

WASHINGTON.

REPORTERS BUILDING.

S.W. .

100 7TH STREET.

18

21

25

A. No. The displays are in the horseshoe area. The
3 signal is sent to a determination cabinet where it comes
4 in from the field.

5 Q. Okay, and this is --

6 BY WITNESS RANZAU:

7 A. NSSS instrumentation that -- switches, that kind
8 of instrumentation are located in the cabinet.

9 Q. Is this the same type of situation where highly 10 detailed situation is put perhaps slightly of ' to the side 11 and the basic information is put at the front? 12 BY WITNESS RANZAW:

A. It's not off to the side. It's right in front
 of the operator on the primary operator's console, 680.
 Q. Okay, so power range monitors are not dealt with
 as are the localized bulk suppression pool temperatures?
 DV WITHERS RANZAU.

BY WITNESS RANZAU:

A. No, it's completely different.

It's a different situation for that.

20 BY WITNESS RANZAU:

A. Right.

22 Q. Does this correctly describe the suppression 23 pool temperature, to your knowledge?

24 BY WITNESS RANZAU:

A. Yes.

	1	MR. DOHERTY: Your Honor, I have no further
	2	questions. Thank you very much.
	3	JUDGE WOLFE: Redirect, Mr. Powell?
	4	MR. POWELL: No, Your Honor.
345	5	JUDGE WOLFE: Board questions?
554.2	6	JUDGE CHEATUM: I have one juestion
4 (202	7	BOARD EXAMINATION
2002	8	BY JUDGE CHEATUM:
N, D.C	9	Q. In describing the allocation of function between
INGTO	10	operator and machine, this, I assume, you have explained,
WASH	11	is done in order to implement what is determined as what
JING.	12	is the best function.
BUILI	13	In other words, what operation or manipulation
REERS	14	is better done by a machine than by a man, by the operator?
AEPOI	15	BY WITNESS RANZAU:
S.W. ,	6	A. Yes.
REET,	17	Q. The question of whether or not the operator can
TH ST	18	override any of these functions which are handled by the
300.7	19	machine as a result of whatever judgment he exercises is
	20	not answered in your testimony, and I would just ask you
	21	that now.
	22	May an operator override any or all of these
	23	machine functions?
	24	BY WITNESS RANZAU:
	25	A. Not to my knowledge, until in an accident

4-3

•

-

condition, the concept of the NUCLENET is nothing is done
 for the first 30 minutes. The operator does not have to
 involve himself in controlling the plant 1. the first 30
 minutes, and then he takes manual action.

As far as overriding the functions, there are
none that I know of that he can override, if they have been
allocated to the machine.

8 Q. A control function, once it's been allocated to 9 the machine, can't be overridden by the operator for the 10 first 30 minutes, at least?

11 BY WITNESS RANZAU:

4 - 4

D.C.

WASHINGTON

PEPPORTERS BUILDING.

W.

Ň

STREET.

HIL

3400

12 A. Right.

13 Q. But after that?

14 BY WITNESS RANZAU:

15 A. I don't believe there are any that he can even 16 override after that.

17 To my knowledge, that's in the logic of the 18 General Electric NSSS systems.

19 0. Am I to understand, then, a machine implementation 20 of the emergency core cooling system supplying water to 21 cool the core couldn't be switched off by the operator as 22 apparently happened in TMI-2?

23 BY WITNESS RANZAU:

A. No. Once the system is initiated, it has to
complete its cycle. There's no stopping in midstream, so

to speak.

1

20024 (202) 554-2345

D.C.

REPORTERS BUILDING, WASHINGTON,

100 7TH STREFT, S.W.

4-5

There are certain things that the operator -certain values he has to close or certain values he has to
open, switches he has to turn to perform the task; but the
rest of it is automatic.

6 There's logic built into the system. If the 7 operator should accidentally do something that he's not 8 supposed to do, like there's -- scramming the reactor, you 9 have to scram two channels of the reactor.

He can scram one of them, but he won't scram the reactor completely. He'll just have a half scram.

12 It's an inadvertent operation. There's a time 13 delay on some of the instrumentation that if he doesn't do 14 the next thing within that time period, nothing happens. 15 There's just kind of fail-safes built into the 16 system.

17 Q. This is on the assumption, then, that the

18 machine operated safety system is infallible and nothing 19 can be done about it.

If it isn't infallible, in other words, the judgment of the operator can't be used on those operations which are machine operated.

23 BY WITNESS RANZAU:

24 A. Yes, they are designed to fail-safe and the 25 operator cannot intervence.

JUDGE CHEATUM: I guess that tells me what
 I wanted to know.

4-6

D.C.

900 7TH STREET, S.W., REPORTERS BUILDING, VASHINGTON,

3 WITNESS FOBERTSON: Excuse me. Can I clarify 4 something just a slight amount here?

I think we're talking about the difference
between a signal that is generated causing something to
happen versus whether the operator can interrupt that
signal.

9 I believe that's what we're talking about. For 10 example, if there's a certain set of signals coming in to 11 tell the reactor to scram, the operator cannot interrupt 12 that scram signal.

13 If there's a certain set of signals that come 14 in to tell the emergency core cooling system to come on, 15 it is going to come on.

That does not mean the operator can't shut a motor off or a pump off to affect that operation, but he cannot affect -- I believe what was intended to convey here was that you cannot interrupt that signal set.

That's been allocated to a machine to get -- as part of the automatic initiation; but that there are ways to turn a pump off that has come on within that first 30 minutes, but not to interrupt directly and allow the operator to prevent that signal from coming in.

ALDERSON REPORTING COMPANY, INC.

He can't blind-side that pump ahead of time.

JUDGE CHEATUM: Okay. That really answers the concern that I was feeling, that everything wasn't in the hands of a machine.

WITNESS RANZAU: No.

JUDGE CHEATUM: An operator could modify, at least, and perhaps even shut off an action which has been taken mechanically, if he judged that was the thing to do. BY JUDGE CHEATUM:

9 Q. There may not be much point in asking this 10 question, but when Mr. Doherty early on, Ms. Ranzau, asked 11 you whether you were going to follow up the function, the 12 experience in panels at Susquehanna and Clinton plants, 13 you said that you had been following it to date, anyway, 14 been watching the progress of that to date.

I would assume there might be something learned once they were installed and operating which might be useful to ACNGS before ACNGS actually used its own panel or panels.

18 Would you still be on the trail of Susquehanna 19 and Clinton panels, alert to any ideas they had out there 20 after they had started using them?

21 BY WITNESS RANZAU:

4-7

4

D.C.

REPORTERS BUILDING, WASHINGTON.

300 7TH STREET, S.W.

25

A. Yes, that's one thing that we do in the utility is we keep in touch with the other utilities that have similar equipment that we have.

We have utilities call us. We call utilities,

160.41

and they are very willing to help us, pass on some 1 operating experience, pass on experience that they've had 2 with equipment that's failed, any kind of information that 3 we need. 4 We just call one of the other utilities that we 5 know has that, and they help us out. We make trips to the 6 utilities. 7 When Clinton gets installed, I'm sure that 8 several trips will be made to see how their NUCLENET is 9 10 operating. When it was on the floor in San Jose under 11 fabrication, we were out there. We watched them put it 12 together and, you know, became familiar with it. 13 14 It was the same way with Black Fox. We are quite familiar with the Black Fox operation, and it's 15 just a close-knit group with the utilities. 16 17 JUDGE CHEATUM: Fine, thank you. I have no 18 more questions. 19 BOARD EXAMINATION 20 BY JUDGE LINENBERGER: 21 Ms. Ranzau, in most of the preceding 0. 22 discussions where you have been talking about instruments, your remarks have been primarily directed to devices of 23 24 one sort or another located in the control room. 25 For the moment and for the purpose of my next

4 - 8

20024 (202) 554-2345

D.C.

WASHINGTON.

REPORTERS BUILDING.

S.W. .

000 7TH STREET.

question, I should like to broaden the term "instrument" 1 to mean everything that goes into a channel of 2 instrumentation, starting with a detector somewhere; 3 perhaps a pre-amplifier or cathcde follower cable driving 4 5 system; the transmission capability, whatever form it might take, COAX cable or whatever, that carries that 6 7 signal ultimately to the control room; perhaps some signal conditioning equipment somewhere that processes 8 9 that signal before it goes into a readout display of some sort; and finally, the readout itself in whatever form, 10 cathode ray, television screen, or recorder or direct 11 12 printout, whatever.

16042

Now, in the sense that what I have just described represents what I shall call a complete channel of instrumentation, does your job responsibility with the Applicant involve such a complete channel of instrumentation? BY WITNESS RANZAU:

A. Yes, it does.

4-9

D.C.

REPORTERS BUILDING, WASHINGTON,

300 7TH STREET, S.W.

18

19 Q. All right. Yesterday I suggested to you that 20 in my view of the scope of this TexPirg Contention 28, that 21 I viewed it as having essentially two parts to it, a 22 part that involved a question of whether or not the 23 channel of instrumentation represented the best choice of 24 hardware to provide an indication to the operator, as one 25 part; and as the second part, whether or not the control

room did indeed provide that information and present a 4 - 101 configuration of controls and displays that made the 2 control room as harmonious as possible with the operation of 3 an operator. 4 Now, I made that interpretation of the contention. 5 20024 (202) 554 2345 Do you agree with that two-part parsing of the contention 6 or not? 7 MR. POWELL: Mr. Chairman, I appreciate 8 D.C. Judge Linenberger's question, but I would like to state 9 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, the manner in which the contention has been defined for 10 the purposes of this testimony, which I do not think goes 11 to the question that Judge Linenberger has. 12 JUDGE WOLFE: Defined by whom? 13 MR. POWELL: It was defined through the process 14 of discovery, through the process of interrogatories. 15 JUDGE WOLFE: Addressed to Mr. Doherty? 16 MR. POWELL: Addressed to TexPirg, Your Honor. 17 JUDGE WOLFE: Excuse me, to TexPirg? 18 MR. POWELL: Yes, sir, and which would give a 19 different interpretation of the contention than that which 20 21 Judge Linenberger has given. My point in raising that is that the scope, I 22 believe, of his question goes considerably beyond what 23 through the process of discovery we've narrowed the 24 25 contention down to.

I just would like to point that out.

2 JUDGE WOLFE: All right, so you've pointed it 3 out. Now --

MR. POWELL: Well, I don't want to get in the
business of testifying. I have further views that it may
not be proper to express.

JUDGE WOLFE: Yes. Well, as a rule, we do not read interrogatories, depositions and what have you until they are really brought to our attention. So we don't scope contentions by those means, but that may well be so; but I think what you're indicating -- you're just indicating what TexPirg's scope of the contention to be, and you make no other suggestions along this line.

All right.

4 - 11

1

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

14

18

25

MR. POWELL: We prepared in that direction, and so where Judge Linenberger wants to lead us from there, I haven't yet discovered a way to control that.

(Laughter.)

19 JUDGE LINENBERGER: I think you have discovered 20 it.

21 Well, your comments notwithstanding, I should 22 still like to ask the witness to answer my last question. 23 WITNESS RANZAU: No, sir, I don't agree with the 24 way you've broken it down.

300 77H STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

4-12 1 BY JUDGE LINENBERGER:

2	Q. All right. So what you're saying is that
3	so far as the scope of this contention is concerned, you
4	do not consider that it involves a judgment with respect
5	to let me just pull a for instance out of the air.
6	You do not consider that it involves a judgment
7	with respect to, for example, what is the best kind of
8	hydrogen concentration detector to use; is that an example
9	of what you think is outside the scope of this contention
10	as you addressed it?
11	BY WITNESS RANZAU:
12	A. Yes, sir, I do.
13	Q. Nor what kind of signal conditioning equipment,
14	for example, stands between the detector and the
15	oscilloscope to assure that the oscilloscope shows
16	something that's reasonably meaningful to the operator?
17	BY WITNESS RANZAU:
18	A. Yes, sir.
19	~ ~ ~
20	
21	
22	
23	
24	
25	

	1	Q. Okay, because I certainly do not want to fly in
	2	the face of Mr. Powell's concern here unnecessarily.
	3	(Laughter.)
	4	MR. POWELL: Your Honor, I knew the other
345	5	shoe would drop there.
554.2	6	BY JUDGE LINENBERGER:
1 (202)	7	Q. Okay. So not to beat Powell unmercifully here,
2002	8	but to confirm, you really were not looking at from a
N, D.C.	9	technical performance point of view what kinds of hardware
NGTO	10	was needed to get information to the control room; is that
WASHI	11	a fair statement?
HNG.	12	BY WITNESS RANZAU:
BUILT	13	A. Yes, sir, it is.
TERS	14	Q. Okay. Do you happen to know whether any
REPOR	15	human factors kinds of considerations went into the
S.W.	16	design layout and configuration of the TMI-2 control room?
REFT.	17	BY WITNESS RANZAU:
TH STI	18	A. No, sir, I don't.
300.7	19	Q. Okay. Does the Applicant have the option to
	20	override or reject any significant aspect of General
	21	Electric's proposed control room design and layout?
	22	BY WITNESS RANZAU:
	23	A. We have the ability to make suggestions and
	24	recommendations on changes we would like to see on the
	25	NSSS portion of it.

4 - 1.3

.

.
	1	As far as implementation, I don't know whether
	2	General Electric would accept what we suggested or not.
	3	We will be in that phase in another six months.
	4	Q. So my question is perhaps premature at this time,
345	5	you say?
554-23	6	BY WITNESS RANZAU:
(202)	7	A. Yes.
20024	8	Q. All right.
, D.C.	9	BY WITNESS RANZAU:
UILDING, WASHINGTON,	10	A. We have some changes that we would like to see
	11	made on the NSSS portions of the panel. We have also made
	12	changes on the balance of plant panels, which we've done
	13	that with Ebasco and have had no problem with that.
CERS 1	14	General Electric, because we're not the only
EPORI	15	BWR-6 that has bought this system, will be a bit more
.W., R	16	difficult to get the changes made.
EET, S	17	Q. You mentioned earlier some BWR thermal couples
H STR	18	that Applicant was not entirely fond of, and that in part
LL 008	19	caused me to probe you a little bit about selection of
	20	detectors or that sort of thing.
	21	Now, the difference well, let me be sure I
	22	understand something here.
	23	I gather from something you said that as a
	24	result of its experience with the La Salle plant, that the
	25	Staff had taken a position with respect to certain aspects

4-14

•

•

•





1 organization, formatting and tabbing, whatever, how or 2 whether it is any way going to be coordinated with the 3 evolving control room design?

4 Is that an understandable question or do I --5 would some for instances help?

6 BY WITNESS RANZAU:

4-17

D.C.

000 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

7

8

A. If you would add a for instance, I think that might make it a little bit cleaser for me.

9 Q. Okay. Let's just say by for instance -- I pull 10 this out of the air so I'm not sure how good it is, but 11 we were just talking about thermal couples.

Let's say that an operator, not a technical support man, but an operator himself, things are going along smoothly, but he sees little twitches here and there and he turns to one of the visual displays and calls up a profile of some sort of core thermal couple readings to get a picture of the temperature along a fuel bundle or across the core or something.

He says to himself, well, this -- we may be working that region or that zone of the core a little harder than we need to. Everything is all right, but I think I can improve things a little bit by maybe some adjustment of rod patterns.

24 Now, let me think, he says, rod patterns, rod 25 patterns, core temperature. Where do I look in the

procedures manual to decide what I want to do. 1 Now, the kind of coordination of development 2 here between control room and procedures manual that I'm 3 talking about is that either the control room information 4 will be labeled in a way that keys into the procedures 5 20024 (202) 554-2345 manual or vice versa, so that if an operator wants to 6 understand how to adjust a little the temperature readings 7 in the core, he knows where to go in the procedures 8 D.C. 9 manual. WASHINGTON. He doesn't have to go to the index and look up 10 thermal couples or core temperature profile or something. 11 REPORTERS BUILDING. It's pretty straightforward where on this long shelf of 12 13 procedures he might start to look. 14 That's the kind of thing I'm talking about with respect to coordinating control room functions and 15 S.W. . 16 procedure manual development. 300 7TH STREET, 17 Now, I'm asking you, are people such as yourself 18 having an input into this? Are you thinking about this, 19 or is it something that hasn't come to your attention yet? 20 BY WITNESS RANZAU. 21 it really hasn't come to my attention yet. The A. 22 only experience that I've had with emergency procedures

4 - 18

23

24

25

are the ones that are being written on the South Texas Project, and our operators are writing those procedures. It's staying strictly with that group, and I

would imagine that's the way it would be done on Allens 1 Creek unless we requested otherwise. 2 Well, the emergency procedures are sort of 3 Ö. high visibility things, so they may well tend to fall into 3 5 place pretty well. 20024 (202) 554-2345 But I was thinking more of the not such high 6 visibility things, such as the example I gave you. 7 8 Okay, let's move on. D.C. What do you in your position and your 9 S.W., REPORTERS BUILDING, WASHINGTON, responsibilities with the Applicant, what does the -- what 10 do the tech specs mean to you, or what do you anticipate 11 they will mean to you when they are written and finalized? 12 13 BY WITNESS RANZAU: In my position on this contention or my 14 Α. 15 position within Houston Lighting & Power? I consider them related, but for now let's say 16 0. 000 TTH STREET, in your position, your professional position, leaving for 17 18 the moment the contention out of it. 19 BY WITNESS RANZAU: We review the tech specs to see what the 20 A. requirements are and make sure that our areas of 21 responsibility comply with the tech specs as we have them 22 23 right now. 24 We have the general BWR-6 tech specs available. 25 Is it conceivable that a technical specification Ö.

4 - 19

would place a functional requirement on some channel of 1 instrumentation that as currently visaged could not be 2 met, so that there would be some conflict between tech 3 spec requirements and what the control room end of things 4 5 can accomplish? 20024 (202) 554-2345 6 BY WITNESS RANZAU: 7 Yes, there could be. A. Now, as you view things -- well, in the first 8 0. D.C. 9 place, have you ever run, so far, into such a conflict? REPORTERS BUILDING, WASHINGTON, 10 BY WITNESS RANZAU: 11 Not yet. A. 12 Not yet, and what would be your course of action, 0. 13 do you think, if you did run into a conflict? 14 By that I mean would you say to yourself, well, 15 this represents the instrument capability. The tech S.W. . 16 specs have got to give; or would you say to yourself, gee, 300 7TH STREET, 17 the tech specs are overriding. We'd better get GE to 18 modify the instrumentation. 19 How would you proceed based on a conflict 20 between what the tech specs asked for and what you perceive 21 that the control room can provide? 22 BY WITNESS RANZAU: 23 Okay. We would evaluate both the tech specs, Α. 24 as well as what -- the instrument that we have, and then 25 if we could make a decision, we would, after discussing it

4 - 20

with both Ebasco and General Electric to find out, you 4-21 1 know, why the two do not agree, whether it's a misunder-2 standing on our part, whether there's a requirement in 3 there that maybe is stricter than what it has to be, or 4 that maybe the instrument needs to be modified or another 5 20024 (202) 554-2345 type of instrument bought. 6 We would evaluate all possibilities. 7 Is that kind of review process going on right 0. 8 D.C. now? 9 WASHINGTON, BY WITNESS RANZAU: 10 11 Yes, it is. Α. REPORTERS BUILDING. Separate and apart from the intrinsic 12 0. importance and merit of the tech specs, you in the prefiled 13 testimony you've adopted discussed a safety parameter 14 display system, and you indicated at the top of page 17 15 that that system will "also indicate when plant parameters S.W. . 16 are approaching or exceeding process limits." 300 7TH STREET. 17 Are the tech specs the source of those "process 18 limits" that you've referred to there? 19 20 BY WITNESS RANZAU: They will be one source of the process limits. 21 Α. So in terms of making the safety parameter 22 0. display system functional and useful, presumably there will 23 have to be some input from tech specs into that system? 24 25

	-		
-	-	-	

20024 (202) 554-2345

D.C.

REFORTERS BUILDING, WASHINGTON,

100 7TH STREET, S.W. .

22

9

1 BY WITNESS RANZAU:

A. Yes, sir.

3 Q. You've discussed a horseshoe array of panels
4 at which the operator will be located as he controls the
5 plant.

6 Is this safety parameter display system to be 7 located in that horseshoe array of panels?

8 BY WITNESS RANZAU:

A. Yes, sir, it is.

10 Q In terms of control philosophy, is the safety 11 parameter display system such that if someone pulled the 12 plug on it, if it were completely taken out of commission 13 by some mechanism, that the operator could continue to 14 control the plant properly?

15 Is this a necessary or is it an auxiliary 16 supporting system to the operation of the plant? 17 BY WITNESS RANZAU:

18 A. It is -- First of all, the system will be 19 redundant. We will have a backup for the SPDS, so that if 20 we lose the CRT, the backup either will be -- possibly be 21 another CRT.

That is yet to be determined.

We want to integrate it in the control room so
that the operator will use it. He can operate the plant
without it, but that it's an aid to him to help him do his

4-23 1 job better.

	2	He has the same information on his CRT's and
	3	his other indicators, but this is kind of a closed,
	4	enclosed concept for him, that the information is right
345	5	there at his fingertips, that he can use that, also.
554-2	6	Q. Are you saying, then, that it's in essence a
1 (202)	7	supporting system, not a required system in order for the
2002	8	operator to properly handle the plant?
N, D.C	9	BY WITNESS RANZAU:
NGTO	10	A. Yes, sir.
WASHI	11	
OING.	12	
BUILI	13	
REAS	14	
REPOI	15	
S.W.	16	
REET,	17	
TH ST	18	
300.7	19	
	20	
	21	
	22	
	23	
	24	
	25	

ALDERSON REPORTING COMPANY, INC.

.

.

BY JUDGE LINENBERGER:

Q In terms of, again, operational philosophy, there is the old adage that a little bit of knowledge can be a dangerous thing. Let's exchange the word "knowledge" for "information," and let me ask you --

Well, first, let me say to you that human nature being what it is, it's going to be natural, I think, for certain operators to look at all this information and try to do something such as I was talking about while ago. "Gee, everything is working fine, and I've got a little time on my hands. Now, let's see. Can I improve the flux flattening across the core by doing certain things? And wouldn't that make the fuel last a little longer? And wouldn't the company be happy, and maybe I'd get a raise."

And he starts making technical judgments beyond what is necessary perhaps just to maintain the status quo. Now, tell me as you see it, as a lead I&C engineer, what kind of philosophy the company has with respect to that sort of thing.

Is that question understandable to you? It's a question of how much information that might be nice for an operator to have versus how little information that is strictly necessary for him to have. It's sort of things like what do administrative controls

ALDERSON REPORTING COMPANY, INC.

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

5-1 bm

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

5-2

1

3

4

5

8

25

allow him to do beyond what's necessary; does the company encourage him to do things such as I have talked about 2 to improve the flux flattening in the core when there's nothing else to occupy his attention other than just keeping the power level line trace straight.

How do you instrumentation and control people 6 look at that kind of thing? 7

BY WITNESS RANZAU:

We like to have the operators use the instru-A. 9 ments and ... you know, make the most out of the informa-10 tion that's available. We don't have any operating 11 nuclear plants, so what I'm speaking of is how we do 12 it in the fossil plants. 13

And the operators do tweak the knobs and 14 turn the dials, etc., to try to get a little bit more 15 out of the system. 16

I don't see them doing anything different in 17 the nuclear plant, unless it would be ... you know --18 19 I don't see them endangering the plant by turning knobs and tweaking it -- tweaking dials. 20

21 I would hope that they would have other things to do and not ... you know, do this without consultation --22 23 like the flux with the nuclear engineer to see what 24 problems it's going to cause.

Okay. Now, right there you expressed a hope. Q.

ALDERSON REPORTING COMPANY, INC.

S.W., REFORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 300 7TH STREET. So far as you know, will there be administrative controls of any sort that translate your hope into some kind of constraints on the operator?

16059

BY WITNESS RANZAU:

5-3

4

5

6

7

8

11

20024 (202) 554-2345

REPORTERS BUILDING, WASHINGTON, D.C.

300 7TH STREET, S.W.,

A. I would think that that would be under the jurisdiction of the watch supervisor, that he would have ... you know, there would be rules set down, and he would be the one that would enforce them.

9 I don't know whether that answered your 10 question or not.

Q. I think it does, for now.

12 One final question: Reference was made to
13 NUREG-0659, with respect to something called motor
14 response or motor response channel loading, and there was
15 a number discussed that indicated that such loading should
16 not exceed 75%.

If I haven't the foggiest notion what that means, nor the foggiest notion how you would recognize 75% versus 80 or versus 62%. Can you explain something about that for me, please?

21 BY WITNESS RANZAU:

Q. Based on my experience with time and motion study, what you have to do is you basically follow the person around while he's performing his job function. And you -- It's broken down into the different tasks

that he has to do, going from one step to another, and they're timed.

And then you look at -- you know, it's also 3 broken down into whether he's using his feet, his hands, 4 his eyes, his ears. And there's computations that are done.

And offhand I don't -- because I haven't used 7 them, I don't remember what they are -- that come up 8 with these numbers, these percentages on how much his 9 perceptual motion skills are used. 10

0. Okay. I think I get a glimmer here. Let me just make a "for instance" to see if I'm understanding.

You're monitoring -- somebody is monitoring 13 him while he's doing some task or set of tasks. And if 14 he can accomplish those tasks and at the same time plow 15 rather vigorously through the reading of a murder 16 17 mystery at the same time, that might seem to indicate that certain channels are not overloaded by the task. 18 19 BY WITNESS RANZAU:

Right. Α.

Ó. Okay, fair enough.

22 JUDGE LINENBERGER: That's all the questions I 23 have. 24

25 111

5 - 4

1

2

5

6

11

12

20

21

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

BOARD EXAMINATION

	1	
	2	BY JUDGE WOLFE:
	3	Q. I'll put this question to you, Mr. Robertson.
	4	What with the control room design being what it will
C+	5	be, what will the operator or operators in the control
67 4-00	6	room be doing with themselves from hour to hour? What
(707)	7	are their duties, other than looking at the board and
17000	8	seeing whether there's a white light or yellow light or
DA	9	red light?
NOTON'	10	BY WITNESS ROBERTSON:
NILICY	11	A. Well, sir, I wouldn't
N	12	Q. I'm putting it simply I'm just for an
TOTAL	13	expression on your part.
In cura	14	BY WITNESS ROBERTSON:
LUNDT	15	A. Right. I don't think I could remember all of
W. THE	16	the things that they would be doing.
61.0	17	But among those rather important things that
ANIC	18	we would expect them to do is to follow any maintenance
	19	activities that are going on in the plant, both visually
5	20	with their instrumentation and through their communica-
	21	tion links to make sure that maintenance is being
	22	conducted in the proper place, on the proper system,
	23	and that the proper close-outs occur as that maintenance
	24	crew completes its activity.
	25	Another rather important function that they

ALDERSON REPORTING COMPANY, INC.

5-5

.

•

will do is to test various instruments and various components.

If one backs off and looks at a nuclear plant and the required testing that must go on in the instrumentation system and in some cases, even hardware systems, that gets to be a very formidable task.

Then one of the rather important jobs of the operator is to make sure that those tests are done and some of them he does, some he must know are being done, and he must know that when the test is completed again that the systems are left in the proper line-up.

Those are the rather more important things.

In terms of -- the basic question -- or the basic part of your question, there's no doubt that a large amount of time the operator spends on the job is not devoted to high intense activities. He has a lot of time in which his eyes are monitoring what's going on. It's somewhat similar to the captain in an airplane going across country.

He has a tremendous amount of instruments. He has the auto pilot on. He's sitting there watching, and he doesn't really have a lot of things to keep his hands busy.

And yet, his training has to be such that whensomething abnormal occurs, he must be able to respond

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345



5-6

1

2

3

4

5

6

7

8

9

10

11

12

quickly.

1

554-2345

(202)

20024

D.C.

BUILDING, WASHINGTON,

S.W., REPORTERS

300 7TH STREET.

But --2 So it would not do to hermetically seal off 0. 3 the control room and not have any operators in the room at Δ all? 5 BY WITNESS ROBERTSON: 6 A. No, I don't think -- I wouldn't recommend 7 that in any fashion. 8 Q. All right. I think the question Judge Linen-9 berger asked -- and I don't know whether it has been 10 answered -- but I take it, operators can make adjustments 11 within the control room itself to -- by shifting the 12 control rod pattern, to get more efficiency by a certain 13 fuel setting -- in order to get a certain fuel setting. 14 15 Can this be done -- and is this done -- and will it be done? 16 17 BY WITNESS ROBERTSON: A. Within certain limitations. We are speaking, 18 19 of course, of the future and those procedures that will 20 control this have not been established. 21 Certainly, within certain limits the operators --22 and it is a team, not just one operator, but we are

23 talking about a team of people involved -- are going to 24 make certain adjustments to keep the plant running in 25 a proper mode.

ALDERSON REPORTING COMPANY, INC.

.

I would not -- and those are going to be done procedurally. I don't think we're going to have very much of a -- or any of an operator looking and saying, "Gee, I'd like to move that rod two inches because I think it's going to do something."

16064

I don't think we'll have that. I can easily foresee the operator looking and saying, "I think we should do that," and checking that appropriately, whether it's with his supervisor, whether it is with the engineering section; and then finding and utilizing the procedure that he needs to make an approved change.

I don't think that would occur in a very intense mode. These plants are designed for baseload. They're pretty well programmed ahead of time as to where rods will be and what power levels they'll be running at.

But upon occasion things drift a little bit, and there may be need to make certain adjustments. That's why we have an engineering section at the site. That is the planned operational mode.

That's why we have a very substantial engineering staff, and a very extensive set of procedures that we know will be in place ... is to allow the operator to make those adjustments where they're needed, and to have the resources available to determine, "Yes, indeed, that is a proper course of action."

ALDERSON REPORTING COMPANY, INC.

300 77H STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

5-8

1

2

3

4

5

6

7

8

9

10

11

	1	I don't know whether that fully answers your
	2	question or not, but I think it's about the best that I
	3	can do at this point, relative to when the plant will ba-
	4	come operational.
345	5	
554.2	6	
(202)	7	
20024	8	
, D.C.	9	
NOTON	10	
WASHD	11	
OING, 1	12	
BUILI	13	
TERS	14	
REPOR	15	
S.W. ,	16	
REET,	17	
TH STI	18	
300 7	19	
	20	
	21	
	22	
	23	
	24	
	25	

5-9

.

0

1	JUDGE WOLFE: All right. We'll recess until
2	2:00 o'clock.
3	MR. COPELAND: Your Honor.
4	JUDGE WOLFE: Yes.
5	MR. COPELAND: As I indicated last evening, we
6	were coing to try to get another witness up for this week
7	and we have been able to do that.
8	It's Mr. Martin, who has prefiled testimony on
9	the chlorine detection monitors and the Part 100 releases.
10	He will be here and available to testify in the morning.
11	JUDGE WOLFE: When?
12	MR. COPELAND: In the morning.
13	JUDGE WOLFE: In the morning?
14	MR. COPELAND: Yes, sir.
15	JUDGE WOLFE: And that's on Doherty Contention
16	40 and McCorkle Contention 9; is that correct?
17	MR. COPELAND: I believe that's correct,
18	Your Honor.
19	MR. DOHERTY: I'd like a minute to check,
20	Your Honor. I'm sorry to keep people up, but
21	Is that Doherty 40 and McCorkle 9?
22	JUDGE WOLFE: Yes, I think so.
23	MR. DOHERTY: Is that correct, Counsel?
24	MR. COPELAND: Just a minute. Let me check.
25	Yes, that's correct.

ALDERSON REPORTING COMPANY, INC.

6-1

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

0

MR. DOHERTY: Well, Your Honor, I object to 1 that with regard to McCorkle 9. 2 He's presupposing -- and I object to it for 3 myself. This was not placed on the schedule, although the 4 testimony was filed. 5 It wasn't placed on the schedule to be done 6 7 at all, and this is just giving me like, okay, Doherty, real quickly, get busy tonight, get ready. 8 9 I have relaxed a little bit and assumed that there wasn't going to be 40; and, therefore, have not made 10 any preparation, or made very little, just basic 11 preparation, anticipating on seeing this schedule that 12 13 that's what the schedule would be. 14 The materials I need I can't peruse. They 15 are locked up in the library at the University of Houston 16 and the library closes at 5:00 sharp. 17 There's no way I can get to them. 18 I suspect Ms. McCorkle is somewhat in the same 19 spot. I won't argue for her, but I will argue for 20 Doherty 40. 21

6-2

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (2.22) 554-2345

21 This is not fair. This is just putting too 22 much on me at once to just jump ahead.

Here it is noontime. He expects me to be ready the very next morning on an issue that he's told me he wasn't going to be doing anything on. So that's

1 why I object.

2 MR. COPELAND: That's not true, Your Honor.
3 I told everybody yesterday we would be trying to bring
4 witnesses up.

5 Mr. Doherty specifically asked that we prefile
6 our testimony a week earlier than the Staff because of all
7 the testimony that had to be filed so he could have time
8 to prepare for it.

9 So we went to the trouble of filing this 10 testimony a week early at his request. Our letter to 11 the Board dated June 25, 1981, put everybody on notice 12 that as we finished issues during this two-week session, 13 that we would intend to bring people up that would otherwise 14 testify in September.

So he was put on notice --

JUDGE WOLFE: You don't mean your June letter; you mean your August 3rd, don't you?

MR. COPELAND: Well, maybe I misstated it. Yes, sir, I'm sorry. You are right.

JUDGE WOLFE: Yes, there was a footnote to that effect.

MR. COPELAND: Yes, sir. So he was put on notice of this. We gave him the testimony early so he could prepare for all the cross-examination on all the iscues.

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

15

16

17

18

19

20

21

6-3

	1	I don't think it's an undue burden. The								
	2	testimony on those contentions is very short.								
	3	I just don't see how he's prejudiced.								
	4	MR. DOHERTY: Your Honor, I don't think it's								
345	5	relevant that they put their testimony out a week sooner.								
554-2	6	I was certainly called off the scent by the								
1 (202)	7	fact that there was no listing of 40 on here. I think								
2002	8	that in view of the circumstances, that it's short, that								
N, D.C	2	that's not important. A very short bit of writing can be								
NGTO	10	very important and require a great deal of preparation.								
NASHI	11	We had two pages, I believe, on ATWS Contention								
OING.	12	8 from the Applicant and there was almost a day's worth of								
BUILL	13	work on that.								
TERS	14	So I think, still, it is burdensome.								
REPOF	15	JUDGE WOLFE: Let's have some suggestion from								
S.W	16	you then, Mr. Doherty. What will we occupy our day								
REET,	17	with tomorrow?								
TH ST	18	MR. DOHERTY: I'm not responsible for occupying								
300 7	19	the days.								
	20	JUDGE WOLFE: I'm asking for your suggestion,								
	21	not your responsibility.								
	22	MR. DOHERTY: All right, sir.								
	23	JUDGE WOLFE: It's the Board's responsibility								
	24	to ask suggestions from the parties and ask on that. If								
	25	you have none, so state.								

6 - 4

0

16070

1 MR. DOHERTY: I would suggest that I have 2 nothing for tomorrow, but that -- yes, that's right, to 3 answer your question. I have nothing to offer in terms of us being busy tomorrow. I have no witnesses to I have 4 5 nothing to offer. 6 MR. SOHINKI: I was going to offer that I've

7 been in touch with my office and it's likely that 8 Mr. Fields who was originally scheduled for Friday will 9 be able to be here for tomorrow afternoon's session.

So in other words ---

6-5

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

10

11

14

15

16

20

JUDGE WOLFE: How many --

12 MR. SOHINKI: He just has a Board guestion on 13 combustible gas control. He has previously testified with regard to containment design basis.

JUDGE WOLFE: So he would be here tomorrow, ready to testify?

17 MR. SOHINKI: Yes. My latest indication is 18 he will be here and available to testify tomorrow 19 afternoon.

(Bench conference.)

21 JUDGE WOLFE: As we have indicated before, we 22 expect that the sponsors of contentions would be here to 23 cross-examine.

24 If they are not here, why, they are just not 25 here, and we will proceed anyway.

1 Mr. Doherty has said on his own behalf that he is not prepared to go forward with cross-examination on 2 3 his own Contention 40. All right, we'll accept that; but 4 we will proceed to hear Mr. Martin on McCorkle 9 5 tomorrow, and then we will proceed to hear Mr. Fields on 6 Board Question 4A tomorrow.

I don't know whether that will take up the entire day.

How shall we then proceed if the entire day is not taken up with Messrs. Fields and Martin? What do we next proceed to, or what are you prepared to do?

MR. COPELAND: I would suggest, Your Honor, that if we reach that point, that we just make a short day tomorrow and bring Mr. Martin back Friday morning to testify on Mr. Doherty's Contention 40.

I just cannot get any more witnesses. Everybody I've got left is from out of town, and I just can't get anybody else here.

JUDGE WOLFE: Will you be prepared with a short day tomorrow to get yourself ready for Mr. Martin's direct testimony on Doherty 40?

MR. DOHERTY: Well, you put me in a difficult spot. It's hard for me to estimate.

24 JUDGE WOLFE: Well, look at the direct testimony of Mr. Martin on Doherty 40, and the library, I

ALDERSON REPORTING COMPANY, INC.

200 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

25

6-6

6 - 7

1

2

3

4

20024 (202) 554-2345

D.C.

S.W., REPORTERS BUILDING, WASHINGTON,

300 7TH STREET.

13

14

15

16

17

18

19

20

21

22

25

take it, will be open tonight --

MR. DOHERTY: No, sir.

JUDGE WOLFE: Or it will be open tomorrow.

MR. DOHERTY: Until 5:00 o'clock is all.

5 JUDGE WOLFE: If we end early, you'll be able6 to get to the library tomorrow.

MR. SOHINKI: I would suggest, Mr. Chairman, along that line that depending upon what happens this afternoon with the cross-examination that Mr. Doherty has left with this panel and the other panel who is supposed to be testifying today, it may not be such a short day tomorrow.

MR. DOHERTY: I see there's eight pages of testimony with regard to No. 40.

JUDGE WOLFE: What do we have left for today, Mr. Sohinki? It's only Mr. Cheng, is it not, on Board Question 10, that we had set aside for today?

MR. SOHINKI: No. Today is the 26th, and, therefore, the Applicant's panel on Doherty 17, TexPirg 41 and Doherty 42 was scheduled for today, if I'm not mistaken.

MR. COPELAND: That's correct.

23 JUDGE WOLFE: So this will possibly take us 24 over into tomorrow, then?

MR. COPELAND: That's possible, Your Honor.

6

MR. SOHINKI: I thought I had my dates mixed 1 up for a second. 2 JUDGE WOLFE: No, but there is the carryover 3 of Mr. Cheng. 4 MR. SOHINKI: Right. 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 JUDGE WOLFE: I think we will just proceed on 6 that basis, as I've stated. 7 8 We will proceed to hear the witnesses as they 9 are scheduled, and if we finish them off tomorrow and have some time left over, we will proceed to hear 10 testimony on McCorkle 9 and Board Question 4A; and then 11 12 if there's any time at all on Friday before 2:30, we intend 13 to hear Mr. Martin testify on Doherty 40. 14 We may not reach it, but those are our present 15 plans, so everyone be governed accordingly. 16 MR. COPELAND: Thank you, Your Honor. 17 JUDGE WOLFE: All right. We'll recess until 18 2:15. 19 (Whereupon, at 1:00 p.m., the hearing was 20 recessed, to reconvene at 2:15 p.m., the same day.) 21 22 23 24 25

6-8

*	177	171	12	T	NT.	1	0	3.1	104	12	25	0	×.	10	8.1	ł
23	1	4	14	12	7.4	V	9	14	2	L	D	D	+	Q	17	ł

2:15 p.m.

16074

3	JUDGE WOLFE: Before we resume the examination
4	of witnesses, I have checked with the the Board has
5	checked and conferred; and with regard to any available
6	dates for resumption of the hearing in October, we
7	have available and this is only tentatively speaking
8	at this point the week of September 28 through
9	October 2nd, and the week beginning October 5 through
10	October 9 September 28th through October 2nd and
11	October 5 through October 9.
12	(Pause.)
13	JUDGE WOLFE: And that is sort of running
14	out that last week in September, we the Board will
15	have been here three weeks all told four weeks. That's
16	pretty much.
17	But come up with a tentative schedule
18	at least, Mr. Copeland, tomorrow and we'll look at it.
19	MR. SOHINKI: Do I understand that the Board
20	is unavailable for the balance of October?
21	JUDGE WOLFE: Right.
22	While we're about it, so that you all have this
23	in mind, the weeks of November the early dates of
24	November 2 through November 13, we're unavailable during
25	that period as well.

ALDERSON REPORTING COMPANY, INC.

7-1 bm

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1

2

1 000					×.
1 12	-	11	2	0	- 1
1.40	Ch.	1.4	2	Saint	

7-2

000 7TH SPREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

1 JUDGE WOLFE: All right. Mr. Dewey, is there 2 cross-examination on Board questions? 3 MR. DEWEY: No, sir, there's not. 4 JUDGE WOLFE: Mr. Doherty, cross on Board 5 questions? 6 MR. DOHERTY: Yes, Your Honor. 7 RECROSS-EXAMINATION 8 BY MR. DOHERTY: 9 Do you recall your exchange with Dr. Cheatum Q. 10 at the very beginning of Board cross? Is it true then 11 that an operator might exceed the ECCS start because it 12 should, for some reason; and he could terminate -- or 13 she could terminate that -- could terminate it after it 14 had done some emptying of water into the reactor? 15 BY WITNESS RANZAU: 16 A. Yes. 17 MR. DOHERTY: That's the only question I had, 18 Your Honor. 19 JUDGE WOLFE: Is there redirect, Mr. Powell? 20 MR. POWELL: No, sir. 21 JUDGE WOLFE: All right. We'll then proceed 22 to cross-examination of Mr. Robertson on TexPirg 23 Additional Contention 52. 24 Is Ms. Ranzau now to be excused? 25

	1	MR. POWELL: Yes, sir, she can be excused
	2	permanently.
	2	JUDGE WOLFE: All right, you're excused
	3	permanently.
	4	(The witness was excused.)
2345	5	
554	6	JUDGE WOLFE: DOES Stall have cross?
4 (202	7	MR. DEWEY: The Staff has no cross-examination,
2002	8	Your Honor.
. D.C.	9	JUDGE WOLFE: All right. Mr. Doherty?
GTON	10	MR. DOHERTY: Yes, Your Honor.
VIHSV	11	CROSS-EXAMINATION
4G. W/	12	BY MR. DOHERTY:
AIGHI	13	Q. Now
RS BL	14	JUDGE LINENBERGER: Before you get started,
ORTE	15	I think there's an item that the Board would like some
, REI	16	clarification on that arises with respect to the
I. S.W	17	TexPirg Additional Contention 28, and probably Mr.
FREE'	10	Deboutcon con receive this
S HLI	18	Robertson can resolve this.
300	19	But with respect to Mr. Donerty's last question
	20	about an operator interrupting, for example, the ECCS
	21	once it has been initiated automatically, there was
	22	some earlier comments about the 30-minute period of some
	23	sort during which there was a limitation on what an
	24	operator could do.
	25	And then you, Mr. Robertson, had some comments

7-3

.

0

ALDERSON REPORTING COMPANY, INC.

16076

explaining that. I'm just not sure that we have a consistent picture here of the extent to which an operator once a safety function has been automatically initiated -the extent to which an operator can or cannot step in and interrupt that function.

Can you --

JUDGE WOLFE: Well, if there is this sort of problem -- I have this problem as well. Perhaps for the moment, inasmuch as Ms. Ranzau is still here in the hearing room, if she would resume the stand and get that clarification from her, and then go to you, Mr. Robertson, with that question.

13 Would you resume the stand, Ms. Ranzau.
14 Whereupon,

PATRIC" A. RANZAU

16 resumed the stand as a witness and, having been previously 17 duly sworn, was examined and testified further as follows:

FURTHER BOARD EXAMINATION

19 BY JUDGE WOLFE:

7-4

1

2

3

4

5

6

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

300 7TH STREET.

15

18

20

Q. You heard the question?

21 BY WITNESS RANZAU:

22 A. Yes.

23 0. Please answer it.

24 BY WITNESS RANZAU:

25 A. During accident condition, the first 30 minutes

into an accident, the operator cannot stop the action 1 from occurring. He can divert the system from completely 2 going through the process by turning a valve. But he can-3 not completely stop it once it has been initiated. 4 Q. That's during the first 30 minutes? 5 S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 BY WITNESS RANZAU: 6 A. No, dur 1.4 ne first 30 minutes he cannot do 7 anything --8 Q. He cannot do anything. 9 BY WITNESS RANZAU: 10 A. He cannot do anything. Afterward he can divert 11 it -- divert the action. 12 Q. And by "divert," you mean what? 13 BY WITNESS RANZAU: 14 A. If -- we'll say the emergency core cooling 15 system is operating, he could like open a valve, close a 16 300 7TH STREET, valve, say, turn off a pump so that the total -- that you 17 didn't have to go through the entire cycle of emergency 18 19 core cooling system. 0. Well, that's not enactly then a diversion, is 20 it? It's really intended to assist, but foreshorten 21 22 the automatic response? 23 BY WITNESS RANZAU: 24 A. Right. 25 0 Is that correct?

16078

ALDERSON REPORTING COMPANY, INC.

7-5

BY WITNESS RANZAU:

A. That's the way.

Q. I see. Mr. Robertson, do you have anything to add? First of all, do you disagree; and, secondly, do you have anything to add to that? BY WITNESS ROBERTSON:

A. Slightly. I think we're both trying to say the same thing, but I don't think it's perhaps coming through quite as clearly as we might.

The plant is being designed on the basis that no operator action will be required for a period of 30 minutes relative to the initiation of what we refer to as safety systems that would protect the plant.

That is, the design basis for the plant. And 14 within that concept, the signals that come in are being 15 designed such that they would be what we would call 16 operator fail-safe, meaning that, for example, in a 17 protective channel, if you were to switch into -- the 18 operator were switch something into a test condition, 19 that would be a trip into the system which would require 20 more trips to cause an action to occur. 21

But because he puts it in a trip, it would, in effect, generate one out of two, or one out of three -whatever the requirements are -- for a particular action to occur.

ALDERSON REPORTING COMPANY, INC.

REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

7-6

1

2

3

4

5

6

7

8

9

10

11

12

13

S.W.

300 7TH STREET.

19

20

21

22

23

24

25

1

7-7

That's what we mean by fail-safe.

I think the difference comes into being that there are certain types of functions that if they occur, they -- in one sense, the operator can't do anything about them. They're already over.

For example, scram. You can't reverse the scram once it has occurred, of course.

There are other functions that a signal will come in and cause them to occur. But that does not mean that the operator has to sit with folded hands for 30 minutes before he can take some appropriate action to change those systems.

The procedures that will be prepared may in some cases tell him to keep his hands off of everything in a certain condition for 30 minutes.

I can't speak to the details of that at this point because, obviously, those procedures have not been written.

But, typically, a pump -- an important pump has controls that exist both in the control room and in a local station. And for an example, if one is called to come on and it does not, you certainly want the availability to go to the local station and start it up. That type of condition we have.

By the same token, there are certain of our



20 Ms. Ranzau said about the operator not being able to 21 take certain actions relative to some of those safety 22 systems within that 30 minutes.

I wouldn't want to characterize that every one of them is in that status. There may be some of them that we may, in fact, not want the operator to be

ALDERSON REPORTING COMPANY, INC.

7-8

able to touch for a considerable period of time. But, clearly, there are some that must be

divertable, when they could result in the plant arriving at an unsafe condition within that 30-minute period of time.

And that would include, certainly among those, those that could overfill, overpressurize, or other 7 similar types of conditions.

BOARD EXAMINATION

BY JUDGE LINENBERGER:

Well, suppose, however, that you have the 0. 11 situation where the ECCS wore automatically turned on, 12 control room personnel immediately interested in why this 13 happened, determined relatively unequivocally that it 14 had been actuated by a fluke, a spurious signal or 15 something, and was not really called for in terms of an 16 accident condition at the core. 17

Do they then have the ability to prevent that 18 system from going through its full gamut of remedial 19 actions when they're able to determine that it was trig-20 gered in the first place by a spurious, unwarranted 21 22 signal?

23 BY WITNESS ROBERTSON:

24 A. I'm going to have to be slightly indefinite here, sir. I have not reviewed the protective -- or all 25

ALDERSON REPORTING COMPANY, INC.

7-9

1

2

3

4

5

6

8

9

10
7-10

1

3

4

5

6

7

8

20024 (202) 554 2345 S.W., REPORTERS BUILDING, WASHINGTON, D.C. 300 7TH STREET. of the system in detail for Allens Creek.

I can speak for myself as a responsible member 2 of HL&P's management and qui e knowledgeable in the design and so forth of safety systems, and tell you that there is no question in my mind that if we find, as we proceed with this design, the operators have any reason to be able to close a system down -- that provision will be there. It is, in my mind, equally important that operators be able to correct inadvertent things as it is 9 that they have the proper training in procedures to 10 follow through the right activities when they're 11 needed. 12

So from that standpoint, I am committing -- in 13 that sense, that if those features are not there -- if I 14 find they're not, they will be. 15

I am familiar -- quite familiar with the use 16 of reset buttons and protective systems and so forth, and 17 how I believe they should be designed. And they will be 18 there in Allens Creek, if they're not already. 19

20 Ms. Ranzau is more familiar with this system 21 in detail than I am, certainly. And it may be that w. need to initiate a review on this. But she can speak 22 23 more to that point if she so desires here.

24 BY WITNESS RANZAU:

25

The logic on the nuclear system protection A.

7-11

system is two out of four logics. You have to have --We have to have two channels go out. So you could have one channel go out and not cause the system to actuate. So there are -- That's another one of the fail-safes built into the emergency 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 system with the logic, either being two out of four or one out of two taken twice type of logic, to avoid this type of thing. But the nuclear system protection system has just recently been revised by General Electric, and some changes have been made to it that we are currently reviewing.

BOARD EXAMINATION

2 BY JUDGE CHEAT' .

1

20024 (202) 554-2345

S.W., REPORTERS BUILDING, WASHINGTON, D.C.

300 7TH STREET.

0

Whr. you pitched my question -- or Mr. Ranzau pitched
my questic that I had asked to you for elaboration,
I recall, it seems to me, that you said when the ECCS
system is put into operation, that the operator, if he
feels it should be done, can in effect moderate or even
stop the effectiveness of the ECCS by turning off the
pump.

I believe that's what you said. So, in effect, you really are preventing the automatic system from doing what it would have done if you hadn't turned off the pump.

14 BY WITNESS ROBERTSON:

That is exactly correct. That function can 15 A. occur at a local station or in a different fashion, you 16 can pull the circuit breaker and stop any pump at any 17 point, simply by interrupting its power source. And the 18 19 circuit breakers are provided for that type of purpose. 20 Could he turn off that pump at the control 0. 21 panel?

22 BY WITNESS ROBERTSON:

A. I cannot speak to each and every pump in that
sense. That I don't know. I do know that he can do
it. How quickly he can do it, I can't answer you, sir.

ALDERSON REPORTING COMPANY, INC.

7-12

Q. Do you know the answer to that, Ms. Ranzau? 1 BY MS. RANZAU: 2 A. The pump can be tripped at the panel. There 3 is local control provided for the pump. However, because 4 of GE's requirement, it's totally under administrative 5 S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 control that the control room operator has got to release 6 the control in order for it to be tripped locally. 7 Q. And to whom would he release that control? 8 BY MS. RANZAU: 9 A. One of the auxiliary operators. 10 Are the auxiliary operators in the control 0. 11 room? 12 BY MS. RANZAU: 13 A. The auxiliary operators are at that particular 14 duty station. 15 0. I see. 16 BY MS. RANZAU: 300 7TH STREET. 17 A. It's in the turbine building or the containment, 18 or wherever the auxiliary operator's duty station is. 19 He would be dispatched to that location and told 20 exactly what to do. 21 And I believe that that pump in particular is 22 under lock and key type of arrangement. He would have 23 to get the key and unlock the controls -- unlock the 24 box that the controls are in, and trip it that way so 25

7-13

16086

that when it's done that they know that it's done. It's not something that you just go over and flip. It has to -- it's all under administrative control with signout of the key and records of it and things like that.

16087

Q. I don't think I quite understand what you mean
by "administrative control." Here's an operator, and when
you say he relinquishes to administrative control the
right to give an order (I suppose) ... is what it sounds
like to me.

10 BY MS. RANZAU:

7-14

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

16

17

18

A. The watch supervisor has the control over this, and he would have to dispatch -- The reactor operator would tell the watch supervisor just ... "This is the problem," or the watch supervisor would see that there's a problem.

And he would say ... you know, "It needs to be shut off locally," and he would be the one that controls the shutoff. It would be his responsibility.

19 Q. I see. Well, under accident conditions, 20 then you sort of have a hierarchy there in the control 21 room in a way -- there may a little difference of opinion 22 as to just exactly what you should do and the supervisor 23 is the one that really finally calls the shot when 24 he has got all of the information that's necessary to 25 justify an action?

7-15		
	1	BY MS. RANZAU:
•	2	A. Right.
	3	JUDGE CHEATUM: I guess that satisfies my
•	4	question.
45	5	JUDGE WOLFE: In light of the additional Board
554.23	6	questions, we'll have recross on Board questions. Mr.
(202)	7	Dewey, any?
20024	8	MR. DEWEY: No, sir.
, D.C.	9	JUDGE WOLFE: Mr. Doherty?
ACTON	10	MR. DOHERTY: No, sir.
AIHSK/	11	JUDGE WOLFE: All right. The witness now is
NG. W	12	permanently excused.
	13	(The witness was excused.)
FERS I	14	JUDGE WOLFE: Now, we're back to the examination
EPOR	15	of Mr. Robertson on TexPirg Additional Contention 52.
5.W. , H	16	Mr. Dewey has no cross. Mr. Doherty.
EET, S	17	FURTHER CROSS-EXAMINATION
H STR	18	BY MR. DOHERTY:
17 008	19	Q. Mr. Robertson, do you have with you a copy of
	20	the PSAR figure designated 2.B.3-1? It's Page 081
	21	of the new Amendment 59?
•	22	BY WITNESS ROBERTSON:
	23	A. Yes, I do.
•	24	Q. That shows an "X" labeled "Approximate Sample
	25	Location." Is that the location where the reactor coolant

7-16

1

2

3

4

5

20024 (202) 554-2345

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

would be sampled from?

BY WITNESS ROBERTSON:

A. Yes. As far as we can determine at this point, the sample location will be along the jet pump assembly.

6 Q Does it -- I have a little trouble visualizing 7 how this is going to work. I guess it's going to have to 8 be a pipe -- at least a single pipe or a penetration of 9 the vessel for this; is that correct? Will there have 10 to be a penetration of the vessel?

11 BY WITNESS ROBERTSON:

12 A. Yes, it will have to come out through the13 vessel, that's right.

14 Q. How many penetrations? One or two? Do you 15 recall, or do you know offhand?

16 BY WITNESS ROBERTSON:

A. I don't know that that has been established, whether there will be one or a multiple or what. We are talking about a sample system that is an upgrade to a system that had been intended to be in place -- or at least in portion it's an upgrade.

It includes some new specific requirements which we have agreed to meet. And we have already initiated with our contractor, Ebasco, to coordinate with General Electric and establish a design for the sampling system.

16090

And they have recently sent us a preliminary report in which they have identified several options, each of which they indicate is feasible to do and will accomplish the desired objective.

And the next step in this procedure now is to go through those options, look at the pros and cons, and make some decisions as to which of them we believe are the best ones to implement.

9 That process is not as yet complete. And I
10 believe that part of that process we will go through will
11 include the determination of how many sample points and
12 where they're going to be located and that type of arrange13 ment.

14 Q. Well, do you have it represented to you that 15 all of the systems--let's call them candidate systems--16 they've sent you are operational somewhere? 17 BY WITNESS ROBERTSON:

18 A. I have no idea. This type of sampling system
19 is not unique itself in that sense. Whether or not there
20 are some specific ones like it, I couldn't speak to
21 that.

Q. But you don't know if it's operational in any
industrial application or ...

24 BY WITNESS ROBERTSON:

A. As I say, the use of this type of sampling

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

25

5

6

7

8

7-17

7-18

1

2

3

4

5

6

7

8

9

10

11

12

13

14

25

system for this purpose is not unique within power

plants.

Q. Where else is it used? BY WITNESS ROBERTSON:

A I am aware that this type of system is being placed -- and when I say "this type" -- I'm talking about systems that draw liquid samples from the primiry system and from the -- liquid samples from the containment, gaseous samples from the containment that the -- North Anna-2 plant has either already put one in or is in the process of putting one in that would satisfy this type of requirement.

That it is exactly like this, I couldn't tell you, no.

That's one example. I'm sure there are others, because all of the plants, as far as I know, are being required by NRC to install a sampling system that would basically accomplish the purpose that we're talking about here.

20 Q. Well, does one of the candidate systems --21 How many candidate systems are there?

22 BY WITNESS ROBERTSON:

A. I don't want to call them systems. There's various
 options.

Q. Candidate options --

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

BY WITNESS ROBERTSON:

-- that have been identified for exactly where A. 2 do you want to locate your sample point, what routing 3 do you want to take it to, what type of auxiliary 4 collection system do you wish to install -- a fully 5 shielded one, one that you could handle a direct sample 6 without any dilution; or do you want to put it through 7 a dilution station and handle it only in dilute form, 8 when you're talking about dealing with a highly radio-9 active material. 10

You may need to have that kind of facility. SO 11 all of those various options fit themselves together, and 12 you must then look at those options and decide, "Well, do 13 we want to, for example, use heavily shielded containers 14 and almost a remote control operation in total to draw a 15 sample and use it in undiluted form," or "Do we wish to 16 put it through a little process unit and dilute it to 17 18 the point where we do not need nearly as much shielding to handle that sample subsequently." 19

20 Those are the types of options that are being -21 that are part of the process.

22 Q. Would the sample system work essentially on --23 somehow decreasing pressures so that ... just that little 24 iny pore is such that if some of the coolant were to 25 leave, that would all be required ... at least to get

ALDERSON REPORTING COMPANY, INC.

REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 S.W. 300 7TH STREET,

7-19

1

7-20

2

3

4

5

554-2345

20024 (202)

D.C.

WASHINGTON

BUILDING.

REPORTERS

S.W.

300 7TH STREET.

25

liquid away from the containment there?

BY WITNESS ROBERTSON:

A. Well --

Q. -- from the reactor vessel.

BY WITNESS ROBERTSON:

A. From the reactor vessel in its pressurized state, you don't need anything to get it out. However, from the suppression pool sample there, you would need a pump of some type available since that elevation is lower than outside, and we would not want to try to depend on some kind of siphoning effect -- to pull a sample out.

So you would definitely need a pump there. If you were also contemplating a sample out of the primary system after it's depressurized, then in all probability you would require a pump for that purpose.

17 These are not big items, they're very small 18 pumps. It's not -- It would be a pump system basically, 19 or the ability to turn a pump on if you needed to, to 20 draw a sample.

Q. Do you know if the Applicant proposes to use
the sampling systems routinely; that is, say, once a
week or once a day, something like that?
BY WITNESS ROBERTSON:

A. Parts of them would be used on a scheduled

7-21

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

1

8

12

13

14

15

16

17

18

basis, not necessarily all of them.

Q. The reason that I'm asking that is I want to know if people who would be doing this, say at an accident scene, would be doing something that's pretty routine to them, except now they know they may have something a little out of the ordinary, but fundamentally the process is pretty well someone's daily routine or --

BY WITNESS ROBERTSON:

9 A. Basically it would be a routine, because they
10 have a very definitive set of procedures that they would
11 be working to here.

We have to build the procedures to deal with a potentially radioactive stream. You do not ever do that by happenchance. You do that very strictly.

So they are going to be used to doing that, just through the requirement to periodically go through the process. Part of it is part of the test program to show the equipment works.

19 Part of it ... because some of those samples 20 are going to be routinely made not with great frequency 21 necessarily, but routinely taken at those points.

22 Q. Now, is it true that normal samples are just 23 sort of slightly -- a tiny bit radioactive, but they 24 generally are not? That is, coolant samples. 25

BY WITNESS ROBERTSON:

7-22

1

2

3

4

5

6

20024 (202) 554-2345

D.C.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

25

A. You're talking about something coming out of the primary coolant, yes. It is not considered highly radioactive normally. There are other places within the plant where you take samples that that is not necessarily true.

7 Q. Now, is there a problem with plate-out of 8 materials taken in a sample that has to be minimized or 9 considered?

10 BY WITNESS ROBERTSON:

A. I don't -- I guess I don't really understand the question. Let me ask you. What do you mean by "plate-out"?

14 Q. Well, drawing materials down the line, some 15 materials tend to adhere ... and that can foul up the 16 sampling at the other end, probably for that sample and 17 succeeding samples. There's at least that potential. 18 BY WITNESS ROBERTSON:

19 A. Yes, there are, of course, certain elements
20 that have a tendency to adhere to surfaces, if they come
21 in contact with them.

We will be minimizing the line lengths, to try
to, among other things, to minimize that type of
event.

Q. Do you regard a commitment made in response to

1 a NUREG item as essentially ... you know, the company's 2 commitment and there's no real retreat from that, or do 3 you regard that as --

BY WITNESS ROBERTSON:

A. The commitments are made in the form of insertions into the Safety Analysis Report. The commitments made in that document then become, in essence, a legal contract, if you want to look at it that way.

It's a legal contract between us and the NRC. 9 buld be very concerned if we found that for some in-10 advertent reason we were not meeting a commitment that 11 we had made, and would, in fact, be on -- if there was 12 a substantial time lapse or something of this type that 13 would really indicate that we were failing to meet it 14 and couldn't meet it, we would be obligated to immediately 15 notify NRC of what had happened. 16

We could not change a commitment that we had made in the PSAR without notifying them in some appropriate fashion that we were making that change.

20 The fact that something is published in a NUREG21 does not commit us to anything.

Q Yes. Well, your statement in your written
testimony as "commitment made in response." Okay. I
feel very satisfied with that answer. Thank you.
Now, at Page 079 of the PSAR, it states:

ALDERSON REPORTING COMPANY, INC.

(202) 554 2345 20024 D.C. WASHINGTON. BUILDING. S.W., REPORTERS 300 7TH STREET.

7-23

4

5

6

7

8

7 - 24		1	"Analysis of the samples per the sample collection section
ó		2	on the same page) will be in the personnel access build-
		3	ing." Is that building in the power block or unit,
•		4	is that building Does that abut the circular re-
	15	5	actor containment building?
	554-23	6	BY WITNESS ROBERTSON:
	(202)	7	A. I don't know. I do not have a drawing here
	20024	8	that I could look at and see right now. I personally
	l, D.C.	9	don't know the answer to that.
	AGTON	10	Q. Okay.
	(HSV)	11	BY WITNESS ROBERTSON:
	ING, W	12	A. It's close by, I can tell you; but how far
•	GHD	13	away, I wouldn't be able to tell you.
	FERS 1	14	
	REPOR	15	
	S.W. , 1	16	
	(EET, 3	17	
	H STE	18	
	300 TJ	19	
		20	
		21	
•		22	
		23	
•		24	
		25	

8-1		1	Q. Now, in the event of high radiation conditions
		2	in the coolant, would the sample still be returned to the
		3	suppression pool or would you expect some alternative
•	÷.	4	arrangement in those particular days?
	345	5	BY WITNESS ROBERTSON:
	554.2	6	A. If you are talking about the sample that's
	202)	7	pulled out and taken out for analysis, I would not expect

that to be returned anywhere. That I would expect to be 8 9 retained.

20024

10

11

12

15

16

17

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

If you're talking about the pumping cycle of a stream that might be out one place, back in another, I think -- I guess I have difficulty here.

13 I cannot envision a highly -- as you describe it, a highly radioactive core condition where we would 14 be terribly concerned about putting it back in the suppression pool. Well, I can -- I guess I have to stop and say, yes, I can, too.

18 The answer to your question is, I think, as 19 follows: If we have an isolated reactor and find we have 20 a highly contaminated primary system, we would not 21 necessarily wish to take any material from there and 22 arbitrarily dump it in the suppression pool, unless -- at 23 that point in time.

24 Now, obviously, as time goes on and if we have 25 to use the suppression pool to cool and remove decay heat,

2 essence -- we could very well find ourselves using 3 suppression pool water circulating directly into the 4 reactor; and whether we wanted to or not, if we had to get 5 into that mode, we would be contaminating the suppression 300 7TH STREET, 5.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 6 pool. 7 4. Correct me if I'm wrong, but after the Three-8 Mile Island accident, they had to stop taking samples or 9 they felt their samples were poor due to contamination of 10 that room itself. 11 Do you know if that was due to an inadequately 12 shielded room or spills or confusion or what? 13 BY WITNESS ROBERTSON: 14 That particular facet of Three-Mile Island I'm A. 15 not familiar enough to discuss. As I understand your 16 question, you are speaking, I think, of the sampling room 17 or --18 Sort of like a little lab, I guess. 0. 19 BY WITNESS ROBERTSON: 20 А. Yes. I don't know. 21 About what time order are you shooting for here 0. 22 on being able to get a total radioactive load in the 23 sample? 24 BY WITNESS ROBERTSON: 25 Well, on page 80 of Appendix O we list the A. ALDERSON REPORTING COMPANY, INC.

then that becomes a moot point because we would be in

8-2

1

time specifications which we would use as maximums that 1 2 run radiological two hours, boron two hours, chlorides 3 twenty-four hours, and so forth; dissolved gases or 4 hydrogen two hours.

Of what value would chlorides be? O. BY WITNESS ROBERTSON:

Chlorides basically are a undesirable feature Α. inside any part of our primary system in particular. They tend to cause corrosion, and the only way to get chlorides into the system that I would be aware of would be if it came from, in essence, unprocessed water, like the service water system, if there was some kind of leakage occurring from outside the plant to inside the plant.

We would want to know that, but the basic problem with chlorides, simply stated, is that you try at all times to keep them out of the plant during normal operation conditions because of stress corrosion caused by excessive chlorides.

20 That it would have any effect on conditions during an emergency, I don't know what those would be.

22 Now, there is mention in the middle of the 0. 23 page 0-79 about GDC-19 with regard to exposure to personnel 24 who are presumed to have the collecting task.

All right. I. gives it 5 rem whole body, 75

ALDERSON REPORTING COMPANY, INC.

554-2345 20024 (202) D.C. WASHINGTON, 300 7TH STREET, S.W., REPORTERS BUILDING. 5

6

7

8

9

.)

11

12

13

14

15

16

17

18

19

21

25

8-3

	1	rem extremities limits.
	2	In my checking over GDC-19, I see the 5 rem
	3	whole body, but I don't see the 75 rem extremities. Is
	4	that a requirement from the Three-Mile Island for the
) 554-2345	5	NUREG-0718 or where does that come from?
	6	BY WITNESS ROBERTSON:
1 (202)	7	A. I don't know the source of that number. It is
2002	8	a commitment number that we've committed not to exceed.
N, D.C	9	Its source I don't know.
NGTO	10	MR. DOHERTY: This was one of the shorter ones.
NASHI	11	I have no other questions really, I think.
ING, 1	12	JUDGE WOLFE: Redirect, Mr. Powell?
BUILD	13	MR. POWELL: No, Your Honor.
TERS	14	JUDGE WOLFE: Board questions?
REPOR	15	JUDGE CHEATUM: I have none.
S.W. ,	16	BOARD EXAMINATION
RET.	17	BY JUDGE LINENBERGER:
US HJ	18	Q. Mr. Peterson, yesterday your Counsel I
300 7	19	apologize.
	20	MR. POWELL: We're going to have to bring the
	21	stretcher bearer in for Mr. Peterson.
	22	(Laughter.)
	23	JUDGE LINENBERGER: But then I call Mr. Scott
	24	Mr. Doherty frequently, and vice versa.
	25	My apologies.

ALDERSON REPORTING COMPANY, INC.

8-4

1 B	Y JUI	DGE	LIN	ENB	ERG	ER:
-----	-------	-----	-----	-----	-----	-----

8-5

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

20

21

Q. Mr. Robertson, yesterday your Counsel passed out
 for the use of the parties as discussion aids copies of
 two PSAR figures.

5 Do you happen to have those?6 BY WITNESS ROBERTSON:

7 A. Unfortunately, he didn't give them to the
8 witnesses.

9 MR. POWELL: Those are the two tables that I10 handed the witness.

11 BY JUDGE LINENBERGER:

12 Q. Well, very quickly, on the PSAR Figure 1.2-4, 13 in the first quadrant in the north, if we call the top of 14 the drawing north, northeast direction just outside of the 15 containment building, there's a sketch of some walls 16 defining a room or building just outside of the containment 17 building.

18 Do you see what I'm talking about?
19 BY WITNESS ROBERTSON:

A. Yes, sir.

Q. Is that the auxiliary building?

22 BY WITNESS ROBERTSON:

A. Sir, I don't know whether that's the beginning of the auxiliary building or not. I can do a quick consultation and determine --

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1

6

7

8

9

10

11

12

13

14

15

16

17

19

20

21

22

23

24

25

8-6

0. No, that's not necessary.

2 I was curious about your statement on page 13 3 that the sampling stations would be located in the 4 reactor auxiliary building near the reactor shield building 5 wall in order to make sample lines as short as possible.

The first question is, ignoring for a moment the length of sample lines, why couldn't the sampling of coolant be made, say, downstream near the turbine inlet? BY WITNESS ROBERTSON:

A. My understanding of this, sir, is that there was concern that one be able to draw the sample directly out of the core region and not depend on it flowing, if you will, down the pipes to get to what would be very much more convenient locations.

But the requirement and concern is being able to sample directly in the core region and have as direct as possible indication of what is going on in that core region.

18 Okay. Is there another consideration here, name y 0. the possibility that some (for want of a petter name) I'll call them isolation valves might have actuated such that you wouldn't have a sample available down at the turbine anyway?

BY WITNESS ROBERTSON:

Well, that is certainly to be expected, that if A. you have anything severe enough to do damage inside the core

region, that you long since would have isolated the system
 at the wall boundary. There's double isolation valves, for
 example, along the main steam line; and certainly, they
 would be called to close in this kind of condition.

5 Q. So in addition to keeping sampling lines short, 6 there is the practical consideration that you might not be 7 able to get at a sample of that coolant unless you were 8 right close to the containment building, I would think. 9 BY WITNESS ROBERTSON:

10 A. That's right. You could draw -- theoretically, 11 you could draw a closer point on the main steam line inside 12 the containment wall out of the piping as long as you stay 13 inside that isolation valve; but as I understand it, the 14 basic concern was the desire to do a direct reading just 15 as close as possible to the core region.

Yes, your practicality concern is certainly valid, sir.

18 Q. I believe you indicated to Mr. Doherty there may 19 be from some of the sampling stations, at least, some 20 routine withdrawals and analyses performed.

21 BY WITNESS ROBERTSON:

8-7

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

22

A. Yes, sir.

23 Q. Now, that would say to me that this either
24 permits the duplication of some kind of an analysis being
25 done another way from another part of the system, or else



8-8

it provides a capability to do something in connection with
 routine operations that cannot be done otherwise.

3 Do you have things progressed far enough that
4 you can answer which of those alternatives it is?
5 BY WITNESS ROBERTSON:

A. No, sir. I don't think we have the opportunity
7 yet to assess the value of this additional sampling
8 capability and what that might do, either in addition to
9 what would normally be done or perhaps as replacements for
10 some of those things that are normally done.

We're not that far along yet in our evaluation of its potential usefulness.

13 Q. Well, let's turn the question around and forget 14 about these sampling stations; but so far as the reactor 15 coolant is concerned, is routine water chemistry being 16 done on reactor coolant?

17 BY WITNESS ROBERTSON:

A. Yes, sir.

19 Q. And will that be done on a grab sample basis or 20 an automatic sampling and analysis basis, or do you have 21 that answer?

22 BY WITNESS ROBERTSON:

A. I don't know, sir. All I can say is we have a rather substantially sized chemistry section devoting themselves to water chemistry in many different ways, one

1 of which is rather a continuous almost -- to me it appears
2 to be a continuous sampling process.
3 Now where they get their samples. I don't know.

3 Now where they get their samples, I don't know,4 sir.

5 Q. What are the principal things that go on in the 6 reactor auxiliary building, separate and apart from this 7 sampling station activity?

8 BY WITNESS ROBERTSON:

8-9

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

17

20

21

22

23

25

9 A. At this point, sir, I don't want to venture 10 that, because I don't know the breakdown between what 11 we refer to here as the reactor auxiliary building for 12 other purposes versus -- the reactor auxiliary building 13 here and the other buildings that are part of this complex.

The various functions that have to go on at the plant I know, but their exact location, I think I would be hesitant to try to list those at this time, sir.

JUDGE LINENBERGER: Thank you.

18 JUDGE WOLFE: Cross on Board questions, 19 Mr. Dewey?

MR. DEWEY: No, sir.

JUDGE WOLFE: Mr. Doherty?

MR. DOHERTY: No, Your Honor, no questions.

JUDGE WOLFE: Is the witness to be permanently

24 excused?

MR. POWELL: I'm not sure if he will be used

.

~		latar but I think ha is to be normanantly avous."
0		later, but i think he is to be permanently excuse.
	2	My colleague says yes.
	3	JUDGE WOLFE: All right. Mr. Robertson, you are
	4	permanently excused.
345	5	(The witness was excused.)
554.2	6	MR. POWELL: Mr. Chairman, I'd like next to
1 (202)	7	recall to the stand Mr. Robert C. Cheng.
2002	8	Whereupon,
N. D.C	9	ROBERT C. CHENG
NGTO	10	was recalled as a witness and, having been previously
WASHI	11	sworn, was examined and testified as follows:
ING.	12	JUDGE WOLFE: Mr. Cheng, you are still under
	13	oath.
TERS	14	You may be seated.
RPOF	15	
MS	16	
46.E.T.	17	
ST N	18	
300 7.F	19	
	20	
	21	
	22	
	23	
•	24	
-	25	

1.20

8-1

4

ALDERSON REPORTING COMPANY, INC.

-1

1	1	DIRECT EXAMINATION						
	2	BY MR. POWELL:						
	3	Q. Would you state your name for the record,						
	4	Mr. Cheng?						
345	5	A. My name is Robert C. Cheng.						
554-2	6	Q. And do you have before you a document entitled,						
1 (202)	7	"Direct Testimony of Robert C. Cheng on Behalf of Houston						
2002	8	Lighting & Power Company on Boar. Ouestion 10 on Drywell						
N, D.C	9	Pressure Testing," consisting of two typed pages?						
NGTO	10	A. Yes, I do.						
MSEN	11	MR. POWELL: For the Board's information, the						
ING, V	12	prefiled testimony has an attachment there which has been						
BUILD	13	removed, since his qualifications were admitted yesterday.						
TERS	14	They have been removed from the copies supplied to the						
REPOR	15	reporter.						
S.W. , 1	16	JUDGE WOLFE: All right.						
tEET,	17	BY MR. POWELL:						
UI STA	18	Q. Mr. Cheng, was that document prepared under your						
300 7	19	supervision, direction or control?						
	20	A. It basically was written by me.						
	21	Q. A. you have any corrections, sir?						
	22	A. e sir. On the first page, line 17, "of my						
	23	background and qualifications," I would like to replace the						
	24	rest of the sentence by the following.						
	25	I'll read it as a complete sentence. "The						

8-1



-

	1	JUDGE WOLFE: Any objection?
	2	MR. SOHINKI: No objection, Mr. Chairman.
	3	MR. DOHERTY: Your Honor, I have just a couple
	4	of questions.
345	5	VOIR DIRE EXAMINATION
554.2	6	BY MR. DOHERTY:
4 (202)	7	Q. Mr. Cheng, what is the difference between
2002	8	psig, as you have in line 5, page 2, and psia?
N, D.C	9	A. Okay. Basically, psig is gauge pressures. When
NGTO	10	you measure one pressure versus atmospheric pressures, you
WASHI	11	can have a pressure gauge.
OING,	12	So basically, if you measure a room pressure
BUILI	13	Q. Measure what?
CLERS	14	A. Outside is atmospheric. You are talking about
REPOF	15	14.7. And when you have absolute pressures you are
S.W	16	really talking about gauge pressure, plus 14.7 atmospheric
REET,	17	pressure. The total is going to give you the so-called
TH ST	18	absolute pressures.
300.7	19	Q. So absolute pressure will always be higher,
	20	larger than gauge.
	21	A. The answer is yes.
	22	MR. DOHERTY: That's the only question I have,
	23	Your Honor.
	24	JUDGE WOLFE: All right. The testimony of
	25	Applicant's Mr. Cheng, relative to Board Question 10, is

8-13





July 20, 1981

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of HOUSTON LIGHTING & POWER COMPANY (Allens Creek Nuclear Generating Station, Unit No. 1)

5

6

7

8

9

10

11

12

0

14

15

16

17

13

19

20

21

22

24

Docket No. 50-466

DIRECT TESTIMONY OF ROBERT C. CHENG ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY ON BOARD QUESTION 10 ON DRYWELL PRESSURE TESTING

Q. Please state your name, business position and professional qualifications.

Q. What is the purpose of this testimony?

A. This testimony is to address Board Question 10 which requests the Applicant to verify that the ACNGS drywell will be tested at some pre-specified value in excess of design pressure. Q. Has the Applicant made any commitments regarding drywell testing?

A. Yes. As stated in FSAR Section 3.8.3.7 the Allens Creek drywell will be tested at 34.5 psig. This is equivalent to 115% of design pressure (30 psig) in accordance with NRC Reg. Guide 1.18 recommendations for concrete containments. Moreover, if the Allens Creek drywell is determined to be a prototype at the time of entries, additional measurements such as drywell wall strains and deflections will be recorded in accordance with the Staff's technical position on "Structural Proof Test of BWR Mark III Containment Drywell," as presented in Appendix H of Supplement 1 to the NRC Safety Evaluation Report of ACNGS.

Q. What is your conclusion?

5

6

7

8

9

10

11

12

6

14

15

16

17

18

19

20

21

22

24

A. The Applicant has committed to test the ACNGS drywell to 115% of design pressure.

8-15	1	JUDGE WOLFE: Is there cross, Mr. Sohinki?
•	2	MR. SOHINKI: No, sir.
	3	JUDGE WOLFE: Mr. Doherty?
•	4	MR. DOHERTY: Yes, I have a couple of questions,
HS	5	I think, unless we've covered them already.
554.2	6	CROSS-EXAMINATION
(202)	7	BY MR. DOHERTY:
20024	8	Q. Is the drywell design pressure greater than the
4, D.C.	9	containment design pressure?
NGTON	10	A. The answer is yes.
NASHL	11	Q. By how much?
ING, V	12	A. The drywell design pressure is basically 30
• In the second	13	psig, and the containment design pressure is 15 psig.
FERS	14	Q. What do you use to produce this pressure of
GPOR	15	30 psig in this large area of the drywell?
	16	A. Basically, Allens Creek adopted GE's standard plan
EET.	17	analysis and GE recommends 30 psig should be used for
H STF	18	drywell design, and as a structural engineer we have to
300-71	19	follow that type of PSAR commitment.
	20	Q. Okay. Did you want to say something else?
	21	A. If you'd like to know my personal interpretation
•	22	of how they get there, strictly from a structural
	23	engineering viewpoint, I more or less like to interpret out
•	24	of my own curiosity how they got that number.
	25	Basically, I think they use the pressure

ALDERSON REPORTING COMPANY, INC.

.

8-16

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

16

17

differentials, theoretical pressure differential between
 drywell and containment, and the theoret.cal result gives
 you 21 psi differential across the board, and the design is
 30.

From there, I derived a 40 percent margin.
That's my own interpretation. That's really the margin they
put on the top.

8 Q. Okay. Now, on the same page there you state, 9 "Moreover, if the Allens Creek drywell is determined to 10 be a prototype, additional measurements such as drywell 11 wall strains and deflections will be recorded."

Now, suppose Allens Creek is not determined to Now, suppose Allens Creek is not determined to be a prototype, will this designed drywell still be tested? Will this testing still be done?

A. The answer is yes.

Q. For the Allens Creek --

A. For Allens Creek. That's right.

18 MR. DOHERTY: Those are all the questions I 19 have, Your Honor.

JUDGE WOLFE: Redirect, Mr. Powell?
MR. POWELL: No, Your Honor.
JUDGE WOLFE: Board questions?
JUDGE CHEATUM: I have none.

25

24

	T	BOARD EXAMINATION
	2	BY JUDGE LINENBERGER:
	3	Q. I'm not sure but what I might have missed
	4	something here, Mr. Chang, but did you say how the pressure
115	5	testing would be done in terms of, for example, what will
554-23	6	be the source of pressure within the drywell?
(202)	7	A. I didn't get you. Would you repeat your
20024	8	question?
i, D.C.	9	Q. Well, I don't know whether you explained something
OLDA	10	that I missed or not, but my question is, in order to
ASHIP	11	accomplish the testing, what will be the source of the
1C, W	12	pressure that is put into the drywell to determine its

ability to withstand the pressure?

8-17

300 7TH STREET, S.W., REPORTERS BUILDIN

13

25

Okay. Basically, we have to have a bank of 14 A. compressors. Okay. That has nothing to do with the accident 15 pressures, but to build in the air flow before the pre-16 operation of the whole plant after the drywell structure 17 18 has been completed.

From there we can have an instrumentation to 19 monitor actually what pressure has been built up inside 20 21 the drywell.

That's the external source of pressure buildup. 22 Sir, do you have a copy of a PSAR figure that 23 Ó. 24 was distributed yesterday afternoon?

> Yes, I do. A.

> > ALDERSON REPORTING COMPANY, INC.

	1	Q. Figure 1.2.8.
1	2	A. Uh-huh.
	3	Q Assuming one knows how to look at it, does that
)	4	figure present a profile or a cross-section representing
24.5	5	where the dry wall boundary is?
6.4.52	6	A. Yes, sir.
6067.1		Q. Or drywell wall boundary is.
6.0006	8	Okay. What I'm interested in here is that it
0.0	9	looks as though, at least in its final configuration,
NCTON	10	within the drywell there may well be several rooms,
THEFT	11	platforms, equipment assemblies and so forth.
I DINIG	12	In other words, the drywell looks to me to be
BUILT	13	a relatively, I'll say, cluttered up place on this drawing.
TERS	14	A. Let me explain exactly what the so-called drywell
00000	15	boundary is.
2 10	16	Q. All right.
C.C.C.	17	A. The drywell actually is the wall in between the
tus tu	18	reactor vessel and the space between the reactor vessel's
3001 T	19	outside surface and the five-foot concrete wall.
	20	If you come from the extreme outside, the first
	21	wall let me give you one-by-one correlation.
ŀ	22	The first wall is so called the shield building
	^,	wall. Then the second wall is the containment vessel wall.
)	24	And the third wall is the drywell wall, and if you go from
	25	the top of the map, follow that drywell wall all the way

ALDERSON REPORTING COMPANY, INC.

16115

8-18

.

.

out, and you come across horizontally, you've got the 1 top of the so-called drywell wall, and then the boundary, 2 the so-called drywell head. That's a steel head, okay, 3 4 and the outer side is the flip around. Okay. I think --5 0. 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 6 That's a free wall in that area. Α. 7 0. I think I'm looking at the right portion of what 8 constitutes the drywell volume. 9 Now, what I was leading up to is I see guite a 10 number of stairways, hatches, penetrations, levels where 11 equipment and supports are placed. 12 Will that drywell volume be pressure tested 13 before do after all these things are placed inside, or do 14 you happen to know? 15 A. At this moment, the way I understand it is 16 probably the reactor vessel will be in and the drywell head 17 will be in. 18 However, those pipings, I don't know exactly if 19 at that time they will be in or not. I couldn't speak for 20 that. 21 Okay. The slight concern I have here is that 0. 22 both the strength of the drywell wall and the leakage rate 23 from the drywell may be somewhat degraded by the time the 24 plant goes into operation, compared to what it was when it 25 was pressure tested.

8-19
So my worry is that you will have a nice clean drywell volume to pressure test, and then there will be a 2 3 whole bunch of stuff shoved into it, anchored on the wall, 4 holes put through for penetrations, et cetera, and by the time the facility is ready to operate, the strength or pressure integrity of the drywell may not be at all what it was when it was tested.

16117

8-20

1

5

6

7

8

300 7TH STREET, S.W., REPORTERS BUILDING WASHINGTON, D.C. 20024 (202) 554-2345

Is that a concern?

9 Α. Yes, but that's the main reason why we test 10 this drywell up to 115 percent of the design pressure.

11 As I mentioned before, the design pressure 12 already includes certain margin. So the actual pressure 13 only gives you, according to the PSAR figures, about 14 21 psid different.al across the board, and we are really 15 testing up to 34.5 psid.

16 Well, do you recall a discussion yesterday 0. 17 afternoon involving a significant amount of hydrogen 18 released due to metal-water reaction in the core, and this 19 hydrogen apparently would end up in the -- at least if I 20 understood it correctly -- a portion of the drywell, then 21 be pumped through the pressure suppression pool and out into 22 the containment volume.

23 Are you in a position to say whether under such 24 a circumstance as that the complete drywell volume with all 25 these compartments is going to be flushed with hydrogen or

is there some level in the drywell above which no hydrogen will be allowed to flow before it is pumped through the suppression pool and into the rest of the containment?

Are you knowledgeable about that?

A. I believe Mr. Elliott of GE testified the
hydrogen built up in the reactor vessel would be released
through SRV, safety/relief valves.

8 So it's going to go directly into the 9 suppression pool between the drywell wall and the containment 10 vessel wall.

To my knowledge, I don't think any hydrogen will be built up inside the drywell wall.

Q. I see. All right.

JUDGE LINENBERGER: I guess the last question I have really is for Counsel rather than for the witness, and very simply stated, this gentleman as an employee of one of Applicant's subcontractors is stating that there is a commitment -- that Applicant is committed to doing something.

20 Now, I just need to know what that means 21 practically. It could well mean that that's the way 22 Ebasco wants it, but it could also well mean that Applicant 23 might say later, "Well, gosh, that's going to add to the 24 bill, fellows. Let's strike that."

So how binding is this testimony with respect to

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS RUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

13

25

8-21

1

2

3

1	a commitment by Applicant itself?
2	MR. POWELL: Well, I think as all of the
3	testimony here, it is binding, and if that commitment
4	does, Judge Linenberger appear in the PSAR, it's a firm
5	commitment, and that's what will happen.
6	JUDGE LINENBERGER: Thank you. That's all I
7	have.
8	JUDGE WOLFE: Is there cross on Board questions,
9	Mr. Sohinki?
10	MP. SOHINKI: No, sir.
11	JUDGE WOLFE: Mr. Doherty?
12	MR. DOHERTY: No, Your Honor.
13	JUDGE WOLFE: Is the witness to be permanently
14	excused?
15	MR. POWELL: Yes, Your Honor.
16	JUDGE WOLFE: All right. The witness is
17	permanently excused.
18	(The witness was excused.)
19	JUDGE WOLFE: It's now 3:30 in the afternoon
20	3:40 in the afternoon.
21	Are we ready to proceed with argument on the
22	radon issue or issues or shall we proceed to take testimony?
23	It's the parties' pleasure.
24	MR. COPELAND: Well, Your Honor, we briefly
25	discussed it over the break this morning, and I understood

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

8-22

•

	from Mr. Doherty it was his position he was not prepared to
1	argue and wanted to file something in writing.
1	I'm prepared to tell you our views right now, and
	I think Mr. Sohinki is. So I guess it's really up to the
010	Board whether they want an oral response or a written
7-1-00	response.
(202)	MR. DOHERTY: Your Honor.
12 (11) 2	JUDGE WOLFE: Yes.
	MR. DOHERTY: I'd like to get in a word there
10) since I have been represented.
1	MR. COPELAND: Well, I mean, we were told
12	MR. DOHERTY: Yes, well, may I go ahead,
1	Mr. Copeland, please?
14	I would like to respond in writing for the simple
1	reason, and I feel a little bit defensive about it. I have
16	just had no opportunity to do anything except look at a
17	borrowed copy of the thing.
18	I have to be honest with you, in the amount of
19	time I've had, I haven't been able to make much sense out
20	of it. I had to return the copy to Mr. Copeland, since it
21	was borrowed.
22	So I just have not had any time.
23	I would like to reply in writing next week, and
24	if the other parties wish to do this orally, that's fine
25	with me; but I really would request the Board I know I've
	ALDERSON REPORTING COMPANY, INC.

8-23

•



	1	JUDGE WOLFE: Mr. Doherty, when will you be
	2	able to submit something in writing to the Board?
	3	MR. DOHERTY: I think I could get it in the
	4	mail Tuesday.
45	5	JUDGE WOLFE: This coming Tuesday?
554 23	6	MR. DOHERTY: Yes.
(202)	7	JUDGE WOLFE: All right. We will have simul-
20024	8	taneous filings on Tuesday next, which is September 1st,
N, D.C.	9	by the parties on this radon issue or issues. After
NGTOR	10	receipt of the simultaneous filings on that date, the
NASHI	11	Board thereafter will make its determination on how to
NOC, V	12	proceed.
BUILT	13	All right. Anything else on that matter?
TERS	14	MR. COPELAND: No, sir.
RFOR	15	MR. DOHERTY: No, sir.
S.W. 1	16	MR. SOHINKI: I'm just I must confess to
EET, S	17	a little bit of dismay over Mr. Doherty's inability to
H STH	18	respond to the Board's question in this regard. I
300 71	19	believe it was a week ago Monday that the Board told us
	20	that this week we were going to be asked to express our
	21	views on chis subject.
	22	And I, frankly, don't see why Mr. Doherty
	23	should be unable to express those views.
	24	JUDGE WOLFE: Well, regardless, I've set the
	25	date of next Tuesday for simultaneous filing.

9-1

.

ALDERSON REPORTING COMPANY, INC.

		16123
	1	All right. Mr. Copeland.
	2	MR. COPELAND: Yes, sir. At this time, Your
	3	Honor, we would call Mr. John J. Boseman, Mr. Robert L.
	4	Huang and Mr. Jac. N. Bailey.
15	5	We would ask that these witnesses be sworn,
554-23	6	Your Honor.
(202)	7	JUDGE WOLFE: Would you identify yourselves
20024	8	first for the record.
l, D.C.	9	MR. BOSEMAN: My name is John J. Boseman,
NOTON	10	General Electric.
VASHE	11	MR. BAILEY: My name is Jack N. Bailey.
ING, V	12	MR. HUANG: I'm Robert L. Huang.
BUILD	13	JUDGE WOLFE: All right, gentlemen, would you
TERS	14	raise your right hands.
REPOR	15	Whereupon,
S.W. 1	16	JOHN J. BOSEMAN,
GEET,	17	ROBERT L. HUANG,
TH STI	18	and
300.77	19	JACK N. BAILEY
	20	were called as witnesses, and having been first duly
	21	sworn, were examined and testified as follows:
	22	JUDGE WOLFE: Please be seated.
	23	DIRECT EXAMINATION
	24	BY MR. COPELAND:
	25	Q. Gentlemen, I'm going to be directing each

9-2

of your -- these questions to each of you with respect 1 to a document entitled "Direct Testimony on Behalf of 2 Houston Lighting & Power Company: Steven A. Hucik and 3 John J. Boseman on Doherty Contention 17 - SRV Re-4 liability; Robert L. Huang on TexPirg Additional Contention 5 41 - Reactor Pressure Limit/Safety Relief Valves, and 6 Jack N. Bailey on Doherty Contention 42 - Position In-7 dication for SRV's." 8 Mr. Boseman, with respect to this document 9 and with respect to the portions of the document that 10 purport to be your testimony, was that testimony prepared 11 under your direction, supervision and control? 12 BY WITNESS BOSEMAN: 13 A. Yes, sir. 14 And do you have any corrections to make at. 0. 15 this time? 16 BY WITNESS BOSEMAN: 17 A. Yes, there's one correction that I'd ' to 18 make on Page 3. 19 I would like to correct one word on Page 3, 20 Line 19 where it reads, "Crosby SRV's," I would like to 21 change "SRV's" to "safety and relief valves." 22 MR. DOHERTY: Excuse me, what line? I'm sorry, 23 I missed that. 24 WITNESS BOSEMAN: Line 19. It's the beginning 25

ALDERSON REPORTIN COMPANY, INC.

16124

9-3

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

300 7TH STREET.

	1	of the answer.
	2	It presently reads: "Crosby SRV's have been
	3	used " I would like to revise that to read, "Crosby
	4	safety and relief valves have been used "
45	5	BY MR. COPELAND:
554 23	6	Q With that change, is this testimony true and
(202)	7	correct to the best of your knowledge, information and
20024	8	belief?
, D.C.	9	BY WITNESS BOSEMAN:
ICTON	10	A. Yes, it is.
ASHIN	11	Q. And do you adopt this as your testimony in this
NG, W	12	proceeding?
IGHD	13	BY WITNESS BOSEMAN:
ERS B	14	A. Yes, I do.
EPORT	15	Q. Mr. Huang, with respect to the portions of
W. , R	16	this document that purport to be your testimony, was that
SET. S	17	testimony prepared under your direction, supervision and
I STRI	18	control?
117 00	19	BY WITNESS HUANG:
3	20	A. Yes.
	21	Q. And do you have any corrections to make at
	22	this time?
	23	BY WITNESS HUANG:
	24	A. No.
	25	Q. Do you adopt this as your testimony in this

ALDERSON REPORTING COMPANY, INC.

9-4

.

.

100	-	-	in	0	2	A	÷.	23	1	2
20	de l	0	\sim	0	0	14	-	4.6	9	*

В	Y	W	I	T	N	Ē	S	S	H	U	A	N	G	:
_				-									-	

3	37 00 00
12.	Y 5-3 5-4
1.24	the frank hand

3	
4	Q. Mr. Bailey, with respect to the portions of
5	this document which purport to be your testimony, was
6	that testimony prepared under your direction, supervision
7	or control?
8	BY WITNESS BAILEY:
9	A. Yes, it was.
10	Q. And do you have any corrections to make at
11	this time?
12	BY WITNESS BAILEY:
12	A. I have one correction to make to my resume.
14	MR. DOHERTY: Excuse me. Mr. Bailey, did you
14	submit a resume to this?
15	WITNESS BAILEY: Yes, there is a resume
10	attached Attachment INR=1.
17	MP DOURDEV. 11 right I'm corry to inter-
18	MR. DONERIT: ALL LIGHT. I'M SOLLY CO INCOL
19	rupt.
20	WITNESS BAILEY: The first line of the second
21	paragraph, "I have been employed by HL&P since December
22	1977," vice '79.
23	That's my only correction.
24	BY MR. COPELAND:
25	Q. All right. With that correction, is this

9-5

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1 tion, knowledge and belief? 2 BY WITNESS BAILEY: 3 Yes, it is. A. 4 And do you adopt this as your testimony in this 0. 5 proceeding? 6 BY WITNESS BAILEY: 7 A. Yes, I do. 8 MR. COPELAND: Your Honor, at this time I 9 would move for the incorporation into the record of the 10 testimony of Mr. Boseman, Mr. Huang and Mr. Bailey. 11 I would ask that the testimony of Mr. Hucik 12 also be incorporated into the record, subject to his 13 appearance at a later date, and, of course, subject to a 14 motion to strike upon voir dire. 15 JUDGE WOLFE: Any objection? 16 2 MR. SOHINKI: We have no objection to that,

testimony true and correct, to the best of your informa-

18 Mr. Chairman.

MR. DOHERTY: I wish to take the witnesses on voir dire, and I would ask the Board if we're going to follow the same procedure as with the previous panel.

JUDGE WOLFE: All right. The ruling is, gentlemen, that questions will be put individually by the cross-examiner to you. When a question is put to you, you may not consult with another panel member -- panel

ALDERSON REPORTING COMPANY, INC.

9-6

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

	1	witness. You're to answer the question.
	2	However, if, for example, questions put to
	3	you and to any one of the three of you and there's
	4	some question as to who best would be able to respond
9	5	to that question, you may consult on that single
27-1-02	6	matter.
(202)	7	If one or more of you, after being asked a
17 (NO2	8	question if someone else is askel a question on
D.C.	9	cross-examination, you may ask the cross-examiner, Mr.
610N	10	Doherty, for permission to supplement the testimony of
VIHSE	11	another witness.
NG, W	12	But you should direct your question to the
TOTIO 1	13	cross-examiner.
ERS B	14	All right, Mr. Doherty.
INUAS	15	MR. DOHERTY: Okay.
W. , MI	16	VOIR DIRE
121	17	BY MR. DOHERTY:
INIC I	18	Q. You are Mr. Boseman?
114 00	19	BY WITNESS BOSEMAN:
ē.	20	A. Yes, sir.
3	21	Q All right. I'm going to ask you some questions
	22	with regard to the submittal you have here on your
3	23	resume, then I'll do it with each person in turn.
1	24	Did you write yes Did you author or
6	25	contribute to the PSAR for the Allens Creek plant at

9-7

•

.

all?

1

2

3

4

5

6

7

8

9

D.C. 20024 (202) 554 2345

S.W., REPORTERS BUILDING, WASHINGTOP

300 7TH STREET,

9- 8

BY WITNESS BOSEMAN:

A. No, I did not write, nor did I originally contribute to the PSAR. I was not in a position of contributing to the PSAR when the PSAR information was provided.

Q. Okay. Did you answer any interrogatories from Intervenors in this proceeding for Houston Lighting & Power with regard to this contention?

10 BY WITNESS BOSEMAN:

A. I didn't quite understand your question. Would you repeat it?

13 Q Did you answer any questions which the Inter-14 venors, such as myself -- those who are opposed to the 15 Allens Creek plant or had questions about this issue --16 did you answer any of those questions for Houston

17 Lighting & Power?

18 BY WITNESS BOSEMAN:

19 A. If the questions were presented to GE, I 20 don't know who generated the question, but there are 21 questions that were provided to us through our system 22 which we responded to, which is in the text.

The only questions proposed that I answered
is in the text on Page 2, 3, 4 -- up to about halfway
through Page 5.

9 - 9	,	If that's what you mean. That's what I
	2	contributed to.
	3	Q. Well, by your statement I can infer the answer.
•	4	What sources have you checked on your testimony
	g 5	for the reliability of safety/relief valves?
	554 23 0	MR. COPELAND: Objection, Your Honor. That
	(202)	goes to cross-examination.
	20024 8	MR. DOHERTY: I think it goes to how well he's
	9 P.C.	prepared to answer questions, which would go to his
	401.5N	knowledge as an expert witness.
	HISEN 11	(Bench conference.)
	'0NIC	JUDGE WOLFE: Your question again, Mr. Doherty?
•	1108	BY MR. DOHERTY:
	SHELL	Q. What sources did you check for your testimony
	15 IS	on the reliability of safety/relief valves?
	. 16 M S	JUDGE WOLFE: Objection sustained.
	17 17	BY MR. DOHERTY:
	IS 18 HI	Q. Did you check any sources on safety/relief
	19	valve reliability in answering your testimony:
	20	MR. COPELAND: The same objection.
	21	Do you understand the distinction here, Mr.
0	22	Doherty, between asking questions to establish or dis-
	23	establish the competency of the witness as against
•	24	questioning about matters within the witness' testimony
	25	

	1	itself.											
	2	Both of those questions were really directed											
	3	to the testimony, not to the witness' competency.											
	4	BY MR. DOHERTY:											
115	5	Q. Have you ever done a study on safety/relief											
554-23	6	valve reliability?											
(202)	7	BY WITNESS BOSEMAN:											
20024	8	A. I have contributed to studies on safety/relief											
i, D.C.	9	valve reliability.											
NOTON	10	Q. Were these done by the General Electric Com-											
ASHIN	11	pany?											
ING, W	12	BY WITNESS BOSEMAN:											
SUILD	13	A. Yes, sir.											
LERS 1	14	Q. Were you the lead investigator in that?											
EPOR	15	BY WITNESS BOSEMAN:											
5 W. , B	16	A. I was in support I was in a support mode											
EET, S	17	for the lead engineer who was performing the reliability											
H STR	18	study.											
17 008	19	Q. Who was the lead engineer, please?											
	20	BY WITNESS BOSEMAN:											
	21	A. I would have to check my records to pronounce											
	22	his name.											
	23	Mr. Visweswaran out of Availability Engineer-											
	24	ing at GE.											
	25	JUDGE WOLFE: The spelling, please?											

9-10

•

P

.

WITNESS BOSEMAN: V-i-s-w-e-s-w-a-r-a-n, 9-11 1 BY MR. DOHERTY: 2 Q. Okay. You were Product Engineer at General 3 Electric Company, then you say "MAO." What is MAO, 4 5 please? 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 6 BY WITNESS BOSEMAN: 7 A. Machinery Apparatus Operation. 8 Q. Okay. Do the Naval nuclear power units use 9 safety/relief valves, such as we're dealing with here? 10 BY WITNESS BOSEMAN: 11 A. Navy nuclear programming uses safety valves 12 and relief valves. The safety/relief valve, per se, 13 here is a combination valve that serves a relief function 14 and a safety function. 15 It's ne piece of equipment that can operate 16 both ways. 17 Q. And in that did you study their reliability --18 any of that work? 19 BY WITNESS BOSEMAN: 20 A. When you ask that question, reliability was an 21 ongoing type of a program, based on time, history and 22 the programs that were undertaken -- the Navy programs. 23 So I guess, yes, you could say it was a 24 reliability evaluation on a constant basis. 25 0. Do you believe that any of your experience with



9-13		Q Okay. Are these like three-credit courses,
	1	typical of a university-kind of setting, or were they
•	2	seminar-type intense, short courses?
	3	BY WITNESS BOSEMAN:
	5	A. They were not seminar-type. They were credit
1 2345		courses. Some of those courses are not offered in uni-
202) 55	7	versities. Some, as you will see, are strictly Navy-
0024 (3	8	oriented courses.
D.C. 2	9	Q. Who gave the courses?
TON	10	BY WITNESS BOSEMAN:
SHING	11	A. Instructors from the program in which I
4G. WA	12	worked, or in the case of the Kepner-Tregoe, it's an
A IT DIA	13	industry-type program that the company sent me to, which
ERS BI	14	lasted one week, eight hours a day.
PORTI	15	Q. What's the difference between the service
W. RE	16	record and the performance record of a component?
ET, S	17	BY WITNESS BOSEMAN:
STRE	18	A. Excuse me. A service record?
HJ.L 00	19	Q. Yes, that's the first of those two.
ň	20	BY WITNESS BOSEMAN:
	21	A. I don't understand what you mean. Where are
	22	you reading, please?
-	23	Q. I'm not.
	24	BY WITNESS BOSEMAN:
	25	A. A service record and a performance record are

interchangeable. In some terminologies individuals use the term "equipment service record" and in other areas they're called "performance records." It's a history file.

Q. Okay. In your experience here, which of these would you say most qualifies you to testify on this issue?

16135

MR. COPELAND: Which experience, Mr. Doherty?

MR. DOHERTY: The experience that he has listed on his resume, or any experience -- maybe it's not listed.

WITNESS BOSEMAN: If we look at strictly nuclear-related, since I joined General Electric back in 5-68 to present, it has been nuclear-oriented the shole time.

Experiences prior to that encompass certain
aspects of engineering, such as test, design work,
operation.

20 BY MR. DOHERTY:

Q. Has any of your work been with the General
Electric utility-type reactors, or has it --

23 BY WITNESS BOSEMAN:

A. My work has primarily been in mechanical equip ment design to support GE-designed nuclear reactor

ALDERSON REPORTING COMPANY, INC.

9-14

1

2

3

4

5

6

7

8

9

10

11

8

٠

15	1	systems.			
554 2345	2	Q. For land?			
	3	BY WITNESS BOSEMAN:			
	4	A. Land-based.			
	5	Well, my Navy work, obviously, is not necessarily			
	6	land-based. They're surface or submarine work power			
(202)	7	plants.			
20024	8	Q. Okay.			
(, D.C.	9	BY WITNESS BOSEMAN:			
ICTON	10	A. They do have a few prototypes that are land-			
ASHD	11	based.			
MILDING, W	12	Q. Have you ever operated a nuclear reactor or			
	13	training reactor, or something like that?			
FERS 1	14	BY WITNESS BOSEMAN:			
(EPOR	15	A. I have not operated one, per se, no, sir.			
. W.	16	MR. DOHERTY: Okay. I'd like to pass to the			
EET. 2	17	next witness, if that's all right.			
H STR	18	BY MR. DOHERTY:			
300 7T	19	Q. Dr. Huang, did you contribute any of the			
	20	material to the PSAR for the Allens Creek plant?			
	21	BY WITNESS HUANG:			
	22	A. I contributed to the so-called GESSAR, General			
	23	Electric Standard Safety Analysis Report; and I believe			
	24	some of the criteria in the GESSAR is used in the Allens			
	25	Creek PSAR.			

-

9-

6

1

1

)

ALDERSON REPORTING COMPANY, INC.

-16		1	So indirectly, I contributed to the Allens
Ó)		2	Creek PSAR.
		3	MR. DOHERTY: Mr. Chairman, are we going to
0		4	take a break or are we on forced flow?
554.2345	345	5	JUDGE WOLFE: We'll have a 15-minute recess.
	554.20	6	MR. DOHERTY: Thank you.
	(202)	7	(A short recess was taken.)
	20024	8	
	l, D.C.	9	
	1 101	0	
	ASHID	1	
	NC. N	2	
0	IGHUD	3	
	TERS 1	4	
	EPOR1	5	
	. н. Н. н.	6	
	EET, S	7	
	H STR	8	
	111 000	9	
	2	20	
	2	1	
	2	2	
	2	3	
	2	4	
	2	5	

	1		JUDGE WOLFE: All right, Mr. Doherty.
	2	BY MR. DONI	ERTY:
	3	Q.	Have you published any articles on the subject
	4	of overpres	ssure protection in any professional journals?
345	5	BY WITNESS	HUANG:
0.054.2	6	Α.	You mean public publications or
1 (202	7	Q.	Yes.
2002	8	BY WITNESS	HUANG:
N. D.C	9	А.	No, I don't have.
NGTO	10	Q.	Have you published any private, like contractor
WASH	11	reports or	that sort of thing?
JING.	12	BY WITNESS	HUANG:
BUIL	13	А.	Yes, some kind of internal GE documents.
CLERCS	14	Q.	What were the names of those; can you recall?
IOTAN	15	BY WITNESS	HUANG:
3.W.	16	Ă	Well, one of them is 'Overpressure Protection
KEE1,	17	Transient A	Analysis for Grand Gulf Project."
IC HI	18	Q.	And that was apart from your duties as the
1 (1010)	19	Grand Gulf	FSAR; was that a different publication?
	20	BY WITNESS	HUANG:
	21	А.	That's part of that, yes.
	22	Q.	Now, in these reports on the GESSAR, did you
	23	calculate t	the amount of reactivity insertion?
	24	BY WITNESS	HUANG:
	25	ā.	I don't understand your question.

10-1

ge

8

	1	Q Well, for various overpressure events, were you
	2	responsible for calculating the reactivity inserted? Was
	3	that one of your duties?
) 554-2345	4	BY WITNESS HUANG:
	5	A. Due to pressurization?
	6	Q. Pressure transients.
4 (202	7	BY WITNESS HUANG:
2002	8	A. The amount of the reactivity in the reactor
N, D.C	9	core is part of the calculation.
NGTO	10	Q. Were you responsible for calculating that for
WASHI	11	any of these
JING,	12	BY WITNESS HUANG:
BUILI	13	A. As part of the GESSAR, yes.
CLERS	14	Q. Okay. Have you ever testified before an Atomic
REPOR	15	Safety Licensing Board?
S.W.	16	BY WITNESS HUANG:
REET,	17	A. No, this is the first time.
TH STI	18	MR. DOHERTY: All right. I have no further
300.7	19	questions, Your Honor, of this witness. I think that's
	20	sufficient.
	21	JUDGE WOLFE: All right.
	22	BY MR. DOHERTY:
	23	Q. And you are Mr. Bailey; is that right?
	24	BY WITNESS BAILEY:
	25	A. That's correct.

ALDERSON REPORTING COMPANY, INC.

•

.

10-2

.

.

		16140
a.	What were your duties on the USS Long	Reach?
BY WITNESS	BAILEY:	
A.	On the USS Long Beach I served in two	capacities.
I served a	year as the Boiler Division Officer, w	hich is a
Mechanical	Division which is responsible for all	of the
reactor med	chanical systems, similar here to the N	SSS
systems.		
	I was responsible for supervising the	individuals
who operate	ed and maintained those sections.	
	I also was a Reactor Controls Division	Officer
for a year.	. That's the division which maintains	and
operates al	ll of the instrumentation necessary to	support
reactor ope	eration.	
	Also, in order to serve in those capac	ities, I
had to be a	a qualified watch stander to supervise	operation
of the nucl	lear powerplant.	
Q.	I missed what you said. You had to be	a
qualified w	vhat?	
BY WITNESS	BAILEY:	

A. A qualified watch supervisor.

Q. Watch supervisor.

10-3

300 7FH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

22 In your undergraduate training, did you have 23 any courses in instrumentation? 24 BY WITNESS BAILEY:

A. Yes, I did.

	1	Q	And was part of your work at the Naval Nuclear
	2	Power Schoo	ol in instrumentation?
	3	BY WITNESS	BAILEY:
	4	A .	Yes. Some courses were devoted to instrumentation,
45	5	their uses	and their types.
554-23	6	2	You are now supervising project engineer. How
(202)	7	many people	e do you supervise at this point?
20024	8	BY WITNESS	BAILEY:
. D.C.	9	A.	I believe there's 12.
GTON	10	Q.	How long have you had the position?
ASHID	11	BY WITNESS	BAILEY:
NG. W	12	Α.	I've had that position since March of this year.
NHEDI	13	Q.	Okay. You say you are "responsible for
FERS I	14	supervisin	g mechanical, nuclear and health physics design
EPORI	15	review."	
.W., R	16	BY WITNESS	BAILEY:
EET, S	17	А.	That's correct.
H STR	18	Q.	Is design review continuous throughout until
17 008	19	the plant :	is there as a physical entity?
νa.	20	BY WITNESS	BAILEY:
	21	A.	Yes, it is.
	22	Q.	Is that your understanding?
	23	BY WITNESS	BAILEY:
	24	Α.	Yes, it is.
	25	Ω.	When you were first employed by I see, you
	300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 7 8 9 10 11 12 13 14 15 16 17 18 19 10 10 10 10 10 10 10 10 10 10	1 Q 2 Power School 3 BY WITNESS 4 A 5 their uses 6 Q 7 many people 8 BY WITNESS 9 A 10 Q 11 BY WITNESS 12 A 13 Q 14 supervision 15 review." 16 BY WITNESS 17 A 18 Q 19 the plant 20 BY WITNESS 21 A 22 Q 23 BY WITNESS 24 A 25 Q

16141

10-4

10-5

1 corrected that. It was December 1977 that you joined

2 HL&P?

4

3 BY WITNESS BAILEY:

A. That's correct.

Okay. Now, was that period of time till February
of 1980 entirely involved with the balance of plant systems?
7 BY WITNESS BAILEY:

Α. I came on board and I worked in the piping 8 9 area, the paint area and several balance of plant systems, yes; and in that time period I also was the engineering 10 11 team leader for Allens Creek, and I also was the Design Task Force chairman for TMI studies, which I believe I was 12 13 chairman of HL&P's TMI Design Task Force, which was a 14 Task Force composed of all the disciplines from HL&P to 15 investigate the accident and make recommendations to the 16 two projects as to what studies or what changes ought to be 17 made prior to the issuance of the various documents, 18 NUREG-0718 being the pertinent one for Allens Creek.

19 Q. You've been involved in that since the 20 publication of 0718. Have you been carrying out some of 21 the design changes?

22 BY WITNESS BAILEY:

A. No, the TMI Task Force was formed shortly after the accident, and I was named chairman of that. I believe it's listed here as February 1980.

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

The intent there was to study the accident and 1 the documents that came out from the various sources 2 fc lowing the accident to determine what should be done 3 by 'L&P to the two projects to try and counter what had 4 happened at TMI, too. 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 So what we did is we worked before these 6 7 documents were out, before NUREG-0718 was actually issued, 8 to try and start design studies and pick out the areas 9 which we felt should be considered. 10 Did you answer any interrogatories which 0. 11 Intervenors in this hearing submitted with regard to this 12 Contention 42? 13 BY WITNESS BAILEY: 14 A. It's possible that they crossed my desk. I 15 didn't personally write them. 16 The people you supervise, are these all 0. 17 graduate engineers? 18 BY WITNESS BAILEY: 19 A. Yes, they are all degreed engineers. 20 0. All bachelor's level? 21 BY WITNESS BAILEY: 22 Some have bachelor's; some have master's. A. 23 Q. Well, in the health physics design review, is 24 there just one person that you deal with and through him, 25 the others' review; is that right?

16143

ALDERSON REPORTING COMPANY, INC.

10-6

1 BY WITNESS BAILEY:

A. There's a health physics group who has the
3 responsibility of insuring that health physics is properly
4 applied to the project.

5 Each individual engineer has certain
6 responsibilities with respect to enacting health physics
7 types of considerations.

8 Q. But do all those engineers report to you or do
9 they report to a leader who reports to you?
10 BY WITNESS BAILEY:

A. I have several supervisors who report to me, and those engineers report to those supervisors.

MR. DOHERTY: No further questions, Your Honor. JUDGE LINENBERGER: Mr. Bailey, on this last subject area of health physics, can you say a little bit about the scope of your responsibilities in the health physics area?

18 WITNESS BAILEY: The health physics area is 19 controlled by a health physics group which is assigned to 20 the project from the Health Physics Department.

21 The health physics team leader reports to me 22 for those actions which he needs carried out. So if he 23 has questions they would be funceled to me for dissemination 24 or fixing within the team.

JUDGE LINENBERGER: Okay. What experience,

ALDERSON REPORTING COMPANY, INC.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

25

10-7

10-8

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

specific experience or specific training have you had that
 you call the most upon for discharging your responsibilities
 in this health physics design review area that you speak
 of in your resume?

16145

5 WITNESS BAILEY: The health physics area will 6 go all the way back to my Navy time. Several courses are 7 taught in the basic school-type portion to make each 8 individual familiar with radiation and its consequences, and 9 how to deal with it.

Operationally, each operator is trained on how to deal with the various effects of loose radiation, fixed radiation, and in my capacity as supervisor, I often had to work in areas where radiation was present, such that I gained a lot of experience relative to the problems that are created because of radiation and how to avoid excessive radiation to my people.

17 In the service that was particularly important 18 because I had very limited crew and I had to be sure that 19 they weren't overexposed for the entire year that the limit 20 was based on.

At HL&P I've received, I believe, eight to twelve hours of training by the ALARA Group as to how they would like to see health physics enacted on the plant and what requirements they've placed on it, plus an ALARA design manual exists for my use.

JUDGE LINENBERGER: All right, thank you very

2 much.

1

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

12

13

14

15

16

17

18

19

20

21

22

23

24

25

10-9

JUDGE WOLFE: Absent objection, the written
direct testimony of Messrs. Boseman, Huang and Bailey
and their professional resumes are incorporated into the
record as if read.

7 With respect to the written direct testimony 8 of Mr. Hucik, his written testimony and his attached 9 resume are incorporated into the record as if read, 10 subject to his later appearance and after voir dire, 11 subject to a motion to strike.

The contentions involved in all of this written testimony relate to Doherty Contention 17, TexPirg Additional Contention 41 and Doherty Contention 42. (See attached pages.)

July 20, 1981

UNITED	STATES OF	AMERICA
NUCLEAR	REGULATORY	COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

2

4

5

6

7

8

9

10

11

12

23

14

15

16

17

18

19

20

21

22

23

24

In the Matter of	5
HOUSTON LIGHTING & POWER COMPANY	§ Docket No. 50-466
(Allens Creek Nuclear Generating Station, Unit 1)	S S

DIRECT TESTIMONY ON BEHALF OF HOUSTON LIGHTING & POWER COMPANY:

- (1) STEVEN A. HUCIK AND JOHN J. BOSEMAN ON DOHERTY CONTENTION 17 - SRV RELIABILITY
- (2) ROBERT L. HUANG ON TEXPIRG ADDITIONAL CONTENTION 41 - REACTOR PRESSURE LIMIT/ SAFETY RELIEF VALVES
- (3) JACK N. BAILEY ON DOHERTY CONTENTION 42 - POSITION INDICATION FOR SRV'S

Q. Panel, would each of you state your name, your position with your employer, and describe your professional experience and educational background?

A. My name is Steven A. Hucik and I am employed by the General Electric Company (GE) as Manager, Mark III Containment Engineering. My professional and educational background is described in Attachment SAH-1.

My name is John J. Boseman and I am employed by GE as a Senior Engineer in Valves and Auxiliary Equipment Jesign. My professional and educational background is

-1-

described in Attachment JJB-1.

2

Ô

4

5

6

7

8

9

10

11

12

3

14

15

16

17

18

19

20

21

22

23

24

My name is Robert L. Huang and I am employed by GE as a Technical Leader of the BWR/6 Transient Design Group. My educational and professional background is described in Attachment RLH-1.

My name is Jack N. Bailey and I am employed by Houston Lighting & Power Company (HL&P) as Supervising Project Engineer of Mechanical, Nuclear and Health Physics. My educational and professional background is described in JNB-1.

Q. Mr. Hucik and Mr. Boseman, would you please state the purpose of your testimony?

A. The purpose of our testimony is to address Doherty Contention 17 which states that blowdown following a Power Excursion Accident (PEA), Loss of Coolant Accident (LOCA) or Power Coolant Mismatch Accident (PCMA) combined with a single or several relief valves stuck in either the fully open or fully closed position may cause loads which would crack the containment wall. In addition, the intervenors question the reliability of the safety relief valves used in a BWR and request that applicant be required to use the most reliable valve available.

Q. Mr. Boseman, please describe the safety relief valve design being used in Allens Creek.

A. The SRV's for ACNGS are spring loaded, direct

-2-

acting, dual function type valves. The current design used at ACNGS is based upon the experience gained in over 100 reactor years of BWR operations. The design of ACNGS SRV's, manufactured by Crosby Valve and Gauge Company, has eliminated the causes of previously experienced undesirable performances associated principally with reverse seated type multiple stage pilot operated safety relief valves. The ACNGS SRV's do not use pilot or air operator diaphragms. Instead, the ACNGS SRV's consist of a direct-acting safety valve with an electro-pneumatic actuator assembly to provide for two separate and independent modes of operation (safety and relief). This design improvement combined with existing manufacturing control of critical dimensions and clearances between all moving parts, stringent production testing and inservice maintenance and inspection will make it extremely unlikely that any of the 19 SRV's on ACNGS will stick open or closed.

2

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

Q. What has been the operating experience of Crosby SRV's?

A. Crosby SRV'S? A. Crosby SRV'S have been used in both nuclear and non-nuclear applications for many years with an excellent service and performance record. The present SRV design with the previously stated improvements have undergone extensive qualification testing and are expected to have an even better service and performance record. To date the

-3-

operational history at Browns Ferry III and at Chinshan nuclear plants have shown this to be true.

2

4

5

6

7

8

9

10

11

12

3

14

15

16

17

18

19

20

21

22

23

24

Q. Mr. Boseman, please describe the operation and function of the safety relief values.

A. Safety/relief valves (SRVs) protect against overpressurization of the Reactor Coolant Pressure Boundary (RCPB) by opening automatically in either the relief or safety modes of operation when the pressure setpoints are exceeded. Allens Creek has 19 safety/relief valves. The pressure setpoints for the automatic relief function of the valves are in the range of 1103 psig to 1123 psig. Of the 19 valves, eight specially selected SRVs, which are part of the ADS system, open automatically as part of the Emergency Core Cooling System for small breaks in the RCPB where depressurization of the reactor vessel is necessary to permit operation of the low pressure coolant systems.

The present design of the system is such that the 19 SRV's open at different pressure levels via the relief function. At 1103 psig, 1 valve opens; at 1113 psig, 9 more valves open; at 1123 psig, the remaining 9 valves open. In the relief mode the valve is opened by pressurizing an air cylinder which moves an actuating lever thereby lifting the valve stem, as shown on PSAR Figure 5.2.6. The air cylinder is pressurized when either of 2

-4-

solenoid values is energized. The solenoids are automatically energized by an Instrumentation and Control signal generated by high reactor pressure or they can be manually energized by the operator.

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

If the reactor pressure exceeds 1123 psig and one or more of the safety/relief values are not open, the values will open automatically in the safety mode of operation when the pressure underneath the value overcomes the spring force holding the disc closed. The safety setpoints range from 1165 psig to 1190 psig. All SRVs will be open by the time reactor pressure reaches 1190 psig.

Q. Mr. Hucik, please describe how the discharge through the SRVs cause loads on the containment?

A. The SRV discharge piping routes reactor steam from the relief values to the suppression pool. The discharge piping is arranged so that the quenchers which are attached to the end of the SRV discharge piping are uniformly distributed in the suppression pool. When a safety relief value is opened, there is a rapid pressure build-up in the discharge pipe. This rapid compression of the column of air in the pipe caused by the release of reactor steam causes a subsequent acceleration of the water column in the submerged portion of the pipe. During this water clearing process, the pressure in the pipe builds to a peak as the last of the water is expelled. At this point, the highly compressed

-5-

cushion of air between the water slug and the reactor steam begins to leave the pipe. As the highly compressed air exits, it forms an air bubble which expands and contracts, or oscillates, as it rises to the surface of the suppression pool. This oscillation of the air bubble causes a pressure disturbance throughout the suppression pool which is transmitted as a dynamic load to the containment. This air clearing process takes about 0.75 seconds. After the air clearing process, the quencher is acting only as a condenser as the steam from the RPV is discharged into the suppression pool and condensed. This will begin to heat the suppression pool. If the relief valve sticks open, it will continue to heat the pool but will not impart any significant dynamic loadings on the containment. This heat-up of the suppression pool will be controlled by the Residual Heat Removal (RHR) System which will keep the pool temperature within acceptable limits.

2

4

5

6

7

8

9

10

11

12

3

14

15

16

17

18

19

20

21

22

23

24

Q. Mr. Hucik, would you also describe the load combinations, pertinent to this contention, for which the containment has been designed?

A. There are two load combinations pertinent to this contention. They are as follows:

- 1. LOCA plus single SRV actuation.
- 2. Automatic Depressurization System (ADS)

-6-
AC

۹

actuation.

For the case of a relief valve stuck open, the worst case for containment design is a combination of LOCA blowdown loads with the loads due to a single SRV actuation. The dynamic loadings due to this load case would be the same as for LOCA plus a stuck-open relief valve.

For the case of relief values failing in the closed position, load case #2 demonstrates that only 8 of the 19 relief values are necessary to rapidly depressurize the reactor. Thus the failure of up to eleven relief values in the closed position will not cause the violation of a safety limit.

The pressure loadings on the containment due to load cases 1 and 2 have been provided to HL&P by GE and are part of the design basis for the containment as described in Chapters 3 and 6 of the ACNGS PSAR.

Q. Mr. Huang, what is the purpose of your testimony?

A. My testimony addresses TexPirg Additional Contention 41, which alleges that there is inadequate protection against overpressurization of the ACNGS Reactor Coolant Pressure Boundary (RCPB) resulting from pressure increase transients. This concern arises, according to TexPirg, because the Nuclear Pressure Relief System (NPRS) is not designed adequately to ensure that during the most severe

-7-

abnormal operational pressure increase transient, pressure is maintained below the limit allowed by the American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code. TexPirg's concern stems from the fact that the analysis of the most severe operational transient resulting in the highest nuclear system pressure rise assumes that the reactor is shutdown by the high-neutron flux SCRAM. TexPirg has asserted that reliance on the high flux signal as a major contributor to the termination of the pressure transient, and hence as a critical design input into the NPRS, does not provide an adequate assurance against overpressurization of the RCPB because there is a history of poor performance in the BWR flux instrumentation systems with inaccuracies of 5.4 percent.

2

4

5

6

7

8

9

10

11

12

B

14

15

16

17

18

19

20

21

22

23

24

Q. Would you briefly describe the purpose and design of the NPRS?

A. As described by Mr. Boseman, the NPRS consists of 19 safety/relief valves located on the main steam lines between the reactor vessel and the first isolation valve within the drywell. These valves protect against overpressurization of the RCPB by opening automatically upon receipt of pressure signals (relief operation) to limit a pressure rise or by self-actuation (safety operation), if not already automatically opened for relief operation. The

-8-

events that lead to actuation of the safety/relief valves result from sudden reduction of steam flow while the reactor is operating at power. Major pressurization transients are caused by the closure of the MSIVs or the turbine control valves or turbine stop valves. The closure of these valves cuts off the steam flow path and isolates the reactor vessel from the condenser while steam is still being formed. The pressure inside the vessel thus increases rapidly.

2

4

5

6

7

8

9

10

11

12

3

14

15

16

17

18

19

20

21

22

23

24

The ASME Boiler & Pressure Vessel Code requirements of Article NB-7000 on setpoints of safety/relief valves are conservatively satisfied by (1) setting all setpoints at or below the reactor vessel design pressure and (2) by setting the setpoints so that the peak vessel pressure does not exceed 110 percent of the design pressure during the limiting pressurization event. The ACNGS safety/relief valves are set to operate in the relief mode from 1103 to 1123 psig and in the safety function from 1165 to 1190 psig. This satisfies the ASME Code requirements because all valves open at less than nuclear system design pressure (1,250 psig).

Q. What is the limiting pressurization event and how does it relate to SRV capacity?

A. The pressure transient resulting from the closures of all main steam line isolation valves (MSIV) represents the most severe pressurization transient when credit is taken only for an indirectly derived SCRAM. The analysis

-9-

of this transient conservatively assumes the failure of the direct, safety-grade main steam isolation valve position SCRAM. In this event the reactor is shutdown by the backup, indirect neutron flux SCRAM. Consequently, the analysis introduces a significant delay between the initiation of the transient (MSIV closure) and the initiation of a SCRAM. The probability of this event with failure of the safety grade scram on MSIV closure is very low.

2

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

The required safety/relief valves capacity is determined by analyzing the pressure rise from such a conservatively postulated transient. The plant is assumed to be operating at 105 percent of nuclear boiler rated steam flow conditions at a maximum operating reactor vessel dome pressure of 1,045 psig. It is further assumed that only one-half of the safety/relief valves operate in the pressure relief mode (setpoints are conservatively assumed to be in the range of 1,115 to 1,155 psig), and the other half is assumed to operate in the backup safety mode (spring setpoints are conservatively assumed to be in the range of 1,175 to 1,215 psig). The analysis indicates that the design valve capacity is capable of maintaining the reactor vessel pressure well below the ASME Code allowable pressure in the nuclear system (110 percent of design pressure or 1,375 psig). The peak pressure at the bottom of the reactor vessel is 1,294 psig. Therefore, the most severe over-pressure transient is terminated well below the pressure limit required by the ASME Code.

Q. What are the conservative assumptions built into this analysis?

2

R

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

Under the general requirements for protection Α. against overpressure, as given in Article NB-7,000 of Section III of the ASME Boiler & Pressure Vessel Code, analysis of overpressure transients can consider the effects of an appropriate SCRAM from the Reactor Protection System (RPS). Thus, the above-described overpressure transient analysis could have considered the effects of a SCRAM resulting from an RPS signal initiated by MSIV closure since this automatic SCRAM qualifies as an acceptable protection device under the provisions of the ASME Code. There are four main steam lines with two isolation valves per line. Position switches mounted on the eight main steam line isolation valves signal MSIV closure to the reactor protection system. Each of the switches is arranged to provide a signal to the reactor protection system before the valves are more than 10% closed. This provides early positive indication of closure. The logic for generating a SCRAM signal from isolation valve closure is as follows: Closure of two main steam line isolation valves on the same steam line will not initiate SCRAM. (To allow for MSIV testing.) However, closure of one main steam line isolation valve (MSIV) in two or more steam lines will cause a SCRAM. In other words, one of four

-11-

steam lines may be closed without initiating SCRAM but closure of more than one steam line will initiate SCRAM assuming any single failure.

2

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

However, even though the Code allows for consideration of the immediate SCRAM generated by MSIV closure, the General Electric Company conservatively assumes the failure of the direct, safety-grade MSIV position SCRAM signals. The General Electric analysis relies only upon the delayed SCRAM signal generated by high-neutron flux.

When the MSIV's close and the vessel internal pressure rises, the steam bubbles in the core region collapse. With more water in the core, the neutron flux increases above the high-neutron flux SCRAM setpoint. This sequence takes considerably longer than the direct MSIV position SCRAM, and its use in the overpressure transient analysis is, therefore, very conservative.

Thus, TexPirg's allegation that the General Electric analysis is nonconservative neglects completely the conservatism of taking no crodit for the earlier scram.

Q. TexPirg also asserts that the safety/relief valve capacity analysis does not account for an alleged history of unreliability in high-flux SCRAM signal circuitry. Is this assertion valid?

A. No, there are 4 divisions of Average Power Range Monitors (APRMs) which measure neutron flux and thus reactor

-12-

power levels. The APRM signals are monitored by the Reactor Protection System (RPS). If the APRM measurement exceeds the setpoint, a SCRAM will be initiated. The 4 divisions of APRMs are amply redundant and are routinely calibrated and checked through heat balances at power operations.

2

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

In addition, the high APRM scram setpoint assumed in the overpressure protection analysis is at a conservatively high level above the nominal setpoint. This accounts for initial setpoint errors and setpoint drift that may occur during operation. Typically, the assumed setpoint in the analysis is about 4% above the nominal setpoint. Furthermore, the neutron flux increase in the overpressure transient caused by MSIV closure with assumed failure in the direct scram is very rapid. So, the alleged APRM uncertainty of ±5.4% could only delay the scram initiation time by less than 50 milliseconds, and its effect on the peak vessel pressure is still well below the ASME Code limit.

Finally, further indepth protection offered by the safety/relief system is demonstrated by the fact that pressure limits will not be exceeded even if the highneutron flux scram (the second or delayed SCPAM) is assumed to fail. The SCRAM under these conditions is initiated by the high reactor pressure trip signal. The probability of the simultaneous failure of the MSIV position SCRAM and highneutron flux SCRAM signals is obviously extremely low. But even assuming these incredibly unlikely events, the peak reactor vessel pressure for this transient is still below the ASME Code limit of 1,375 psig. Hence, even if TexPirg's unfounded claims of high-flux signal unreliability were true, the RCPB would still be adequately protected against overpressurization.

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

Q. Mr. Bailey, what is the purpose of your testimony?

A. The purpose of my testimony is to address Doherty Contention 42 which alleges that the design of the SRV position indicators is inadequate. He bases his allegation on events at TMI and the main thrust of his contention is that HL&P has not explained how it will comply with the recommendations that evolved from the TMI incident.

Q. Are you familiar with HL&P's commitments to meet the new regulatory requirements that evolved from the TMI incident?

A. Yes, I am. I was the engineer at HL&P who had primary responsibility for the preparation of HL&P's detailed response to NUREG-0718. Accordingly, I am intimately familiar with the details of the steps taken to comply with the new regulatory requirements that evolved from TMI.

Q. Turning to Mr. Doherty's contention, does the ACNGS design provide direct indication of SRV position in the main control room?

A. Yes. As indicated in Appendix O, page 0-93 of the PSAR, Allens Creek will provide direct indication of SRV position in the main control room. This commitment was made in response to Item II.D.3 of NUREG-0718-"Licensing Requirements for Pending Applications for Construction Permits and Manufacturing License", which requires a demonstration that design and implementation can be completed prior to the issuance of an operating license.

2

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

Q. Please describe the SRV position indication design to be incorporated in the Allens Creek design.

A. SRV position indication will be determined by pressure measurement in the SRV discharge pipe. Data from plants presently in operation demonstrates that this method provides an adequate indication of SRV position. The actual pressure setpoint to be used at ACNGS will be determined from a combination of analysis and field test data, and will be submitted with the FSAR. Indication in the Main Control Room will be on two light matrices, one for each division of position measurement, on the Reactor Core Cooling Systems benchboard above the manual control switches for the relief valves. The indication will be redundant, safety grade, seismically and environmentally qualified, and powered from a Class IE power source. An alarm indicating that an SRV is open will be provided.

There are no questions regarding technical feasi-

-15-

bility or state-of-the-art of the SRV position indication design, nor is there any concern that it cannot be implemented prior to OL issuance. In fact, this design concept has been approved by the NRC for use on the Hatch nuclear plant operated by Georgia Power Company. Accordingly, there is no doubt that we can demonstrate that our design concept is "echnically feasible.

Attachment JNB-1

Jack N. Bailey

I graduated from Georgia Tech in 1972 with a degree in Electrical Engineering. From June 1972 through November 1977, I served in the U.S. Navy. During this time I attended the Naval Nuclear Power School, served on the USS Long Beach, a nuclear-powered guided missile cruiser, and served as a supervisor in the Naval Nuclear Power Training Unit, DIG Prototype.

I have been employed by HL&P since December 1977. Initially I was a member of the ACNGS Engineering Team with responsibility for piping program organization, painting requirements, inservice inspection access requirements and other balance of plant systems. From February 1980 to August 1980 I was Chairman of HL&P's TMI Design Task Force. The task force studied the TMI accident and made recommendations for needed studies and design changes. From August 1980 to March 1981 I was Engineering Team Leader for Allens Creek with responsibility for all NSSS systems and a variety of balance of plant systems. I was also responsible for HL&P's response to NUREG-0718, "Licensing Requirements for Pending Applications for Construction Permits and Manufacturing License." I was promoted to my current position as Supervising Project Engineer in March 1981, and in this position I am responsible for supervising the mechanical, nuclear and health physics design review of ACNGS.

RESUME

John J. Boseman

Position: Senior Engineer

Employer: General Electric Co., San Jose, CA.

Principal Duties and Responsibilities:

Responsible for the design, development, qualification tests, programs, and related technological growth of equipment assigned including all necessary technical and liaison assistance to support installation, testing, inspection and maintenance of the equipment. Formulated, directed, and participated in the design, tests, evaluations and programs to improve the reliability and optimization of Safety/Relief Valve designs for BWR applications.

Background

- 5/68 1/77 Product Engineer with General Electric Co., MAO, Schenectady, N.Y. - As cognizant engineer liaisoned and performed design, development, tests, manufacture, evaluations, installation and field support functions for various types of Naval nuclear power plant fluid components. As Product Engineer performed and provided technical direction for the design, applications, qualifications, development, installation and maintenance of assigned equipment. (e.g. - Valves (checks, gates, globes, relief, motor operated, hydraulic operated, etc.; magnetic separators, filters, pressure vessels, pipe and fittings, demineralizers, reactor viewing devices, etc.)). Assigned to participate in the Navy's 1970 Valve Design Review Task Force.
- 6/66 4/68 Associate Engineer with Lockheed Missile & Space Co., Sunnyvale, CA. - Analyzed, proposed, designed, developed, tested and liaisoned the manufacture of advanced electromechanical microwave antenna and antenna systems for Satellite and Polaris/Poseidon Missile applications.
- 2/66 5/66 Assistant Engineer with The Boeing Company, New Orleans, LA. - Performed environmental and simulated testing of fluid power components and sub-systems applicable to the Saturn IV & V Booster System. Established cause for LOX and lift check valve failure and recommended corrective action to preclude recurrence.

7/64 - 1/66 - Assistant Engineer with Delta Steamship Lines, Inc., New Orleans, LA. ~ Operated, tested, maintained and repaired steam and diesel power plant systems and equipment including the review and liaison of design proposals and major shipyard overhauls and repairs. Conceived and demonstrated an emergency technique to repack stern gland while underway.

Education/Training

- 1964 B.S. Marine Engineering U.S. Merchant Marine Academy.
- Nuclear Radiation & Environmental Effects/Navy Structural Design Basis-63/Reactor Plant Technology/ASME Pressure Vessel Codes/ Kepner-Tregoe "Problem Solving & Decision Making Course.

Publications/Articles

- ASME 80-C2/PVP-29 OPERABILITY ASSURANCE TESTING OF ASME CODE, CLASS 1, SAFETY/RELIEF VALVES.
- EVALUATION OF 3 THERMALLY SHOCK TESTED 1/2-INCH GLOBE VALVES (MEDF #54) U.S. Navy Document (Restricted).
- U.S. NAVY NUCLEAR VALVE DESIGN MANUAL (VDM-71) (Classified).
- Plant Equipment Design Memorandum No. 126-74 SEALING MECHANISM FACTORS.

Robert L. Huang

I received a Bachelor of Science Degree in Nuclear Engineering from National Tsing Hua University in Tsiwan, China in 1968. During 1969 to 1975 I attended Columbia University in New York and received a Master of Science Degree in Nuclear Engineering in 1970 and a Doctor of Engineering Science Degree in Nuclear Engineering in 1975.

I joined the General Electric Company's Nuclear Energy Division in September, 1974. I was responsible for BWR/6 transient safety design, which includes reactor vessel overpressure protection and reactor fuel overpower protection. Shortly thereafter, I performed transient safety analyses for the General Electric Standard Safety Analysis Report (GESSAR), and for the Grand Gulf FSAR. Since then, I have performed design and analysis studies for all BWR product lines, and led the transient design efforts which established the BWR/6 product line.

In my current position as a Technical Leader, I provide technical guidance and work direction to engineers to perform the reactor system transient safety design analyses and licensing evaluations on BWR plants. I am also responsible for the establishment and specification of reactor system hardware and reactor protection system functional requirement.

Steven A. Hucik

Mr. Hucik is manager of the Mark III Containment Engineering Unit of the Nuclear Power Systems Engineering Department in the General Electric Company. His employment with General Electric began in 1973 and his experience has been mainly in the containment loads area. His unit is responsible for all Mark III containment analysis and dynamic load definition for loss-of-coolant accident (LOCA) and safety/relief valve discharges.

Mr. Hucik's experience in Mark III containment includes responsibility for the dynamic loads development and application, documented in the Mark III Containment Loads Report. He was responsible for the analysis of the Caorso SRV test data used to support the SRV load reduction defined in the final Mark III Containment Loads Report.

Mr. Hucik's Mark III experience is also supported by his previous involvement in the Mark I Containment Program. His involvement included application of test data, load definition development, customer and Architect/Engineer interface, and US regulatory presentations.

Mr. Hucik has provided support to the Mark III Customers and Architect/Engineers in the load application area for both LOCA and SRV discharge events. He has also made presentations of the design and licensing bases to the US regulatory agencies, customers, and Architect Engineers.

Mr. Hucik is a 1973 graduate of Washington State University with a B.S. Degree in Mechanical Engineering. In 1976, he received an M.S. Degree in Mechanical Engineering from the University of California, Berkeley. He is also a Registered Professional Engineer in the State of California.

0-10	1	JUDGE WOLFE: All right. Any cross, Mr. Sohinki?
•	2	MR. SOHINKI: No, sir.
	3	JUDGE WOLFE: Mr. Doherty?
•	4	CROSS-EXAMINATION
345	5	BY MR. DOHERTY:
554-2	6	Q. Noticing on page 2 never mind that.
4 (202	7	You had a correction, I noticed, at the beginning,
2002	8	on page 3 at line 19, I think you said it was.
N, D.C	9	The word "Crosby" still stays in that statement;
NGTO	10	is that right?
WASHI	11	BY WITNESS BOSEMAN:
, DNIG	12	A. Yes, sir, that's correct.
BUILI	13	Q. So i essentially changes the meaning of the
TERS	14	sencence from saying that safety/relief valves have been
REPOR	15	used to some safety valves have been used, maybe even
S.W.	16	hundreds, I don't know, and some relief valves have been
REET,	17	used; is that right?
US HI	18	BY WITNESS BOSEMAN:
300 7	19	A. That is correct. There's safety valves as an
	20	entity in its own right and there's relief valves. A
	21	safety/relief, or in effect a dual function type valve they
	22	did not have in the past.
	23	It's one valve that serves two functions. They've
	24	had safety valves and relief valves which they have used in
	25	the past.

....

1

15

1. 10

1. 148

ALDERSON REPORTING COMPANY, INC.

.

~

0

Q. Okay. Now, we look on to the next sentence. It says, "The present SRV design with the previously stated improvements have undergone extensive qualification testing and are expected to have an even better service and performance record."

16148

Now, even better than what? BY WITNESS BOSEMAN:

8 A. Even better than their commercial -- when I
9 refer back to safety values in the past, we're talking
10 about the basic Crosby design.

The existing design is an improvement, an improved version of that design, and specifically it's in the area of leakage capability.

14 Q. Okay. So then the meaning we should attach to 15 that sentence which you retain, then, is that -- well, what 16 would that meaning be?

It sounds like we are still going to have a comparison, that we're going to compare them to safety valves on the left hand and relief valves on the right, rather than a composite valve such as is going to be in the plant. Is that correct?

22 BY WITNESS EOSEMAN:

23 A. The way I'd like to answer that question is 24 this one value that serves two functions has been the 25 result of extensive review of the existing types of safe.

ALDERSON REPORTING COMPANY, INC.

10-11

1

2

3

4

5

6

7

10-12

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345

13

15

25

valve and relief valve designs that exist in the world as 1 well as with Crosby and various vendors. 2

The design pursued here is to take all the best 3 features of the safety valves and combine it into one 4 5 portion and all the best features of the relief valve and 6 combine that, and then combine both into one valve.

7 That's the meaning behind the statement that's 8 made with "The present SRV design with the previously 9 stated improvements have undergone extensive gualification 10 testing and are expected to have an even better service 11 and performance record."

12 0. Have you been associated with these valves while working at General Electric -- excuse me -- in your work 14 with G neral Electric at all?

BY WITNESS BOSEMAN:

16 Yes, sir, I have been intimately involved with Α. 17 the hardware and design and qualification testing and 18 production and evaluations of it.

19 Okay. Now, I meant to be talking about the 0. 20 safety/relief valves; is that what you understood me to 21 be speaking of?

22 BY WITNESS BOSEMAN:

23 A. I'm speaking of the safety, slash, relief valve, 24 which Allens Creek will be using. Yes, sir.

Q. Okay. Now, weren't those used at least for a



20024 (202) 554-2345

WASHINGTON, D.C.

REPORTERS BUILDING.

S.W. 1

300 77H STREET,

20

25

24

1 time at one of the Browns Ferry nuclear plants?

2 BY WITNESS BOSEMAN:

A A similar design was installed in Browns Ferry
4 III for a period of approximately a year, more like eleven
5 months to be precise.

The difference between the two values is the
size. Allens Creek will use an 8 x 10 size, and the one
installed at Browns Ferry was a 6 x 10 value.

9 They are both sister values, except for sizing10 considerations.

11 Q. What was the result of their use at Browns 12 Ferry? I gather they were put in and out of that plant; is 13 that right?

14 BY WITNESS BOSEMAN:

A. That is correct. Performance was satisfactory.
There was no problems with the value.

17 Q Do you have any recollection of the amount of 18 service they actually got there in that eleven months, 19 how much operation they actually did?

BY WITNESS BOSEMAN:

A. I have it in terms of months. The precise number of sequence operations as compared to the transient operations I would have to check through the records that were provided to us from TVA.

0. Well, was some of this use at Browns Ferry, was

16151

10-14

1 that included in the statement here -- or was that part of 2 the gualification testing?

3 BY WITNESS BOSEMAN:

A. That follows the statement made on line 24 where
5 it reads, "To date the operational history at Browns Ferry
6 III and Chinshan nuclear plants have shown this to be true."

7 That's where the Browns Ferry in-service operational 8 history has been demonstrated.

9 Q. Okay. When you say "dual function," you do then 10 refer to safety function and relief function; is that what 11 you mean by saying "dual function"?

12 BY WITNESS BOSEMAN:

A. Safety function and relief function. The
safety/relief value is a value that relieves pressure.

When we speak of the relief function, we speak of the method by which relief is provided through the value.

18 In the relief function the value is opened by 19 some external means. In this case it's electromatic 20 actuator.

In the safety function, the inlet pressure initiates the action to force the valve open. It's independent of the relief function.

24 I'd like to clarify it, because it's one value 25 performing the same safety function, but by two different

ALDERSON REPORTING COMPANY, INC.

300 71'H STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (262) 754-2345

10-15

900 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1 vehicles.

2 Q. You give these measurements 6 x 8 and 6 x 10, I think. Is this a square aperture through which relief 3 is afforded, or what does that measure? 4 5 BY WITNESS BOSEMAN: 6 A. 6 x 10 is the nominal pipe size. The inlet 7 is 6-inch; discharge 10-inch; and the other valve 8 that I mentioned which was an Allens Creek sizing is 9 8-inch inlet. It's a flange-rated size for the pipe size. 10 And a 10-inch discharge line. 11 That's all that means, 6 x 8 versus by 8 x 8 --12 rather 6 x 10 versus 8 x 10. 13 Q. All right. The aperture is actually round then? 14 B/ WITNESS BOSEMAN: 15 A. No, just pipe sizes. You can have a one-inch 16 pipe, two-inch pipe, three-inch pipe, et cetera. 17 MR. DOHERTY: Excuse me a minute. I need to 18 get something. 19 20 21 22 23 24 25

JUDGE LINENBERGER: During the pause I would 1 bm like to inquire about something we have -- in prior 2 testimony heard the term "pilot-operated relief valve." 3 Is that a term that is used in conjunction with the valves 4 you are talking about; or is that another type of 5 20024 (202) 554-2345 valve -- a PORV? 6 WITNESS BOSEMAN: To answer your question, a 7 pilot-operated valve is another type of valve. It is 8 S.W., REPORTERS BUILDING, WASHINGTON, D.C. not the same type of valve we're speaking of here. 9 JUDGE LINENBERGER: Thank you. 10 BY MR. DOHERTY: 11 Q. Okay. Now, what has been the usual buyer --12 or ... this is a new valve system, right? It's not the 13 14 one that --15 BY WITNESS BOSEMAN: A. This is a new valve design based on existing 16 300 7TH STREET. 17 design. It is a new valve design. 18 0. Why did you change the design? 19 BY WITNESS BOSEMAN: 20 A. We changed the design from the existing designs to improve the overall reliability and performance 21 of the valves, in general. It's part of a standard 22 ongoing improvement -- product improvement program that 23 24 GE undertakes in the Mechanical Equipment Design 25 Section.

ALDERSON REPORTING COMPANY, INC.

16153

11 - 1

Q. When did you initiate this process? 1 BY WITNESS BOSEMAN: 2 A. GE initiated this process back in 1975. I 3 personally did not initiate it. I was not at GE/San Jose 4 at that time. ÷. 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTUN, D.C. 20024 (202) 554-2345 0. 1975? 6 BY WITNESS BOSEMAN: 7 A. That's an approximate date. Sometime in 1975. 9 Q Well, did you -- Did the Three Mile Island 10 event have anything to do with that at all? 11 BY WITNESS BOSEMAN: 12 A. No, sir. This precedes the TMI event. Most 13 of the effort undertaken to date with this safety/relief 14 15 valve predates the TMI event. Q. Do you have any failure rates for the new 16 17 valve (let's call it)? 18 BY WITNESS BOSEMAN: 19 A. No, sir. We don't really have failure rates. 20 The valves that have been in service to date have not 21 failed, and we're basing that primarily on Browns 22 Ferry III and Chinshan I and II. 23 Q. So they had some additional work at Chinshan. 24 Was that -- Did the Chinshan work roughly double the 25 work done at Browns Ferry or ...

16154

ALDERSON REPORTING COMPANY, INC.

11-2

11 - 3

1

2

3

4

5

6

7

12

13

22

D.C.

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON,

MR. COPELAND: Do you mean duplicate it? MR. DOHERTY: No, not that. Double it in terms

16155

of quantity of information.

WITNESS BOSEMAN: In effect -- Are you really asking the question: How many of these types of valves have been in service to date?

8 Q. Yes. Well, I thought that Browns Ferry was 9 the only place you had put them in use. But now I think 10 you've said Chinshan and ... you know, was it as big a 11 study as Chinshan, if we could call it that -- or was

it greater?

BI WITNESS BOSEMAN:

BY MR. DOHERTY:

14 A. Well, it's more than a year. It's approximately
15 18 months of operation of Chinshan. So it's eight months
16 longer than what was in Browns Ferry.

17 Q. Were there any failures to open at Browns
18 Ferry in any transient or normal attempt to open?
19 BY WITNESS BOSEMAN:

A. There have been no failures to open, to my
 knowledge, no.

Q. And at Chirshan?

23 BY WITNESS BOSEMAN:

A. That's what I'm speaking of ... Chinshan. Both
Chinshan and Browns Ferry. The valves have performed to

date, to the best of my knowledge, satisfactorily. They 11-4 1 have opened and closed upon command. 2 Q. Have there been any inadvertent openings or 3 just openings? 4 BY WITNESS BOSEMAN: 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 None have been reported. I'm not aware of any A. 6 inadvertent openings on these types of valves. 7 Q. Okay. What were some of the causes that you've 8 eliminated here? 9 BY WITNESS BOSEMAN: 10 A. Some of the causes that we have eliminated? 11 Q. Yes. You, in your testimony at Page 5 or 6 12 there ... 5, say, " ... has eliminated the causes of 13 previously experienced undesirable performance" -- Crosby 14 design. 15 BY WITNESS BOSEMAN: 16 A. Not on Crosby design, but other valves, 17 specifically pilot-operated valves. We have eliminated 18 pilots so that leakage into the pilot does not inad-19 vertently open the valve. 20 This particular valve design does not contain a 21 pilot. 22 Another thing that has been eliminated from this 23 design is a diaphragm, which is common to the pilot-type 24 operated valves, where they have an operator on it; and 25

16156

16157

2 3 4 5 WASHINGTON, D.C. 20024 (202) 554-2345 6

1

7

8

S.W., REPORTERS BUILDING.

300 7TH STREET,

22

11-5

diaphragms have a tendency to generate a leak, which provides a leak path so that you can't generate the Delta P necessary to open the valve on command. It slows it up.

So those items have been eliminated. They don't exist in this particular design.

Q. Okay. I think you said Delta P. I was trying to follow that out.

Are you saying that for each leakage ... 9 decreases the differential pressure, so that sometimes 10 you don't get openings; is that --11

BY WITNESS BOSEMAN: 12

A. If you have a membrane, one side pressurized 13 and the other side not pressurized, and it takes that 14 differential pressure to move the membrane a certain 15 16 distance, then that's the force required to move the 17 membrane.

18 However, if you puncture a hole -- like in a 19 balloon which is blown up, the balloon decays and, 20 therefore, you don't have any pressure to move the 21 membrane.

Were there any other causes? 0.

23 BY WITNESS BOSEMAN:

24 A. Those are the prime two causes based on past 25 experience, yes.

11-6		
	1	Q. Were there any other causes based on ex-
•	2	perience that have not been eliminated, to your knowledge?
	3	BY WITNESS BOSEMAN:
•	4	A. Not to my knowledge. We have eliminated or
10	5	have worked towards improving the performance of it by
554.2	6	minimizing pote tial problems that could cause a valve to
(202)	7	become non-operable, as desired as intended to
20024	8	work.
, D.C.	9	Q. Which of the two modes requires the most
NGTON	10	moving parts?
VASHI	11	BY WITNESS BOSEMAN:
ING. V	12	A. The relief mode.
	13	Q. I guess I couldn't ask you how many moving
TERS	14	parts, but could you give us an idea of the difference in
REPOR	15	number of moving parts between the two? Is one you
	16	know, virtually zero and the other maybe 10 or something?
EET,	17	BY WITNESS BOSEMAN:
H STR	18	A. I'd have to refer to a sketch in order to give
300 71	19	you some idea. That would be the best way to explain
	20	it rather than give you numbers.
	21	However, in the relief mode you have an
	22	electro-pneumatic actuator and a mechanism which means
	23	that you have an actuator assembly and that has got a
•	24	set of moving parts, which in turn pulls up on a spindle
	25	rod of the safety valve portion of the valve, in order to

16159

		open it.
	1	Now in the safety valve mode of operation, you
	2	non in one bales faite mode of operation, for
	3	do not have to use the actuator assembly and its inter-
	4	locking mechanism. Therefore, you could eliminate the
2	5	mechanism and actuator.
54.23	6	There's less moving parts in the safety valve
202) 8	7	portion of the valve.
0024 (8	Q. The direct acting mode uses an air source -
D.C. 2	9	or
NOL	10	BY WITNESS BOSEMAN:
SHING	11	A. No, the direct acting description of the
IG. WA	12	valve is the term used for a safety valve spring-loaded
MOTH	13	direct acting. It's very similar to the pressure relief
ERS BI	14	device that's on your hot water heater at home.
PORT	15	Q. I'm sorry, I've never taken one of those
W., RF	16	apart, so I don't know what that is.
ET, S.	17	BY WITNESS BOSEMAN:
STRE	18	A. That's the basic concept. It's a spring-loaded
HLL OI	19	device holding down a pressure force. And if the pressure
ē.	20	force exceeds the spring force, the valve opens.
	21	Q. What's the source of the pressure force,
	22	please?
	23	BY WITNESS BOSEMAN:
	24	A. The main steam system is the steam force.
	25	Q. The steam force is from the reactor vessel

11-7

•

16160

11-8	 i	t	S	e	1	Ĩ	2.

•

0

	2	BY WITNESS BOSEMAN:
	3	A. That's from the reactor vessel.
	4	Q. So the vessel directly acts on the valve?
15	5	BY WITNESS BOSEMAN:
554-23	6	A. On the spring-loaded closure, yes.
(202)	7	Q. What's the spring made of, what material?
20024	8	BY WITNESS BOSEMAN:
, D.C.	9	A. The spring is a carbon steel grade spring
ICTON	10	steel.
VIHSV	n	Q. Have you observed rusting or anything like
NG, W	12	that?
IGHIOS	13	BY WITNESS BOSEMAN:
FERS I	14	A. Yes, there is a degree of corrosion on the
EPOR	15	spring. Once the surface corrodes to a degree, it in-
. М. , В	16	hibits further corrosion. It's part of the design basis
EET, S	17	for those types of springs.
H STR	18	In effect, it's very similar to a spring
300 TT	19	that you would see on a railroad car. It's that type of
	20	a spring. It has a high-duty life.
	21	Q. Does the spring Have these types of
	22	springs been used in other relief valve applications?
	23	BY WITNESS BOSEMAN:
	24	A. These types of springs have been used in safety
	25	valve and relief valve applications, but primarily in

safety valves, because they do primarily belong in 1 safety valves. 2 Similar springs have been used in relief 3 valves for other reasons. 4 All right. Do they show any aging tendencies? 0. 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 BY WITNESS BOSEMAN: 6 A. I have not -- As long as the spring is 7 properly designed, you don't see any aging effect, per 8 se. I interpret "aging," I mean "fatigue." 9 That's about the only form of aging that a 10 spring would really see. 11 Uh-huh. You speak about reverse-seated type 0. 12 multiple-stage pilot-operated relief valves. That's the 13 old style you're talking about there, right -- reverse-14 seated? 15 BY WITNESS BOSEMAN: 16 A. Yes, sir, that's correct. 17 All right. There's no need to go into that. 18 Ō. On terminology have either of these valves 19 ever been called electromagnetic valves? Are they 20 ever called that; or is that just another type of 21 22 valve? 23 BY WITNESS BOSEMAN: 24 That's a different type of valve. Α. 25 Okay. Is there any part of this value that's 0.

11-9

16161

		16162
11-10		called the actuator?
	-	BY WITNESS BOSEMAN:
•	2	A. Yes, sir. The electro-pneumatic type. That's the
	4	part of the valve that initiates the relief mode of
10	5	operation of the safety/relief valve.
554-234	6	Q. Okay. Now, let me get this straight. Is there
(202)	7	an actuator on this system?
20024	8	BY WITNESS BOSEMAN:
. D.C.	9	A. Yes, sir.
GTON	10	Q Can the actuator ever fail; or have there
ASHIN	11	ever been failures of the actuator?
NG, W	12	BY WITNESS BOSEMAN:
III II	13	A. Not to my knowledge. There hasn't been any

failure of the actuator, providing the actuator works within its working range.

16 Q. Is the set point with the actuator? Is that 17 part of that?

18 BY WITNESS BOSEMAN:

300 7TH STREET, S.W., REPORTERS BUI

14

15

19 A. No, the set point is with the safety mode of 20 operation for a spring valve. In the actuator for the 21 relief function, the way it's tied into the system, you 22 have a pressure transducer or pressure sensor in the 23 RPV, which is tied into the actuator via the solenoid 24 in the air -- the pneumatic system, which operates 25 a piston-type cylinder.

The piston-type cylinder is called the actuator.

And when you add the solenoid and air valve, which is a driving force to open and permit air to flow into the cylinder, the whole unit is called an actuator assembly.

Q. Okay. Has it been true that in this directacting function then that there is -- I'm trying to visualize this.

There is -- the reactor's pressure is constantly pressing against the value itself then, and it's just simply a matter of -- or against that spring essentially, as long as it stays below the set point, there won't be anything.

But the instant the pressure exceeds the set point, then the valve should operate?

17 BY WITNESS BOSEMAN:

A. That is correct, if you don't --

19 Q. There's no gating function upstream or anything 20 like that?

21 BY WITNESS BOSEMAN:

A. There is no -- It's direct. It's in intimate
contact with the pressure. If the pressure goes
up, and if the inlet pressure or steam pressure exceeds
the set point of the valve, the valve will open.

ALDERSON REPORTING COMPANY, INC.

S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1

2

3

4

5

6

7

8

9

10

11

12

13

14

18

300 7TH STREET.

11-11

4	4	*	4	z	*	4
	ς,	,	4	2		4

1-1:	2	
	1	Q. Okay. Now, what if this pneumatic I think
	2	you called it pneumatic-operator?
	3	BY WITNESS BOSEMAN:
	4	A. Actuator.
	515	Q. Actuator. Suppose that failed. Is there any
	554-2 0	way the system can still do its job? Is it
	(202)	BY WITNESS BOSEMAN:
	20024 8	A. Yes, sir.
	6 D.C.	Q. How does that work?
	10 IO	BY WITNESS BOSEMAN:
	III II	A. The way the dual function safety/relief valve
LERS BUILDING, W	5 12	is designed is so that the valve can operate two ways,
	0110 13	in a relief mode and in a safety mode. And both modes
	I SH31	are independent of each other.
	HO43	If the actuator assembly should fail for any
ET. S.W. RI	≝ 	reason, and the inlet steam pressure increases, and it
	17	exceeds the set point of the valve, the safety portion
	H STR	will automatically open.
	12 19	Q. Okay. And then what?
	20	BY WITNESS BOSEMAN:
	21	A. It will relieve pressure.
B	22	Q. So you'll have it open
-	23	BY WITNESS BOSEMAN:
	24	A. And when the pressure decreases to below the
	25	set point of the valve, the valve will reclose.

11

Q. Well, aren't there some transients where the pressure tends to hop -- climb a bit and cause the valves to operate and then drop below because the valve did

16165

open and then the pressure builds again? Will this
valve continue to be able to function to each of these
challenges, or will it --

7 BY WITNESS BOSEMAN:

11-13

1

2

3

D.C.

WASHINGTON

REPORTERS BUILDING.

STREET, S.W.

HLL

300

0

15

17

A. This value is -- The safety portion of the
y value is a very simple concept. It responds directly
to whatever the inlet pressure force is telling it. If
the inlet pressure force exceeds the set point, it opens.

12 If it decreases, it closes. If it then increases 13 again, it will reopen, as many times as it's demanded to 14 open and close.

Q. That's the safety mode?

16 BY WITNESS BOSEMAN:

The safety mode, yes.

18 Q. For the relief mode, what's the situation? 19 BY WITNESS BOSEMAN:

A. On the relief mode you have instrumentation
and control from a pressure sensor, and it will respond
to the pressure sensor instrumentation to your solenoid
and air system.

And as long as you have your electrical power and pneumatic power to the cylinder, it will open and

16166

1-14	1	16.
1	1	reclose.
	2	Q. If there's a failure of the pneumatic system,
	3	will it simply then become a safety valve?
	4	BY WITNESS BOSEMAN:
	g 5	A. Yes, sir.
	554.23 0	Q. And it will no longer have that lower set
	(202) 2	point property?
	20024 8	BY WITNESS BOSEMAN:
	9	A. That is correct.
	NOL51	Q. Do you regard that as sort of a minimal kind
	VIHSA 11	of problem, in terms of safety?
	≊ 92 12	BY WITNESS BOSEMAN:
0	10110	A. From a safety point of view, the safety valve
	1 SN310	are used as an independent safety overpressure pro-

voverpressure protection system. And the analysis for safety analysis 15 does, in fact, consider it. 16

It's required by the ASME code.

Q. Okay. But to me it sounds like you're 18 saying that if the relief valve fails, such that it 19 may be -- it might actuate once or might operate once 20 as a relief valve, but if after that it has got a problem 21 in its pneumatic actuator such that it can't operate, 22 23 it will still operate as a safety valve? 24 Is that right?

25

300 7TH STREET, S.W., REPOR

17

1

A. Yes, sir.
12-1

1

2

D.C.

WASHINGTON,

300 7TH STREET, S.W., REPORTERS BUILDING,

Q Okay. Are the values designed to last as long as the plant is?

16167

3 BY WITNESS BOSEMAN:

A. The values have a design life of 40 years;
5 however, there are certain parts in the value that require
6 maintenance, and in practical terms the useful service life
7 of the value is five years without maintenance.

8 That's the useful service life. We recommend a 9 more frequent service life, rather than five years, but 10 five years would be the max that we would recommend.

What I mean is you just refurbish it just like
you take your car in and get a lube job and change the
oil and filter and things like that.

14 Q. Does the spring require replacement? Is the 15 spring expected to require replacement?

16 BY WITNESS BOSEMAN:

17 A. The spring does not require that frequent of a
18 replacement. It will be inspected however.

19 It's not a replaceable item. You can replace it 20 if you need to, but it's not one of the items that have a 21 more limited service life.

I'm thinking in terms of seals, O-rings, seals, things of that nature that degrade, or certain areas that show wear.

25

Q. Is the spring exposed to conditions similar to

16168

the interior of the reactor, temperature of 500 degrees and 1 2 that sort of thing? BY WITNESS BOSEMAN: 3 4 A. Under normal conditions, no; not 500 degrees, no. The spring is isolated from the primary boundary system 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554 2345 itself. It's on the other side of the valve. 6 7 0. Okay. So it's the seals that -- well, let's see 8 now. 9 Direct acting, what is that direct acting 10 pressing against? Is it pressing against one side of a 11 disk or something? 12 BY WITNESS BOSEMAN: 13 A. A plate. May I have the liberty of showing you 14 a sketch? I think it's self-explanatory. 15 I have one in front of me from the PSAR called 0. 16 Figure 5.2-6. That might be the one you have. 17 BY WITNESS BOSEMAN: 18 A. That would be fine. 19 If you take a look at that Figure 5.2-6 in the 20 PSAR, you look at the designation for nozzle. It also says 21 inlet. That is the steam side in direct contact with the 22 pressurized media. 23 On top of that you will see what's referred to 24 as a disk. That forms a closure so that you do not have 25 flow going through the discharge end of the valve or down

12 - 2

		1						ž					÷.,	
× 1	1.1	n	£22	C1.	1.	S	0	Π.	a	77	CT	£X.	1.1	ъ.
	245		-	-	~	-	~	**	10.00	100	2	100	*	-

ne.

12-3

If you look up at the top, you will see something called a spring, which is generating a force acting down to hold the disk against the nozzle.

5 MR. COPELAND: Want some copies?
6 WITNESS BOSEMAN: I may have a few copies of
7 a better concept sketch.

B JUDGE WOLFE: One will do for the Board.
9 WITNESS BOSEMAN: Mr. Doherty, if you use this
10 one, it's a little bit more detailed on the design. The
11 other one is a basic PSAR figure.

12 When you get to the FSAR, it will show this other 13 figure because it's more detailed.

If we can speak from that, I would appreciate it.
It's got more detail in it and it's got a better
description of the terminologies of the different parts.

JUDGE WOLFE: Would you read this into the record where this came from and the figure number, please?

19

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

I don't think you have.

20 WITNESS BOSEMAN: No, I have not. What we're 21 looking at is Figure 5.2-12 from GESSAR-2 for the 238 22 Nuclear Island Standard Plant schematic of a dual-function 23 type spring-loaded direct-acting safety/relief valve. 24 BY MR. DOHERTY:

25

0.

This is very helpful. Now, at inlet at the very

foot of the figure, does that arrow point immediately to a 1 flat, or is that simply the edge of the nozzle there that 2 it's pointing to, the back edge of the nozzle? 3 BY WITNESS BOSEMAN: 4 A. That arrow indicates direction, that once this 5 valve would be mounted up onto the steam line, and of 6 course, recognize that this is a schematic of a cross-7 section of the valve, what the internals would look like, 8 that the pressure would be acting up in that direction 9 through the nozzle flow path area. 10 Q. So that actually -- is this mounted on the top 11 12 of piping? BY WITNESS BOSEMAN: 13 14 A. Yes, sir, it's mounted on top of the piping. There are special flanges to which this valve is mounted. 15 16 Q. So then there is sort of like a place, if someone could crawl in there, they would reach up and they 17 18 would find -- it looks like a ! ttle hole that ended with 19 a disk. Is that it? 20 BY WITNESS BOSEMAN: 21 A. If you could crawl into it, yes. 22 Yes, feeling along the top, you might --0.

23 BY WITNESS BOSEMAN:

12-4

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

24 A. That is correct. If the valve is not installed,
25 you can hoist the valve up and look underneath, and you'll

1 see the disk.

12-5

6 0

Q. There's a hole there if the whole thing is lifted, 2 then? 3 BY WITNESS BOSEMAN: 4 5 A., Up to the disk. 20024 (202) 554 2345 Q. Okay, right. 6 7 BY WITNESS BOSEMAN: 8 A. It's almost as if you were looking down the D.C. 9 inside diameter of a pipe. WASHINGTON. 10 Q Everything above the disk, then, is not 11 subjected to the environment of the power system, then; BUILDING, 12 is that right? 13 BY WITNESS BOSEMAN: S.W., REPORTERS 14 A. Of the steam media. Not when the valve is 15 closed. Definitely not the spring. 16 If you'll notice, the spring is located on the 300 7TH STREET. 17 outside of another closure. There's a sealed closure 18 between the body, what's referred to as a body in a bonnet, 19 and the spring is on the outside of that. 20 The reason I mention that is because when the 21 valve opens, obviously the component parts that are inside 22 the body will be wetted by the steam media. 23 Q. Do these things, then, act sort of -- the 24 springs that govern the action, do these things act rather 25 slowly if pressure is just barely exceeded, and act rather

1	4.1	4	يعر	• >
	0	4	4	4

e

12-6	1	fast if the pressure is way over? Is that a fair
	2	description?
	3	BY WITNESS BOSEMAN:
0	4	A. No, that's not exactly a fair description for
	<u>s</u> 5	this type of a valve.
	554.27 O	If the pressure exceeds the set point of the
	(202)	valve, the valve will, quote, pop open. This is a fairly
	20024 8	fast-acting valve.
	6 D.C.	Q. That's the relief mode, though, right?
	10	BY WITNESS BOSEMAN:
	IIISV/	A. No, that's the safety mode.
	5 12	Q. Allright. So
•	01111 13	BY WITNESS BOSEMAN:
	SH214	A. Now, in the relief mode, you have a rate of
	3043	opening that once the signal is received at this solenoid
	3 16	and air control valve assembly, it permits air to go into
H STREET, S	17	a pneumatic actuator, which in turn pushes up on that
	HIS 18	piston rod, forces the lever up and through a lifting
	LL 19	mechanism, pulls up and compresses a spring, thus opening
	20	the valve.
	21	Q. And compresses what again, please?
	22	BY WITNESS BOSEMAN:
	23	A. Compresses the spring. In order to open the
	24	valve, the spring has to be compressed. So when you operat
	25	the actuator through the leakage of the lifting mechanism

it pulls up on that spindle rod and compresses the
 spring, thus opening the valve.

3 It permits flow to go from the inset to the 4 discharge.

Q. Well, in a rapid rising pressure situation, would
you ever get a situation whereby the pneumatic actuator
sort of gets about half completed before the -8 BY WITNESS BOSEMAN:

16173

9 A. Like I s 'd before, if for any reason the 10 actuator assembly does not operate or the response time is 11 slower than the pressurization rate, its safety valve 12 portion will go off by itself.

13 Q. Well, let me see. As a practical question, I 14 notice you described the outlet, I think, in terms of 15 inches. I think you called these 8 x 10 or something like 16 that. Eight was the inlet, like a ratio of eight to ten? 17 BY WITNESS BOSEMAN:

18 A. No, sir.

19 Q. I'm getting a little confused there.
20 BY WITNESS BOSEMAN:

A. The terminology of eight inlet and ten outlet is just designation to say that the inlet flange and bolting configuration will meet up with a standard eight-inch pipesized flange; and a ten-inch means the same thing, except it's a ten-inch flange on the discharge. That's so that

ALDERSON REPORTING COMPANY, INC.

12 - 7

16174

you can mate up to the piping, the attached piping. That's 1 for interface control between component and pipe. 2 Okay. I can see that now. I am looking at the 3 Ő. nuts on the drawing. 4 Now, the outlet, of course, is broader than the 5 inlet. It appears to have greater surface, if you could 6 7 measure a surface there, greater area; is that right? BY WITNESS BOSEMAN: 8 A. Yes, sir, because it mates up with a ten-inch 9 10 pipe. Q. Okay, but isn't that also because the inlet is 11 12 actually a good deal smaller than an eight-inch pipe? 13 BY WITNESS BOSEMAN: 14 A. That's true. It meets up. The inlet is consistent with the basis for flow capacity requirements. 15 16 In other words, what I'm trying to say is when 17 you talk about an eight-inch pipe, it means in effect you 18 have an eight-inch nominal outside diameter. The ID, per se, is not necessarily eight inches. 19 The ID is smaller than that. The same thing goes for the 20 21 ten-inch. Q. Okay. Now, is the outlet, the size of the outlet, 22 will that -- well, let's ask this. What is the most --23

12-8

00 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C.

what limits the ability of an SRV to discharge as a pressure path? What is the limiting factor, the size of the outlet?

10110

MR. COPELAND: Your Honor, I'm going to object 1 to any .urther questions along this line. It seems to me 2 that the thrust of the contention that was filed was that 3 these relief values were not reliable; and we've spent the 4 last 30 minutes explaining to Mr. Doherty how they operate. 5 300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345 I would assume that he would have known how they 6 cperate before he even started this cross-examination. 7 JUDGE WOLFE: Where were you a half hour ago, 8 9 Mr. Copeland? 10 MR. COPELAND: I try to be patient, Your Honor, 11 but it's run out the string now. 12 JUDGE WOLFE: What is the purpose, Mr. Doherty, 13 of this prolonged examination on the workings here. I 14 thought you had something definitive in mind when you filed your contention, namely that you were concerned about 15 16 the sticking of these relief valves. 17 Now, apparently you had whatever you had in the 18 way of a diagram extracted from the PSAR, and one would 19 assume that you were prepared to address direct questions to this witness to pin down the likelihood of stuck valves. 20 21 All we've been doing is having questions and 22 answers on the workings of the valves. 23 Isn't that a good objection on the part of 24 Applicant? 25 MR. DOHERTY: I think it is. I would like to

12-9

10-10

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

16

24

25

1 offer an emplanation.

The diagram is a great deal more detailed than the one I had, and perhaps like a little boy I got very enthusiastic about it for a few minutes and asked about the moving parts.

6 Then I think in my own mind I had slipped off 7 into considering 41, which has to do with the ability to 8 accommodate overpressurization, and that's how I got into 9 talking about the outlet and the inlet, which I must 10 confess is not relevant to reliability, since that has to 11 do with whether the gate will open or not, not how much 12 water the gate will let through.

JUDGE WOLFE: Well, in any event, I'm going to sustain the objection to any further questioning along the lines that we've had for the past 20 or 30 minutes.

All right.

MR. DOHERTY: Would this be a good time to stop 18 for the day?

19 JUDGE WOLFE: We'll recess until 9:00 a.m. in
20 the morning.

2 (Whereupon, at 5:30 p.m., the hearing was 22 adjourned, to reconvene at 9:00 a.m., Thursday, August 23 27, 1981.)

This is to certify that the attached proceedings before the NUCLEAR REGULATORY COMMISSION

in the matter of: HOUSTON LIGHTING & FOWER COMPANY

DATE of proceedings: 26 August 1981

DOCKET Number: 50-466 CP

PLACE of proceedings: Houston, Texas

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

)-

÷.

Mary L. Bagby Official Reporter (Typed)

Mary L. (Dagby Official Reporter (Signature)