UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	
SACRAMENTO MUNICIPAL UTILITY DISTRICT	DOCKET NO.
(RANCHO SECO)	50-312

Conference Room 620
California Energy Commission
1111 Howe Avenue
Sacramento, California

Saturday, May 10, 1980

The above-entitled matter came on for hearing, pursuant to recess at 8:00 a.m.

BEFORE:

ELIZABETH S. BOWERS, CHAIRMAN
DR. RICHARD F. COLE, MEMBER
MR. FREDERICK J. SHON, MEMBER

APPEARANCES:

On Behalf of the NRC Staff:

STEPHEN LEWIS, ESQ.
RICHARD L. BLACK, ESQ.
Office of Executive Legal Director
Washington, D.C. 20555

On Behalf of SMUD:

THOMAS A. BAXTER, ESQ.
MATIAS F. TRAVIESO-DIAZ, ESQ.
MS. NANCY KNOWLES
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N.W.
Washington, D.C.

APPEARANCES, Continued:

On Behalf of the California Energy Commission:

CHRISTOPHER ELLISON, ESQ.
California Energy Commission
Office of General Counsel
1111 Howe Avenue
Sacramento, California 95285

C O N T E N T S

WITNESS:	Direct	Cross	Board	Redirect	Recross
D.G. Bridenbaugh) G. C. Minor)		3550 (resumed)	3609	3635 and 3648	3644
Robert A. Capra	3650	3663			

E X H I B I T S

EXHIBIT NUMBER	MARKED	ADMITTED	WITHDRAWN
Staff Exhibit 4	3652	3662	

ADJOURNED: Page 3677

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PROCEEDINGS

MRS. BOWERS: Mr. Baxter, are you ready to begin?

MR. BAXTER: Yes.

Whereupon,

DALE G. BRIDENBAUGH

AND

GREGORY C. MINOR

the witnesses on the stand at the time of recess, were resumed as witnesses and, having been previously duly sworn, were examined and testified as follows:

CROSS EXAMINATION (RESUMED)

BY MR. BAXTER:

Q Mr. Bridenbaugh, let's return to page 10 of your testimony, please. The third bullet entry on that page, you state that no system exists to make NRC (NUREG) reports readily available to the operators.

You cite Mr. Tipton's deposition at page 139. Would you turn to that page of Mr. Tipton's deposition, please, ehich is CEC-36?

What is the -- do you have that?

A (Witness Bridenbaugh) Yes, I have that. I was just skimming it over to get myself refreshed on what preceded before that page.

Q What is the particular NUREG document Mr. Ellison is asking Mr. Tipton about?

bfm2

A He is asking him if he has seen NUREG-0623, which is -- the title of it is in the deposition transcript, "Generic assessment, delayed reactor pump trip, coolant pump trip during small break loss of coolant accidents in pressurized water reactors."

Q Is your statement in the testimony that there is no system to make such a report readily available, based upon Mr. Tipton's testimony on this page, that he could get the document if he requested it, but that it is not in the control room?

A No, I do not think my statement -- my statement is not based on that they are not in the control room. My statement is based on his response to Mr. Ellison's questioning, which is that he had not seen that report before.

In further questioning, he responded to a question, "Do you have access to them?" He replied he could get them if he requested them.

Q Does that tell that there is no system to make the reports readily available to operators?

A It seems to me that it does, yes. Perhaps the difference of opinion might be in "readily." My assessment of reading through these depositions and my knowledge of the way that plant operators in other plants are generally dept informed is that they do not normally have access to these reports.

bfm3

They do not normally attempt to gain access to them. I think that in the case where you are dealing with a plant, that admittedly places heavy demands on the operators; and where the training is, in general, for the nuclear industry, has shown not to have not been effective.

I think that such systems are needed to ensure that the information is not just accessible, but is overtly presented to them.

Q But if Mr. Tipton states, as he does, that he could get access to them if he requested them, and you statement is not based on his absence from the control room, then what do you mean exactly when you say "make them overtly available"?

A Well, I think there is a need to more than to just establish a library and say to the people, "If you want to go read in the library, the library is open to everyone."

I think you have to -- these people are very busy. I think you have to -- you have to place the material essentially in their hands and make sure that the documents that are important to their fundamental understanding of the plant are not just available in the library, but are recommended, at least, that they read them, be aware of what is going on.

Q Are you familiary with -- it is hard to generalize, I realize, but the kind of reports NRC NUREG documents are

bfm4

generally?

A Yes.

Q Their length and format?

A Yes.

Q Would you advise, if you were training operators, that these documents would be a preferable study material for operators to use, as opposed tostanding orders or lesson plans prepared by the training department or other instructional devices which might summarize the information contained therein, for the operator who, you state, has a large number of things to keep up with?

A I do not think that is the preferable -- I do not think it is an either/or situation. I think the standing or special order program certainly has to be in place -- but I think is should be supplemented by doing a little bit more to make the back-up documents available to the operators, and to encourage that they read the relevant ones, that they understand the technical basis for the spectial orders that are produced.

Q With respect to this particular NUREG document Mr. Ellison was discussing in the deposition, did you find in reviewing the transcripts of these depositions which you testified yesterday, you did read in their entirety that the operators displayed an adequate understanding of the phenomenon which serves as the basis for the reactor coolant

pump trip requirement.

If it might help, let me refer you to Mr. Tipton's deposition page 136.

(Pause.)

A May I take a moment to read what is on page 136, sir?

Q Certainly.

(Pause.)

A Well, I think responding generally to your question Mr. Baxter, my assessment of the operator's level of understanding -- I am speaking of Tipton and Morisawa primarily, is that while they were knowledgible, certainly with the procedures, I did not think in my opinion and based on my knowledge of the situation, that they really exhibited a fundamental understanding of the basis for those procedures.

That is what I have tried to point out in the preparation of this testimony by referring to specific pages in the deposition where they exhibited confusion, uncertainty, and apparent lack of understanding of the bases of some of the things that they were required to do.

Q Do you see any deficiency on page 136 in Mr. Tipton's understanding of the analytical basis for that reactor coolant pump trip procedure?

(Pause.)

A I do not see any glaring examples of lack of under-

bfm6

standing. I do not think that there is -- I do not see that that particular page demonstrates the point in either direction, really.

He makes some generalizations. On line 19, he says, "As long as the coolant pumps are operating, even with voiding in the core, they will still provide enough cooling to prevent clad damamge.

Of course, reactor coolant pumps, in and of themselves, do not provide any cooling. It is the heat removal system that provides the cooling.

Q That is the only deficiency that you find in his discussion?

A Well, I -- that is one that I see in the few seconds that I have glanced over this thing.

Q Take your time.

(Pause.)

A It seems to me, generally, that he may be missing the point. I am not exactly -- it is hard to tell from the few responses from this page, but he indicates that the reason for the pump trip -- he is talking about a B & W analysis which demonstrated that the pumps operating, they will provide sufficient cooling in the core.

The B & W analysis, the main point of the analysis as I recall, is not that the pumps running would provide cooling to the core, but that a subsequent trip of the

bfm7

pumps would violate the clad temperature limits under certain conditions, specifically under certain small break accident conditions.

It seems to me that he is focussing on the reasons for having the pumps running, rather than the basis of the change of the procedure to require pump trip.

Q Doesn't he say, beginning on line 9, that if for some reason during the accident core cooling is lost due to the tripping of the pumps, there would be backflow to the pump due to steam and water separation?

A Yes.

Q Isn't he addressing, there what youjust described from the B & W analysis?

A Yes, part of it.

Q Let's turn to Mr. Comstock's deposition, if you would, please, page 52. That is CEC-37.

A What page, Mr. Baxter?

Q 52. If you would review briefly that testimony and continue on to page 53.

(Pause.)

Mr. Bridenbaugh, let me advise you of a few transcript corrections that the operator made to this that are included at the end of the deposition, which may or may not affect you answer here.

A I have assumed some of them.

bfm8

Q On page 52, line 24, the end of that sentence was amended to read, "the core with the high pressure injection system."

A Okay.

Q On page 53, line 4, the word "refuel" should be "refill." "On" should be "of." In line 16, the word "same" should be "time."

A Okay.

Q Does Mr. Comstock, in your judgment here, display an adequate knowledge of the phenomenon underlying the reactor coolant pump trip requirement, the basis for it?

A His understanding appears to be pretty good, yes.

Q Let's turn to Mr. Morisawa's deposition next page 10. Starting on line 23 and continuing over to page 11.

(Pause.)

A I think I need to go back a little further to get the sequence here. Did you give me some advice on how far to go, Mr. Baxter?

Q I was recommending through line 11 -- through line 19 on page 11.

A Okay.

(Pause.)

Q Does Mr. Morisawa appear to understand the phenomenon which underlies the reactor coolant pump trip requirement and the basis for that requirement?

bfm9

A I do not think it would be possible to say that he understands the phenomenon. He seems to have a general understanding of why the procedure was put in place, yes.

His only reference on phenomena, basically, is a high void formation on line 7 of page 11.

Q Let's return to your testimony now at page 10. Under "C" effectiveness of emergency procedures, you are referring to the depositions once more. You described some problems you saw in the understanding of emergency procedures.

The third sentence states, "Not the least of the problem is determining which of several procedures actually applies." You are citing Mr. Tipton's deposition at page 56.

Let's go to that page, if you would. It may be helpful to start at the bottom of page 55, where the scenario that was being given was loss of feedwater, loss of turbine trip and reactor trip.

Just the part where is says "would be h lpful."

A Where?

Q Turbine trip an reactor trip.

(Pause.)

end tP-1

bgn tP-2

A Do you have a recommendation on how far to read?

Q I would recommend through line 16 on page 56.

A Okay.

Q What problem, if any, do you see Mr. Tipton having

bfm10

here, utilizing the emergency procedures with response to the scenario proposed to him?

A A problem that I see is his responses indicate and certainly acknowledge, I think, that it is difficult to refer to a number of procedures simultaneously. On line 5, he says in effect that he -- it would be impossible to refer to procedures simultaneously when you get in a situation involving a number of different problems.

Q Does he indicate any need to refer to four procedures simultaneously? He testifies that it is impossible to do that, but does he indicate any need to do that to meet the situation?

A He does not state those specific words. He does acknowledge that all of those procedures would apply, yes.

Q He does state -- he does testify on line 7 that the procedures cross reference each other, isn't that correct?

A He says yes. One procedure would refer to another, yes.

Q Down at the bottom of the page -- taking you a little further that I had stated before, feel free to read it over. He testifies --

A Page 57?

Q 56. That they are all in the same volume. Is that true?

bfm11

A Yes, he does. Of course, the volume has quite a few pages in it, too.

Q Going back to your testimony on page 10, you state that SMUD has committed to the NRC, or it is indicated that SMUD has committed to the NRC that the operator will memorize the immediate action steps. I think we are referring to the emergency procedrues here.

A Immediate action steps contained in emergency procedures, yes.

Q But it is not clear that the operators accepted that as a requirement, since they describe a heavy reliance on written procedures. Where is that description?

A That is the description -- that is the deposition contained in both Tipton's and Morisawa's -- the transcript of Tipton and Morisawa.

The sections that we were just referring to where they talk about the need to refer to the procedures and I think, perhaps, I should take some time and turn to the site, which is, according to my testimony, page 142 of Tipton. I do not recall exactly what that says, but let me check.

(Pause.)

What was your question now, Mr. Baxter?

Q Let me ask one question about this page before I return to the other. Mr. Tipton does testify, does he not,

bfml2

on this page that he is tested in both NRC licensing and requalification examinations on his knowledge of the immediate actions steps?

A Yes, he does. He does say that on line 22 and 23.

Q I think this is an accurate citation to the statement that precedes footnote 9. I was looking more for some reference for the next sentence, that which is that there is heavy reliance on written procedure.

A I do not have a specific cite for that statement. I do not believe that that is a quotation from any of the operators.

That was my assessment of the situation after reading through all three depositions. I think certainly in the past several days of testimony, Mr. Rodriguez also indicated that, you know, the procedures are there. The operators are expected to refer to them.

I do not think there is any disagreement about that.

Q Is it your impression that if the operators memorize the immediate action steps that they would have no further reason to turn to this written procedure?

A No.

DR. COLE: Excuse me, Mr. Baxter. What would you have them do then, sir? Are you going to have them do something different than is just described?

WITNESS BRIDENBAUGH: I have not made any recommen-

bfm13

dations in this particular part of my testimony, Dr. Cole. I am just making an observation that, certainly, I believe they need to memorize the immediate action steps.

They need to understand why those action steps are taken. Perhaps that is a more significant matter. I think that that is probably the most significant thing of this whole testimony.

When an operator is trained to do things, following steps one through ten, that is fine as long as the procedures were correctly written, and a long as the equipment design is fully understood.

When unusual circumstances come up, then he needs to know more, such as at Three Mile Island. Situations where the procedures didn't really think about that.

DR. COLE: All right. Thank you.

BY MR. BAXTER: (Resuming)

Q Further down on page 11, in the last paragraph starting on that page, you state that "SMUD's training program is not substantially different from that used at TMI."

You go on to observe that the same simulator is used.

A Yes.

Q There was testimony in this proceeding earlier that the B & W simulator is modelled after the Rancho Seco control room. Is it your view that it detracts from the

bfm14

quality of the Rancho Seco training program, then, because the TMI operators use the same simulator as the Rancho Seco operators?

MR. ELLISON: Mr. Baxter, just to clarify. I do not believe there has been testimony in this proceeding that the B & Wsimulator was modelled on the Rancho Seco control room.

There has been testimony. It is fair to say that there is a great deal of similarity between the two, but I do not think there has been any testimony that it was modelled.

MRS. BOWERS: There has also been testimony pointing out the difference.

MR. BAXTER: I did not say they were identical, Mrs. Bowers. I said that they were modelled, would you like a reference? We can take the time to do that.

(Pause.)

Well, I will not spend a lot of time looking at it. I am referring right now to staff exhibit 3, I believe. The draft NUREG-0667 document which states that 5/69, that the B & W simulator located in Lynchburg, Virginia, is representative of the RAncho Seco control room. Let's go with that.

BY MR. BAXTER: (Resuming)

Q Given that representative nature of the Rancho Seco

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control room of the B & W simulator, would you say that the training experience that TMI operators received on that simulator is the same as that the Rancho Seco operators would have received?

A You changed your question just slightly. You said "the same." I think my words are that it was not substantially different. No, the -- well, I'm sorry. I'll wait for your next question.

Q Does it detract, then, from the Rancho Seco training program, the fact that the same simulator was used to train the TMI operators that is used to train the Rancho Seco operators, given the fact that the control room there is representative of the Rancho Seco control room, or isn't that rather an advantage that the Rancho Seco program has over the Three Mile Island program?

A I think there is a slight advantage to the Rancho Seco operator that the control rooms have a greater similarity, certainly.

I think, however, if you look at reviews that have been conducted of simulator training programs in general, and the B & W simulator program specifically, there have been a substantial number of deficiencies that have been pointed out.

I might just list a couple of points. On the Essex study which was done, they concluded with regard to the

bfm16

simulator training program that, number one, it was not directed at the skills and knowledge required of the operators, too little stimulation was provided.

It failed to provide the operator with skills they needed in the accident. This is perhaps the most important part, for example, the skills in developing a hypothesis and acquisition of feed-back data to verify the hypothesis. That is the -- you know, the essential fact in this whole testimony.

We are not dealing with people who need to be trained. If "A" happens, do "B". You need to train the people to understand what is going on, to analyze the data that they have available to them, and to figure out what the next step is.

They also indicated in the Essex study that the B & W simulator program failed to provide for measurement of operator capability. There are a number of other deficiencies pointed out.

That -- that is a long answer to your short question.

Q Is there any classroom training that is a part of the B & W simulator training in Lynchburg?

A Yes. My recollection is that it is approximately 50 percent classroom and 50 percent simulator experience, or simulator/control room experience.

bfml7

Q Are you familiar with any changes that have been made to the B & W simulator training program since the Three Mile Island accident?

A There has been -- well, there have been a number of changes that have been made. I am not familiar with all of them, but generally I know that the model that the simulator uses in determining response to the control manipulations has been changed to be able for it to play back the TMI accident sequence.

I know that in testimony presented by SMUD in this proceeding, they have indicated that the TMI accident sequence has been demonstrated in the one week simulator requalification program for, I believe, a couple of hours.

Certainly, it is discussed in that program, yes.

Q Do you know whether the academic phase of the TMI hot license training program includes any instruction in mathematics, chemistry, or physics?

A The --

MR. ELLISON: You referred to the TMI hot license training program. Is that correct?

MR. BAXTER: That is correct. Is there an objection?

MR. ELLISON: I object to that on the grounds that it is irrelevant. You are referring to TMI-2, I presume.

MR. BAXTER: Yes.

bfml8

MR. ELLISON: It is my understanding that the TMI-2 hot license program was never given to any of the operators since the facility was only operating for a little over a month at the time of the accident.

MR. BAXTER: That is not correct. There is no foundation in the record for that statement, I believe. I am referring to the witness's statement in the last full paragraph, that SMUD's training program is not substantially different from that used at TMI.

BY MR. BAXTER: (Resuming)

Q What TMI training program are you referring to there?

A Well, the TMI training program that I am generally referring to there is the description of the TMI training program that is contained in a number of the TMI review programs.

The one, I think, has the most information in it is a report which is a supplemental report to the Kemeny Commission. It does not have a number, but the name of it is "Technical staff analysis report on selection training qualification and licensing of Three Mile Island reactor operating personnel to the President's Commission."

The second page of it says it is by Ronald Aytchison, or Eytchison. It is dated October 1979. It has a fairly detailed summary of the hot license program, the

bfm19

cold license program, and the requalification program.

It is quite complete in specifying what they had done at TMI.

Q It is your impression he is evaluating the hot license program, the cold license program, and the requalification program?

A Well, he is evaluating the Three Mile Island's operator training program in general, which would include all of those and there are other aspects that are included in there too.

Q Does that program include any course in mathematics, chemistry, or physics?

A It depends on which particular -- which particular program you look at. If you look at the cold program, they have certainly more fundamentals then the hot program does.

In general, for TMI-2, there was very little academic type training included in the cold licensing of th. TMI-2 operators. The reason for that is quite simple.

The reason is that apparently all of the operators that were licensed for TMI-2 operation had previously been licensed on TMI-1, so they had already been through an extensive amount of training, and had an extensive amount of operating experience, essentially on an identical unit; not quite identical, but very similar.

I think, in general, they had a one week course at

bfm20

Penn State, which is probably the point that you are getting at.

Q Actually, the narrow point of my question is, did they include any courses in chemistry, mathematics, and physics?

A I am not sure. I do not remember.

Q Do you know if the Rancho Seco hot license training program includes such courses?

A I believe that it is mentioned in the program, but I am not -- I do not recall if it identified by those names.

end t-2

bgn t-3

The similarities that I was referring to when I said that the two training programs are not substantially different is in looking at the basic elements of the cold program, for example, TMI had listed 200 hours of classroom training.

Rancho Seco has, I believe, in their exhibits shown 240. This is in the cold program. As far as simulator training is concerned, TMI had eight weeks, Rancho Seco had twn weeks.

Going on to the requalification program, for example, TMI indicates in their program, they have 60 hours of lectures or classroom time per year. I believe Rancho Seco's requalification program shows 60 hours every two years.

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So, certainly my statement is a generality, but I do not see a substantial difference between the two programs. I would not expect that qualification of the operators would be substantially different.

Q The last complete sentence on page 11 states that until new standards are adopted, a question as to the effectiveness of the programs must exist.

Are you speaking of the NRC standards there?

A Basically, yes. The completion of the reevaluation of the total licensing training program changes to the training programs resulting from that reevaluation completion of the -- completion of review and an assessment of all of the studies that have fallen out of the TMI accident.

You know, not limited to the NRC, but including some of the EPRI programs, the INPO -- all of the things that are under way now.

I am aware that NRC has issued some proposed changes to training programs. I am not sure whether they have been introduced in this proceeding or not.

There are specific changes that are being considered.

Q Have you made any recommendations to the NRC or to any industry about the new standards that should be adopted for the training and qualification of operating licensed personnel in nuclear power plants?

bfm22

A Well, I think -- I think we have made a lot of recommendations in general to many different bodies on deficiencies in the program.

I do not recall saying, "Here is a draft standard, I think you should adopt." If that's what you mean.

Q Where have you made recommendations to the NRC or to an industry body with respect to standards or changes that should be made in the training programs and qualification of licensed personnel?

A The only one I can think of is the testimony before the Joint Committee on Atomic Energy, which of course no longer exists, but back in February of 1976 we made a substantial amount of recommendations to that body.

The NRC presented testimony to the same body and said that those suggestions -- the changes that we suggested -- when I say "we" I am referring to myself, Mr. Minor, and also out third partner, who is Mr. Hubbard.

The NRC responded to those concerns and changes by saying that they were not necessary. I think it is interesting to see that in the Rogovin review of the Three Mile Island accident, they go through a section on precursors to problems in training, and human engineering.

That testimony is cited as a precursor. They conclude that after reviewing action taken, that the NRC did not take any action as a result of it.

bfm23

Q As I recall that testimony, is it fair to state that you recommended increasing operator training, but that you did not impose any -- suggest any specific modifications or new standards for training and qualification of operators?

A Perhaps you should give us a minute to just think about that because Mr. Minor was very heavily involved in that, too.

(Panel conferring.)

I may be placing too much reliance on your use of the word "standards." The recommendations that we made were that simulator training should be used more frequently, that there should be, if not exact, nearly exact duplication of the simulator -- representation between the simulator and the plant that the operators were going to be operating, and frequency -- I do not know.

There is a lot of things that were covered in that testimony.

Q Let's turn now to page 13 of your testimony. In the first full sentence on that page, you are discussing on the job training.

You state that program means that unlicensed operators may not know how or where to perform certain actions the first time they are called upon to perform them.

You cite Mr. Tipton's deposition at pages 113 and 114. Let's turn to that please. Starting at line 20.

bfm24

(Pause.)

Doesn't Mr. Tipton say exactly the opposite here, that you stated in your testimony that, indeed, these people are instructed before the first time that they are called upon to do a task?

MR. ELLISON: Mr. Baxter, could you be a little more specific about what part of Mr. Tipton's deposition you are referring to?

MR. BAXTER: Line 25. They are instructed before the first time they have to do a task, or again if they need a refresher.

MR. ELLISON: You are stating -- your question is --

MR. BAXTER: I am asking a question. I am not stating anything.

MR. ELLISON: Your question is that that is the opposite of the statement that appears on page 13 at the top of Mr. Bridenbaugh and Mr. Minor's testimony. Is that correct?

MR. BAXTER: I would like to know how the witness derives the statement that unlicensed operators may not know how or where to perform certain actions the first time they are called upon to perform them and referring them to the first part of Mr. Tipton's deposition.

WITNESS BRIDENBAUGH: I do not believe that my testimony says that -- I forget exactly the words you used in

bfm25

your question, Mr. Baxter.

This is a rather straight-forward statement. The sentence in my testimony that you have referenced; it says, "the on the job training program means that unlicensed operators may not know know how or where to perform certain actions the first time they are called upor to perform them."

I do not think that disagrees at all with what Mr. Tipton is saying, here. He says they are trained on the job. Therefore, they are instructed on the job.

The first time they have to do a task, they may not know how to do it. I do not see any discrepancy there.

BY MR. BAXTER: (Resuming)

Q Where does he say they may not know how to do it?

A It does not say. He does not say they do not know how to do it. Some of things they would know how to do, some of the things they would not know how to do.

Q He says, does he not, that they are instructed, either the first time they have to do a task or again if they need a refresher. How does that imply that they might not know how to do it?

A It seems to me it is the context or the interchange. Again, I do not have a specific quote, but my interpretation of what Tipton was saying there is that it is a very common occurrence in the on the job training program for the operator to not know how to do things.

bfm26

It isn't -- the point of my testimony is not that he may not know how to do things the first time he is called upon to do them. That is to be expected. The concern would be that he may be called upon to do it the first time in a critical or emergency situation. Then you would be in real difficulty because there would not be time for the supervisor to come and help him out.

Q I am very interested because much of your testimony is citing to the deposition of these witnesses, these operators. You are deriving a lot of your conclusions on that basis.

How did you arrive or how did you go through this process of interpreting this testimony by Mr. Tipton to conclude that they may not know how to do it the first time they are called upon?

You say that is your interpretation in the context of the testimony. I would like to understand that better.

MR. ELLISON: Mr. Baxter, I object to that question. First of all, I believe it is asked and answered. Second of all, I believe it is argumentative. You have -- Mr. Bridenbaugh has described statements in this deposition that he was relying on.

The statement in his testimony is clear to everyone. I think the relationship is self-evident. It certainly -- whether the inference can be drawn is something that is

bfm27

before the board at this point. Your question has been answered.

MR. BAXTER. Mrs. Bowers, it might be clear to Mr. Ellison. The last answer the witness gave, however, is while there was not a statement there, he drew this interpretation from the context of the testimony.

I am nowasking for an explanation of that interpretation. I do not think that has been asked or answered.

MRS. BOWERS: Mr. Lewis, does the staff have a position?

MR. LEWIS: I would support Mr. Baxter on this question.

(Board conferring.)

MRS. BOWERS: The objection is overruled. We would like the witness to answer the question.

WITNESS BRIDENBAUGH: Could I please have the question restated?

MR. BAXTER: Certainly.

BY MR. BAXTER: (Resuming)

Q I believe your answer to that last question was that you interpreted the testimony in the context given, that unlicensed operators may not know how to perform a job the first time they are called upon to do it. I would like to understand how you reached that interpretation from the testimony, and the context of the testimony.

bfm28

A I guess I reached that conclusion [illegible] reading through Tipton's description of the on the job training program and his experience with it.

On page 113 of the deposition, he is asked, "Is there anestablished program of training or are people simply instructed on how to do things the first time they have to do it?"

His answer is "I do not know if there is -- if there are on the job training courses per se, but they are instructed, either the first time they do it or again if they need refreshers."

That, to me, says that the training program for the unlicensed operators is, in his experience at Rancho Seco as of this time, was a rather informal on the job working relationship. There was not any formal instruction on how to do exactly the different tasks that they may have to do.

They learn by doing.

Q So, it is the lack of formality that leads you to conclude that they may not know how to do something the first time they are called upon to do it?

A I think the lack of having a program in place that gives them instructions prior to doing it is certainly -- it certainly detracts from the training program.

It provides the higher probability that they will

bfm29

not know how to do it. If called upon to do something important in emergency situations, it increases the probability that they will do it wrong.

MR. BAXTER: I have no other questions.

MRS. BOWERS: Mr. Lewis?

BY MR. LEWIS:

Q My first question will be to Mr. Bridenbaugh. Mr. Bridenbaugh, will you please turn to page 6 of your testimony? The large central paragraph there, the last sentence, you state that the importance of having an understanding of these procedures is particularly true after TMI because the procedures adopted since that accident placed heavy new responsibilities on operators.

A (Witness Bridenbaugh) Yes.

Q Would you please describe exactly what you mean by the heavy new responsibilities that have been placed on operators?

A Well, the things that I was generally thinking of, Mr. Lewis, when I wrote that are the responsibilities in making the proper judgment in abnormal or emergency conditions in operating a B & W reactor, which you know, has been discussed many times has a higher sensitivity to transients.

The thing that I was specifically thinking about was the requirement that in certain transients they must be

able to identify the difference between a small break LOCA and an overcooling accident in the initialstages of that situation.

Those things are difficult to differentiate between. So, the operator has to make a decision -- has to determine which way the accident is proceeding. He has to be able, in certain circumstances, to verify that central circulation has, in fact, achieved -- been achieved.

That is a difficult thing to do because he has to intuit -- not intuit, but he has to determine through -- through secondary means that there is, in fact, natural circulation through the core.

Because of the changes that have been required by the post-TMI analyses and subsequent analyses by B & W, he has to be prepared for a reactor coolant pump trip, and more frequently than he had before TMI.

This gives him more transients that he has to respond to with more severe consequences. There have been substanitally loarge numbers of procedural changes as the signals are changed in the on-going reviews. He has had to keep up with those procedural changes and make sure he remembers which one is, in fact, in place.

I am sure there will be many more procedural changes that will take place. He has concern about the response of the integrated control system and whether or not

bfm31

failures such as Crystal River and the "light bulb incident" at Rancho Seco may be fooling him on the exact condition of the equipment that he is responsible for operating.

Those are the sorts of things that I was thinking about and one very recent statement by Mr. Rodriguez yesterday.

He indicated that when talking about the RCP trip requirement, you know, he does not believe -- this is a rough quote -- taking pumps away from the operator is the way to go. I think that is certainly true. It reduces the flexibility that he has.

That puts a heavier burden on the operator and makes his job more difficult. As I have siad before, we need to recognize the fact that the B & W operator has a more difficult job at this particular point in time.

Perhaps modifications will be made, but certainly that is indicated in the NRC's NUREG-0667 report. It is indicated in Tedesco's May 1st, 1980 transmittal letter of that report which indicates in paragraph number 4, based on the design features and the faster response of B & W plants during transients and upset conditions, the operators may be required to take more rapid action and have a better under standing of instrument reponse than operators on plants having other designs.

Q Yes. However, my question is with the exception of

bfm32

the reactor coolant trip, which was a post-TMI requirement, wouldn't operators of Babcock and Wilcox reactors have had these kinds of responsibilities before the TMI accident as well as having them now?

A Well, a very brief answer to that would be they may have had them. Unfortunately, they were not aware of them, but you know the equipment has not essentially been changed other than the addition of recirc pump trip and so on.

end tP-3

dsp flws

tP-4

(Panel Conferring)

Q On page 8 of your testimony, in your listing of items of assorted lack of understanding of bases, the second one you talk about there is the vessel weldments; do you know whether or not the Rancho Seco technical specifications presentlycontain any limitations based on a concern about vessel weldments?

A I am not positive of that, Mr. Lewis. My recollecti on is that the Rancho Seco reactor has been identified as one of a number of reactors that have problems in that area -- potential problems in that area, and that the tech specs, I think, have been changed to reflect that.

(Pause)

Q Are you aware of whether or not the NRC sent a letter to SMUD indicating its concerns about whether the vessel weldment question at Rancho Seco had been resolved?

A I am not specifically aware of that letter. I am aware that a letter -- I believe sort of a generic letter was sent to a number of different plants that had concern in that area, and I think each utility was given a certain period of time within which they must respond. And I assume that they have responded and NRC has acceptedtheir response.

(Pause)

Q On page 8 of your testimony in the full paragraph

dsp2

beginning, "Additional concern," you make reference to the deposition of Mr. Comstock.

A Yes.

Q I believe your citation is page 9 of that. Could you please look at that. Why don't you start, actually, on page 8.

A I think the cite probably should have been 8 and 9 because that particular point is more specifically addressed on page 8, lines 14 through 17.

Q Is the discussion that is taking place there concerning relative ease of B & W versus other reactor designs to handle feedwater transients?

A Yes. On page 8 they are talking about -- they are talking about -- if you are talking about if they are as sensitive, they are talking about a comparison between B & W and somebody else; so I guess that would be a relative comparison.

Q And when you said Mr. Comstock asserted that these B & W systems are far superior to Westinghouse systems with regard to feedwater transient response, were you referring to -- what testimony were you referring to there?

A Well, I was referring to the testimony or to the deposition pages 8 and 9 in whichhe is talking about -- you know -- at one point they respond better in a positive way for the operator; he has better control over plant parameters

dsp3

and then he goes on to say, "We have better control over feedwater systems in the B & W plant."

And then on p[illegible] 9 he says at line 8, "In my experience wi[illegible]h it -- and [illegible] have also have experience with Westinghouse pressur[illegible]ed water reactors -- that the B & W system is far superior to it."

Q Do you disagree with the point that Mr. Comstock is making on pages 8 and 9 of the testimony with respect to the ways in which one controls the Westinghouse steam generator level and the ways in which one controls -- and his comments that he does not have to specifically control the steam general level of the B & W plant?

A I do not know whether I disagree; I am a little bit confused by your question because certainly I do not think there is any indication that a Westinghouse plant operator does not have control or is concerned about the control of feedwater.

I mean, there is feedwater control in both types of plants. There is a water level that has to be maintained. Perhaps I missed your question, the point of your question.

Q That's okay.

(Laughter)

Do you believe that the statements made by Mr. Tipton on pages 8 and 9 of his deposition --

A Mr. Comstock?

dsp4

Q Mr. Comstock on pages 8 and 9 of his deposition with respect to the ways in which the control of B & W and Westinghouse and Combustion Engineering plants differ, do you believe that those statements are inconsistent with a concern about the sensitivity of B & W plants to feedwater transients?

(Panel conferring)

A I am not sure that it is inconsistent with -- you know -- the characteristics of the two systems. It seems to me that his response here is saying -- instead of saying, yes, a B & W plant is more sensitive -- he is not saying it is more sensitive. He is saying that he likes it more sensitive because it gives him more control.

And I think -- you know -- there is a mis-communication or he is not really responding to the question.

If I may draw a sort of a crude analogy, it is perhaps like me giving a Mazurrati race car to my 15 year old son. Certainly, the performance is better, but I am not sure whether his performance would be adequate to handle the situation.

Q Did you view the statements made by Mr. Comstock that you cited to be an indication of a negative mind set on his part?

A I would not characterize it as a negative mind set,

dsp5

per se.

I think it is representative of something that has been discussed several times in this hearing, and I believe Mr. Rodriguez mentioned it again yesterday or the day before, that people tend to not want to believe that which -- tend not to believe that which they do not want to believe, and -- you know -- when things are going from bad to worse, the tendency is to say, well, you know, it is not really going to go all the way this time and to sit there and hope that the indications you are reading are not really true.

I think that there needs to be a recognition in all levels in the SMUD organization that B & W's system is more sensitive to transients, that in certain transient situations it requires more of the operator -- operators. And that ought to be recognized as a fact of life.

And appropriate action should be taken.

Q In your review of the deposition of Mr. Comstock, did you note anyplace where he appeared to have a lack of understanding of what might have to be done with the B & W reactor in a feedwater transient type of situation?

(Panel conferring)

A I cannot recall any specific areas that I can site at this time; it has been several months since I reviewed this deposition transcript in detail. And perhaps if I went

dsp6

through it for a couple of hours I might come up with one. But none immediately comes to mind.

Q On page 9 of your testimony, you make the point that the annual simulator course at the B & W training simulator merely provides an opportunity to experience and practice transients.

Is it your understanding that the operators do not in fact run the transients at the simulator.

A No, that is not what is being addressed in this section of my testimony, Mr. Lewis. This has to do with the communication of new information, and specifically it is talking about information on transients that have occurred at other B & W units.

I am not -- I do not mean to indicate there that the operator does not perform -- control manipulations simulating transients.

I am just saying that it does not appear to me in reading through SMUD's -- the information that was available to me that there is a formalized system for the passing on of transient and operational experience from other plants.

Just having a statement saying it provides an opportunity during the simulator one week course does not in fact mean that it is going to happen.

I think, if I may go on, that is an ongoing program

dsp7

that has to be done 52 weeks a year, not just during the one week simulator course.

Q At the bottom of page 10 and continuing over to page 11, there is a sentence that Mr. Baxter was discussing with you in which you states, "It is not clear from the depositions whether the operators accept that commitment" -- meaning, a commitment to memorize the immediate actions of the emergency procedures -- "as being a requirement."

Is it your position that you believe the operators have no in fact memorized the immediate action steps of the emergency procedures?

A It is not really my position that they have not memorized them because I do not know if they have memorized them or not.

My statement there is based on Tipton's response to that question, and it seems to me that if he had memorized them, he would have said, "I have memorized them," rather than saying that SMUD has made a commitment to the NRC that they will be memorized.

It would have been a much more direct response, and it gives rise to some uncertainty as to whether or not he takes that responsibility on himself other than during the periods of license examination which he admits to on the preceding page.

Q You infer from that statement that perhaps he only

dsp8

took that responsibility upon himself in connection with taking the operating license examination?

A There is an element of uncertainty there, yes, and I have concern about that. I know how the training programs are conducted by utilities, and -- you know -- it is no different than the training program for a hearing. People try to get prepped to remember things -- you know -- the day that they are going to be cross examined, the moreso than during the year.

So, it is a rather natural phenomenon.

Q On page 11, you cite the Kemeny report, and one of the things you highlight there is the suggestion that the training institutions, simulators, courses provided by vendors should be accredited.

Are you familiar with a proposal by the NRC staff that in fact simulators be accredited by the NRC?

A I am not specifically familiar with that proposal, Mr. Lewis. I certainly endorse it as a good idea, subject to seeing how it was done.

Q All right. I will not hold you to it.

On page 12, the last sentence of the runover paragraph you state, "Based upon the information we have reviewed, SMUD operators' training appears to be similar to that received by TMI operators, and accordingly, there is not basis to conclude that they have adequately been trained

dsp9

to respond to off-normal conditions."

In writing that, were you basically comparing to the pre-TMI incident type of training that the Met Ed operators had?

A I guess I would have to say yes directly to that question, Mr. Lewis, because I am not familiar with any post-TMI training that Met Ed operators have had. I am not sure they have had any, since they are not operating at this time.

But they have had a lot of on the job training, I guess you might say, in other matters. But my general conclusion, I guess, that is probably what that sentence is. I think it is a fairly, generally accepted assessment, that the TMI operators were inadequately trained to respond to the off-normal condition that they encountered.

And generally, looking at the training program of SMUD's operation, I do not see any substantive difference in the two that would lead me to believe that they would resond any more adequately, and furthermore, recognizing that any B & W plant operator is dealing with a more demanding machine, it does not seem to me -- it does not seem to me that the additional training that they have received is enough to assure that their response is going to be adequate.

Q Did you have in mind any particular off-normal conditions as to which you had a question about their ability

dspl0

to respond?

A Well, I do not have any specific sequence, but in general we are talking about the response to loss of feedwater transients, the pump -- the RCP trip, the need to identify natural circulation -- you know -- that whole area of concern based on the response of the B & W plant to that type of a transient.

Q On page 13 of your testimony under "Conclusions," you stated, "There is substantial reason to judge the operator training the level of understanding at Rancho Seco as inadequate."

Could you tell us in what specific respects you believe the operator training and level of understanding is inadequate?

A Well, again, it goes to the general level of inadequacy that has been identified in the total nuclear program training effort and the particular demands that are placed on the Rancho Seco operator since he is operating a plant that requires -- to use the NRC's words -- a better understanding than operators of plants with other designs.

And I think I would supplement that by -- you know -- going back to page 7 of my testimony and citing what the Essex Corporation found in their review, which is the quote in the middle of the page there, which in essence says that in the postmortems of serious accidents and

dspll

situations, that it is -- you know -- often the case that operator error is given as the -- being the cause of the problem and that the remedy is to provide more effective training, and they say the operator is expected to learn how to operate control panels, regardless of the quality of the panel design or the procedure.

However, where poor design or procedures are causal factors, improved or increased training will not f ôtself resolve the problem.

And I think that specifically is addressed at panel design. But it is a rather general truism that that is true of the whole machine, that it is more demanding -- you reach a point -- you may reach a point where no matter how well trained your operators are, they may not be able t o handle it in certain situations.

Q Do you have specific reference there to B & W reactors?

A I have specific reference to B & W reactors in the context of this hearing. There may be other reactors with other problems.

But that is what I was referring to here, yes.

Q In other words, is it your testimony that B & W reactors may simply be too sensitive for operators to be properly trained to handle?

A I think there is that possibility,yes.

dspl2

Q Mr. Minor, I have some questions for you. On page 14 of your testimony, the bottom of the page, you are discussing the problem of the inability to directly know water level or more generally to know when saturation conditions are reached.

Are you aware of the installation of the saturation meter at Rancho Seco?

A (Witness Minor) At the time I wrote this testimony,which was back in February, the tour of the plant that we had asked for, for inspection of the control room, had not been granted. And I did not have the benefit of that inspection to know the situation in the control room.

So, I wrote this testimony from that point of view. Since then we have had a chance to go through the plant,and I amaware that they have installed two subcocling meters in the control room.

And I am also aware of the correspondence about them, that they had been installed in a hurry, and therefore are not safety grade and need to have improvements made in the future to come up to the standards that are necessary for that type of important instrumentation.

Q My question to you is: with these saturation meters now installed at the plant, do you believe that the operators are now in a better position to determine whether or not saturation conditions have been reached?

dspl3

A As far as determining whether saturati n conditions have been reached, yes, I believe they are in a better position.

But the other part of that is once you reach saturation conditions, you then have a greater need to know vessel level because you are then in the condition where you do not know your level for certain because your pressurizer is no longer a good direct inference the way it was in the past.

Q Are you aware of testimony given by Mr. Rodriguez that an indication of vessel level would not provide the operator with any further diagnostic tool to know what further operator action he should be taking?

I believe the context in which that came up was in terms of high pressure injection already being on and the question of whether or not knowledge of the water level in the vessel would provide any further diagnostic tool to the operator in that situation.

A The answer is yes, I am aware there was testimony to that effect. I was not present for all of that, but I have read some of the transcripts of that period. But in response to that, I think it is important to note that I believe this would be an important additional diagnostic tool.

Granted, the operator does not have any additional water source available to him because you put a

dsp14

level meter in there, but it may help him to decide earlier what actions to take and waiting prescribed periods, for instance, to see that natural circulation is established, and so forth.

He may determine that he does not have a chance of achieving natural circulation and therefore take other actions sooner.

I think it is an additional step that would be helpful in the diagnosis of an accident condition and in deciding his next steps earlier.

Q Do you believe -- is it your position that Rancho Seco operators do not presently have sufficient indication of onset of natural circulation?

A Well, you have to conclude that reading procedure B.4, I believe it is, that it certainly is an indirect indication that natural circulation is going on; you have to infer that it is happening from at least three to four to five other readings.

And there is a lot of operator judgment. And it is my position that because we are dealing with a plant that is more sensitive, that is more prone to transients, that it is more likely to get into a situation where you will need natural circulation early in a transient; that you are going to need to the operator to have the best available information as soon as possible.

dsr15

B.4 calls for looking at trends up to 15 to 30 minutes of whether or not natural circulation is being established, as part of their procedure for verifying natural circulation. That is a considerable period of time. If he had a direct indication that would tell him earlier that there was indeed flow being established, then he could make his decision sooner.

(Pause)

Q On page 16 of your testimony, you make the following statement in the first full paragraph: "SMUD has committed to comply with the Lessons Learned Requirements, but the details of the changes to be made and the range of plant conditions the changes will cover are not clear at this time."

Have you had the benefit of seeing CEC Exhibit 41, which is the NRC staff's evaluation of compliance with the NUREG-0578 items?

A I believe I was here when that was handed out, but I would like to look at it again to make sure we are talking about the same one.

Q Could you please take just a moment to look at that and refresh your recollection about it.

(Pause)

My question to you is actually going to be quite general.

dsp16

A Good.

Q I would simply like to know whether between the time that your testimony was written and the present date, that you know believe the details of the 0578 short term changes have become clear?

A Only in terms of the subcooling meter. I would say that in terms of the level instrumentation, there still seems to be a standoff where SMUD is saying, "We don't want to do it," and the NRC is saying, "Well, at least study it."

And that is the standoff that exists today.

Q To your knowledge, is the question of installation of a vessel level indication or some such type of instrumentation a long term Lessons Learned item, so-called category B?

A It is a category B item as it is categorized right now, yes.

Q On page 17 of your testimony you state that without the types of instrumentation and displays that you have been talking about in your testimony, there is an undue burden placed on the operators.

Could you describe to us what you believe that undue burden to be?

A I think the entire testimony leading up to this point where I make this statement gives evidence that we are

dspl7

dealing with a reactor where the requirements may be more immediate and more intense on the operator and there was even a statement in the May 7 board order that says that this in turn places a large burden on the plant operator in the event of off-normal system behavior during such anticipated transients.

Certainly, there are other reports that agree with that; NUREG-0667 makes that statement. The Rogovin Committee makes that statement. I do not believe that is unfounded at all. It is my personal belief that when you are dealing with a machine that puts these additional requirements on an operator, you need to provide as much assistance as you can to that operator to be sure he will make the right decisions.

And I think that goes beyond what you were talking about, normal machines that may have less demanding requirements on the operator.

Q Would it be your position that absent instrumentation to determine reactor vessel coolant level and instrumentation that you believe should be installed to determine initiation of natural circulation, that the Rancho Seco facility cannot be safely operated?

A I would have to put my answer in the context here of my background, which is for a considerable period of time in control room design. And looking at what is the

dsp18

environment you would want a reactor to be operated in and what environment you want to provide for the operator, we have come to the conclusion, General Electric, and I myself as a designer and manager of that group, that you want to take away as much inference and detailed judgment from the operators as you can so that the operator has direct indications that he can rely on, rather than inferred measurements and indications.

Now, I am not saying that SMUD cannot ride through a transient at Rancho Seco; they have demonstrated that they can ride through some transients, the ones that they have had. But I am saying that because of the nature of the machine and thenature of he displays and the nature of the indications that the operator has and the number of inferences he has to make of critical parameters, such as vessel level, and other conditions where you have excessive voiding and the establishment of natural circulation under certain conditions, he does not have everything that would be helpful to him to understand his situation quickly.

And, therefore, you stand the chance that a new operator, an operator that perhaps has not had the experience of the past transients or has been fairly long out of the training slot -- the training simulator, may make an incorrect judgment and get you into a serious condition in a short period of time.

dspl9

Q Are you aware of the fact that SMUD has indicated to NRC staff that their review to date of proposed vessel level indication instrumentation has not produced satisfactory instrumentation from their point of view? Are you familiar with that position by SMUD?

A I am familiar with their written resonse to the Lessons Learned and with their recent update of that. I also contend that their stonewalling of this, in effect, if I can characterize it that way, saying they do not feel it is needed, is largely predicated on the fact that they have not found a simply way to do it.

If they found a simple way to do it, I think they would agree that it is needed and necessary and helpful.

Q Are you aware of any readily available, simply ways -- available types of instrumentation to measure vessel level in this type of facility?

A I do not have a pat answer for this problem. That is why I am suggesting here that it be carefully studied to find the right way. My concern is that the present SMUD position will be adopted by the NRC, that they do not need it, and I think that would be a step in the wrong direction.

Q So you would encourage the NRC to impose as some part of the category B items some type of instrumentation that can measure vessel coolant level?

dsp20

A Yes, I would; I believe that what they indicated the other day is an inadequate situation. In response to the board's recharacterization of the contention, I belive the answer was that if they had serious voiding they could tell if the water level was above or below the exit thermocouples.

Well, that is a pretty gross indication of water level. What you would like to know is if you are getting close to that level, not whether you have just gotten deeply in trouble.

(Pause)

Q Mr. Minor, on page 17, you refer to a lack of physical diversity in control in the Rancho Seco control room. Could you explain what that means?

A If you look at the control boards, particularly the vertical control boards, there is a large array of push buttoms, lights, and indicators which from a distance all look identical.

They have varying functions, but that is not apparent. They have no mimic to indicate which ones are related in which fashion.

And, therefore, it requires a very careful scrutiny of the indicator labels, the name plates to establish what the function is of a particular switch. Another way to accomplish that is to make sure that switch

dsp21

functions of a particular type have distinctive features, size shape, some other feature that tells you if this is a safety device, for instance, or if it is related to a particular type of system, whether it has a particular type of action.

And that is the particular diversity I was speaking of. Let me put that in context: at one point we evaluated the Bailey meter module for use in the control room. We were asked to by a New Jersey utility.

MR. ELLISON: Mr. Minor. Just a moment. When you say, "we," are you referring to --

WITNESS MINOR: I was referring to my position at General Electric at that time in the General Electric design group.

And we rejected the idea at that time on the basis that it had no diversity. It had other problems, but it had no diversity. And the idea of standardizing on a module to do all functions had advantages in the factory when you were trying to turn them out like weenies. But it had disadvantages in the operation when you tried to decide which weenie did which job.

MRS. BOWERS: Mr. Lewis, we need to take a mid-morning break at some time. Would this be a convenient time?

MR. LEWIS: I am almost through.

dsp22

BY MR. LEWIS: (Resuming)

Q I had been confused about that term, "physical diversity." I assumed you were talking about separation requirements, physical separation requirements. Was I wrong about that?

A That is a separate subject. I do not deny that it needs that also.

Q In footnote 23 on page 17 you note that at the time you wrote the testimony you had not yet seen the control room.

But I understand that you have testified that you now have had the opportunity to see the control room.

A Yes, we did.

Q At the bottom of page 17, going over to page 18, you state: "The design appears to be optimized for normal operation" -- referring to the design of the Rancho Seco control room -- "but may be lacking the needed displays and reliable data to handle upset conditions."

Exactly, what displays and data are lacking?

A Again, you are taking a piece out of that sentence. When I say "optimized for normal operation," I do not believe that is the best control room you could design for normal operation. I do not mean that in any way.

What I do mean is that the philosophy of design, particularly as enumerated by Mr. Rodriguez in yesterday's

dsp23

testimony was that they wanted to make it small. And that was the design parameter that they optimized around. You remember in the testimony regarding CEC 33, I believe the document number is, the control room study, Rancho Seco got very high grades for smallness. But they got low grades for other features, such as operability characteristics and other areas.

Now, that does not mean that they designed the plant to handle transients in the best way; it does not mean that all the displays and indicators are there. Indeed, in making it small, you often eliminate indicators that you may have put in the control room.

And you eliminate them on the basis of size to minimize the size of the control room and control panels. Now, what we are seeing here is that there are displays being added back into the control room. We are seeing the aux feedwater flow being added back in.

We are seeing subcooling meters being added; we are seeing different range of instrumentation added. So you have both a wide and narrow range for transient operation and normal operation.

In general, instrumentation in a control room is like entropy; it is usually increasing. They just happpened to start at a very low level for their starting

dsp24

point.

Q Is it your position, then, that in fact the Rancho Seco control room, because of an attempt to keep it small, did in fact not have specific displays and data capability that it should have?

A I believe that they could have used additional instruments, at least of the nature of the ones that I am talking about. And certainly in relation to some of the current knowledge, the instruments that have already been added since TMI show that there are things missing that would have been beneficial.

Q Given the fact that Rancho Seco is an already existing control room, is it your belief that --

A Excuse me. I missed the introduction to that question.

Q Given the fact that Rancho Seco is an already existing control room --

A Yes.

Q -- would it be your position that major reconfigurations of that control room or major redesigns of that control room are feasible and should be considered?

A That is a very difficult question because you get into the physical problems of a control roomthat is already laid out with its wireways, its cable separation room, its physical separation of panels and wiring ducts, and so forth.

dsp25

And when you start making changes in that, you require large outages. You require a compromising of the safety during the period when you are trying to make modifications to the panel.

There is a lot implications to that; however, that is proposed, at least, or being proposed for study right now. And I understand -- and perhaps this has come to contract at this time -- it was just being discussed as a proposal at the time I found out about it -- but they are looking at a program for augmentation of control rooms. That is to figure out what critical set of parameters the operator needs as a minimum to be sure he understands the status of an accident or upset condition and providing an augmentation to the existing control room to add at least that and perhaps other changes to the human factors of the control room and the operating controls so that each control room is brought up to a new standard.

For some control rooms, this would be more major -- a more major change than others. I do not know exactly what Rancho Seco's status with regard to this program is or whether that program is indeed going into effect. But I believe that is a proper step.

Q So it would be your testimony that further investigation and studies of possible control room augmentation for operating plants such as Rancho Seco should

dsp26

continue and be considered?

A I certainly do; particularly, in regard to the fact that control rooms historically have not had a very critical review by the NRC or other bodies.

(Panel conferring)

WITNESS MINOR: Excuse me. Could you read back where I was. I have forgotten.

THE REPORTER: "Question: So it would be your testimony that further investigation and studies of possible control room augmentation for operating plants such as Rancho Seco should continue and be considered?"

"Answer: I certainly do; particularly, in regard to the fact that control rooms historically have not had a very critical review by the NRC or or other bodies."

WITNESS MINOR: Because of that, I feel it is time we do bring them up to at least a minimum level. There are beginning to be effective standards generated in that area. I would cite IEEE 566 as one step in that direction, and some of the criteria being developed within the NRC itself for review of control rooms for the future.

But I believe it is also important that we go back and bring the other plants up to date. And I think there is a real concern that we not just create an additional study of past control rooms, but that we bring it to a conclusion and implementation in a reasonable period of time.

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MR. LEWIS: Those are all my questions.

MRS. BOWERS: We'll take a 10 minute break.

(Recess)

BOARD EXAMINATION

BY DR. COLE:

Q Mr. Bridenbaugh, Mr. Miner, I have read your testimony, and I believe I understand your position. I just have a couple of questions.

Mr. Bridenbaugh, with respect to training, could you tell me how you developed your knowledge of the training program for Rancho Seco operators?

A (Witness Bridenbaugh) Well, I guess the -- Is this on? Yes.

I would have to say that, first of all, Dr. Cole, I would have to put it in the context of my experience in training,that I have had a substantial amount of experience in the operator training area, and I don't want to go through all the details of that, but in terms of the preparation of this testimony, which I suppose is really the gist of your question, what I have been doing for the past year is keeping track of and reading the NRC and other reports on the TMI accident, and that includes keeping track of their analysis of training deficiencies or information on training.

And with respect to the Rancho Seco training program, I obtained copies of their training procedures, interrogatory responses, the descriptions of their training programs. I have -- We have a copy of the FSAR and other Rancho Seco documents, and of course I obtained copies

of the depositions and reviewed that material in preparation for writing the testimony.

Q All right, sir.

In response to some questions, I don't remember whether it was from Mr. Baxter or Mr. Lewis, you made a quantitative comparison of training programs at Rancho Seco, and at TMI, 240 hours of one type compared to 200 hours of another.

A Yes.

Q Did you make any effort at a more qualitative comparison, and could there be significant differences there, sir? An hour of instruction from a certain kind of instructor might not be -- The point I am making is that one kind of instruction, even though it is listed as an hour of mathematics from one person, might not be the same as from another.

Have you made any qualitative comparison of the training programs?

A I guess I would say that I haven't had the opportunity to make any extensive qualitative analysis of the two programs. I think in order to do that, for example, you would find it necessary to do many of the things that the NRC does, and that is to -- or should be doing, at any rate, and that is to sit in on training programs and observe them in operation.

I did not have that opportunity to do that. I think your point is a very valid one, though, and that is, you know, that -- comparing absolute hours is not necessarily, you know, a total picture of things, because I don't remember which training program it was on, even, whether it was Met Ed's or Rancho Seco, but I do remember the comment that where someone says they did -- had six hours in the training program to do this, what that six hours involved was five hours of on the job time that the trainee was supposed to be reading procedures, and then subsequent to that he was given a one-hour test, and that is called six hours of training.

That's -- You know, those kinds of deficiencies I would expect to find in both training programs, but I -- you know, I can't respond that I have done that extensive of an analysis.

Q You -- I believe you testified that you have read the testimony of Mr. Rodriguez, and I believe you sat in the -- in the room when he gave virtually all of his testimony--

A Most of it. I was not here for the first day, but --

Q -- during the last three days.

Do you recall him describing the training staff at TMI -- I'm sorry, at Rancho Seco, the training supervisor and his staff?

Were you in the room at that time?

A Yes, I believe I was. I am not sure whether that came up more than once or not, but I -- yes, I can perhaps -- I think it was in response to some of your questions to him.

Q So you know at least something about the training staff --

A Yes.

Q -- that is used at Rancho Seco. Is there a comparable staff at TMI? Or do you have any knowledge of the kind of a training staff they have at TMI?

A There is a -- Yes, there is a training -- there was a training staff at TMI, and still is, I hope. I think that in terms of numbers, training staffs in general at all utilities have, of course, been going through the same acceleration of emphasis that the training has in the past year.

I don't remember the number of people and their backgrounds in the information that I read on TMI. I am sure it is in this report, which is, you know, one of the Kemeny Commission reports, and I assume you have that.

One thing that I do remember in thinking over the Rancho Seco training staff qualifications is that one of the -- I believe one of the recent additions to their staff, relatively recent additions to their staff is an operator from -- that came to Rancho Seco from -- as a training

instructor from PG&E's Humble Bay plant, and I believe that his experience was listed as four or five years, and that includes a three year period at Humble Bay from 1976 through 1979, when he came to SMUD, when Humble Bay has been shut down, you know, for three years because of seismic deficiencies.

So there -- you know, whether his experience there is directly applicable to SMUD or not, I don't know, but there are, you know, it's not possible, I guess, to give an exact -- to do an exact comparison to the two, but based on what I have read, I didn't see a lot of difference in the people involved.

Q I believe in -- either in your written testimony or in one of your statements, I don't know, possibly both -- I don't have -- I didn't write the cite here, but I believe you indicated that in your opinion, Rancho Seco is in general compliance with the training statement, and as I recall now, it is -- it is in your testimony, and I believe you commented on it also. They are in compliance with 10 CFR 55.

Now, my question to you, sir, is, in view of the charge of this Board, which in general is to determine compliance with regulations, what would you have this Board do?

A Well, I think there are a number of things that

you can do. Let me preface that by saying I am sure that there are legal restrictions that you have that I don't understand and I don't -- so I may recommend that you do something that you don't have the ability to do.

Q People do that all the time. Please feel free.

(General laughter.)

A But I think that there are a number of commitments and requirements that could be imposed on the operating license of Rancho Seco.

One example that might perhaps be a knit, and maybe it has already been corrected, I don't know, but I think that certainly should be done has to do with the one-week annual training at the simulator that SMUD has spoken of for their operators.

I am not sure exactly how they characterize that, but they said that they do send all their operators to the simulator for one week of training every year. If you look at their requalification training procedure, at least at the copy of it that I have, that is not a requirement in their requal program.

Neither was it a requirement in TMI's requalification training program.

The fact that they do it is nice, but I think that those sorts of things ought to be made a specific requirement.

Q I don't know whether that would be a fair

criticism or not. Would that depend on why the requalification program was written out? Does that have some legal requirements with respect to the Nuclear Regulatory Commission? And that requalification statement would state what the minimum requirements of NRC might be, and that might just be their legal advice to do it that way.

Now, whatever else we do, fine.

A And I think -- yes, yes, sir. That is -- I am sure that is the reason it was written that way. It probably isn't that -- even that the 10 CFR 55 says that. I think it probably fell out of an ANSI standard, you know, as these four items shall be done as a minimum, and the utilities in general in going through the licensing process will commit on paper only to the legal minimum of the law.

Q Don't you think that their lawyers would advise them that way?

A Of course. Of course they would. But that doesn't mean that that was the right way to run an admittedly risky -- a potentially risky operation.

Q All right, sir. I understand your position on that.

A Okay. And -- you know, that is just a, let's say a knit example, but I think many of the things that have been discussed in the past three or four days, I think -- I am sure that as a result -- I won't say I am sure as a result of this hearing, but I am sure that it's only a matter

of time until SMUD develops a written documented, formalized procedure on how they are going to handle operating experience from other reactors. I am sure they are going to have a more rigid procedure on how they ensure that procedure changes are communicated to the operators and how each operator will sign those things off.

You know, those are the sorts of things that I think could be specific improvements in the training program, the operating procedures, and certainly I would encourage that those things be done, but I think there are other things beyond that that could perhaps be imposed, and one thing that has bothered me about SMUD's operation a little bit, and some other utilities, is that -- and it has been addressed at this hearing -- they are a relatively small utility; they have had no experience as a utility in operating other thermal power plants. They are isolated, if you will, from their supplier by a large amount of distance. They are isolated from the simulator.

I think that -- that recognition of those factors needs to be taken, and maybe they need to do a little bit extra in order to make sure that they are in compliance or have done everything they can to have their operators and their communication with B&W the best they possibly can be.

Q All right, sir. Thank you.

Mr. Minor, just one or two questions.

In your testimony about human factors engineering as related to Rancho Seco, how did you develop your knowledge of the control room at Rancho Seco?

A (Witness Minor) Well, of course, with a background in control room design, I am naturally critical of other designs, to see what they have done in comparison to what I have done in the past and what has been established as industry practice.

My particular knowledge of Rancho Seco came from studying the documents related to it. I became interested in it back when the lightbulb incident occurred, and followed up on that event to try and figure out what was going on there.

I learned a lot about the TMI control room during -- subsequent to the accident there, and during the work with the Rigovin Committee, where I worked also with the human factors group, and in reviewing the proposed study for the Essex -- by the Essex Corporation of the TMI control room and the adequacy of the human factors employed there, and also in reviewing the report by the Kemeny Commission on the human factors section.

In addition, for Rancho Seco, I did have the inspection of the plant, and a chance to view it firsthand and make some observations of the practices and ask some questions about it a couple of months ago.

Q I notice at the bottom of Page 17 of your testimony you indicate that you had not had the opportunity to inspect the control room before preparing the testimony.

A That's correct. I had to rely on some color photographs, a large number of color photographs that had been taken by the Energy Commission during the tour that they were allowed earlier. We had requested a tour prior to the testimony, but we didn't have a chance to do that.

Q So as a result of your later inspection, you in your opinion didn't have to change or modify any of your testimony.

A Actually, I did not, except for the subcooling meter, which I found, what type they employed, and where it was installed, and its visibility and so forth. I did change that part of my testimony.

Q All right, sir. Thank you.

On Page 16, in the last part of the second full paragraph on that page, the next to the last sentence, you said, "The operator would be less likely to make errors in diagnosis if he were provided with a dedicated indication of natural circulation which was reliable under normal conditions."

A Yes.

Q Mr. Lewis asked you about a reactor level indication. I believe you indicated that that that is

something that would require a little study, you didn't know offhand what the best way to do that would be at Rancho Seco.

Do you have any ideas how indications of natural circulation could be accomplished relatively easily, or how at all, at Rancho Seco? How could it be done?

A Well, basically what you are trying to establish is that there is continued flow between the vessel and the steam generator, so flow measurement capability comparable to the coolant flow measurement for normal use, but for the scale that you are talking about. The natural circulation, I believe Mr. Rodriguez told us, is about 4 percent of full scale, and so that is down in the noise level under normal instrumentation, and that is part of the problem of why they have to rely on other instruments to make sure that they really do, because essentially the meter looks like it is reading zero under those conditions.

That would be the first approach I would look at. I don't know that that is practical, and I think that this, too, requires some study to make sure that what you have would be a satisfactory solution under the various conditions that it would have to operate on.

There is a lot of concern you would have to have for void content, for temperature compensation, pressure compensation, and so forth, whatever type of technique you

employ. I do not imply that I have in my vest pocket a pat answer for this. I am saying that it is a needed instrument.

Q On Page 17, about -- just below the middle portion of the page, you use the word "mimics."

A Yes.

Q Could you tell me what that means, sir?

A If you have a system such as an emergency system which involves pumps and valves and controllers and various functions, it is helpful for most operators to visualize the system as a line diagram, if I can. In other words, it is a representation on the panel of the function of the system, so that the controls and indicators are positionally placed in proportion to where they would be on, say, the P&ID's that the operator uses to learn the function of the system, or the piping instrument diagrams, and a lot of plants use this, and some overuse it, but Rancho Seco under-uses it, in my opinion.

Q All right, sir. Thank you.

My last question, on Page 18, in the -- Line 6, you state, "In general, essentially all nuclear control rooms are inadequate and poorly designed from a human factors engineering point of view."

You have testified that you spent a considerable portion of your professional career working in the human

factors engineering and control room design aspects for a nuclear plant manufacturer, and in your curriculum vitae it indicates that you occupied a senior position with respect to control room design input.

Does your characterization of control rooms as being inadequate and poorly designed relate to BWR's also, and if so, how come that is the case?

(General laughter.)

A It sounds like you are asking me if I have beaten my wife in the past, and have I stopped.

(General laughter.)

Q Well, I am just curious.

A Yes. Well, your question is a very good one, because it is a fault of this industry that the control room design in the beginning was either the result of groups who had been in the practice of designing for chemical -- at the chemical plants, steel mills, hydro plants, other smaller power plants, fossil plants, and the magnitude of the control room in a reactor, either boiling or pressurized, is considerably larger than most of those.

So, the practices that were used in the past didn't necessarily apply here. The responses required by the operators weren't exactly the same. So, there was a long learning period where there were very few standards to guide the designers, and certainly I was in that position,

too. When I took over the job at General Electric, I hired the first human factors guy they had ever had in the organization, and we started working on future generations, as I mentioned. So that means that everything prior to that had none, and I would say yes, they are inadequate from the human factors engineering point of view, and that is the general conclusion that the Essex study comes to.

In general, there has been no applied human engineering, except on a very low level, in nuclear control room -- reactor control rooms in the United States.

Q All right, sir. Thank you.

Let me just check.

(Pause.)

A I would like to add to a previous answer I made about where I gained my experience about the Rancho Seco control room. Vicariously I learned about it by having studied in the past the control room documents and the control room study, where I learned yesterday officially that Plant C is actually Rancho Seco.

I had studied that, and I recognized Plant D as looking a lot like Dresden reactor, because of the unique configuration, but I wasn't certain that Plant C was Rancho Seco prior to yesterday.

Q You found out that you knew more about it than you knew.

All right, sir. Thank you. I have no further questions.

BY MRS. BOWERS:

Q I asked Mr. Rodriguez yesterday a question or two dealing with how you can try to screen and select individuals as operators who will be unflappable under stress, and are you, either one of you aware, or do other utilities have programs to attempt to do quite a bit in this area of screening?

A (Witness Bridenbaugh) I guess I am generally aware of the programs that other utilities follow. I think that there are some general descriptions on this in some of the Kemeny and in the Rigovin subreports. I think that some of the problems in doing the screening, of course, is that there are, as Mr. Rodriguez indicated yesterday, there are some problems in doing rigid screening with the equal opportunity -- or Equal Employment Opportunity regulations and those sorts of things.

So, you have to accept the fact that there are limitations to what can be done, but I think a number of the -- you know, one report that I can recall that went into this was the GAO report that talked about some of the requirements for emotional stability and so on, and I guess I would say as yet I don't have -- like the vessel level indicator, I don't have a pat answer for that, but it is

something that I think needs to be looked at more carefully.

Q Well, are other utilities doing more in this area?

A I don't know. I don't know. I would speculate that probably some are and some aren't, but I think in general they are all at about the same level.

Q In my mind, this also ties in with the human factors question --

THE REPORTER: Would you speak into the microphone, please?

MRS. BOWERS: Oh, I am sorry.

BY MRS. BOWERS: (Resuming)

Q In my mind, this also ties in with the human factors problem, and I mentioned yesterday some of the screening and testing that went on for air traffic controllers with FAA. Also, there were serious human factors problems in the control rooms with the radars, the placement, location, and so I think I am really kind of talking about two things that are closely related, and that is the response under stress plus what help you get from good human factor designing.

A There is a concern in that area that we tried to deal with at General Electric in designing the control room concept, and that is what level of operator you are designing for. Certainly if you design for the lowest level operator, you will automate as much as possible, and put the minimum

number of controls. The ideal control room would be an on-off switch and an increase-decrease lever and a power meter. But that isn't reality. You have to rely a lot on the operator. You have to rely a lot on his decisions, and you have to provide him the best information you can to make those decisions.

Then you have to get into the level of education that he has to make those decisions.

So, it is a difficult decision. We have designed the reactors as if the operator was not a very high IQ person, I mean, not extraordinary IQ person. We assume that he would have basic education, but not extreme education. He wouldn't be a college graduate. And you have to build your control room about that type of operator. We were not involved in the screening of the operators themselves. We were just trying to provide the human factors aspects for an operator of that capability.

BY MR. SHON:

Q Now that we are talking about that sort of thing, operators and their braininess, are you familiar with the school of thought that says that an operator should not be all that brainy, because brainy people, when they don't keep their brains thoroughly engaged, tend to daydream and do things like that and try experiments. Are you aware of that?

A (Witness Minor) Yes, I am, and we were concerned about that, too. You get too intelligent a person, and he is probably going to get bored, and when a person gets bored, who knows what they are going to do?

Q On Page 19 of your response, your ultimate conclusion was that there could be errors in diagnosis and control of upset conditions without direct indication of three things. As I understand it, the first thing you mentioned was reactor vessel coolant level, and you said that you don't feel that the exit thermocouples are a good enough control -- are a good enough indication to be called a direct indication of that. Is that right?

A Well, there are various direct indications. You can look for the failure of self-powered detectors, like they did at TMI. As they failed, they knew the water was getting down to those levels, but that is not a very good indication.

Q The second thing that you mentioned was a direct indication of the onset of saturation conditions, and you tell us that you are now aware that they have the TSAT meters, but you feel that it is not safety grade, and that therefore it should be upgraded in some way. Is that correct?

A That's correct.

Q The third thing was that you didn't feel that

the -- I believe it was delta t across the once-through steam generator was a very good way of determining whether or not you had flow under natural circulation conditions. Is that right?

A The combination of instruments that they are allowed -- they are required to look at to verify natural circulation seemed to me to be unduly complex, when it is the type of condition that they may be in fairly infrequently, to control the transient.

I didn't want to imply that these are the only three, Dr. Shon, that I was concerned about. In fact, I should really have added that I feel that this whole area needs to be studied from a human engineering aspect, and a human factors concern, to decide what is the appropriate added set of instruments to fully instrument the plant for transient control and operation.

Q You said that they could contribute to errors in diagnosis and control of upset conditions.

A Yes.

Q At the bottom line, is that the same as saying that the plant is unsafe?

A Yes, I believe it is.

Q We have had several questions which we had adapted from the Tasco(?) contentions, and you answered them in the original form. I would like to do the same as we

have done with our other witnesses --

A Yes.

Q -- read our revised form to you and get a response on the record as to whether that is the same or are there changes in your responses.

A That would be fine.

Q Let's take Number 31 first. In the form that you had it, it appears at Page 17 in your testimony. The form that we have ultimately wanted answered, or very nearly the right form -- I think we used the wrong word -- were, are there features of Rancho Seco's control room design and configuration which make it difficult for operators to avoid a loss of feedwater pressure perhaps that would be to respond to a loss of feedwater pressure? Do you think that there are such features as that?

A Yes, I don't believe I would change my testimony in view of that change in wording.

Q The next one is Number 32. It appears in your testimony at Page 5, and the version that we finally wound up with is, what procedures have been used to test and evaluate the competence of Rancho Seco's operating personnel management. Would the form of that change your opinion or -- I guess that is Mr. Bridenbaugh's department.

A Yes.

A (Witness Bridenbaugh) No, that sounds very similar

to what I was considering, and I would not change anything.

Q The last is Number 34, which also appears at Page 5 in your testimony. And it says, what actions and or programs were employed at Rancho Seco to assure that operating personnel, both licensed and unlicensed, adequately respond to feedwater transience? Is that again essentially what you have analyzed there?

A Yes, I think that is the same. I perhaps addressed the aspect of how the information is communicated to the operator, and the -- my testimony, I think, says I don't feel it is adequately communicated, and therefore he doesn't have -- is not assured that he has the information to adequately respond.

Q I would like to ask you a question about operators and their procedures that is kind of a philosophical thing. It has been with the nuclear business for a number of years. It is the diversity of thought that says on the one hand, operators should be smart enough so that they can figure out things on the spur of the moment, and on the other hand, said, an operator should never have to make things up as he goes along, he should always have written procedures.

It seemed this morning when you were talking about the operators you were saying, oh, they have all these written procedures, and therefore they are not smart enough

to make things up as they go along. Is that alternative really a much better system? Can a fellow really make something up on the spur of the moment under stress that is a better response than could have been thought up by a group of careful thinkers who sat around and thought about it for a while?

A Well, I think I will revert to Mr. Rodriguez's response to this sort of question, and never say never, but I think philosophically or procedurally, the operator has got to follow the procedures,but he has to have enough understanding of the fundamentals underlying those procedures so that he can identify -- so that there is as high a likelihood as possible that he can identify when he gets to a point in the procedure that the response of the machine to the action that he has taken indicates that there is something wrong with the procedure, he is aware of that, and he then says, there is something that doesn't quite add up here, I have got to, you know, go back and look at the procedure, I have got to huddle with the shift supervisor, I've got to find out whether I need to do something different.

I am not suggesting that he make up new procedures on the spur of the moment because he thinks the old ones are not adequate. A very simple example I can think of was, in my old turbine start-up days, I can recall TVA, I think it was, had a procedure in place for starting up the

unit, and this particular unit had undergone a major overhaul, and the operator came in in the morning following the completion of overhaul, and no one had revised the start-up procedure. He started it up and put it on the line in a matter of 45 minutes or whatever it was, and of course the situation -- he followed the procedure. No one had thought to say, you know, you've got to do an extensive check-out and warm-up, and as a result of that it ruined the machine, essentially, and -- go back to zero.

Q Nevertheless, when he gets to the point where he says this procedure isn't working, I have to do something else, isn't he then making it up as he goes along, to some extent?

A He may be. He may be, but I think the thing that he has to do is say, there is something wrong, and then he has to ask for some help.

A (Witness Minor) I would like to just add in on that. I think procedures are very valuable when everything is normal and within the range of procedures, but if you get into the off-normal conditions, where things aren't responding, or equipment failures are unusual, and where the machine is not acting the way it is supposed to, you are going to have to have an intelligent operator.

Q In the matter of control room design, there are an awful lot of things that seem to be two-edged swords. For

example, size. If the control room is big, everybody says you have to take too many steps and you can't see the things at the other end. If it is small, everybody says it is crowded, you are tripping all over each other and you get in each other's way.

How close to being an optimum, for example, do you think Rancho Seco is with respect to size?

A Well, in the spectrum of plants that I have seen, I think the smallest I have encountered is a proposed control room for a southeastern utility where they were going to have essentially like an airplane cockpit, where the guy got in and he had everything miniaturized and it surrounded him. It was a one-man operation. I don't think they ever built that one.

The biggest was one that the used to classify as the ballroom, where they said the operators had to have roller skates to get quickly from one end to the other.

Rancho Seco is somewhere in the middle. I think it tends to be on the low side, on the small side, and a lot of that is a result of their design philosophy. I don't know if there is an exact optimum. It depends on the type of plant, the number of systems you are dealing with, and the complexity of those systems as to how many displays are really appropriate.

But because Rancho Seco has never really been

reviewed with that thought in mind officially, I think that it is appropriate to do so.

Q Another one is diversity. You said Rancho Seco lacks diversity. But diversity can be a good thing in some senses, and in another sense, where you have meters indicating the same thing but reading in totally different ways, it can be a bad thing. For example, we have already heard of the difficulty that Rancho Seco had because the open and closed indications on valves were not uniform or were in some sense diverse.

A That is a diversity of philosophy. I am talking about physical diversity. I am talking about certain shaped switches for doing certain jobs, for instance, or certain shaped meters for doing certain types of indications. Like functions. They talk about how a red light at the different plants can mean up to a dozen different things. Priority lights, prioritizing of the annunciators so that you have different categories of functional indication.

end SB1
SB2 foll

Q So it isn't diversity alone, but there's bad diversity and good diversity.

A Yes, that's correct.

Q You think Rancho Seco has too much bad diversity and not enough good diversity perhaps?

A I wouldn't want to quantify exactly how much good or bad it is; I know that it has some bad, and I think that needs correcting.

Q Lastly, it's kind of a detail, but on page 16 of your testimony near the bottom of the page, in fact, it's the last sentence on the page, you speak about natural circulation and then you say, "This problem is particularly important on B&W plants which have a lower driving head due to the lower position of steam generators relative to the reactor vessel." A previous witness, Mr. Parish, I believe, has told us that really, there isn't all that much difference in flow rate between the plants. Were you aware of that? He said it was only of the order of a few percent, and that they had tested it. Have you seen such data?

A I had not seen that. I was of the opinion that his testimony said that there was a difference, but not that one was a few percent better than another. I would have to go back and look at the transcript for that, but I had heard that characterized slightly different than you did.

But there was an appreciable difference, but in

both cases, the level of natural circulation was considerably lower than the normal flow. In other words, both of them are in the noise level, in essence, compared to normal flow, but the low head would have an ever lower value.

MR. SHON: Thank you, I have no further questions.

MRS. BOWERS: Mr. Ellison?

REDIRECT EXAMINATION

XXX

BY MR. ELLISON:

Q I'd like to address my first question to you, Mr. Minor. You were asked whether there was a simple and readily available detector for reactor vessel level and saturated conditions and you replied something to the effect that there was not.

Is it your opinion that developing such a device involves extremely difficult or perhaps insurmountable technological problems, and are you aware of any attempts to develop such a device?

A (Witness Minor) I certainly don't feel it's insurmountable. I understand and I concur that there are difficulties with some of the approaches that have been proposed so far. I don't believe it's beyond the state of the art to put a level indicator in a PWR and to properly compensate it for the pressure and temperature conditions that it would need to experience.

I feel that there are ways that have not been

evaluated that some of them have been brought out in this hearing. So I'd say yes, it's within the state of the art but it has some difficulties associated with it.

Q In presenting that last response, are you relying on any personal experience of development of such devices?

A Well, we at General Electric in the past looked at some different ways of measuring vessel level, water level inside the vessel, and we were looking at some essentially sound techniques, sonic techniques, to determine level, which was a great departure from the techniques we'd used in the past, and there we had problems with Delta p and reference legs and so forth. But that was abandoned because of mainly it was about a wash with the present technique and would take a fair amount of development so we decided not to pursue it.

But it just tells me that there are other alternatives that could be pursued.

Q Mr. Bridenbaugh, Mr. Baxter asked you a number of questions about the basis for your conclusions with respect to operator training, and you replied that in part your conclusions were based upon your knowledge of the training programs of utilities generally. Could you describe your experience with respect to operator training in nuclear power reactors?

A (Witness Bridenbaugh) Yes, I'll try to summarize it quite briefly, but I have had quite a bit of experience in

the training area and while it isn't specifically identified in my testimony, I might go back to immediately after getting out of school I did spend a couple of years in the Army and was trained as an instructor in the ordinance school back in Maryland and spent about two years as an instructor teaching heavy artillery maintenance to officers and enlisted men.

Then, getting back into the field of power plants, I spent about eight years as a startup engineer for GE and I conducted startup, which included operator training on fossile plants for a number of different utilities, but I can recount doing that in Illinois, Indiana, Minnesota, California, Mississippi, Arizona, and Nevada and the Philippine Islands, among others. And then I had about 12 years in nuclear construction operation and maintenance. I worked on the startup of the Dresden-1 plant in Illinois; the Garigliano plant in Italy. I did operator training lectures for the GE training operation in San Jose; I also did some in Spain. I did some videotape lectures for GE's BWR training center in Illinois, and I helped develop a simulator training program for the utility management personnel at GE's training center.

Mr. Minor has suggested maybe I should spell Garigliano.

Q Yesterday, Mr. Baxter gave you a sequence of events, which as I recall was increasing reactor coolant pressure, no feedwater, high pressure injection on, and the EMOV open,

and he asked you whether you would do anything with the reactor coolant pumps. I recall your response was that since reactor coolant pressure was increasing you would not do anything right away with the reactor coolant pumps.

If Mr. Baxter was assuming that the high pressure injector system was on because the safety features low pressure set point had been reached, would that change your answer?

A It would depend on at what point he asked that question in the sequence. If the safety features set point had been reached and that was the reason for the HPI coming on, I assumed at that time that the reactor coolant pumps would have been tripped by the operator. Since he didn't ask about that, I -- My answer is still right, I believe, but it would depend on the circumstances.

Q This morning, Mr. Baxter asked you to refer to page 8 of your testimony where cite uncertainty regarding conflict between procedures and procedures and technical specifications. He referred you to page 56 of Mr. Tipton's deposition, and asked you whether there was anything at that particular page that suggested that procedures at -- well, I'll clarify. Mr. Tipton at that point states that he couldn't carry out procedures simultaneously, and Mr. Baxter then asked you whether there was anything on that particular page that suggested that it was necessary for procedures to be carried out simultaneously.

Do you have any reason to believe that it might be necessary for Rancho Seco's operators to carry out procedures simultaneously?

A Yes, I do.

Q Would you describe what your reasons for believing that are?

A Well, I don't want to limit my response to just one, but I do have a copy of Procedure D.5 which pertains to loss of reactor coolant, reactor coolant system pressure. And an example of the need to, if you will, simultaneously operate from two procedures can be found on page 5 of that procedure where it talks about medium leak, subsequent operator action, and in step .5 of that it says, "Perform natural circulation cooldown in accordance with OPOP B4, Section 6, in conjunction with the remainder of this procedure."

I think it's fairly common that operators are dealing with several procedures at the same time, and this verifies that.

Q Inasmuch as Mr. Baxter asked you whether Mr. Tipton had stated anything that suggested that procedures might be carried out simultaneously, I'd like to direct your attention to another portion of his deposition and ask you if you believe that also supports that conclusion. Referring to page 71 beginning at line 20 and continuing through line 1 of the next page, page 72; and then also, I'd like you to examine

page 76 beginning at line 18 and continuing to page 77 at line 9.

A In looking over those particular cites, there appears to be a misunderstanding or uncertainty in Mr. Tipton as to the difference between what I believe in the deposition is called -- I forget the exact words -- boil and vent or feed and bleed, it's been called a number of different things, natural circulation and reflux boiling. And he changes his mind at several points, and I think on page 72 he was asked: "Would you use reflux boiling in place of the other procedure?" And his answer to that is, "I'm not sure off the top of my head." That's page 72, line 2.

Then, on page 75 and the top of page 76 he's talking about what's more desirable, forced circulation or natural circulation, and then at the top of page 76 he says that it's assumed that he's tripped the reactor coolant pumps. "In that circumstance, would most prefer natural circulation? Is that correct?" "Yes." And so on.

This section of the deposition he has changed his statement on what is the most desirable cooling mode and I think that's illustrative of the problems in dealing with different procedures and not being certain what the most desirable cooling mode is.

Q Mr. Baxter and Mr. Lewis asked you questions about the basis for your statement that operators had -- let me find

the statement. It appears at the bottom of page 10 of your testimony and continues on to page 11. Both Mr. Lewis and Mr. Baxter asked you about the basis for the statement, "It is not clear from the depositions whether the operators accept that commitment as being a requirement as heavy reliance is placed upon written procedures as described."

Have you had an opportunity to refresh your recollection of the depositions, and have you found any examples of statements that would support this?

A Yes, I have. I'm looking at Mr. Morisawa's deposition, for example. There are a couple of points that I would like to refer to. One is found on page -- it starts at the bottom of page 55 and then it goes on on page 56. And the discussion has to do with the procedure by which the shift supervisor briefs the operators of changes in the procedures. And with regard to that, Morisawa says on the top of page 56, "The operations supervisors come in and give us a brief rundown on why the change was made..." And he says then, "...because it's kind of nice to know sometimes why the changes were made."

Then on page -- having to do with the statement about, or the questioning about, committing to memory, on page 66 that's addressed. This is at the bottom of the page in talking about conflicts between the Tech Specs and -- I'm sorry, I'm on the wrong page. Okay, on the conflict on

the Tech Specs and the procedures and so on he says at the bottom of page 66, "A lot of this stuff, man, you just kind of, you read it and there are so damn many changes going on you don't want to memorize all these things. When you get setting down hard, you want to remember those things."

I'm not certain exactly what he's saying there, but it seems to me that there's some confusion in his mind as to whether or not he's required to memorize things.

MR. BAXTER: What was that page reference,again?

THE WITNESS: The bottom of page 66, top of page 67.

BY MR. ELLISON (Resuming):

Q Lastly, Mr. Bridenbaugh, you were asked a number of questions with respect to the statement at the top of page 9 of your testimony, your conclusion, "We find there's no assurance that SMUD operators have an analytical understanding significantly better than that of the TMI operators." You stated that part of that was a general impression that you got from reading the three operator depositions. Have you had an opportunity to refresh your recollection of the depositions and found any examples that would support that statement?

A Yes. I think there are several examples of lack of fundamental understanding, and one was discussed somewhat yesterday, I think it was yesterday, in cross examination of

Mr. Rodriguez and he was talking about a response that Morisawa made to a question that was asked on the temperature that might occur in the tailpipe of the relief valve. And I think Mr. Rodriguez indicated that he wouldn't expect the operator to know, but that particular exchange is found in the Morisawa deposition on pages 18 and 19 in which Morisawa says incorrectly that if temperature in the pressurizer is 590 degrees, he expects that the temperature in the discharge pipe would be very close to it. Of course, that's not correct.

Then there's another example on page 23 of Morisawa's deposition, and there's a discussion going on about what should be done to a valve that's opened under certain circumstances. And the circumstances that were posed to him were that we have a small break; that is, the valve is open, there's no feed to the steam generator, no aux feed, no main feed, and would I go ahead and close the valve -- should he close the valve that was leaking. And he indicates at the top of page 23, line 5, "If the valve is closable, close it." And of course, that's not true in all cases because if he has no other cooling, he may need to be cooling by the feed and bleed method.

Another example, a couple that I pointed out on the response to a question a few minutes ago on Mr. Tipton's apparent confusion between reflux boiling, feed and bleed and

natural circulation on pages 71 and 72, 76 and 77.

MR. ELLISON: That's all I have.

RECROSS EXAMINATION

BY MR. BAXTER:

Q Mr. Minor, you testified in response to Board Examination that in terms of the size of the Rancho Seco control room, it lies somewhere between the ballroom and the cockpit that wasn't built. That's not meant to be a total statement of your answer, but to refresh your recollection of that answer, have you been in a control room of an operating nuclear power plant that's smaller than Rancho Seco's?

A (Witness Minor) I've been in a dual unit plant where one unit of it was at least comparable, perhaps smaller. It's hard to visually compare the two because Rancho Seco being a single unit, it has a different physical appearance. I don't know the exact dimensions. I've been in comparable sized plants.

Q Could you identify for us any comparably sized control rooms you've been in for a single unit plant?

A Well, for a single unit plant I would say if you're going to restrict it to that comparison I don't know the exact dimensions, but the Monticello unit in Minnesota is not too much different in being a BWR. It has additional systems and therefore requires additional panels. But on a

comparison on a system-to-system basis, I would say it would be about equivalent.

Q Did you say it would be larger or smaller?

A About equivalent.

Q You discussed this morning, Mr. Bridenbaugh, an instructor at Rancho Seco who is a Humble Bay transferee. Does he also have a degree in nuclear engineering?

A (Witness Bridenbaugh) I don't remember.

Q Let's turn again to Mr. Tipton's deposition at pages 75 and 76, Mr. Bridenbaugh. I believe you testified just a few minutes ago that in these pages he changed his view about cooling mode he'd prefer.

A Yes, that's right.

Q At the bottom of the page, on page 75, he identifies forced circulation as his preference over natural circulation. At the top of page 76, hasn't the question been changed in that the reactor coolant pumps have been tripped, and then he says that his preferred cooling mode is natural circulation?

A Yes, at lines 6 and 7 he said that with the pumps tripped, he would most prefer natural circulation. Yes.

Q Does that reflect any ambivalence or uncertainty about his preferred cooling mode in those two situations?

A Not there alone, no.

MR. BAXTER: I have nothing further, thank you.

BY MR. LEWIS:

Q Mr. Minor, I'd like to clear up what appears to be, in my mind in any event, a confusion. I had asked you a question and then Mr. Shon asked you a question later on regarding your conclusions regarding human factors engineering on page 19 of your testimony. My recollection is that I had asked you whether or not you felt that Rancho Seco could be safely operated without the addition of these two items of instrumentation and the upgrading of the saturation meter.

I understood you to answer that you could not -- you were not taking the position that the plant would be unsafe without those instrumentation added. Subsequently, Mr. Shon asked you in a somewhat different way, I gather, the same question and I believe what he asked you was, when you said that the absence of these three instruments could contribute to errors in diagnosis and control of upset conditions, did you mean that the plant would thereby be unsafe to operate. And my recollection is that you said yes, that is what you meant.

At least in my mind there's confusion between these two statements. Is it your position that absent the reactor vessel level coolant instrumentation, the more definitive indication of natural circulation and the upgrading to safety grade of the saturation meters, that the Rancho Seco

facility cannot be safely operated?

A (Witness Minor) The distinction in my mind between the two questions would lead me to answer your question the same and probably Mr. Shon's the same. Let me distinguish between them. Your question is can it be safely operated. And my answer to you was that it certainly can under the right circumstances if everything is going normally, and during the transients that they've already experienced. I believe that's the way I answered it.

But I also feel that the lack of these instruments and getting further into that, possible errors in diagnosis of upset conditions, is an unsafe condition that is yet to be proven safe. And that's where I'm making the distinction. You're operating a sensitive plant with less than adequate instrumentation in my mind; you have procedures which, if you have the right operators and everything goes right and they do the right thing, should get you through any prescribed transient, or any design basis transient. But it doesn't mean the plant as a whole is safe. And I'm really talking about the off-normal conditions that you can't predict right now.

Q Are you recommending that the unit be shut down until these instruments are installed?

A That's a difficult call. I'm not in charge of that, thank goodness, that's your decision. I don't want to

make a recommendation on it.

Q I'm asking -- you don't want to make a recommendation, okay.

MR. LEWIS: I have no further questions.

MRS. BAXTER: The Board has no further questions.

MR. ELLISON: I have just one more questions, Mrs. Bowers.

FURTHER REDIRECT EXAMINATION

XXX BY MR. ELLISON:

Q Mr. Baxter a moment ago asked you, Mr. Bridenbaugh, with respect to Mr. Tipton's deposition and the preference of one cooling mode over another, and he referred you to page 75 at the bottom with reference to forced circulation, and page 76 at the top with reference to natural circulation.

My question to you is, was that part of the transcript the basis for your statement, or was it page 76, lines 9 through 11 where the comparison of boiling and venting to other methods is made, and also page 77, lines 14 through 22.

A (Witness Bridenbaugh) The answer to that question is that he obviously had straight in his mind that he prefers forced circulation when that's available to him, and of course, back on page 75 I think he talks about forced circulation is the most desirable mode, and there certainly isn't any question about that.

But I think in the degraded conditions that are

being discussed here on pages 76 and 77, there appears to be confusion in his mind as to what is the most desirable mode of cooling in those degraded conditions. And in my view, he does not adequately demonstrate his understanding of that.

MR. ELLISON: No further questions.

MRS. BOWERS: Any objection to the witness being excused? Hearing none, the witness is excused.

We'll take a short recess.

(A short recess was taken.)

MRS. BOWERS: We will resume. The transcript will show that Mr. Capra has been previously sworn.

Whereupon,

ROBERT A. CAPRA

was recalled to the stand by counsel for NRC Staff and, having been previously duly sworn, was examined and testified further as follows:

MR. LEWIS: I've called to the stand Mr. Robert Capra who has previously offered testimony in this proceeding and been cross examined. The Staff had earlier put into evidence in this proceeding draft NUREG 0667, which is entitled, "Transient Response of Babcock and Wilcox Designed Reactors." That is Staff Exhibit 3.

At that time we had indicated that it was, indeed, a draft and that the final report was expected to be issued shortly, and that we would put that final report into the

record of this proceeding.

I have distributed to the Board and parties last week a copy of the final NUREG 0667 dated May, 1980, and a three-page transmittal letter from Mr. Tedesco who is Chairman of that Task Force to Mr. Denton who is the Director of Nuclear Reactor Regulation, and that's dated May 1, 1980.

DIRECT EXAMINATION

BY MR. LEWIS:

Q Let me ask, Mr. Capra, do you have in front of you the final NUREG 0667 and the transmittal letter?

A Yes, I do.

Q Do these, in fact, comprise together the package and material that was sent from Mr. Tedesco to Mr. Denton on this subject?

A Yes, it is.

Q And could you explain again what your capacity was with respect to this document?

A I basically served as the Project Manager for the Task Force. Mr. Novak in previous testimony characterized it as Editor-in-Chief.

Q Are you familiar with the contents of this document?

A Yes, I am.

Q Was Chapter 7 of this document, which is entitled, "Risk Reduction Potential" prepared by someone other than yourself?

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A Yes, that was prepared by the Probablistic Analysis staff.

Q Were you involved, however, in the preparation of the other portion of this document which is newly added in the final form; namely, Chapter 8 on Generic Implementation Guidelines?

A Yes, I wrote Chapter 8.

Q With the exception of Chapter 7 which was not prepared by you or in which you did not participate, is this document true and correct to the best of your knowledge and belief?

A Yes. I did participate a little bit in Chapter 7, editorializing. I did not write it or provide the conclusions that are presented in there.

Q Do you have any corrections to this document?

A Yes, I do. I take it everybody has a copy of the document. Turn to page 5-38. On Table 5-2 there's a listing of auxiliary feedwater automatic initiation signals. For Rancho Seco you'll see two X's in the block that says "To Main Feedwater Pump Trip." Those should be deleted and add two X's to the very last column, which is "To Main Feedwater Pump Low Delta p."

Essentially, what that change does is it still gives you automatic initiation of auxiliary feedwater on loss of the feed pumps; however, the initiating signal is low

discharge pressure vice the actual control oil pressure or trip of the pumps.

The other corrections, turn to page 8.1-2.

Q Is that Table 8.1, Mr. Capra?

A Yes, that's Table 8.1. Under Recommendation 4, you see an X under "Action Group A." That should be an X under "Action Group B." And on Recommendation 15, there is no X under "Action Group" and there should be one under "B", also.

That's the extent of the corrections.

Recommendation 15, which deals with simulator training, if you look under the "Action Group" there is no X under A, B, C, or D. An X should be under B.

MR. LEWIS: Mrs. Bowers, I'd like to first of all have this identified as Staff Exhibit 4.

(The document referred to was marked Staff Exhibit No. 4 for identification.)

BY MR. LEWIS (Resuming):

Q And I'd like to ask Mr. Capra to summarize the events which took place between the issuance of the draft report and the final report and the ways in which the final report either has additional items or differs from the draft report and the present status of these recommendations.

A Okay. Just a short chronology of what has

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transpired. Some of this I covered before,but now that the final report is out it would be best, I think, if I put it all in one place.

As it states in the document itself, the Task Force was formed on March 12th of this year. On April 2nd, all these dates I'm referring to, of course, are 1980, on April 2nd, the draft report was issued which was presented at the hearing last session.

The day after that report was issued, April 3rd, we met with B&W and the B&W licensees in Bethesda to discuss the report. At that time, the report, if you recall, did not have Section 7 in it at that time. It was a one-page explanation that Section 7 would be provided later.

On April 8th, we met with the Advisory Committee on Reactor Safeguards, the Subcommittee on B&W Reactors. On April 11th, we made a presentation of the results of the report to the full ACRS. On April 21st, we held a Commission briefing. On April 23rd, we once again met with the ACRS, the B&W reactor subcommittee, and at this time we went over Section 7 with them.

The final report was issued on May 1st and forwarded to Mr. Harold Denton by the memo that Mr. Lewis has identified earlier. And on May 2nd, we met once again with the full ACRS committee, and at that time gave them a presentation of the results of Section 7 and Section 8.

We also met, but I don't recall the date, once again with the B&W licensees and B&W to discuss Section 7 and to discuss the recommendations in a little more detail to get some comments from them on the report itself.

MR. BAXTER: Excuse me, Mr. Capra, I might refresh you on something. Is it possible that the meeting with the B&W licensees was on the 23rd, and the meeting with the ACRS subcommittee was on the 29th?

THE WITNESS: Yes, I think that's right. That's why I stopped; because I had missed something here somewhere. I believe that's correct.

The actual changes that have taken place in the report since the April 2nd draft which you've received is the addition of Section 7, which presents an evaluation of the risk reduction potential associated with each of the recommendations. Section 8 has been added, which is the generic implementation guidelines. If you recall, the draft report had in it that the Task Force intended that these recommendations, if adopted in whole or in part, would be incorporated into the TMI action plan.

That did not come to pass. Mr. Denton made the decision to close out the action plan. The action plan would not be a living document to incorporate further items. The purpose of the action plan was mainly to take care of the recommendations in response to the Kemeny Commission and

Rigoven Committee. So in order to forward some type of recommendations to Mr. Denton about what to do with the recommendations rather than just give the recommendations without any schedule with them, we developed Section 8 in which we prioritized the recommendations.

In addition, two of the recommendations were modified. Section 6, which dealt with a selected data set of principal plant parameters, we deleted our recommendation to have one of those parameters, being containment temperature indication. Recommendation 14 was changed. Originally in the draft we had proposed generic guidelines be developed by B&W for loss of non-nuclear instrumentation/ICS.

We have since come to the conclusion that that would be better off handled on a plant-specific basis. The generic guidelines from which the detailed plant procedures would be developed is not necessary.

In addition to that, we have modified several sections of the report for clarify, but nothing of major substance.

If you would like, I could give you a brief synopsis of what Section 7 and Section 8 is all about.

BY MR. LEWIS (Resuming):

Q Please do.

A Okay. Originally, Section 7 was going to be developed to -- at least it was my perception that we would

essentially have the recommendations ranked in some type of order, and we would have some type of quantitative assessment that went along with it, such that the original purpose why Mr. Denton had wanted that section was to see if he could, or see if the Probablistic Analysis staff, could come up with a quantitative assessment of what the risk reduction would be had he implemented any of these recommendations in whole or in part.

It became apparent rather quickly, when the Probablistic Analysis staff took on this assignment, that a quantitative assessment could not be done. It was going to have to be a qualitative assessment based on the consensus and experience of three risk assessment engineers.

The reasons why it cannot be a quantitative assessment are provided in the front of Section 7. Basically in order to do that they would have needed detailed plant-specific knowledge of the likelihood and consequences of many of the competing accident scenarios in the plants, and also the effects -- the detailed effects that the recommendations would have on the various systems.

Now, since some of the recommendations call for studies to determine if there are fixes that can be perpetuated in any of the plant systems, it is impossible to second-guess what those fixes would be, so basically it turns out to be a qualitative assessment.

There are three tables in there that prove fairly useful, I think. Table 7-1 tabulates the influence of Babcock and Wilcox' plant characteristics on the consequences and likelihood of three different classes of accidents. Severe accidents is the first category; accidents is the second, and incidents is the third, and there is a definition provided in Section 7 of what those three accidents are.

Section-- The plant characteristics that we are talking about are things like, what effect does the short steam generator dry out time have on either a severe accident, the likelihood of a severe accident, accident, or incident. Another example would be the capability of all

but one of the B&W plants to feed and bleed. That is assessed against all three of those accidents also.

Table 7-2 tabulates the effect of each of the 22 recommendations on the frequency and consequences of seven different events, and those events are loss of feedwater, ICS faults, loss of off-site power, small break loss of coolant accident, station blackout, anticipated transient without scram, and steam generator overfill.

Table 7-3 is a tabulation of the effect of the individual 22 recommendations on the likelihood and consequences of, again, those three classes of accidents, severe accidents, accidents, and incidents. It is Table 7-3 which the task force used in providing input to our prioritization of the recommendations in our Section 8.

Section 8 is a fairly short chapter, but as I said, it presents the task force's view on how we would now foresee these recommendations being implemented. As a result of Section 7, we have not withdrawn any of the recommendations, such that we still feel they are all useful.

We believe that these recommendations need to be implemented on a plant specific basis, and that should be done by the Division of Licensing, in coordination with the Division of Safety Technology. The Division of Licensing under the reorganization is the old Division -- would

really incorporate the Division of Operating Reactors.

I feel that the implementation of the recommendations should really take into account four things. Hopefully it will take into account our generic guidelines proposed in Section 8. It should also take into account the associated items in the TMI 2 action plan. I think that is especially critical, seeing how these items will not be incorporated into the action plan; they cannot be implemented apart from the action plan. There are too many items that are closely tied with individual action items in the action plan itself.

That is why Table 8-1 shows the associated item along the side from either the action plan or the other related requirements that are ongoing.

Also, implementation should take into account plant-specific design, and also it should take into account alternative solutions which are proposed by the licensees. That came out at a meeting that we had with the licensee, and I think that is important. We tried not to be over-prescriptive in the recommendations, but where we have been rather straight and to the point, that does not mean that the staff in implementing these should not accept reasonable alternatives. There certainly may be better ways than the task force has designated to actually accomplish the same goal.

What the generic implementation guidelines are is, we prioritized them into Priority Group 1 or Priority Group 2. Priority Group 1, we feel those items should be scheduled and implementation begun as soon as possible, realizing that this will impact both staff, licensee, and industry priority and resources. However, we feel that they are important enough that they should be factored in and done as soon as possible.

Items that fall into Category 2 are items that should be scheduled and implemented. However, they should be fit into existing staff and licensee resources and priorities.

The priority groups -- I am sorry, not the priority groups. The action groups, there are four classifications. There is A, B, C, and D. Items in Action Group A are ones that are closely coupled with existing requirements that are in the action plan now. That is why all those Action Group A items have reference to the present version of the TMI action plan associated with them.

Items B, C, and D are items which are not associated with presently existing requirements in the action plan. However, they do require different lead organizations to perform them. For instance, Action Group B is one that would require licensee and industry action to take the lead. C would be NRC staff action, and D would be requiring joint

effort by both the staff and licensees.

I forgot to mention the things that when we prioritized these into either Priority 1 or 2, we basically took three things into account. We did take into account the probabilistic analysis staff's evaluation of the effectiveness of the recommendations, and we took into account the decision and priority group assignments of associated recommendations in the action plan themselves if they had one, and also comments received since the issuance of the draft report from B&W, the licensees, NSAC, ACRS, B&W, Reactor Subcommittee, and the full Subcommittee.

Out of the 22 recommendations, they break down into 10 Priority 1 items and 12 Priority 2 items, for a total of 22 recommendations. There are 11 of those 22 recommendations which are closely tied with items in the action plan. The rest, the other, remaining 11 are not tied with any existing requirements in the action plan. Eight of these would require licensee action. One would require NRC staff action. And two would require joint effort to implement the recommendation.

As of yesterday, Mr. Denton has not taken a position on the recommendations of the task force. I believe that he may be waiting for the ACRS letter, which should be coming out probably next -- at their next meeting. which I guess is the beginning of June.

Originally when we met with the ACRS, they had a draft letter ready to forward to Mr. Denton. Of course, I was not able to see what the draft said. There must have been some problem that came up after our presentation that required further deliberation or discussion such that they were not able to accomplish it at their executive session on Saturday, the day after we presented the -- we made the presentation to the ACRS.

That is essentially where we stand now. This is not a staff position. It is still a task force document. The task force has been dissolved.

MR.LEWIS: And they left you here to defend it. As task forces have a way of doing.

Well, I would like to move the admission of Staff Exhibit 4 into the record of the proceeding. It will be marked as an exhibit.

MRS. BOWERS: Any objection?

MR. BAXTER: No objection.
MR. ELLISON: No objection.

MRS. BOWERS: Staff Exhibit Number 4, which was just identified, is admitted into evidence.

(The document referred to, heretofore marked for identification as Staff Exhibit Number 4, was then received in evidence.)

MR. LEWIS: Mr. Capra is available for questioning

MRS. BOWERS: Mr. Baxter?

CROSS EXAMINATION

BY MR. BAXTER:

Q Mr. Capra, most of my questions have been answered by your opening statement this morning, so if there are pauses here, I am marking them off.

You described this morning the major changes that have been made to the draft document you were provided last month.

A Yes, sir, I did.

Q Do these changes reflect the task force response to comments from other members of the staff, the ACRS, B&W, and the operating licensees?

A Yes.

Q Has the Sacramento Municipal Utility District been given any direction from the NRC with respect to the conclusions reached or the recommendations contained in the report?

A No, we asked at that last meeting -- I can't remember the date of it. Did you say it was the 29th?

Q 23rd.

A 23rd? With the B&W licensees, we had asked that the B&W licensees forward comments to us in writing on the report itself, on the recommendations. I have seen, although I don't have a copy with me, SMUD's response, which

was a fairly short letter. It was not a detailed letter commenting on any of the recommendations as I had thought they would all be from the licensees. It was a very short letter, as I said, which mainly stated that they believed that they should be implementation, if implementation was going to be done, that it should be done on a plant-specific basis, and they should have an input to the scheduling, and that they should be done as the task force had recommended, closely coupled with the action items being done in the action plan.

Q I take it from your testimony that since Mr. Denton has not taken a position on the task force, the Commission, or the ACRS in writing, the District has not been directed or ordered to implement any of the recommendations. Is that correct?

A That is correct.

Q You testified that Mr. Dencon would have preferred that the probabilistic assessment group do quantitative measure, but it quickly became apparent when they got involved in the task that they couldn't. Why do you think that he would have preferred to have a quantitative probabilistic safety analysis?

A I think being an engineer anyone would rather have hard numbers if the numbers were legitimate rather than somebody's judgment.

Q Was time a factor in the probabilistic analysis, the staff's inability to perform such an analysis?

A Well, I would say that time had something to do with it. However, the actual accomplishment of the -- of doing doing a quantitative assessment, as I said, it is very difficult to do that unless you know what the before fixes -- or what the system configurations are at each plant-specific unit as they are now, and then what the -- what the net effect of the recommendations when implemented would have.

So, it is not possible to do that.

Q To your knowledge, did that probabilistic analysis staff have the benefit of any risk assessment work that has been done on Crystal River?

A Their experience in performing the Crystal River IREP study I am sure was used as a factor in their assessment of Chapter 7, presented in Chapter 7, as experience gained in doing all of the risk assessment work they have been involved with lately.

There is a separate section, as you know, prepared in the report on IREP itself which is Section 6 of the report, which gives you a status report of it. The people that are doing the Crystal River IREP are the same people who prepared Section 7 of the report.

Q Where does the IREP effort stand at this point?

Do you know?

A The -- The draft report should be available at the end of this month. When I say available, I am not sure if that means internally or externally. I am not sure. But at least the initial report should be out at the end of the month.

Q In applying its engineering judgment, to your knowledge, how did the probabilistic analysis staff consider the specifics of Rancho Seco plant design?

A Plant specific inputs were not used. It was a generic assessment, with the exception of one recommendation, which-- Recommendation 3, which deals specifically with Davis Besse.

Q Is the table provided in Chapter 8 for Categories A, B, C, and D there the only comparison that the task force has made of its 22 recommendations with other improvements that are being undertaken for B&W plants?

A No.

Recommendations 1, 2, and 3 all have to do with some manner or modifications to the auxiliary feedwater system. Each of the B&W licensees has done an auxiliary feedwater system reliability study, including Rancho Seco. That was discussed at one of our -- in previous NRC testimony in this proceeding.

The reliability study itself, the complete --

the staff completion of all of the B&W licensees' reliability studies and the development of requirements to be issued to licensees is in the action plan itself. It is closely related to Items 1 and 2.

So, in order to implement Recommendations 1 and 2, you need to go really to the action plan under II-E(1.1) and II-E(1.2), and tie the two together. There are other recommendations which are listed on the table 8-1 which shows other closely associated documents other than the action plan.

For instance, BAW 1564, that is the ICS reliability analysis, also discussed in this hearing previously. THe NSAC 3/INFO 1 report, that is the Crystal River evaluation by those two groups, and I&E Bulletin 7927, which was the bulletin issued as a result of the November 10th Oconee ICS incident -- correction, loss of non-nuclear instrumentation incident.

Q I guess my question is, while you identified here items, and there is a helpful cross-listing of this task force's recommendations of items in the action plan, the heading of that one column is Similar Requirements Which Should be Considered.

My question is, the task force didn't attempt, did it, to integrate any of these recommendations either in terms of scope or changes or schedule with items in the

action plan, TMI 2 action plan?

A No, but that needs to be done. That is why we just gave them a priority and assigned them to an action group. We did not make an attempt to give any type of plant specific or detailed implementation schedule by dates, because that work has to be done before any of the recommendations could be implemented.

Q Could it be that whoever undertakes that integration task will find that some of the 22 recommendations may be contradictory or unnecessary in view of other requirements either in the action plan or elsewhere within the NRC that are being imposed on the B&W licensees?

A I don't think they are going to find-- I am familiar with all of the requirements which have been imposed on the B&W plants that are related to any of these from other work on the bulletins and orders task force and -- so I know that there aren't any that are in conflict. Now, what you will find is that some of the work has already begun in some -- under some of these recommendation areas on some of the plants already. Some of the work may actually have been complete, at least in the various licensees' estimates, but I don't think you are going to find any that are in conflict.

Q You mentioned the auxiliary feedwater reliability study. In preparing Section 7 of Staff Exhibit 4, did the

probabilistic analysis staff make any quantitative use of the results of that auxiliary feedwater reliability study?

A As I told you, Section 7 is not a quantitative assessment. However, the probabilistic analysis staff or the individual -- are the same individuals involved also reviewed the AFW reliability study prior to the development of Section 7.

Q So they considered it in a qualitative way as part of their judgment?

end SB 3

SB 4 foll

A Yes.

Q Did that staff compile and study any detailed data comparing the relative frequency and severity of the transients at B&W facilities with those at other PWR plants? Or is it your impression that they relied more on their feelings or judgment about those comparative frequencies and severities?

A No, there is very limited data comparing one vendor to the next. We have quite a bit of information and statistics on B&W plants, as you can probably well recognize. But a comparison to GE and Westinghouse PWR's for various classes of incidents, there's not a wealth of information on that subject, no.

Q Is it fair to say that in the final analysis, the use which the Task Force made of the Probablistic Assessment Staff's efforts is the final ranking you made between Priority 1 and Priority 2 in Chapter 8?

A Yes. Now, it may be considered farther or in additional ways other than for use by the Task Force. In other words, if Mr. Denton takes the position that he would like these recommendations implemented, or maybe he would have a specific threshold above which he would want them implemented and below which, if they're considered to be of low risk reduction potential maybe he will perform some type of cost-benefit analysis or exercise some use of his

judgment and come to the conclusion that maybe they aren't warranted.

Q Let's look for a second in Chapter 7, Table 7.3, so I cannot understand what's being depicted there. The table starts on page 7-20. Does the epsilon in the table mean insignificant?

A Yes. Well, negligible.

MR. SHON: I think those things are set forth at pages 7-23 and 7-24.

MR. BAXTER: Thank you.

BY MR. BAXTER (Resuming):

Q Looking, for instance, then at Item 12, Instrumentation and Control Technicians, it's ranked by this staff as having a potential benefit for severe accidents as large, and accidents and incidents as medium; potential detriment, insignificant for severe accidents, and large for accidents and incidents. How does the Task Force --

A No. That's low, medium and high. L is low.

Q Oh. Strike that question.

(General laughter.)

Given that ranking made by the Probablistic Assessment group, why did the Task Force decide to keep that recommendation at all?

A I think we found out that work may have already been done. In the meeting that we had with the B&W licensees

on the 23rd GPU represented to us that they had performed an analysis of this type and they did not see any benefit to moving the injection point into the normal main feedwater injection -- through the main feedwater injection nozzles. However, we would like to see the assessment ourselves. We don't know if it was an assessment performed by the Babcock and Wilcox or by GPU engineering staff themselves. We still feel that it may have some potential benefit. Admittedly, it's not very high priority item right now.

Q I'm trying to understand the difference in the potential schedule implications of Priority 1 and Priority 2 items. It says that Priority 2 items are those recommendations which the Task Force believes should be scheduled and implemented within the framework of present priorities and resources. But Priority 1 are those which should be scheduled and begun as soon as possible and it may involve the rescheduling of staff and licensee industry priorities and resources.

That means that Priority 2 items should be done but nothing else should be delayed for them, but Priority 1 items, things should be rearranged to accommodate them so they can be done promptly?

A Yes.

Q How would you expect that sorting out process is going to be undertaken by the agency on Priority 1 items?

A As I said, I would imagine that it would have to

be done in a coordinated effort between the Division of Licensing and the Division of Safety Technology. The Division of Safety Technology is a new division under Roger Matson, who is the Editor-in-Chief of the TMI action plan. His new group, the Division of Safety Technolgoy, was developed in order to provide a central focusing area for the implementation of new requirements -- plants under construction, operating plants or plants being constructed at the present time. So that's the function of his division.

However, the actual detailed implementation -- scheduling, meeting with the licensees -- would have to be done through the normal channels, which is the Division of Licensing. It's going to have to be sorted out on a plant-specific basis.

MRS. BOWERS: Mr. Baxter, do you have many more questions?

MR. BAXTER: Notice I didn't say on the record.

(Laughter.)

BY MR. BAXTER (Resuming):

Q Lastly, I'd like to read a couple of statements to you, Mr. Capra, and get your reaction and assessment of them. Mr. Lewis distributed to the parties at the beginning of last week -- and I didn't make extra copies today but I'll share this with anyone after I've finished reading it. A memorandum from Edward J. Hanrahan to the five Commissioners

dated April 24, 1980, entitled, "OPE Evaluation of the Impact of Post-TMI 2 NRC Requirements on B&W Reactors in the Crystal River Transient." OPE, as I understand it, is the Office of Policy Evaluation.

And on the first page of that memorandum, it stated that, "We prepared a comprehensive list of post-TMI 2 NRC requirements, the status of implementation requirements at Crystal River and a brief statement of our assessment of the impact of each requirement. The OPE staff encountered difficulty in compiling this comprehensive list of requirements since no single individual or organization knew all that had been required of B&W reactor licensees. Several independent groups were responsible for analysis and development of new NRC requirements."

And later at page 9 under a caption entitled, "Need for a Systems Approach" the OPE memo states that "Since the TMI 2 accident, many individual requirements have been placed on licensees without the benefit of an integrated systems analysis. Each new requirement appears beneficial by itself, but no systems analysis of the totality of the requirements has been made."

Do you feel that these criticisms might be addressed to the recommendations in the Task Force report as well, or be applicable?

A If they were implemented in a shotgun, haphazard

manner, yes. But I don't think that that's the case. You're talking about these recommendations from this Task Force?

Q Yes.

A That's why we steered away from detailed implementation.

Q So you feel that in the implementation phase you have to be undertaking,any detail that integrated systems analysis can be considered?

A Yes.

MR. BAXTER: I have no other questions.

MRS. BOWERS: We thought we would probably conclude with Mr. Capra before 12:00 o'clock and it hasn't worked out that way. We don't want to hamper your questioning but it might be that we could stop now and resume Monday.

MR. ELLISON: I have several questions. I expect it would probably take maybe as much as an hour, but I don't have hours and hours. We could go forward and finish with Mr. Capra today, if you wish. On the other hand, at this point in the proceeding I am becoming quite confident that we could finish the proceeding next week if we were to quit now. So I'll leave it to your discretion.

MR. LEWIS: I'm really not equally confident. In fact, if you wanted, I would suggest that we take a short lunch recess or go on, but I would suggest we try and finish with Mr. Capra today, because there are -- the list of staff

witnesses for next week -- there are panels involving quite a few people and it's been my estimate that potentially they could be on the stand for a fairly long time. So I'd like to get this subject behind us.

(Pause.)

MRS. BOWERS: I have to go with the Board member who wants more opportunity to review and consider this document and that would be possible over the weekend. So what we'd like to do is adjourn now and take this up first thing Monday morning. We do think this is a very important document and we don't want anybody to be hurried along with questions just because it's Saturday afternoon.

MR. BAXTER: I have one closing matter. Mr. Lewis, would you be able to identify the order of presentation of the next group of witnesses, please?

MR. LEWIS: Yes. Mr. Wilson who is sponsoring three pieces of testimony I believe. Generally speaking, to be characterized as the whole operator qualifications training area.

Followed by the witnesses from Region V of the Office of Inspection and Enforcement who will be appearing in conjunction with Mr. Allenspach from Bethesda.

Now, there is one member of that panel who does have some scheduling conflicts and that is Mr. Morrel, who is on a somewhat segregated issue; namely, unlicensed operator

training. So depending upon his particular schedule, we may ask that he go on independently and we take the full round on his subject, and perhaps get him excused and then proceed with a panel, Mr. Cantor, Mr. Johnson, Mr. Zwetzig and Mr. Allenspach on the management competence issue. That would then be followed by Mr. Gagliardo and Mr. Hinckley, who are representing the Performance Appraisal Branch. I believe that would be the order.

MR. BAXTER: Thank you.

MRS. BOWERS: We'll adjourn, then, until 9:00 o'clock Monday morning.

(Thereupon, at 12:30 p.m. the hearing in the above-entitled matter recessed, to reconvene at 9:00 a.m. on Monday, May 12, 1980.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: SACRAMENTO MUNICIPAL UTILITY DISTRICT (RANCHO SECO)

Date of Proceeding: May 10, 1980

Docket Number: 50-312

Place of Proceeding: Sacramento,,California

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

David S. Parker

Official Reporter (Typed)

Official Reporter (Signature)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: **SACRAMENTO MUNICIPAL UTILITY DISTRICT(Rancho SECO)**

Date of Proceeding: **May 10, 1980**

Docket Number: **50-312**

Place of Proceeding: **Sacramento, California**

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Suzanne Babineau

Official Reporter (Typed)

Suzanne Babineau

Official Reporter (Signature)