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acrst-1444

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

ACRS GESSAR II Subcommittee Meeting

Docket No.

Location: Washington, D. C.
Date: Wednesady, September 11, 1985

Pages: 1 - 294

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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ACRS GESSAR II SUBCOMMITTEE MEETING

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Room 1167

1717 H Street, Northwest

Washington, D.C.

Wednesday, September 11, 1985

The ACRS GESSAR II Subcommittee met, pursuant to notice at 8:35 o'clock, a.m., David Okrent, chairman of the subcommittee, presiding.

APPEARANCES:

DAVID OKRENT, Chairman of the Subcommittee

Member, ACRS

CHARLES J. WYLIE

Member ACRS

CARLYLE MICHELSON

Member, ACRS

JESSE C. EBERSOLE

Member ACRS

RICHARD K. MAJOR

ACRS Staff member

PRESENTERS:

D. SCALETTI

P R O C E E D I N G S

MR. OKRENT: The meeting will come to order.

This is a meeting of the ACRS Subcommittee on GESSAR. I am David Okrent, Chairman of the Subcommittee. Other ACRS members here today are Jesse Ebersole, Mr. Wylie, Mr. Michelson, and Mr. Marks may be here later.

The purpose of this meeting is to continue the sub-committee's review of GESSAR II for final design approval applicable to future plants, selected topics from SSER Number Four, as well as other outstanding ACRS key items will be discussed.

The meeting will be open to the public as far as possible. Where portions of the meeting would be closed to discuss proprietary information relating to the GESSAR probabilistic risk assessment, and plant security.

Richard Major is the assigned ACRS staff member for this meeting.

A transcript of the meeting is being kept, and it is requested that each speaker first identify himself or herself and speak with sufficient clarity and volume so that he or she can be readily heard.

We have received no written statements from members of the public, and we have received no requests for time to make oral statements from members of the public.

Are there any comments that members of the

subcommittee would like to make about the proposed agenda, or any other points that they wish to make at this time?

MR. MICHELSON: I have just a small comment for Richard

What I had asked Richard to check on was a clarification of the request that was made at Sandia concerning exactly what is an FDA, what documents does it cover, where are these documents identified, which one of those documents has been reviewed by the staff. I assume that this will come sometime during the day.

MR. MAJOR: It will be clarified.

MR. MICHELSON: I don't think that it will take long, but I think it is something that needs to be cleared up because it was explicitly stated at that time.

MR. OKRENT: I made up a list of questions and that is number one on my list.

MR. MICHELSON: You have it on your list already, good. Maybe we will get a good clarification.

MR. OKRENT: Any other comments at this time?

If not, why don't we start with this rather extensive agenda. I think that it is important that we stay on schedule because, in fact, there is another subcommittee to which I have to go at a certain time, and some members may be going earlier, I don't know. There is to be a late afternoon, early evening, or late evening meeting as the case may be.

In any event, let's start with the Item Two, an update by the NRC staff, who will tell us what an FDA is for GESSAR.

MR. SCALETTI: My name is Dino Scaletti. I am the Project Manager for GESSAR II. I have other members of the staff on hand, and members of Brookhaven National Laboratory to assist us in our meeting with the committee.

Prior to starting with Topic Two, I would like to bring up that on September 6, Mr. Denton, the Office Director of NRR, wrote to Mr. Fraley and provided some responses to some of the questions on the agenda that was given to us a couple of weeks ago that had identified prior responses requested.

In that memorandum, the topics that have been addressed, some topics were addressed from the standpoint that the staff is not in a position to address the issues related to safety goals. I believe that this directly impacts two or three of the agenda items.

As to questions in there that have implications or direct reference to safety goals that we thought were directly applicable to GESSAR II, that we could answer, we have provided responses.

The staff doesn't plan to amplify on those responses today. We have people here who can respond if the subcommittee needs clarification of these responses, and I will request, if

you do have questions when the topic comes up, please ask us and we will try to respond.

There are some questions that were not addressed in the September 6 memorandum that we will endeavor to discuss today.

In relation to Topic Number Two, update by NRC staff of the current status of the GESSAR II FDA, as you are aware, on August 8, 1985, the Commission approved its policy relating to severe reaction accidents. Section B.3.b of that policy recognizes that GESSAR, and also the CESSAR FDA as being suitable in CP or OL applications with the provision that either the information needed to satisfy the severe accident concerns addressed in Section B.2 which all four concerns related to meeting the existing regulations, meeting the CP and OL rules, provide a PRA, and resolve the USI, and the high and medium priority GSIs, or provide suitable interface requirements to ensure the CP or OL applications satisfy the severe accident concerns.

GESSAR from General Electric, and the GESSAR application provided the information required by Section B.2, which is the severe accident concerns that we are currently reviewing. On August 9, 1985, the staff issued Addendum 1 to GESSAR II. This amendment allows the GESSAR design to be referenced in new CP applications. It removes the constraints that were previously in there that said that it should only be

referenced by those applications that referenced the PRA at the construction permit stage.

The FDA allows the design to be referenced in new applications. However, there is a condition in the FDA that says that the staff cannot issue a CP or OL on an application that references the GESSAR II design until it has completed the severe accident review.

In fact, the FDA Amendment 1, the effective date and the expiration date are tied to the severe accident review, and it is effective August 9, when it was issued. It will be amended upon completion of the severe accident review.

With regard to future activities, the staff is pursuing a letter from the ACRS with respect to recommendations with regard to the application. Following receipt of that letter, the staff will issue Supplement No. 5 which addresses the committee's concerns, and present its final conclusions with regard to the review, and it will amend FDA One with Amendment No. 2 to reflect the outcome of that review.

MR. OKRENT: What does it mean for the FDA to be in its current state. I am not quite sure I understand.

MR. SCALETTI: When the CESSAR FDA was issued in 1983, the conditions in the FDA limited that design to be referenced by applications to OL applications that had previously referenced TDA at the construction permit stage. This limited the FDA, limited the design as far as its

referenceability goes.

Upon completion of the severe accident policy statement, as I had indicated, the Commission now feels that these designs can be referenced. If you read the section with regard to future FDAs, you will see in there also that these designs can be referenced. Referencing the design does not grant you an approval for a construction permit. It is just a means of completing the application.

However, the constraints of the CESSAR and GESSAR FDAs were such that you could not do it.

MR. OKRENT: So if I were a utility owner who chose to purchase a plant using GESSAR FDA today, I could reference it, but there would be a but, and the but is what?

MR. SCALETTI: The but is pending the outcome of the severe accident review, whatever that may be, approval of the staff review, and approval that will allow us to say, okay, the staff feels that this documentation is good enough to issue a construction permit, either that or to the point of the other extreme and say that the design is not suitable for referencing in future plants. Those two extremes.

Your application would be totally dependent on the outcome of the staff review of the severe accident and the ACRS review.

MR. OKRENT: What documents are considered to be part of the GESSAR for FDA review?

MR. SCALETTI: Right now, the GESSAR II, through Amendment 16, I believe, and SER 1 and Supplement 1, are the documents that are applicable to FDA 1, Amendment 1. All of the severe accident information that has come in and the subsequent publication of Supplements 2, 3, 4 and Supplement 5, future Supplement 5, will be applicable to FDA Amendment 2 as it is so issued.

GE has before them the task of amending GESSAR II to include all of the severe accident information that has been provided to the staff. This, I assume, will be done relatively shortly. I don't know what time or what date, but I would assume that this would be done prior to the staff issuing a design approval, or another amendment to the design approval.

FDA 1 covers only information that has been reviewed by the ACRS up to the July 1983 FDA.

MR. EBERSOLE: So the FDA comes in parts.

MR. SCALETTI: This is the numbering system that has been used to correspond to a number on the license. CESSAR has FDA 2.

MR. EBERSOLE: Let me ask you something. I went through an exercise. I took the latest version of the FSAR, and waded through about a dozen or so of the volumes to see what was in it, in the context of firmness or looseness of the language, ambiguities, and so forth. I find that it has to be done over again. It is ambiguous, it is permissive. I

can build almost anything in the language of the FSAR as it is written now. It is the same old garbage that we have had for the last 15 years that permits you to interpret all over the place.

I have not been able, and I will never be able to go through the drawings that more sharply define the design, but I certainly find that the FSAR is no document of any particular guidance to get what we all want, which is a defined design in hard physical configuration.

MR. OKRENT: Does the staff agree with Mr. Ebersole.

MR. ROSENTHAL: I am Jeff Rosenthal, and I am in the Reactor Systems Branch, and I used to serve in the Control Systems Branch. Let me address the instrumentation control panel.

In Chapter 1, 1.7 or 1.8 of the FSAR, there is a reference that goes on to many pages to electrical drawings. Those drawings were done by GE's contractor. When the staff did the review, we pulled real drawings and looked at what the electrical drawings would be. You would do the same thing with DIG drawings, et cetera.

They are not in the SAR itself, but they are there by reference, and that in my mind is what constitutes the hard design. I think that the design is really far firmer via the referencing of those drawings which are in structural and mechanical areas than would be implied from the SAR itself.

It is no mean undertaking to wade through what constitutes real file drawers of stuff, but by reference, it is there.

MR. EBERSOLE: Then the drawings should be examined and the narrative to support, which is always an integral part of the whole picture, should be updated to say what the drawings say in more definitive terms. I am just telling you that the language is ambiguous in the FSAR everywhere, whether by intent, to give flexibility to somebody like a utility, or some lousy contractor, I don't know, but it is just so loose that you can do anything.

MR. SCALETTI: That may be true in part. I do agree with Jack, much of the design is complete for GESSAR, however, this may not be true in another application coming along. I just stay with GESSAR, and I do believe that the FSAR is only one part of the application.

MR. EBERSOLE: Let me explain something. To me a design is complete when I have a drawing or a set of drawings which is a hardline definition of what is going to be which is inevitably supported by a narrative which is iteratively produced until they match. The two as a package are the final design. I don't find that the narrative supports the drawings. The drawings are really quite definitive, and the language is just ferociously ambiguous.

MR. MICHELSON: I would like to reply a little bit.

You said that you reviewed certain of the final design drawings.

MR. ROSENTHAL: Yes.

MR. MICHELSON: There are revisions of those drawings because these are constantly revised, and will probably be constantly revised for years to come. That is just the way the world is.

In terms of your FDA, then, which drawings, and is it identified which drawings you have reviewed and, therefore, if further revisions come out, those revisions will have to be reviewed because you may totally change the design with the revision. A revision of a design can be a whole new design.

MR. SCALETTI: All of the information that is provided to the staff is in the files. It is kept in the central file system. It is kept as part of the FSAR. It is in the SSER.

MR. MICHELSON: All of the drawings are identified by revision?

MR. SCALETTI: The FDA will identify up to what revision of the FSAR that is covered.

MR. MICHELSON: Will the FSAR, when you refer to a drawing in the FSAR, will it be referenced by revision so that it is the revision that is covered by the FDA.

MR. SCALETTI: Absolutely. All drawings that come in are referenced by revision number.

MR. OKRENT: For GESSAR.

MR. SCALETTI: In GESSAR, all the drawings, all the revisions to that, are identified by an amendment number. This amendment number, at the end of the staff's review, the FDA will be issued that will identify, as it does now, that it covers GESSAR amendments through 16. It will then identify and cover amendments through 21, which we are expecting the amendments on GESSAR to cover severe accident information.

MR. MICHELSON: Those amendments, you say, within the FSAR, you say that you are going to identify each drawing you reviewed, and which revisions of that drawing, so that you know what was the scope of your review and approval. You have not yet told me the revision number on the drawing is going to be identified in the SAR, but there is a limit on how far this FDA goes.

You understand my problem. My problem is that if you look at revision four, and now they are working on 14, it is a whole new design.

MR. SCALETTI: All revisions to the FSAR have to be reviewed. I am saying, if a new drawing -- If GE does something on the site, changes drawing numbers, revises drawings that have not been given to the staff, that is not part of the application.

MR. MICHELSON: It is the same drawing number, but it is revision five instead of revision four. Revision four is

the one you looked at and approved when you did your job.

MR. SCALETTI: All of the drawings we have reviewed are in our files.

MR. MICHELSON: Are they identified somewhere so I know what you have reviewed?

MR. ROSENTHAL: On a break, we will run downstairs and look at GESSAR. I don't remember, but it is either Section 1.7 or 1.8, there is a list of drawings with draft numbers that may be in there.

MR. MICHELSON: I have looked, and sometimes, yes, and sometimes, no.

MR. ROSENTHAL: Let me say what we did on CESSAR and Palo Verde, which I think has some bearing. We would run up to Windsor for CESSAR and run out to Phoenix on Palo Verde. We had a real applicant on our hands, so it is easier to work out the problems. We required that Palo Verde identify every single change, point by point, to the standard, and document and review every single deviation.

MR. MICHELSON: We can cover this real simply.

MR. ROSENTHAL: We had a scheme.

MR. MICHELSON: We can cover this really simply. Does the staff commit to identify, in the FSAR or in the SER, I don't care which, what was the limit of their review, and therefore the limit of the FDA.

MR. SCALETTI: Yes, everything that we have reviewed

is in our docket files.

MR. MICHELSON: Then one further clarification. When I say, identify, I mean the revision that you looked at because I can keep changing drawings and have the same drawing number, so giving me a drawing number doesn't help.

MR. SCALETTI: Everything that we have reviewed is in our docket files. Everything that we review has to be part of the GESSAR application.

MR. MICHELSON: You have given me that answer already. I want to know, are you going to identify in the FSAR or in the SER?

MR. SCALETTI: I told you, the FDA and SER identify the amendment numbers. It does not specifically say, we reviewed such and such a drawing, which is in Revision 3. All the drawings we have, which we have reviewed, are supposed to be in our files, and all those drawings are on aperture cards. Those drawings should identify the revision number, and also the amendment number, along with those stacks of drawings should be identification of what amendment that is to GESSAR II.

MR. MICHELSON: Do you intend to take that stack of microfiche, or whatever, and give me a listing? If any member of the public walks in and asks: What is the scope of your FDA, what are the limits on it? Can you tell them that, or do you have to pour through drawings?

GE keeps sending new stuff in. How can you tell if you have reviewed it or not? Is there some kind of an accounting of all this business?

MR. EBERSOLE: It seems to me you have to go through what is done in a design organization. You have to annotate a drawing by a number and date, and routinely keep it up. If you don't look at a drawings, the records show that you don't. You don't look at everything because you can't, but you look at something, and I need to know what you looked at and what you didn't look at.

MR. OKRENT: How are we going to come to a resolution of this question?

MR. SCALETTI: I guess, all I can tell you is that for GESSAR, I will go through it again, everything that comes to us is identified by an amendment to GESSAR.

MR. OKRENT: That comes to you.

MR. SCALETTI: If it is part of the application. If it is not part of the application, then you can assume that we haven't reviewed it.

MR. EBERSOLE: Even if it came to you, you may not have reviewed because there is no annotating process.

MR. SCALETTI: We don't review everything.

MR. EBERSOLE: All I want to know is what you do.

MR. SCALETTI: The GESSAR design is much more voluminous than the 26 volumes of FSAR. There is a carload.

MR. MICHELSON: We are simply trying to understand your accounting system, if any. You say that you have an accounting system, tell me what it is, and we will tell you whether we think that it has bones.

MR. OKRENT: I am going to ask the staff, after lunch, to tell us if they have any other way of stating what they have just said, because it seems that to some committee members, it is not clear that it is a definitive accounting system. Let come back to this right after lunch, and remind me, and see if you have something other than that.

MR. WYLIE: Mr. Chairman, may I also inject something.

MR. OKRENT: Yes.

MR. WYLIE: This should be expanded to include the interfacing documentation also, the specifications.

MR. SCALETTI: The interfacing documentation is identified in the FSAR.

MR. WYLIE: All of it?

MR. SCALETTI: And in the SERs.

MR. WYLIE: Including the specs?

MR. SCALETTI: They are to be dug out of the FSAR.

MR. WYLIE: I am not sure that it is in there.

MR. EBERSOLE: I have one small thing before we branch off.

I just want to take a shot in the dark here on this

number down here. As a case in point, I go through the FSAR, and I think that it is up to date. I find that the ADS system is contingent upon having a "brick and cooling cell" system for containment pressure, and I get rid of that. Then I come to River Bend this afternoon, and it has been gotten rid of. Why do I find that language in the FSAR, when I presume that it has been taken out, and it should always have been taken out?

MR. OKRENT: Jesse, I will ask that we pick up that question later.

MR. EBERSOLE: This is one of dozens.

MR. OKRENT: There is an Item 9 which relates to performance criteria deriving from PRA, and at that time, I would like to hear from the staff, once again, or maybe for the first time, not by being told, here is a long list of references to SERs or GESSAR amendments, just what the quantitative performance requirements and base requirements are, if any.

I don't want to be told where to go and where to look. I want to know, are there any and what are they. If you can't tell me today that there are some, I will assume that there are none. Don't tell me to go and look, that is what I am saying.

We had better move along. We are on Agenda Item 3. I would like the staff, if they would, to reiterate their

reply, if they think they have replied to the question. The first question is, did the staff use mean values, or has the staff given us some values?

MR. RUBIN: My name is Mark Rubin.

Essentially, what you have provided in the SER are mean or partial mean values.

MR. OKRENT: Excuse me. I would like you to define your terms. When you use the term "mean," define it for me. When you use the term "partial mean," define it for me.

MR. RUBIN: The values which we presented in the internal event SER, as modified by Brookhaven National Laboratory, were requantified, and the numbers that were presented in Supplement No. 2 to the SER were developed from a limited item that was presented to you four or five subcommittee meetings ago.

The internal event results are mean values. The coremelt is 3.8 10_5, is the estimate for mean value. The external event analysis, however, cannot be construed to represent true mean values because it was composed of the fragility analysis as well as the site hazard function.

In the course of the analysis of the seismic events, Brookhaven composed what they thought would represent a mean component structural fragility curve, but there was no mean hazard curve available when they were combined to represent the total seismic coremelt contribution.

What was done was that the site hazard function was assumed to be a mean curve. We had no site, therefore, it was an assumption of the analysis. When we combined and assumed mean hazard function with what they determined to be a mean fragility curve, the numbers presented in the seismic analysis could be considered a mean value, but only in an extremely limited sense because we had no distribution of the site hazard function. Indeed, for the component fragility value, there is no actual component or actual structures that were reviewed by our consultant, John Reed from Jack Benjamin and Associates, but rather they were representative values from previous plants, and this was felt not to be representative for the GESSAR site.

For our final reporting in SSER 4, we had a composite coremelt value. The values were represented as a numerical estimate. As I mentioned, it is composed of mean values, to a large extent, but we certainly we would not represent the numerical estimates as a mean value. To the extent possible, we utilize the mean values.

The medium coremelt for internal events is presented in the B&L report, and we do not believe that it was presented in SER, however.

MR. OKRENT: Let me see if I can rephrase what I think you said.

If I understand correctly, you are saying that for

internal events, the B&L support group attempted to generate uncertainty distribution on the various factors that enter into an evaluation of the frequency of some particular sequence, the uncertainty on the initiating event, and so forth, the uncertainty of human error numbers, and so forth.

You are saying that they performed at the state-of-the-art -- those are my words, so correct me if I am wrong -- an estimate of the internal coremelt, and came up with a mean value, and also uncertainty distribution that would enable you to have 90 percent confidence.

MR. RUBIN: They presented a 595 balance.

MR. OKRENT: For external events, let's talk about earthquakes, is there something that makes it impossible to assess a mean value when you are talking about a siteless plant?

In other words, for any standard plant where the site was unspecified, GESSAR is an example, would it be impossible for you to provide an estimate of the mean value of the seismic contribution to risk?

MR. RUBIN: We attempted to deal with it by enveloping a site that General Electric supplied to us. I think, surely, if we don't have an actual site hazard function, I don't see how we could reasonably represent the mean hazard function for a site.

What we did was assume that what was presented was a

mean value, was a mean hazard function for computational purposes only. However, in our interfacing requirements --

MR. OKRENT: Excuse me. Hold on a minute.

I am not sure what it means to say, you took their envelope and you called it a mean value.

MR. RUBIN: I am talking about a single curve. I am not talking about the envelope.

MR. OKRENT: I realize that, because, in fact, for any particular site, there will be some uncertainty distribu- ion in the frequency of different degrees of the seismic shake. One can get, in fact, different results in convulting through distributions and in taking a mean for one of these and a distribution for, let's say, the fragility. You don't necessarily come up with the same answer.

What is it you think you are doing when you took a single curve for seismic hazard and went through some kind of arithmetic? What is the physical or mathematical interpretation of these, or does it have one?

MR. RUBIN: We feel it has a useful interpretation in letting us understand what the various sensitivities are of some of the seismic events.

As far as the bottomline numerical value to the coremelt estimate for an unknown site, we felt that we had no grasp of the uncertainty distribution of the site as a function and we did not postulate one. We would not put a great deal

of emphasis or creed on the numerical point value.

We did do a fairly extensive sensitivity study, looking at various hazard functions, the low and high end, to see what likely limit results could be written, and we have presented that to you.

MR. OKRENT: Yes, but I don't know if you have any way of taking that and translating it into some mean estimate of the risk. I saw the numbers but, as we well know, sensitivity studies are not the same as uncertainty analysis in trying to estimate some mean value.

I guess, in a sense, I am trying to understand if there is some kind of generic problem that faces any standard site approach, GESSAR happening to be the first one that we are looking at, let's say, in some depth this way. If there is some kind of -- If you feel that there is no basis for, in fact, trying to analyze this aspect of the problem for a group of sites, putting in uncertainty distributions around a hazard curve, and then putting variations in the hazard curve as a way of looking at sensitivity -- If you feel that that doesn't make sense for, let's say, standard siteless plants, how does one know that one has adequate evaluation of that part of the problem? This is truly what I am trying to understand. Does one have adequate evaluation? It is really a question that at the moment, I don't pretent to have an answer to, but I think there is a question that is not irrelevant, partly

because the numbers fall in a range, and if they were all in the minus ten, we wouldn't care so much.

MR. RUBIN: It certainly is a very valid comment. Dealing with more than normal uncertainties that one would encounter in doing a basic seismic analysis, and the experts there on a particular site vary tremendously on their estimates of frequency of seismic events.

Without a particular site, we are obviously handicapped in developing the numerical estimates. However, I want to emphasize that this is not the final product where we have concluded on the seismic adequacy of design, folding our hands and sitting back, or walking away.

When a plant does come in for reference, the site hazard function will be looked at most carefully by the staff. The people who will be here this afternoon will be looking at the evaluated percent of site specific hazard curve, will be considering not only mean value, but I feel they will be considering what the uncertainties are for presented sites, and they will be making evaluations and determining whether it will give a reasonable seismic risk analysis.

MR. OKRENT: Are there criteria, quantitative criteria, that exist now that will provide a basis for judgment of such a plant, were someone to apply tomorrow and magically turn in the FSAR referencing the FDA?

MR. RUBIN: There is an interface requirement

developed by the Division of Engineering, and I will read it to you.

"Perform a site specific function analysis, and justify that the mean and mean plus one standard deviation of the site specific hazard around bounded by the mean and mean plus one standard deviation GESSAR II seismic hazard function as indicated in Table 2-3 of the GESSAR II Seismic Event Uncertainty Analysis, December 1983."

MR. SCALETTI: That is clarification of the previously existing interface requirement in Supplement Three. There was some concern at one of the subcommittee meetings that the staff wasn't clear enough on the interface items, so we added some clarification to that.

MR. OKRENT: Those words are in something that I have in front of me?

MR. SCALETTI: This is the list of interface requirements from the staff's SERs. It has been modified and it is in Supplement Three now, or amplified, I guess.

MR. OKRENT: This is what page?

MR. SCALETTI: It is on the fourth page, at the bottom of the page, "Site specific hazard function analysis."

MR. OKRENT: I assume I should remember, then, that GESSAR II gives not only a seismic hazard curve, but a curve showing one standard deviation.

MR. RUBIN: We probably could address this better

later on in the afternoon when the seismologists are here.

MR. OKRENT: GE knows for sure. Does GESSAR II present a hazard curve and also show some kind of a mean plus one standard deviation around it?

MS. HANKINS: We presented a seismic uncertainty analysis.

MR. RUBIN: There is an interface requirement which would be evaluated when the plan is submitted. Typically, if the interface is not met, there would be a reevaluation to see what impact not meeting the requirement would have on the site for contribution.

MR. SCALETTI: We will add this clarification to SSER Number Five.

MR. OKRENT: How do you decide whose mean and mean plus one standard deviation is to be compared with what, I will assume, is in GESSAR?

As you and I know, frequently, if not most of the time, the estimated hazard curve, with whatever uncertainty distribution is placed around the site, as provided by the utility, is sort of a factor between five and ten, and different from what the staff gets from its contractor, Livermore, using its experts, and so forth.

Which, if not one of these, is the mean and mean plus one sigma to be compared with GESSAR?

MR. SCALETTI: First of all, whether the application

that was submitted referencing design would have this information, the staff would review this information -- the staff or its consultants would review the information, and the position would be established at that time to determine whether we felt that the curve so presented by the referencing applicant was satisfactory. If not, the staff would either request that it be redone, or if it felt that its own curve was close enough, it is the staff's determination of the mean and mean plus one standard deviation that would be used. It may be that the staff agrees with the applicant, but in that case, it is still the staff's position.

MR. OKRENT: But at the moment, I have no way of knowing for some particular site -- I can probably find five or ten existing now -- where side by side estimates, on the one hand, made for the staff by Livermore, on the other hand, made by a set of consultants for the utility vary by a factor of five to ten. I have no way of knowing what the staff's choice will be, and on what basis they will make that choice.

MR. RUBIN: You will certainly have that information presented to you.

MR. OKRENT: I didn't ask about the information. I am asking about how one ascertains what the staff's choice will be, and by what criterion, or whatever it is, on what basis they will make a choice.

MR. SCALETTI: The staff's choice will be that of, I

assume, its consultants. We have hired people to review this for us, and at that time they are an extension of the staff. They are not strictly consultants, they are an extension of the staff. What they present to us, obviously, we review. We make a decision based on that. If we don't agree with what they say, then we have to justify that.

The position presented at that time would be, I assume, in most cases, the position of the staff combined with its consultants. If it differed from that of the utility applicant by a great degree, resolution would have to be either some other means, another hazard question developed by the utility applicant, or more supporting information to support it.

MR. ROSENTHAL: I know, as you know, working on Millstone, that is an example where the seismic hazard characterization program, the seismic hazard curves result in a couple of orders of magnitude in risk -- you are quite right about the spread of the perceived risk curves. What we have to do, then, is say, how will this affect the decision process, we intend to do that.

What I would like to do is say, how does this plant perform at the SSE, and then I start sliding up two multiples of the SSE with Gainsmore and SHCP. We are also getting information out of the seismic margin program. We start sliding up a scale of the SSE to some multiple of the SSE. We say,

what oreaks? What is the credibility in that acceleration? What might we do to fix it? We keep going up to larger and larger seismic events.

To a great extent, it is a question of judgment. Many times, you may conclude that the fix, the decision to fix or not to fix would be independent of whether it is SHCP. The typical curve for very large accelerations varies several multiples of the SSE. We have the recurrence interval going down 10_6 or below, and uncertainty going up to infinity. The conditional consequences going up to infinity.

We are on new philosophic grounds. We don't have a good answer for you. On the other hand, what we see is that typically, for events that are only some few multiples of the SSE, we don't bust up buildings. We may have a relay chatter or some other kind of internal event.

So the answer is, we haven't relied simply on this convolution of the hazards and fragility curves, but looking at a point by sliding, saying, what margin is there, how can you pick up some margin. That is the sort of exercise that I think we will be able to do in the future.

MR. EBERSOLE: I would like to ask, concerning these studies, did that include a study of strenghtening UPPS system up and upgrading the SRP function to be sure that it is quite seismically competent, and going to open cycle boiling to cover the enormous range of events that can be caused by

earthquakes in the other systems, and go to shutdown cooling fundamentally by the open cycle boiling process?

MR. ROSENTHAL: We have some recommendations --

MR. EBERSOLE: Let me explain what I am getting at. It is clear to me that this ultra simple system is the place where to gain margin, if you can't get it anywhere else, cheaply because you can make it super-conservative and it won't cost you anything. Not to do that, as far as I am concerned, is virtually criminal for a domestic plant.

You can sell that to China, if you want to, but I would like to see a domestic plant capable of being definitive enthusiastically to the public, and have these sorts of conservatisms. I really believe that this old boiler could be the mainline of our nuclear power if we can do these things.

MR. ROSENTHAL: In fact, the staff has recommended a partial upgrade of UPPS to increase --

MR. EBERSOLE: I hear that "partial," and that is what I don't like.

MR. ROSENTHAL: One of my problems is where do I stop. The SSE is 0.3 G. Do I ask that it be qualified for 0.6 or 0.9?

MR. EBERSOLE: I don't really know, but I know that this is the easiest way of doing it.

MR. ROSENTHAL: The philosophic issue is, if I am

looking at a 0.3 G plant, not how do I handle the events between 0.3 G and 0.6 G, but rather what do I do about the 0.6 to 0.9 G.

MR. EBERSOLE: I could put rubber hoses on the water supply system, and virtually insure it against any upper limit spectrum. If I can get an AVS function and a containment vent, I have got it made.

MR. OKRENT: I think that we are going to come back to the features of UPPS, so don't lose that.

In the staff's response to Agenda Item 3, somewhere in here, they say that inclusion of off-site costs would not change the cost/benefit analysis by more than a factor of two.

MR. ROSENTHAL: That came from me, sir. If you look in SSER 4, there is a table of on-site and off-site costs. You will find that those on-site and off-site costs are roughly equivalent.

MR. SCALETTI: It is Table 15-16.

MR. ROSENTHAL: It is page 15-48, SSER Four.

MR. EBERSOLE: Only a factor of two.

MR. OKRENT: There is a table on page --

MR. ROSENTHAL: On page 15-48, Table 15-16, monetized worth of risk reduction. Internal costs were just taken as the coremelt frequency times ten of the tenth dollars for destroying the plant in 40 years, no present worth. Those may be a little bit high, because there is no present worth. I

feel that on-site costs could well be present worth.

Be that as it may, as you see, right across the table, the base case UPPS, et cetera, on-site and off-site costs are roughly comparable. Now, if I take the benefit of the numerator and the costs of the fix in the denominator, in one case I include only the internal, and in the other case, the internal and external, we are only off by a factor of two of the same fix.

Bear in mind that what we are doing is that we select the fixes to examine in the first place that we think will reduce the coremelt frequency, or we think that will reduce the risk to the plant. We did not look at those fixes which only reduce on-site property damage less than coremelt. If you play that game, it is a totally new ballgame.

MR. EBERSOLE: Did you say, you take the lost generation for that interval of time to reconstruct that plant and put another one back on line.

MR. ROSENTHAL: We took ten of the tenth dollar as the lost value of that plant.

MR. EBERSOLE: Is that a good number?

MR. RUBIN: It was used in two previous studies, and there is a reference in the SER indicating where it came from. It is only a very rough value.

MR. EBERSOLE: Does it include lost generation for the interval to restore the plant?

MR. RUBIN: I believe it does.

MR. EBERSOLE: That is a lot of money, and it is more than the value of the plant.

MR. MICHELSON: Ten billion dollars is a lot of money.

MR. EBERSOLE: They make a lot of money.

MR. OKRENT: I need to understand something in Table 15-16. Suppose that we just take what is called the base case, that assumes a coremelt frequency of 10_4, and then for onsite risk, it assumes a $10 billion accident which is distributed over 40 years.

MR. ROSENTHAL: Yes.

MR. OKRENT: There is no present worth.

MR. ROSENTHAL: Right.

MR. OKRENT: I have not asked the question yet. How is the off-site risk number obtained?

MR. ROSENTHAL: The off-site calculation is the sum of person rem --

MR. OKRENT: How do I know what the person rem is? What accident sequence is it?

MR. ROSENTHAL: It is a weighted average over all the different ways that we go to coremelt and all the different ways that a containment performs in order to come out with an annualized person rem. It is a weighted average.

MR. OKRENT: It just seems like a big number to me,

and I am trying to understand. I thought that there was such a low man-rem for the average coremelt accident.

MR. ROSENTHAL: Let me turn you to page 15-31 of SSER Four, that is page 15.1.

MR. OKRENT: Okay.

MR. ROSENTHAL: That shows conditional person-rem over a wide range of events. You can see, except for the 1TL3, which is the late over-pressurization failure of containment, the other numbers are roughly comparable. That is the sort of person rem that we are dealing with.

MR. OKRENT: I see.

MR. ROSENTHAL: So you have 10 to the six person-rem per event, 10 of the three dollars for person-rem, and 10 to the nine dollars for some sort of conditional consequence. There is no discount here. We don't do what I am verbalizing here, we did do a properly weighted average consequence.

MR. OKRENT: This is for some average site.

MR. ROSENTHAL: This was done for shipping ports, and you can have your own perceptions. Shipping ports is a worse than average site.

MR. OKRENT: It is worse than 80 percent? If shipping port is not an average site, I wonder if that doesn't affect your conclusions, the relative conclusions about off-site and onsite, for the average site.

MR. RUBIN: I don't think it would. A great deal of the benefit we found for the off-site risk reduction in the design modification was the reduction in exposure due to the hydrogen control systems. At that point, we already have coremelt. Therefore, improvements that were fairly large for off-site would show essentially no on-site risk reduction.

The area where we would see some benefit --

MR. OKRENT: I am just trying to understand these numbers and the statement that there is only a factor of two difference.

MR. RUBIN: Quite likely it is less, perhaps well less than a factor of two. There is no discounting here. We have cut the numbers down by possibly two, but we don't think that the estimate of on-site cost value is any better than a factor of two, or three, or five, so we didn't include discount.

The benefit, the same benefit we get from off-site risk reduction from all the design models that we looked at wouldn't show you the same delta improvement for on-site costs because we don't see a good coremelt reduction for a lot of the modifications. We see a good risk reduction from some of the B&L consequence assessments.

MR. OKRENT: I heard that. What I am trying to put in juxtaposition were some discussions that were held at the subcommittee meeting when we were looking at the valuation of

the safety policy, and where there were several senior staff members who were making the position that more was needed for existing plants to try to accomplish a lower estimated core-melt frequency. In some of these written documents, the argument was made that, one, the proper way to do a cost/benefit calculation, if you are going to do it, is to include all costs; secondly, if you did do this, you would find that you had very little financial capability, if you will, on the reduction in loss on the balance of anything new.

Here you are saying that it is not much of a factor. Is it because they were talking PWR, and you are talking BWRs, or is it that the shipping port site is substantially different than the average?

There is a little bit of a difference in what I heard at two different meetings, and I need to understand why.

MR. ROSENTHAL: Let me back up for a moment. If we look at a plant with old source numbers, you get larger off-site risk. So proportionately, the contribution of on-site is, in fact, less.

MR. OKRENT: What source terms are here?

MR. ROSENTHAL: New source terms.

MR. OKRENT: New source terms, and you are still getting comparable numbers.

MR. ROSENTHAL: They are an order of magnitude higher. We typically saw ten of the seventh with great

regularity. Remember that 1TL3 is ten to the fifth. So you do see a reduction.

Going on, all things here, the contribution to on-site relative to total is greater than you will see. If we look at fixes which mitigate person-rem, this is the sort of picture that we form. What we were considering, if we wanted to use the on-site costs, then we would look at fixes which reduced on-site costs, and perhaps reduce coremelt or core damage with no corresponding person-rem, and we would come up with a different list of fixes to examine, and we would test that against on-site averted costs. That is an exercise that is under discussion with the staff, and we think that we are being discouraged from doing that.

MR. OKRENT: Are there other questions on this morass that I fin' myself in?

I don't understand the difference. These are all numbers coming to me from the staff, they are not my own. I must confess, at the moment, I don't understand the difference in the report of on-site versus off-site. It seems to me that we have managed to get late in time.

Let's go to the next agenda item, Item Four, Mr. Denton's proposed coremelt frequency per reactor year for present plants. Is this also an objective for future plants? I think you said, if I can recall your response, that the EDO is thinking about this matter.

If I understand correctly, the EDO is thinking about the matter in terms of current plants. My understanding was that the steering task force for evaluation and various other groups that were offering thoughts were developing these thoughts in terms of current plants, and the safety policy of the Commission says that even though they think there is no undue risk for existing plants that future plants should be safer, but they don't say how much safer.

Now my question is: Since the staff, instead of going to the Commission and saying, tell us how much safer future plants should be, tell us how much stronger the containment should be, tell us, tell us, tell us, the staff, I think, proposed to the Commission. I don't know whether they were asked to propose, or whether they proposed of their own volition.

The staff proposed to the Commission that future plants, we will review these one by one, without the benefit of this guidance. Now I have to ask the staff. What is the target of acceptability of coremelt frequency for future plants?

MR. SCALETTI: Dr. Okrent, we don't have the go or no go level for coremelt frequency for future plants. We endeavored to review GESSAR, we believe, very thoroughly with the understanding that future plants, based on the Commission's policy, should be safer.

The results of our review to date would give the impression to the staff that GESSAR is a safe plant and probably safer than the other plants out there. We feel that with the modifications that we have required, identified in Supplement No. 4, the addition of the ignitor system, the dedicated backup power supply to the ignitors, the ability to maintain station black-out for ten hours without an alternate plant protection system, and the inclusion of an alternate plant protection system, which would give you indefinite station black-out capability, we have come out with what we feel to be a relatively low number, quite the lowest number as far as coremelt frequency. We believe that it is acceptable.

We do not have an acceptable level, however, it could have been higher and still have been acceptable. We can't give you an answer on it.

MR. HERNAN: I would like to point out one distinction. The Denton recommendations to the EDO was coremelt defined as fuel leaving the cooling system. I think that some of the other numbers kicked around as goals are just core damage. So the probability of the reactor vessel penetration would be smaller for this plant.

MR. SCALETTI: I don't know if anybody is willing to put that on the record or not, but we do believe that clearly the ten to the five, and what the staff did and what Mr. Denton is proposing, the coremelt versus core on the floor, or

whatever, are different.

It may be, if we equated to what Mr. Denton was proposing, the ten to the minus five, it may be significantly lower.

MR. ROSENTHAL: The number quoted in the SSER Four, three minus five for internal, and 1.1 minus four, without fixes that you just saw, are core on the floor events.

MR. OKRENT: You are saying, 1.1 minus four was --

MR. ROSENTHAL: Table 15.16 in SSER Four

MR. OKRENT: What page is that?

MR. ROSENTHAL: Page 15-48, SSER Four.

MR. OKRENT: That is your total coremelt.

MR. ROSENTHAL: That is for internal and external events, and those are full coremelt events.

MR. OKRENT: The internal is mean, but the external has some uncertain definition.

I guess a question that we should think on, and we will certainly want to hear about in the meeting of the full committee, is why, for a future plant, is a number like one times ten to the minus four total coremelt frequency good.

MR. ROSENTHAL: It is not good enough.

MS. AIKENS: The numbers that Brookhaven used in developing the coremelt frequency were based on General Electric success criteria. They did not change our success criteria. The success criteria was based on reaching 2200

degrees Fahrenheit in the fuel. So it was actually a success criteria for core damage. We did not include any system recovery after that point. Once the core reached that temperature, we took no credit for recovery.

We have other estimates made in other documents that if one included recovery, you might get as much as a factor of ten reduction between core damage and coremelt. We didn't even approach that subject. So the success criteria is based on core damage and not coremelt.

MR. OKRENT: You don't approach the subject, but you mention the factor of ten. I have a big problem with throwing around a factor of ten loosely, suggesting that it is probably there, without the benefit of really good analysis. This is being done commonly throughout the industry, and I think that it should be stopped. If people are going to try to make a distinction, which there certainly is, between getting to 2200 and melting, there is some chance of recovery, we have seen one case where that occurred, not by plants, not even knowingly, people had better come with detailed analyses. Clearly, it will be scenario by scenario, and it may vary very much from plant to plant, and so forth.

Please let's be careful about getting into a habit of thinking which may well be erroneous and lead to incorrect

conclusions in, let's say, half of the plants or something. I see such discussions, I believe, between the staff and the Commissioners. It is not just in subcommittees that this kind of thing comes up.

MR. EBERSOLE: Dave, I am glad you said this because this will force this matter that has been bugging me for a long time, and that is when I have a white hot core on the verge of partial melting, am I going to continue to squirt water at it. I think that you must always do that. I don't know of any recourse.

This is a very fuzzy area as far as analysis is concerned as I have seen so far.

MR. OKRENT: If I could ask one more related question and it is really a question at 9:40, so we may almost get the break on time. There used to be in the NRC staff the idea that if you have some kind of objective, whether it be total risk, or coremelt frequency, that you don't attribute more than one-tenth of this to any single source.

For example, when one was -- there was a time when, for each external source like airplane crashes, or tornadoes, or hurricanes, and so forth, you would say, if it is less than some number, ten to the minus seven per year, it is okay, assuming that you were trying to achieve the ten to the minus six frequency or better in a serious accident.

Is there, in the staff's opinion, some fraction of

the coremelt frequency or the risk that should be assign seismic, or should one-tenth be applicable here?

MR. SCALETTI: We have not done that on GESSAR looked at the numbers as they came up. We reviewed the design. We went through the PRA. We looked at the insid gain from the PRA. We felt that the ultimate bottom line number was not the goal of the staff at that time.

So we do not have an answer.

MR. OKRENT: It is not a bottom line number. It a kind of philosophy of safety that we are talking about, w used to sort of go like this -- Since we don't know precise in fact, what the actual risk contribution is going to be fr any particular source, even though we have made an effort to quantify it, whatever it is, airplane crashes or hurricanes wind or floods or earthquakes or fire or ATWS, this term of one-tenth, I think, was first written down by the staff in connection with ATWS probably -- Since we don't know this very well, if we have some goal that we are trying to achieve, as we estimate each contribution, we will try to keep it, let's say, on the order of a tenth of the goal, so even if we are wrong somewhat in it, it is not going to, of itself, be eating up all or even top the goal.

It is a, if you will, another way of looking for defense in depth, I suppose, a different kind of depth than -- a defense against uncertainty, or whatever you want to call

it.

There are many countries, in fact, that try to use this idea, which may have been set here first in the U.S., I don't know.

I am trying to understand whether the staff consciously says, no, we don't want to use that, or, we would like to use it, but it doesn't work here, so we will have judgment, or just what is the staff's position?

MR. SCALETTI: I don't think the staff has a position on it at this time. I don't think that we consciously said, no, we don't want to use this. I don't think that we were looking for that.

GE says that the contribution from seismic risk is about 5 percent, I believe. The staff, obviously, doesn't agree with that because that number has shown that they are about equivalent. The staff has done a conscious review. We have looked at the important things in the PRA in our review. The results of that are in Supplement Four. I can't answer you any better than that.

We didn't consciously rule that out. We didn't consciously do it at all. We tried to do a comprehensive review of the PRA, both internal and external events for seismic.

MR. OKRENT: So if, for some reason, President Reagan said: We have this staff that is doing a fine job at

the NRC. I am going to move them all over to EPA, and get hazardous waste control in good shape. I will move the EPA staff over here. There wouldn't be any criteria for the EPA people to use, they would come over and use their judgment.

MR. SCALETTI: There may be this criteria when the safety goal is finally approved or discussed further, or there may not be.

MR. OKRENT: What I am getting at is that it is not clear to the public, or to me as a member of the ACRS, just what it is the staff will buy in the end. I don't know how long that is supposed to go on.

In other words, what level of safety with what confidence do you think you should be striving to achieve?

Are we going to have Mr. Denton or anybody like that at the meeting on GESSAR?

MR. SCALETTI: Dr. Okrent, I believe Mr. Denton will be at the meeting of the Philosophy, Technology, Criteria Subcommittee on October 9 at which time the safety goals will be discussed.

MR. OKRENT: I see.

It looks like it is time for the break. Are there any more questions on this area?

Let's take eight minutes to catch up.

(Recess)

MR. OKRENT: The meeting will come to order.

Is there a presentation on Six?

MR. ROSENTHAL: Sure.

MR. OKRENT: We have 20 minutes.

MR. ROSENTHAL: I will try to be real quick.

MR. OKRENT: We can come back to some of the other items.

MR. ROSENTHAL: I would like to point out, one, we don't have a containment performance objective. What I thought I would do is show you a concise view of how I think containment will behave.

I would like to point out that in prior reviews that typically involved the large containment, such as the ZIP work, much of the staff effort was focused on would containment fail or not. This effort was primarily focused on what are the releases to the biosphere, and much of our effort involved source terms rather than containment.

In our view, going back and looking over the material, containment will fail, but that the releases from containment will be quite low. In a typical containment matrix, we show no fail categories, basemat failed categories. In this plant, we think with some surety, that you won't have a basemat penetration that you will fail the containment proper by over-pressurization prior to basemat penetration.

MR. OKRENT: Excuse me. Does that mean that the basemat failure will not occur at all, or that it will occur

with a high probability?

MR. ROSENTHAL: I think that it is unlikely to occur since you just keep chewing down through 20 feet of concrete and it is endothermic. You lose energy as you chew down. The net energy balance between hydrogen production and oxidation and ablation energies is such that it is a net energy loss process as you chew down into the concrete, and it seems unlikely that you fail by basemat penetration. On the other hand, we think that you fail the containment proper.

MR. MICHELSON: Just for clarification, below the basemat on these reaction, what is the ground condition? What interface requirements have you placed? Do you have to build these on rock, for instance, or just what?

MR. SCALETTI: There are eight conditions identified in the SER of which soil conditions is one. It can be built on rock and other types of soil.

MR. MICHELSON: You are assuming the worst soil condition if it did get penetration; is that right?

MR. SCALETTI: Can you answer that, Jack?

MR. ROSENTHAL: I don't have the answer.

MR. MICHELSON: Thank you.

MR. ROSENTHAL: I will ask Trevor Pratt of Brookhaven to chime in.

You have seen this slide before, and I just wanted to make the point that we had many classes of coremelts and

many containment failure modes, and a half-dozen entries, the station black-out sequence, to restoration of AC before vessel failure, after vessel failure. In some sense, I think we are so snowed in with details that it is hard to see the big picture.

In trying to prepare for this meeting, I tried to make a little simpler picture of what is going on. The attempt here is to try to capture the essence of how containment would fail. I think that it will make some of the detail people, who spent years of their lives working on this, cringe at the degree of simplification that I have done.

For instance, right now, I don't want to distinguish between what is called an I2 and I2Q. Hydrogen detonation is one that fails the drywell head, and you end up with a quench release. On the black-out, I didn't want to distinguish between the event tree where you restore power prior to vessel failure, and one after it. So I did away with that.

Please don't cringe too much, but I think there is a better way to capture the essence of what is going on. I am going to talk a little bit about the containment, and what I would like you to do also is to open up your SSER Four to Table 15.1 and 15.2, you can see the conditional consequences associated with these events.

As I said, it is a source term game, so you can't divorce the containment failure mode from what is going to

happen. What I am showing you is for no ignitors in the plant. Remember that much of our work was done prior to our commitment to install ignitors, and how that changes the picture.

LOCAs look like less than one percent of the coremelt frequency, some number less than one percent. Station black-out, about 80 percent of coremelt frequency. An awful lot of emphasis was put on our part in looking at black-out because it does dominate the frequency of coremelt. Loss of containment and heat removal is the TW event of the RSS, where you lose the containment heat removal, and turned off the core.

In this PRA, credit was taken for recovery. There is a large difference between the total probability of losing full cooling versus ending up melting the core. I think that three percent of the TW events were believed to ultimately lead to core failure. Three percent of the loss of containment heat removal events, we are led to believe, but we still have ten percent here, and ATWS is eight percent.

Let me back up again. The thing is now to say, notice I don't have an epsilon, I don't have a no fail column, but fail columns. This is to say, how does this beast behave? We have a benign bin of 2TB3 for the TW event, and the reason for that is, at least what we believe, in such events all of the fission products will be scrubbed by the pool. For ATWS, on this plant, we believe that all the fission products will be scrubbed by the pool, and the pool will be super-heated rather

sub-cooled. That is an important distinction.

ATWS on this plant looks much more like a transient than ATWS would look on a Mark I or Mark II where the failure location is different.

MR. OKRENT: You say, all the fission products, you don't mean the noble gases.

MR. ROSENTHAL: The noble gases, we imagine, are at least fraction one. The nobles get out, so the price you are paying for low release of iodine and heavier elements is release of the noble gases, and that is philosophically different from, let's say, a large dry where there is some probability of not releasing anything. Effectively, you have a filtered vent here, and we believe that it is a good compromise to buy confidence on not releasing what would be groups two to seven at the cost of releasing the nobles.

MR. OKRENT: Again, what are the conditions? What is in, and what is not? You said that there are no ignitors on this. Are there other things that are in the plant now that are not on this viewgraph?

MR. ROSENTHAL: It doesn't change the relative fraction. I think the relative fractions are good. But ignitors are different.

Note that the black-out dominates the coremelt frequency, and that is why the staff wanted to put ignitors on adverse power because you don't have them in the dominant

coremelt event otherwise.

Now, what do ignitors really buy you? Ignitors force a 1TL3 release, a late over-pressure failure due to noncondensible gas generation, and I will put this one back up. I just wanted to show you what we meant by late failure. We enter 11 hours with CORCON -- It is a late failure no matter how you cut it. Based on previous committee work where we looked at the relative strengths of the wetwell and the dry-well, and margins to failure, we were pretty convinced that there would be a wetwell failure.

Now you go back to what the ignitors buy you. The ignitors force the event to go from an I2 failure mode to late over-pressure failure mode. In person-rem, it is worth an order of magnitude or so. More important, it makes us less reliant on our ability to predict the details of fission product migration.

I think that we have a pretty good handle on the vaporization release, that which comes off the fuel in the vessel. We may not have a good handle on the exact amount of primary system retention. We may not have as good a handle as we would like on cool spray. But I think we have reasonable confidence that iodine and cesium which comes off in vessel get scrubbed out on the dryers and separaters, or get deposited on the piping down to the pool, or has to bubble through the height of the pool, and between those things, we think that we

are in pretty good shape.

On the vaporization release, we are less confident that we know the details of it. I don't think that we should put ourselves in the position where we have to be concerned that we really know the vaporatization release. The way to do that is to put on ignitors that preserve containment integrity for a long period of time that allows for agglomeration and settling. This is particularly true if you worry about pool bypass events. Without ignitors, permitting an early failure mode, means that you have confidence that you are not going to have a bypass of the drywell. With the ignitors, you are getting confidence that the drywell integrity is preserved and there is bypass, and there is 12 to 24 hours for agglomeration and settling of the isotopes.

The reason that you hang battery-backed ignitors on this plant is not because the risk estimates are too high without them. They are acceptable without them. You hang them because you are worried about the confidence in your predictions, and this is a way to force the outcome of a situation that you believe you know better.

An example of that is, we had a discussion on the I2 and the I2Q releases. I is an intermediate time failure, and the Q is quenched or not quenched. It is the vaporization release that we are concerned with.

I don't think that we should have to play a betting

game on having a failure over here which forces the water to be dumped down and quench versus a failure over here which gives you a dumping in the pool.

Although we have given you conditional consequences for the I2 and the I2Q, you can see that the I2Q is less. I think that Dr. Marks has some valid concerns about our treatment of hydrogen and the use of the CS2Q code. The ignitors remove that from the decision process, the concern over how well you treat it.

He also thinks that we have over-estimated the hydrogen --

MR. OKRENT: The ignition system is seismic class I?

MR. ROSENTHAL: I don't know.

MR. EBERSOLE: I can't imagine why they shouldn't be.

MR. OKRENT: Is it, though, that is what I am asking.

MR. SCALETTI: No.

MR. EBERSOLE: They aren't, why not? They are batteries and wires, and little filaments.

MR. ROSENTHAL: I am going to check and I will come back to you on that.

MR. OKRENT: It strikes me as a little late in view of Mr. Denton's letter to the ACRS for a design item like this not to be clear in both the staff's and the applicant's

mind.

MR. SCALETTI: The ignitors will be the same as those that are required for Grand Gulf.

MR. OKRENT: I don't know what that means.

MR. SCALETTI: The Grand Gulf review has not been completed yet.

MR. OKRENT: I am aware of that.

MR. ROSENTHAL: We will get back to you on that.

MR. OKRENT: I see no basis for hinging what is in GESSAR on Grand Gulf, absolutely none.

Go ahead.

MR. ROSENTHAL: All I wanted to do was to point out that when you put ignitors on, you change the drywell failure due to hydrogen into TL3 type releases, and those releases have low consequences. That is the basis for the acceptability of that.

MR. OKRENT: Can I ask once again, what is your or the staff's best estimate, in sort of one or two minutes, of the succession of phenomena given that the core has melted, and it is leaving the vessel. What remains intact, what doesn't, what features of the drywell, or wetwell, and so forth, in the staff's opinion?

MR. ROSENTHAL: You melt the core.

MR. OKRENT: You melt the core.

MR. ROSENTHAL: In the time being, we have taken the

iodine and cesium, and we pumped it out the top, it is retained in the primary system where it is pumped into the pool. What it brings down is some fraction of the tellurium, and roughly 70 percent of the decay heat with the melt.

I generated hydrogen at a modest rate in the station black-out sequence prior to the vessel --

MR. OKRENT: I am interested in the structural integrity of the pedestal.

MR. ROSENTHAL: I stood up at a prior ACRS meeting and I said that I wasn't too sure about the integrity of the pedestal. Trevor got up at a subsequent meeting and said that he wasn't sure about pedestal integrity. We both said that it was a late failure mode, and that we didn't see it as being very significant. I think that Dr. Hankins got up and said, it probably will not fail. I have laid up to the first bit of steel that I have and it turns out to be 0.4 meters per second of steel, and argue that the remainder of steel will hold up the vessel.

If you are ablating at a rate of a foot an hour initially, and then you slow down, you just have another foot of concrete to eat into. So I think that it is a matter of time before there is potential failure of the pedestal. On the other hand, the recent data seems to show that the core is eating its way down with the same degree of ablation.

What I am trying to say is, I can't, based on what

we know today, exclude failure of the pedestal, but we can say that it isn't risk significant.

MR. OKRENT: I just want to understand what goes on at the moment. If the pedestal fails, what follows that?

MR. ROSENTHAL: Depending on when it fails, relatively little. It will freeze the core on the floor in about ten hours, and you should stop the vaporization release. You have already put the gap and melt release into the pool, if you fail the vessel and it tilts. You pull on very hot piping at that point. I don't know if the piping bursts and it pulls the penetration out of the wall. At that point there is the threat of bypassing the drywell, and conceivably failing the drywell and the wetwell.

I do argue that you have to say where are the fission products at that time. The fission products are either stuck in the primary system, pushed into the pool, or they are frozen on the floor.

MR. OKRENT: At the moment, it seems there is not a sophisticated analysis of the effect of coremelt on the structural behavior of the drywell; correct me if I am wrong. If there were, I don't know whether we should believe it anyway since -- You make a sophisticated analysis, but there are some basic assumptions that may have considerable uncertainty.

In any event, there is some unspecifiable likelihood, if I understand it correctly now, that with each coremelt,

sometime in the event, some hours, that you can lose both drywell and wetwell integrity. Is that correct?

MR. ROSENTHAL: Yes.

MR. OKRENT: I have a kind of philosophical question. For future plants, why not strive to have a containment which a large fraction of the time, whatever that means, is expected not to lose its integrity, not to release the bulk of the noble gases, and not to, in fact, have a failed containment building with, I will use the word, access around the venting medium -- excuse me, around the filtering medium to whatever kind of fission product generation there may be?

Why, for future plants, should containment be accepted which you expect the bulk of the time, given a core-melt, to release the bulk of the noble gases and, perhaps, an appreciable fraction of the time, not all the time, to lose integrity of the containment late in the event?

In other words, if one looks at this not just from bottom line risk numbers, which I thought the staff doesn't do, but from general safety philosophy points of view, you might say -- There was a time, in fact, when the staff shuddered at the thought of venting fission products.

Years back, there were applicants who came in and said, at a certain time in the event, we want to be able to, under controlled conditions, vent small amounts of fission products, a little bit at a time. The staff said, no.

Now, in fact, it seems acceptable, in an uncontrolled fashion, for all the noble gases to go out of the stack, and you are not controlling wind, the meteorology, et cetera, and for a containment building to have lost its integrity, you think, at a time when there is not too much more to get out, at least to the extent that you now know what goes on, they are pretty well, you hope, fixed some place in the building. Philosophically, why is this okay?

MR. EBERSOLE: May I ask the question, since you introduced this and looking at it square in the face. Why isn't this concept materialized by accepting the notion that you have failed in core cooling in the first stage, and it is melted and gone, but you have cooling capability below it in the sump, in a heat sink, that will accommodate the problem and avoid ablation considerations. The core simply falls into a coolant.

MR. ROSENTHAL: I have to be careful with that coolant.

MR. EBERSOLE: The main thing is that it is there. You don't have to pump it. It is there all the time.

MR. OKRENT: Some plants claim that their cavity is flooded and everything freezes. There are some other PWR people whose cavity is dry, and they said, we come out better than those other people.

MR. ROSENTHAL: The long-term over-pressurization

that I showed -- before I get to your more philosophical question, so that the record can be clear -- are some original hand-calculations that we did of the concrete ablation of the pedestal were based on CORCON generated heat fluxes to the walls. That is the best that we can do now, but there is some analytic basis to it.

One of the problems is that there is a lot of consideration of treatment of the core on the floor, and what is the heat transfer from that surface to the other.

I am not willing to stand up here and say that it won't shoot through to the pedestal, that the long-term heat flux to the pedestal won't eventually shoot through that concrete. That is not to say that it might go -- that if it chews its way down, as may be a reality. We just don't know now. We should not treat it as a best estimate, or a likely outcome, but as an imponderable.

MR. OKRENT: That is why I said some of the time.

MR. ROSENTHAL: What we have bought in the design by, in turn, puffing out the nobles, relative to earlier designs like the Mark I or II, is higher confidence that the releases of heavy metals will be less for a broad class of events than it will be in those corresponding containment types.

This is a very fortuitous failure location and physical layout such that it is difficult to bypass the pool. Based on the structural analysis that I have presented to you,

I think that we have confidence that it will be a wetwell failure rather than a drywell failure.

The logical compromise that we are making is to say that you gain greater confidence in retention of the long-lived isotopes at the cost of releasing the nobles.

MR. OKRENT: But there is an option. One could design a BWR so that its containment, not a 100 percent guarantee, but with some reasonably high degree of confidence, captures the noble gases, for example, where it didn't really lose its integrity except through deliberate filtering systems, or whatever.

Let me leave this as a question that the staff should think on until tomorrow because it is really a philosophical question, and we will come back to it on the agenda tomorrow among other things.

I am not advancing an answer. I am saying that this is the kind of question that arises if you open up your safety philosophy and ask yourself, why am I accepting certain things. For example, if there existed containment performance criteria, they might tell us why this was okay as it is, or not okay as it is. Presumably there would have been established, perhaps, a different way.

What can the plants do, and we will set criteria around that. This has been the traditional way in this business. Or, you could say, what is it that we would like to

achieve.

MR. ROSENTHAL: I think, if you will permit me one more moment, we will be talking to you about performance objectives on October 9.

MR. OKRENT: We will talk about this again tomorrow.

MR. ROSENTHAL: Relative to tomorrow, I think it might be good to give the subcommittee just a feel. We do end up in discussions, in development of things like the performance goals, of the question of over and under regulating, and of how plants measure relative to the current safety goals. There are those from the staff, some senior managers, who would argue that to go far beyond the safety goals is to over-regulate.

We have before us a plant with or without ignitors, a plant, which at least in terms of the health QDOs, can meet those objectives. So we have to phrase our questioning of what more should we do within the context --

MR. EBERSOLE: Do you believe that over-regulation exists in foreign countries? Looking at their configuration, you must say, yes.

MR. OKRENT: The Germans must be over-regulated.

MR. EBERSOLE: The Japanese have 100 percent electric on their main feed pumps, and beaucoup other provisions for continuity of power and avoidance of serious trip.

MR. ROSENTHAL: On the feed water, then the question

comes, how much of that is economic regulation, and how much of that is for safety.

On the Germans, we did a report where we argued that the use, because of common cause failures, we didn't see a net gain in safety in going to four trains over two or three. Here we have used 17 ways of putting water on the core, so the parallels are not quite there.

I did read some of the material from the French where they talk about a minus six large scale release, and where they talk about a tenth of the coremelt coming from any one way. My problem with the French is that I never get to the next level of detail. I think that we are much more straightforward in the material that we put out here.

MR. OKRENT: I think that you should go and visit with them and find out what they are doing in detail. They are going far beyond the staff, as far as I can tell, in providing the ability to get cooling to the core in the event of a loss of off-site and normal on-site power.

MR. ROSENTHAL: The EPGs on plants, and their H procedures are no more than the Westinghouse EPGs.

MR. OKRENT: I am sorry, I am talking about design features, not about procedures. If you haven't looked at what they are doing in the last year, you should.

We had best move along, or it will be five o'clock. You have discussed somewhat your hydrogen ignitor backup

position; is that correct? Do you have any more to say on Item 7?

MR. ROSENTHAL: I guess I would argue rigorously that I want the ignitors, and I want them battery powered because station black-out dominates the risk. I want them there, not because of a favorable cost/benefit analysis that we can hassle over, but because of the reduction of concern, it forces a more known situation, a more benign situation, and I think that should be the basis for our argument, not cost/benefit, but prudence.

Now we end up with the question of why not put containment sprays also on backup power. We did a calculation for Grand Gulf of 3,000 pounds of hydrogen, 50 pounds a minute. Bear in mind that we can't burn that much hydrogen in GESSAR. What that slide will show you is that with passive heat sinks only, no active heat sinks, the pressure in the containment went up to about 40 psi. So it is beyond design, but there is plenty of margin of failure.

You don't need the containment sprays for pressure suppression. That is the key, you don't need the sprays for pressure suppression.

Second, we look at the temperature. The temperature shoots up to about 600 degrees Fahrenheit in containment atmosphere, so you don't have to worry about integrity of materials. Mechanistic calculations were done of the response

of the seal material on the wetwell/drywell personnel hatch, and that seal is now predicted to fail due to the high containment atmosphere. So you don't need the sprays to maintain containment integrity.

What do the sprays do? In other plants, the sprays keep down pressure, and they scrub fission products. Here we have a pool that is scrubbing fission products.

MR. EBERSOLE: Let me butt in for just a minute.

I don't understand the logic of beginning this discussion. The containment sprays are no more than a bypass path of the RHR cooling system, using the same pumps, and merely a re-routing of the flow path to include traversing the atmosphere of the drywell and wetwell.

What would you even bother to consider taking them off of the regular power source, and that is what you said.

MR. ROSENTHAL: Yes.

MR. EBERSOLE: It seems to me that you are getting of a very good thing on a wildly theoretical basis.

MR. ROSENTHAL: One could develop some sort of a conceptual switch where if you lost 1-E power, the diesels that are outside, then you --

MR. EBERSOLE: You can have the argument.

MR. ROSENTHAL: The ignitors, when ultimately implemented, may or may not follow a similar scheme as we use here.

MR. EBERSOLE: You are just arguing it. You are saying, when I have lost the 1-E power, I have lost the most important thing in the spray pumping.

MR. ROSENTHAL: We are asking that we not lose the ignitors when we lose 1-E power. We are just trying to follow along. What happens if the ignitors are working, but the sprays are not, which is what that situation would be.

MR. EBERSOLE: Okay.

MR. ROSENTHAL: Now we have the situation where the ignitors are on, but the sprays are not, we don't fail the containment structurally.

The other function of sprays is to cool vital equipment in the containment. Here we are already talking about severe accident issues, the preservation of vital equipment in the containment is at that point moot with respect to this sort of a review.

MR. OKRENT: What about the ignitors themselves?

MR. ROSENTHAL: They are to be protected against the flames, or whatever kind of temperature environment exists. Here is my pressure.

MR. OKRENT: Is that 40 gauge or absolute that you were talking about?

MR. ROSENTHAL: Absolute, but let me check that.

MR. OKRENT: The containment is supposed to have a minimum failure pressure of --

MR. SCALETTI: Eight-three psig gauge.

MR. OKRENT: There is a big margin.

MR. ROSENTHAL: That is the rationale. That is the rationale for requiring that the ignitors be in diverse power. Station black-out dominates the coremelt frequency, so you can't rely on on-site AC, and this is the rationale for requiring that the ignitors be on some other diverse means, but not requiring that the containment spray be on the other diverse scheme. It is as simple as that.

MR. OKRENT: You are sure that there is nothing -- You need somehow, subsequent to this burning, that you have -- I am just asking.

MR. ROSENTHAL: In the PRA review, we were concerned about full coremelt events. If one were to be concerned with less than full coremelt, it is an over-heated core and it has made hydrogen now, you are going to save the core by putting water back onto the core. That class of event, then one worries about the vital equipment in containment which has the function in order to reflood the core. That is not the exercise that we went through.

Let me get to that exercise just a little bit. I would like to focus on station black-out because that is the main function contributing to coremelt. If you have lost power, all power, for an hour or less, you are probably not going to over-heat the core. If you have lost power for more

than two hours, there is a good chance that you are going to put the core on the floor.

Now you have to ask, what is the probability of restoring AC in that interval of time. If you look at the restoration curve for diesels and off-site power, which you will find is the probability of getting equipment back early, it is quite high.

If you are out past an hour or so, with loss of AC power, it is improbable that you will get it back in the next hour.

MR. EBERSOLE: May I ask a question at this point. It is traditional, I think, and always should be, that fire pumps should never be run by electric devices, but that they be run by their own energetic power sources, which means diesel and gasoline engines.

When I hear you talking this way, it immediately comes into view that AC power -- admittedly that the loss of it is very low, and you are way down, probably safer than any other reactor. The fact that the accident potential converges on loss of AC power, it certainly suggests the more free use of small, independent, packaged energy systems like Caterpillar diesels or whatever, just like you do for fire protection. It is intrinsic to fire protection, and you do that by common sense.

Here I see you jumping off to diverse power supplies

for ignitors, but never taking the intermediate step of pumping water straight from diesels, and I don't understand that. UPPS is one place that you are going to do that, and I certainly endorse, but I certainly endorse the enhancement of that process a little bit beyond where you have taken it.

Do you contemplate pumping UPPS with an independent UPPS diesel?

MR. ROSENTHAL: All pumps have their own diesels, and those are very reliable.

MR. EBERSOLE: I thought you were running on fire protection and I thought that it was a chancy way to go. I would put fire protection at the back of it.

MR. OKRENT: We are going to have a discussion of that, so can we hold discussion now.

MR. EBERSOLE: He was getting to this emergency power for the ignitors.

MR. OKRENT: Let's hold on various things related to UPPS, if we can. We will get to it.

Are there other points to be made on Agenda Item Seven?

We had some discussion earlier which related to Agenda Item Eight. Is there more to be added at this time?

MR. RUBIN: We combined that with Item Three.

MR. OKRENT: Then I guess we are at Agenda Item Nine.

MR. SCALETTI: You were previously given copies of

interfaces, and I have more copies, if you need them.

This is a list of staff required interfaces in the Supplements Two, Three, and Four of the staff's SER. They are identified in here as to section, and as to page number of the SER three supplements, and where they are to be found.

The equipment fragilities so requested are identified on Table 15.2 of Supplement Three. They are alluded to in the interface requirement related to the critical component and structures list, site specific hazard curve, and site specific hazard function. These are the three interface items that we said were clarification of the previously existing interface requirements in Supplement Three.

MR. MICHELSON: Does anybody have an extra copy of Supplement Three that I can look at for a moment.

MR. OKRENT: What page of the discussion are you on in the handout?

MR. SCALETTI: I was not on a particular page.

MR. OKRENT: Can we go through it page by page in some way.

MR. SCALETTI: We can try.

MR. OKRENT: Why don't we try to help my tired mind, which it is only 8:00 o'clock in the morning for me, and I should be waking up soon.

MR. SCALETTI: Before we start, let me just go on and indicate that the staff does not have specific reliability

criteria associated with these interfaces. However, we would expect, at the time of application, and at the time that the applicant responds to these interfaces, and provide the information that is required by these interfaces, and this information will have a great deal of reliability associated with it.

We can start on the first page of the handout, related to Supplement Two, which probably is one of the more significant of all the interfaces, 15.6.2, the quality assurance and interface requirements which require the utility applicants -- Again, let me just say, this one interface relates to all of the interfaces. It is a very subtle one, but it requires the utility applicant, referencing the GESSAR II design, to provide an evaluation to support the PRA interfaces and assumptions are applicable to the PRA as it has been carried in the GESSAR II design.

MR. OKRENT: What does that mean?

MR. SCALETTI: It means to make the PRA come true.

MR. OKRENT: What does it mean to make a PRA come true, using your words?

MR. SCALETTI: Using my words, to provide the information, to provide whatever -- To meet the fragility requirements that the PRA was based on for the components and structures.

MR. OKRENT: Excuse me, but when you get to talk about fragility requirements, there is a this or that, or

something else, and the something else, in fact, says, if I recall correctly, that there will not be a significant effect or differences and so forth.

I want to know what it means to make the PRA come true, those are your words.

MR. SCALETTI: The "this," I assume you mean by that, are the GE fragilities that have been identified. The "that" is directed toward the staff's case on fragilities that are not included. There is always the consideration that there may be a time when there is an exemption granted. Being a standard plant, I would believe this to be at an absolute minimum.

I would believe that there would be a great deal of emphasis by the staff and pressure put on by the staff to assure that the PRA does come true. It is a standard design, and we don't believe that it should be deviated from.

MR. OKRENT: Let's use your words now. GE has gotten certain values when they did a PRA. Brookhaven got certain values when they did a PRA. Mr. Bond got some different values when he looked at a certain part of the PRA. Some people showed uncertainty distribution for certain parts of the PRA.

What does it mean to say, make a PRA come true? I really don't understand how you expect to interpret those words. For example, I read somewhere that somebody has provided an interpretation of what does the word

"significant" mean in the backfitting amendment. If I remember correctly, he has said that this has been interpreted, I assume, by the Commissioners, to mean that there will be a difference of at least a factor of -- now I am stretching my memory -- five in the risk, or something, to be significant. I could be wrong, but that is what my memory tells me.

I don't know the risk measure. I don't know if there is such an understanding. But I am quite sure that somewhere, in something that he has written, he says that there is this interpretation that has been placed.

Let me, for the purpose of talking, take the number five. One could say, ten, because some people say that PRAs are only good to an order of magnitude. In fact, the staff, from time to time, has stated that.

One might mean, the staff, that the PRA comes true if the applicant doesn't calculate anything larger than a factor of 9.9 greater than what Brookhaven had. Is that coming true?

MR. SCALETTI: I don't think that we have that. We don't have a number of acceptability. If they calculated a number 9.9 times higher than what Brookhaven have, I don't know if it would be acceptable or not.

If they calculated a number which was equivalent to what we had, and agreed with that number, it would be acceptable. If we agreed with the basis for that number, it

would be acceptable to the staff. As I said, we don't have a number for an acceptable.

Getting back to the fragility, GE has proposed fragilities that would make you believe that the components are much stronger than the ones that we have chosen. The requirement is that they meet those fragilities that they have identified for the component and structures that they have identified. Those that they have not identified, the ones that Brookhaven staff has looked at, and are so identified in the SER, they must meet at least our fragility numbers.

MR. OKRENT: Or?

MR. SCALETTI: They must meet our fragility numbers.

MR. OKRENT: Yes, but there is a third path.

MR. SCALETTI: On that third path --

MR. OKRENT: Why don't you read it.

MR. SCALETTI: It says that you have to tell us that there is no significant --

MR. OKRENT: What does significant mean, I am trying to find out.

MR. SCALETTI: I can't answer that right now.

MR. OKRENT: It is your word.

MR. SCALETTI: Did you have any input into this from the standpoint of --

MR. FOREMAN: We have dealt with words in the past such as "reasonable." It is a word that tells us if it is

important. I don't know that at this point, we can tell you what the criteria is. Probably that criteria will change by the time we come to -- The quantification of that criteria will probably change two years from now from where it is today. I think that the qualitative concept is there. At the time that the review comes in, and we argue -- Something comes in, and a factor of two or a factor of three is important, I think that that will have to be discussed at that time.

I don't think that it is really possible at this point to quantify that. I don't think that you can disagree with the qualitative idea, but I think that you might find a lot of disagreement in attempting to quantify it.

MR. OKRENT: Let me find out something. Does the staff have the impression that the word "significant" in the backfit amendment means that the risk should be reduced by some factor? Are you aware of anything like this?

MR. SCALETTI: We don't have an answer for you.

MR. FOREMAN: I can give you an example of what I consider significant.

Suppose they come with a hazard curve, and we have criteria where you have to meet the mean and the mean plus one standard deviation proposed by GE. Suppose that they come up and they look at that, and the mean and the mean plus one sigma is somewhat above it. That is not necessarily automatic criteria to reject that particular site.

I think at that point, the reviewer and the staff, using all judgment, will make a judgment as to whether that is important or not. I don't know that it is possible at this point to attach rigorous criteria to that. I think there is so much uncertainty that it would be foolish to do it at this point.

MR. OKRENT: The problem is exacerbated by the fact that one is being asked to issue a final design approval, and say, we have looked at this part of the plant, and we are not going to look again at this part of the plant in the way we have looked on things we have looked at, barring some major upheaval, I have to assume.

On the other hand, I must confess that it is a little bit hard to ascertain what level of safety it is we think we are asking of the plant. I can't really tell from reading the SERs.

MR. SCALETTI: We are asking the plant to maintain at least a level of safety consistent with what we have so determined in our review of GESSAR to this point. As I said before, this is a standard design. We would not look kindly upon a different design, and the commission would discourage changing the design of GESSAR later on, after the FDA is issued, changing the design to suit a purpose in the future. It would have to go through our backfit procedures to be done.

It is a standard design, and the reason that we are

reviewing it this way is to improve the licensing process, and changes to this should not be made.

MR. OKRENT: Again, the question I am trying to understand is just what -- here are two questions -- level of safety that the staff thinks it should accomplish, what assurance, and what level of safety does it think there is this GESSAR design with what assurance. I think I have a little difficulty understanding.

I don't think I could tell my colleagues on the ACRS what the staff's answer is to either of those two questions.

MR. ROSENTHAL: When we get to the source, you will have the philosophy.

Let me tell you what we did in assessing the GE source terms is compare at one point GE, Grand Gulf, BMI 2104, and then we made up some value judgments group by group, and by the way we split up these groups as it is traditionally done in PRA. Later we went through, and Brookhaven exercised the code itself and came up with what could be called mechanistic or code predicted values. We add that to the sensitivity studies that we have.

We went through this exercise piece by piece, and nuclide group by nuclide group, and said, what is striking in the differences, and does it matter. I think that this is the level that we worked out. Now you go to the seismic, and you have seismic risk on relay chatter. You have seismic risk on

the far end of the spectrum. You have a massive containment failure which would cause a horrendous release. You have seismic risk due to breaking an RHR line.

I think the way you do, you take it apart, and you look at it piece by piece, and you say, where are the margins; how does the seismic hazard curve at a future site differ from the referenced curve; what equipment will be affected and what can be done about it. You take it apart and you examine it piece by piece, and that allows you to make judgments. That is the way you go about it.

MR. OKRENT: We were at 15.6.2, and I guess this started when I tried to learn what it meant to demonstrate that the PRA is applicable. Why don't we go on down the page and continue and see where there are questions.

MR. SCALETTI: Internal and external flooding analysis, page 15-19, Supplement Two, requires that the internal flooding analysis consider a rupture suppression pool lines, the potential for bypass pathways, and to address the impact of risk from the plant based upon these sequences.

External flooding requires that you provide information on the probable maximum flood in accordance with the PMF.

MR. MICHELSON: This is information provided when?

MR. SCALETTI: When the application for construction permit comes in that references GESSAR II.

MR. MICHELSON: When you reference GESSAR II, you are getting both your construction and operating permits.

MR. SCALETTI: Not necessarily.

MR. MICHELSON: What is covered at the operating permit stage?

MR. SCALETTI: We still have a two-stage licensing process, although the information provided and the evaluation that we have done would be considering the operating license and OL application, it does not preclude a construction permit referencing it.

Again, the documents could be referenced at an operating license stage without modification to the documents.

MR. WYLIE: Just for a little more clarification. Under the FDA idea, the documents that were approved by the FDA are introduced as a part of the construction permit application, aren't they?

MR. SCALETTI: Those documents, yes, they would be part of the construction permit.

MR. WYLIE: So the only thing left would be whatever changes or things that were identified as having to be outstanding until the operating permit stage. So you expect it to be a fairly minor amount of information at the OL stage compared with what you normally see at the OL stage.

MR. SCALETTI: Yes.

MR. WYLIE: Thank you.

MR. EBERSOLE: May I ask a minor question on this. You were talking about suppression pool bypass. I was looking at the FSAR, and I noted in there that one of the most severe conditions is introduced by no more than a quarter-inch orifice in a one-inch instrument line discharging to the drywell. I found that fantastic. Is that true?

In particular I was looking for the bypass that might be afforded by anyone of the beaucoup central rod drive supply lines. Was that negligible?

I was suspicious of the language in the FSAR.

MR. RUBIN: There is a much larger bypass in seismic.

MR. OKRENT: The question is, what is the smallest bypass that negates -- that gives you a less efficient scrubbing than you have used, not only less efficient than GE's.

MR. EBERSOLE: Let me read it to you. The FSAR claims that an instrument line orifice, a quarter-inch in diameter, failure is "maximum discharge of coolant to containment."

MR. RUBIN: I believe in Supplement Two, the bypass areas that were considered were listed in the table.

MR. EBERSOLE: That is another kind of bypass, that is bypassing the drywell. This is due to piping that traverses both of the volumes. It runs right through the drywell on through to the wetwell side, and it goes to atmosphere or

terminates there. I just found it fascinating that a quarter-inch instrument line was "defined the maximum discharge rate of primary coolant to the containment." This is typical of this weird language in the FSAR.

Incidentally, it refers to a discussion of Chapter 15 which is not there.

MR. ROSENTHAL: With respect to drywell/wetwell leakage, what we did was --

MR. EBERSOLE: This is not leakage.

MR. ROSENTHAL: Let me get up to that.

What you do is say, what was the measured bypass at Grand Gulf, and then you jacked it up by the -- you get an effective flow area, and then you jack it up by the pressure.

MR. EBERSOLE: This is not leakage

MR. ROSENTHAL: That gives you -- You can conceptually say, should I expect GESSAR to be built any better than Grand Gulf. Then you get the flooding, and that gives you some sort of lower boundary of what it takes on the integrity side.

MR. EBERSOLE: You are talking about a different topic.

MR. ROSENTHAL: I understood, but I wanted to get both out.

Then when we look at -- Remember that the vaporization release is pumped into the poor before you get the core

on the floor, and then you worry about vaporization. You look at the driving forces, and --

MR. OKRENT: That is for a specific scenario.

MR. ROSENTHAL: Yes, a non-LOCA scenario.

MR. OKRENT: Yes.

MR. ROSENTHAL: Then you say, is that well area, which would consist of a lot little cracks -- We effectively considered cases --

Now let's go to dry wells and wet wells, and what we do is look at the RBCW line, and look at the RCIC line, because those are big lines, and we have had some operating procedures that say that we should worry about those.

We are in the course of doing a mechanistic new source term of dent V type calculations with those bigger lines, the RBCW and the RCIC lines, and what we conclude in SER Four is that we do not believe that they would significantly change the risk profile. There was some argument about the probability of those events, and we are doing those calculations to support some requirements on the isolation valves.

The table that I referred to did talk about bringing the pressure vessel to outside containment, and listed from 46 steam lines down to three inch main steam drain pipes. This may still not answer your question.

MR. EBERSOLE: I was just looking at the line that

traverses the wetwell having originated at the primary cooling system, and looking at the discharge on the backside of the suppression pool through the pipes, not through the cracks in on the walls.

MR. FRAHM: We did consider a number of bypasses flowing out directly to the outside of the outer-containment. These are in SER Supplement Two. These were involved in questions to GE as to the potential for direct bypass from all of these, and this is the response. The table is based on the response from General Electric. The items are listed on the left side here. Here are the ones from the reactor pressure vessel directly outside of the table. These are the isolation areas that GE cited for each of those.

We have some discussion in the SER, but it is not a great deal.

MR. MICHELSON: You are talking about outside of secondary containment. There are a number of them inside of secondary containment which bypass the pool, and in essence release to the secondary containment. Those are, even, perhaps, in some respects more troublesome if a particularly large line breaks.

MR. EBERSOLE: The very first one, the one with the orifice, that is the one that is quoted in the FSAR as the one that delivers maximum discharge of coolant to the containment.

MR. MICHELSON: Those are some kind of funny words.

MR. FRAHM: The words are funny there.

MR. EBERSOLE: I found this all through the FSAR, which discredits the whole cotton-picking thing.

MR. KNECHT: I don't know what language you are quoting from, but when we did this bypass study, the instrument lines came out as one of the largest probabilistic contributors.

MR. EBERSOLE: The quarter-inch orifice?

MR. KNECHT: Because there are so many of the lines.

MR. EBERSOLE: What about control rod drives.

MR. KNECHT: There are a lot of lines there, too, but that one was a little bit less because of the restriction to the lines.

MR. EBERSOLE: I suspected that.

MR. KNECHT: When you consider how restricted the control rod drives are in passage from the vessel, that was smaller than the quarter inch.

MR. EBERSOLE: You mean due to seal leakage and so forth.

MR. KNECHT: Right.

MR. EBERSOLE: I figured that this was probably the case.

MR. KNECHT: I don't understand where you are quoting but I think what you are getting at is the conclusion that I just gave you.

MR. ROSENTHAL: Mr. Frahm, if you would explain the additional requirements on GESSAR with respect to the isolation valves, I think that some of the members would appreciate it.

MR. FRAHM: We could do it now, but there is an item on the agenda, I thought. The staff recommended that it has to be performed to show that the isolation valves will close against static as well as dynamic loads. I think that it is Item 15.

MR. OKRENT: Why don't we let that go until then, and then ask the questions related to that at that time.

We are going down the first page slowly. What about systems interaction.

MR. RUBIN: I would like to defer that one because we have someone coming down this afternoon, and it is scheduled on the agenda for later on.

MR. FRAHM: It just identifies the four requirements that must be addressed by future applicants. We will go into that in more detail later.

MR. OKRENT: Okay.

Is there any seismic induced systems interaction required for GESSAR? Do you know what I mean?

MR. RUBIN: Yes. I can only speak to the design improvement area.

MR. OKRENT: Let's say, yes or no. Is there something required now with regard to a seismic system interaction?

Failure of non-seismic systems impacting?

MR. SCALETTI: Yes.

MR. OKRENT: It is not on this list. Where is it written?

MR. SCALETTI: The place I am most familiar would be in NUREG 0588.

MR. OKRENT: I don't think the staff has a requirement right now that all plants do a study of possible interaction between non-seismic systems and safety grade systems. In fact, it is a recommendation, in effect, of the seismic panel, or at least a highlighted area where you want to work, if you want to improve seismic safety.

MR. SCALETTI: But the environmental qualification requirements specify that all equipment that is Class I, which would be seismic, must be shown to be seismic, and for safety grade, the safety function must be demonstrated. It also must be shown that it would not interfere with another system.

MR. OKRENT: It would not, but that relates to seismic Class I systems. Right now, as far as I know, there is not a requirement for a systems interaction study which looks at the possible effects of non-seismic --

MR. KNECHT: Dr. Okrent, this is another item for this afternoon. Perhaps, when we have the systems interaction here, we can try to address that.

MR. OKRENT: But is not currently in the interface

requirements or in any requirements; is that correct?

MR. SCALETTI: That is correct.

MR. OKRENT: As I understood you earlier, there are no quantitative requirement on interface unless they are specifically listed somewhere on these sheets?

MR. SCALETTI: No. They could be listed in the SER some place, such as the tables on fragility. It could be in the FSAR on GESSAR II, if it relates to the interface items that we have so identified.

MR. EBERSOLE: How does GE impose requirements on a system. I will take a case in point, a plant, yesterday, I forget which one, burst loose with 25 tons of CO2, blew up room and poisoned people all over the place, and it wasn't a seismic event, it was just malfunction of some lousy controls. How would GE, for instance, control the design of the CO2 or water, the spray system in the fire protection complex to preclude damage to critical shudown systems?

MR. KNECHT: The same way that we control the design of all of our systems. We don't distinguish in the control of the design between safety grade equipment and non-safety grade equipment.

MR. EBERSOLE: You would set your requirements on the balance of plant.

MR. KNECHT: That is correct.

MR. MICHELSON: Is fire protection balance of plant

on GESSAR II? I thought that you covered fire protection in the nuclear island?

MR. VILLA: We do, some of it.

MR. MICHELSON: So there is no interface design document needed. It is fully defined by the FSAR commitments.

MR. VILLA: That is right, but we still would have to control the design requirements.

MR. MICHELSON: Wait a minutes you are designing it, you are providing the design requirements as a part of GESSAR II.

In the balance of plant, outside, in the turbine building, there you provide an interface requirement, if there is an interface, between fire protection there and fire protection inside the nuclear island.

You are already fully defining the nuclear island requirements, I assume. When I read what they are, I assume that this is it.

MR. KNECHT: Yes.

MR. VILLA: Yes.

MR. SCALETTI: There are a couple of interface items related to fire protection. One is the water supply system, and is related to transformers, Section 9.5.

MR. MICHELSON: The inference is that there is no interface between balance of plant fire protection and the nuclear island fire protection, other than those interface

items.

MR.SCALETTI: Correct.

MR. MICHELSON: That is the inference.

MR. SCALETTI: Yes.

MR. MICHELSON: That was my understanding and I just wanted to make sure.

MR. RUBIN: Let me add that we have a specific seismic interface requirement for the UPPS system. Failure of non-seismic equipment structures for the UPPS to performance backup heat removal.

MR. EBERSOLE: You make that to the UPPS, when it should be general, at large.

MR. OKRENT: It is only on UPPS.

Ultimate heat removal is still in the balance of plant, is that right?

MR. SCALETTI: You mean ultimate heat sink?

MR. OKRENT: Yes.

MR. SCALETTI: Yes.

MR. OKRENT: If I understand correctly, there is not an interface requirement on the reliability of that system, a numerical one?

MR. SCALETTI: The staff has not identified one.

MR. KNECHT: In the interface table, which is part of the GESSAR, I forget the table number, there is a specific requirement on the emergency service boiler for reliability,

that it be consistent or less than the value used in the PRA. In different trees, they have a single value.

MR. EBERSOLE: Let me ask a question about this.

The ultimate heat sink can be the ocean, the river, the creek, or whatever, but then it also can be the atmosphere. At the plant, it is the atmosphere. It being the atmosphere, it seems quite reasonable that should come under the domain of the entire plant furnished by GE because it is no longer a geographic characteristic, you have atmosphere everywhere.

It seems to me that you should have in your provision that the interface is going to turn out to be an atmospheric heat sink, that you should check it over in its entirety and package it. In fact, it would be a hell of a lot better plant, on a judgmental basis, if you used the atmosphere rather than the nearest creek.

MR. KNECHT: We do that when we use the UPPS.

MR. OKRENT: I must confess, I seem to have a mixture of answers as to whether there are quantitative requirements of an interface nature.

MR. SCALETTI: There are quantitative requirements.

MR. OKRENT: Let's leave the seismic part, and talk about the others.

MR. SCALETTI: There are quantitative requirements that have been identified in, I believe, Table 1.9 of GESSAR, which is 40 or 50 pages of specific interface requirements.

As Mr. Knecht said, there are assumed numbers in some of those interface requirements. Those are applicable to the design. The staff has not culled them out specifically and put them in the SER per se because they are a part of the application, and they are in the GESSAR II documents.

MR. MICHELSON: Are you saying that the interface requirements include reliability requirements?

MR. SCALETTI: Some do.

MR. MICHELSON: In some cases.

MR. OKRENT: I found it rather formidable to go through all of those pages trying to see, was there a quantitative requirement. They mostly looked deterministic, if I may use that adjective. I would appreciate, by tomorrow, knowing just what quantitative requirements General Electric is placing on the balance of plant.

MR. MICHELSON: Reliability requirements.

MR. RUBIN: We have also asked that complete documentation and a submittal of that be done by an applicant when he comes in with a plant in the future.

MR. OKRENT: We are reviewing the FDA at this stage, and I am trying to understand and looking at interface requirements as they are now. I am just trying to see what, in fact, the actual requirements are, which should have a quantitative aspect.

I don't want to miss some because there are so many

pages, I got tired before I got finished.

MR. SCALETTI: There are not that many as I remember. I know that we put one on loss of off-site power frequency, and one on emergency service water. I think that we have another one on airplane crashes. There are more.

MR. OKRENT: I went through quite a few pages, and I didn't see any.

MR. RUBIN: The staff judged the list to be incomplete.

MR. MICHELSON: How is the list completed? Is there a requirement that all FDA applicants submit a complete list?

MR. RUBIN: Yes.

MR. MICHELSON: Applicants using the FDA, I should say.

Is that stated explicitly in an SER?

MR. RUBIN: Yes, it is.

MR. OKRENT: I don't understand the logic. You are approving an FDA. You have done a PRA review which used certain numbers, and so forth, or assumed certain numbers. So it seems to me that what the staff is saying is okay, there are either some numbers, you have decided, they could have made this a factor of ten less reliable, and it still would have been okay. That's okay, no problem there. But there were certain things in there.

For you to say, this is all not to be specified

until someone comes in with an application --

MR. RUBIN: I don't think that that is a correct interpretation.

In the course of the staff's PRA review at Brookhaven and in-house, where questionable assumptions for the data were used, they were investigated, and it is highlighted. The staff did not do the PRA. General Electric did the PRA. Every number in the PRA was verified. Where we found areas that we thought were sensitive to the risk profile or areas of high uncertainty, we highlighted it, we looked at it in more detail, we brought it to the attention of our management, and to your attention, and we found it necessary to requantify the results.

Areas where we felt there were items that involved some sensitivity, such things as fragility, the hazard function and similar areas, such things as a particular component reliability, or availability which would likely have a small impact on the results, we did ask General Electric to identify and carry through a process where all the assumptions of the PRA would be followed through by an applicant when the plant was referenced to make sure that nothing was overlooked.

They submitted some material demonstrating what their approach would be, identified the numerical values that they thought were important. We looked at that list, and we felt that it was not complete, that they had deleted some items due

to a rationale that we were not convinced was completely valid.

We asked that very complete documentation be provided on all areas when the applicant came in. We will be looking for that when the plant is referenced. However, the areas that we think are sensitive, we have identified and we have brought them to your attention.

MR. MICHELSON: Is that defined in a particular SER?

MR. SCALETTI: It relates to the very first interface item.

MR. RUBIN: This is for the service water, and that for the future may turn out to be non-conservative. Hopefully, when the applicant comes in and he has more operational experience in the particular model pump, and we will make an assessment. But to be realistic about it, we have to admit that a small impact like that will most likely be dwarfed by something such as a site hazard function. We have tried to put the majority of our attention in the sensitive areas, which is where the risk/benefit is.

MR. OKRENT: Let me ask the subcommittee members if they have questions concerning matters written on page 2.

MR. MICHELSON: I have a question on the ice water system. In essence, the little speech that you just made to me applies to that particular item.

Page 2, Appendix C, reliability of open cycle service ice water, this is the chilled water system, and that is what it should say.

MR. SCALETTI: It is open cycle service ice water, and not chilled water.

MR. EBERSOLE: What was the impetus for using chilled water, I would like you to get rid of it, in the safety context. I can understand it from the human comfort standpoint, but why for safety?

MR. KNECHT: I don't know the answer.

MR. MICHELSON: I think the emphasis is to keep the air handling units half the size. Some of those coolers can get enormous if you don't cool the water down, so I expect that this was the impetus, but I don't know.

You have plants where you don't need to chill the water, and in that sense you would eliminate that feature. It is not desirable to ever have to chill the water on a safety system.

MR. KNECHT: It has to do with the human comfort.

MR. OKRENT: What about cooling the water, there is not, as I understand, a quantitative requirement.

MR. SCALETTI: The PSI requires that they calculate the coremelt probability, and this asks them to demonstrate significant changes.

MR. OKRENT: The word "significant" is define how?

MR. SCALETTI: No change, or very little impact.

MR. OKRENT: Does it have to be the backfit definition? Let's say that an applicant comes in with a CCW, and my PRA says that the risks are lower than Brookhaven calculted, then there has been no significant change, I assume.

MR. SCALETTI: If they are lower than Brookhaven calculated, yes.

MR. OKRENT: They are twice as large as Brookhaven calculated, is that significant?

MR. SCALETTI: I don't know.

MR. OKRENT: When is it significant?

MR. SCALETTI: I can't answer that.

MR. OKRENT: If you had to use the backfit definition, how much larger would it have to be before you could make a case, or you would even bring it up to the EDO?

What does the word "significant" mean?

MR. RUBIN: If you are looking at microscopic levels, the assumption inthe PRA would be, you have a three train system, or a four train system, and the pump available was supposed to be such. The first cut would be looking at a broader level, did the architect-engineer fulfill the requirements of General Electric or the assumptions in the PRA, are we looking at an equivalent system.

If we start seeing major deviations between what the architect-engineer and what the utility has actually designed

and installed based on the PRA assumptions, you have to start getting down to more details, back to the BNL assessment of the PRA, and start to try to quantify the impact.

At that point, your question becomes much more relevant, what is significant.

MR. OKRENT: I am sorry, I am trying to understand the word "significant." If I understand correctly, you will pretty much have to go to the backfit rule, correct me, if I am wrong, if in fact you want to compose a modification, certainly to GESSAR II, perhaps even in the bounds of the plant if it looks like what was in the GESSAR II PRA.

MR. SCALETTI: We do not have to go through the backfit process to impose -- to have a modification imposed upon the service water system which is outside of the scope. The only place that you would have to go through the backfit process on GESSAR would be on those parts of the design that have been reviewed and on which the final design approval has been issued.

To make a change to the service water system, which we don't have any way, to bring it into line with our risk assumptions on GESSAR II as they are now, does not require us to go through the backfit process.

MR. MICHELSON: Could I have a clarification on your statement. The interface document is a part of GESSAR II, as I understand it, GE's interface document.

MR. SCALETTI: Yes.

MR. MICHELSON: If a utility meets the interface document requirements, and then you say that you have to make a change, that is then a backfit, isn't it?

MR. SCALETTI: No.

MR. MICHELSON: He has met the interface document requirements, whatever they are. If there are none, then he can do what he pleases, I guess. But as long as he meets any stated -- If he does not meet stated interface document requirements, then he has to meet them. But if they are not stated, I think that it is a backfit if you ask him now to add something to the balance of plant system.

MR. SCALETTI: It may say, provide a service water system to provide for the heat sink.

MR. MICHELSON: Yes.

MR. SCALETTI: The heat sink has not been defined as of yet. It is subject to and it will be subject to the standard review plan which is in effect six months prior to your filing the application. So you review to that standard.

MR. MICHELSON: You are already getting into the question we raised at time zero here this morning, what does an FDA cover. I thought that the FDA included the interface documents and their requirements.

MR. SCALETTI: It include the interface documents.

MR. MICHELSON: Then you can't diddle with them any

more. That is all he has to meet.

MR. SCALETTI: The interface document, though, the interface requirements, they don't specify the design.

MR. MICHELSON: This is unfortunately the case in many cases, they don't specify enough of the design to even know what the design might look like.

MR. SCALETTI: They don't specify the design, and more than likely would no longer be an interface.

MR. MICHELSON: Yet, you are accepting the interface document as a part of the FDA. You are approving the interface document when you issue the FDA.

MR. SCALETTI: Those interfaces, as provided by General Electric now, and as identified by the staff are sufficient, and that information is provided to the staff to bring it in line with our regulations.

MR. OKRENT: I get the impression, from my limited look at some of the pages of the interface requirements, that they tend to resemble what you would extract from the SRP. Maybe the wording isn't the same, but --

MR. SCALETTI: I would hope that they wouldn't be.

MR. OKRENT: I am not sure what it is that you are telling me. In other words, they are sort of qualitative, sometimes deterministic. They don't just say, you are going to supply an air system, if that is what is involved. There will be various things of the sort you would see in the SRP.

MR. SCALETTI: That is correct.

MR. VILLA: You remember we have had this discussion before, and we went back to our documentation and dug out the interface requirements for the emergency service water. They are pretty extensive, besides being extensive, they are pretty deterministic.

MR. MICHELSON: I think that a previous meeting, we had asked for the interface document on the component cooling water. Was that supplied?

MR. SCALETTI: Yes.

MR. MICHELSON: So we have that on file.

MR. SCALETTI: Yes.

MR. MICHELSON: I will look at it.

MR. EBERSOLE: The old BWR, the component cooling was RBCCW, Reactor Building Component Cooling Water, and it was a cheap system, screwed pipes, non-seismic, not safety grade, no nothing. You managed to get a design out with that, and there was no component cooling at all.

In view of the fact that it is an impediment from the primary heat source and the primary heat sink, almost invariably it turns out to be a detriment to safety. However, it affords better doability and maintenance, and so forth, if you use treated water on certain aspects of the design.

What is the criteria that GE uses and imposes on its buyers of its plant to either have or not have component

cooling water in view of the fact that it is a detriment to safety as a barrier to the heat flow paths?

Service water directly connected to primary coolant across the heat exchangers is the most direct way to get heat out, and that is what you do, even though the water is contaminated post-accident.

What is in the rules that says, yes, you are entitled to use component cooling or, no, you must use direct cycle cooling of primary water?

MR. KNECHT: To the reaction pressure vessel?

MR. EBERSOLE: Yes, or whatever.

MR. KNECHT: The way that we control it, we don't control so much the design as we do the water quality.

MR. EBERSOLE: You mean in the component cooling system.

MR. KNECHT: In the entire reactor coolant.

MR. EBERSOLE: Yes, but you are face to face with sea water, with the reactor water in the condensor.

Let me tell you what we did. We have a fellow study, which you can get, if you want, which says that there is no rhyme or reason or pattern about when you do and when you do not use the component cooling system. We looked across all the reactors, and it is a random process as to whether you use direct cooling or component cooling. If you interpose treated loops. There is no pattern of consistency at all, and I think

that there should be some rational set of reasons when you do or do not put this in inpediment to the cooling in place.

MR. KNECHT: Certainly, you have to meet all of the requirements of the immediate cooling system.

MR. EBERSOLE: What is worse than an RHR water, that is what you have now.

MR. KNECHT: An RHR for what?

MR. EBERSOLE: An RHR exchange, you use service water.

MR. KNECHT: It is pretty strict on what kind of filing you are allowed --

MR. EBERSOLE: Most BWRs use component cooling, and perhaps some boilers do, I am not sure.

MR. KNECHT: I can't recall off-hand all the components that we have in cooling water. The ones that come to mind are things like recirc pump seals coolers, and some reactor clean up stuff. These are the systems that are running 100 percent of the time when the plant is operating.

MR. EBERSOLE: Yes.

MR. KNECHT: I think that those are the types of systems that we use with the component water supply.

MR. VILLA: The RHR has better efficiency, and all that, and it has the direct cycle cooling, but it is also not a constantly operated system.

I can't answer you with a broad generic philosophy.

MR. EBERSOLE: There should be a rationale for using it or not using it.

MR. VILLA: That system is also defined in terms of which ones are on that.

MR. EBERSOLE: My experience is that if you turn it over to the A-E and the utilities, you can never forecast it.

MR. VILLA: That system is designed. It is defined already. It is not something left to the future.

MR. MICHELSON: Are you saying that it is in your scope?

MR. VILLA: Yes.

MR. MICHELSON: And the reasons for it are explicit, I guess.

MR. VILLA: It is probably there in the design documents, and I will have to dig it out. I just can't tell you where it is.

MR. OKRENT: We had better move along, we are now at least a half-hour behind in our agenda. I think we talked about the seismic things. Can we skip to what is Supplement No. 4, and talk about venting procedures later. RCIC room cooling is left to study and judgment by the staff.

Appendix C, Safety Implications of Control Systems, if I understand correctly, this is unresolved, open, or resolved, or what?

MR. SCALETTI: Page A-47 is partially an interface

and partially resolved. It is in two parts. One is the impact of non-safety related control systems on the safety of the plant, and the safety systems. The other postulates an open field transient. The staff feels that the open field transients have been adequately addressed. This interface relates directly to addressing the outcome of USI A-47.

MR. OKRENT: Can I ask that the staff review the frequency of initiating transient challenges and make a conscious decision that these were adequate, or that it was not in their bailiwick, or that they take steps to try to reduce the frequency of challenges initiated by transients. Where did you come out on that?

MR. SCALETTI: It is about 8.7. The evaluations to support the control systems are outside of the scope of GESSAR II, and we made no determination of that. That portion of the USI has to be resolved at the time the referencing applications come in.

MR. OKRENT: Anything else on that last page?

MR. MICHELSON: Could we back up just a minute for clarification.

MR. OKRENT: Go ahead.

MR. MICHELSON: On the RCIC, does General Electric consider that to be an engineered safety feature?

MR. VILLA: Yes.

MR. MICHELSON: Thank you.

MR. EBERSOLE: Would you have a look at that system in regard to its interdependency on AC function beyond just running to it. You have certain valves in it, so there is a certain amount of residual dependency on that system, which, by the way, keeps you, in the present mode, I think, with the pipes propped full open so that you don't have to open them if you get steam.

I think there should be something done to look at that AC dependency of the main steam valve and other valves. You have motor driven valves, which are not all direct current, which makes them dependent on the presence of AC to do certain things.

MR. VILLA: To close.

MR. EBERSOLE: To close if they are open.

MR. VILLA: They are normally closed.

MR. EBERSOLE: One problem might be, for instance, the safety if the valves were closed in the first place, and you wouldn't have the presence of those pipes out there.

MR. KNECHT: One of the valves is going to be closed with a bypass around it.

MR. OKRENT: Which is the one normally closed?

MR. KNECHT: The big valve is AC, and it is normally closed.

MR. EBERSOLE: How do you get steam to it without AC?

MR. VILLA: You rely on the bypass.

MR. EBERSOLE: But most bypasses are just pressure equalization.

MR. VILLA: There is a one-inch pipe.

MR. EBERSOLE: That is for pressure equalization.

MR. VILLA: It is also sufficient to start to roll the turbine.

MR. EBERSOLE: Yes, but how are you going to open that valve if you don't have any AC. That is the reason that you have them open now.

MR. KNECHT: It is just a warming line.

MR. EBERSOLE: It is just a general question of looking at AC dependence.

MR. VILLA: It is a DC valve.

MR. MICHELSON: Are they both DC valves. The one that is normally closed is DC.

MR. VILLA: The one that is normally closed valve is DC.

MR. MICHELSON: Is it the one next to the steam line source?

MR. VILLA: Yes.

MR. EBERSOLE: The one normally closed is DC.

MR. VILLA: The normally closed valve is the DC valve, and it will open up when you start the system.

MR. MICHELSON: You can tolerate the time required

for the valve to open.

MR. VILLA: Right.

MR. MICHELSON: That used to be the argument, you couldn't tolerate the time required for the valve to open, and so forth.

MR. EBERSOLE: That eliminates then standing presence of a half pressure line that could emit full flow to the secondary building.

MR. VILLA: Yes, it takes care of that problem.

MR. EBERSOLE: I wish you would go back and make all operators do that.

MR. MICHELSON: It would be nice if we could fix all the pipes, it greatly reduces the hazard of the line. You have on this one.

MR. VILLA: We have made that change.

MR. MICHELSON: Good.

MR. VILLA: The DC valve is on the inboard side.

MR. MICHELSON: It is source side.

MR. EBERSOLE: You said that you put the AC inboard because it can tolerate the environmental problems. The DC has brushes, and things.

MR. VILLA: I am getting fuzzy on that point.

MR. MICHELSON: Maybe you could clarify it for tomorrow. It is important to know how you decided to fix it for GESSAR II in terms of argument along the terms of what one

might do for older plants.

MR. VILLA: Fine.

MR. OKRENT: On interfacing LOCA, you talk about requiring, on a prototype basis, testing. Would such testing have been the thing, an important thing for some of the recent events that have actually occurred where we had a loss of isolation of the high pressure and low pressure systems on BWRs, or was it something completely different?

MR. SCALETTI: We are having somebody come down this afternoon related to GSI 105.

MR. OKRENT: So you want to wait until then?

MR. SCALETTI: Yes.

MR. OKRENT: Okay, we will wait until then.

MR. ROSENTHAL: I have an answer on the ignitor side of your question.

MR. OKRENT: Yes.

MR. ROSENTHAL: The rule does not require ignitors of seismic quality. The ice condensor and Mark III owners universally have seismically mounted ignitors, all the plants have done that. The cable trays are already qualified, and the diesels.

MR. MICHELSON: The funny way of your answer leads me to believe that if I haven't thought of some of the either gaps, you have not covered them. It is the igniting function that is seismically qualified, and the answer ought to be, yes,

and that is all there is to it. Don't tell me about the mounting of the trays. Just tell me that the function is qualified, if that is the case. Your answer is, yes, it is.

MR. ROSENTHAL: Yes. Is it a requirement, no.

MR. MICHELSON: Those are good answers.

MR. ROSENTHAL: It may be a requirement. Whatever comes out of the hydrogen control owner group review of Grand Gulf. The rule does not require that the ignitors be seismically qualified. There is no other requirement on seismic quality.

MR. OKRENT: Is there a fragility number for this?

MR. ROSENTHAL: Will this be qualified to at least the SSE, the answer is, yes.

MR. OKRENT: Is there a fragility estimate for the ignitors?

MR. EBERSOLE: They are a diesel sparkplug.

MR. ROSENTHAL: I don't know.

MR. OKRENT: The ignitors, which it is important to operate in case you lose off-site and on-site power due to an earthquake, and you want DC power back up, diverse power, may themselves not be functional.

MR. RUBIN: There is a requirement that an evaluation be made of the backup power system, including a failure design that would be beyond SSE, such as a differential building. So we do expect that they will be operational.

MR. OKRENT: That is not my question. I have no idea up to what size earthquake you have high confidence that there is a low probability of failure for the ignition system in an earthquake. I think that this is something that you had better think on.

MR. EBERSOLE: It ought to be the minutest challenge that I can think of.

MR. OKRENT: Can I ask the staff two more short questions. This seismic panel that is supported by NRC funds, that is trying to develop seismic safety research efforts, have estimated that they don't have the information on which to judge that there is a high confidence that there is a low probability of failure with reactor internals below 0.3 G, I am saying, inother words, if you look at 0.3 G or lower.

They also, on the sheet that I have here, and I don't have their final report with me, but Idon't think that it has changed, they have a similar comment related to the available for emergency, what they called, early emergency core cooling .

I recognize that you have estimated fragilities and gone through your own reevaluation of the seismic PRA. What I can't tell is how Brookhaven, for example, factored into their thinking what I will have to call the reservations of this seismic panel group, which includes Kennedy, Cornell, and Budnitz, and other well-known names, that they lack

sufficient information to have a high confidence that there is low probability of failure for these specific systems.

Can somebody help me in that regard. Does Brookhaven know something that they didn't know, or what?

MR. SHIU: I am unable to provide the information because I missed the part of the discourse. Could you repeat it?

MR. OKRENT: You are familiar with the work of the seismic panel.

MR. SHIU: Yes.

MR. OKRENT: And their input concepts. This chart that they have -- this is actually a presentation that they made -- where they looked at various functions, if you will, and made an expert judgment based on their experience as to which systems did they think you can have a high confidence of low probability of failure, from what they knew now, as a function of the acceleration. For the lowest range, which is less than 0.3 G, they put two things in the category: reactor sub-criticality, and that related to the internals; and early emergency core cooling.

They don't say here, do they mean both PWR and BWR. They just left it vague in that regard, and it is LWR at the moment.

I am trying to understand how that kind of information is impacted, if at all, by what the staff has been

telling me about the seismic credibility of the GESSAR II plant.

MR. SHIU: The seismic panel work was done subsequent to the BNL review. As a matter of fact, as you know, one of our consultants, John Reed, is one of the panel members. Some of the concerns reflected in the BNL review, such as the lack of adequate information to complete a thorough review of the reactor internals, is reflected also in the panel's review.

With regard to the statement about the early ECCS system, I believe they initially principally focusing on the pressurizer, the PWR, I am sorry, and they have spent less on the boiler. Subsequent to that, I think that they are still -- I think that one of the major things that I have gotten from the members is that there is a lack detailed information to allow someone to come up with a reasonable fragility value.

A lot of estimates have been thrown in the previous seismic PRAs, certainly we believe that they are conservative. However, in order to improve on that, and in order to get a better handle on that, there is really a lack of information there.

MR. OKRENT: Maybe tomorrow the staff can tell us how they have factored in the initial findings and recommendations of the seismic panel into their seismic review. Or, if they have not, they can tell us that, and they might tell us whether they can estimate in any way the possible impact, and

one of the things they recommended, for example, was the seismic system interaction study. They also pointed out to various areas, likely failure points, I think, either in that paper, or an accompanying paper by members of the panel.

For example, you may assign a fragility to it, but do you get it. How does the staff deal with some of these specific reidentified points. Think on it for tomorrow, we will be interested to hear.

MR. WYLIE: On this interface, on the last page, you refer to ten hour station battery requirements. I think you confuse the issue. You are talking about the vital control and instrumentation batteries.

MR. SCALETTI: Yes.

MR. WYLIE: I think that by choice of words, you are confusing the issue, because station batteries refer to something else generally, non-Class I batteries, for example. In the supplement, you go into details, I think, and you describe what you are trying to achieve there.

MR. SCALETTI: We paraphrased what is in the statement and I agree with you.

MR. OKRENT: I am going to suggest that we break for lunch now, even though it is not lunchtime on the agenda. When we come back, we will pick up Item Ten, and hopefully we can save some time on Item Twelve. We have been seeing quite a bit of Item Twelve now, and it should be very much the things

that are most significant.

Can we take 45 minutes instead of an hour for lunch, and be back at 1:05.

(Whereupon, at 12:20 o'clock, p.m., the subcommittee meeting adjourned, to reconvene at 1:05 o'clock, p.m., the same day.)

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A F T E R N O O N   P R O C E E D I N G S

(1:13 p.m.)

MR. OKRENT: The meeting will be convened. For the moment we will go on to Item 14.

The Staff can tell us in what way systems interaction will or will not become an interface requirement.

MR. SCALETTI: I don't believe we can do that right yet, because our guy is not here to discuss that.

MR. OKRENT: All right.

MR. SCALETTI: We could start on Item 13.

MR. OKRENT: All right. Let's start on Item 13.

MR. SCALETTI: My name is Dino Scaletti. I need to state that again.

Starting with USI A-43, containment emergency sump reliability --

MR. OKRENT: I'm going to try something and see if -- I guess I would like to pose a general question.

If A-43 or B-6, for example, or B-58, is in your opinion resolved for GESSAR but is still an open item in general, could you just summarize what it is specifically that GESSAR has done, in your opinion, that Grand Gulf hasn't done that makes it resolveable?

MR. SCALETTI: Okay. I will try.

MR. OKRENT: All right.

MR. SCALETTI: Starting with A-43, the concern

for A-43 is debris blockage of the RHR strainers. All right.

The resolution as far as the Staff is concerned on GESSAR is the alternative core makeup that would be provided by UPPS. So, if you did have a severe accident and you did have -- although the Staff, in addressing this item in the SER, indicates that there is a very low probability of having a problem due to the oversized strainers and due to the position of the RHR intakes in the suppression pool.

However, with the alternative of additional core makeup system independent of the suppression pool, independent of RHR blockage, we feel this item is resolved for GESSAR II.

MR. EBERSOLE: May I comment?

MR. OKRENT: Go ahead.

MR. EBERSOLE: On this topic, in Paragraph 1.826, that's the place where we define the matter of the sump performance. Then, they pick up with debris, et cetera.

And GE blindly prescribes these hydroclones in the total absence, if any, of what you might call a physical source term for what the hydroclones are supposed to digest and separate.

There is a -- they make reference to the quality of the paint. There is none about the plaster insulation

#1-3-SueW

or any other physical debris which may be presented to the sump. And it isn't merely the sump strainer; it's the systems beyond the sump strainer, including the seals, the journals, the elastomers and other things that are degraded by the presence of grimey substances which successfully got past the strainer.

So, A-43 is supposed to be addressing this, but I would think that GE would circumscribe this fully and defend why they have hydroclones versus deep bed filters, or whatever else it takes to protect their vulnerable bearings which shouldn't be vulnerable in the first place.

Do you follow me?

MR. SCALETTI: Yes.

MR. EBERSOLE: So, here is another one of these loose, wondering, non-based prescriptive requirements for hydroclones without even the first piece of identification as to what they are supposed to digest.

And that's typical of what I find in the FSAR all over the place. Now, I hope that's critical, because I intended it to be.

MR. HERNAN: I'm Ron Hernan with the NRR Staff. I'm not addressing your concerns specifically, Jesse, but I wanted to bring to the attention of the Subcommittee that the A-43 issue has recently been presented to an ACRS Subcommittee, and the day before yesterday it was presented

#1-4-SueW

to CRGR.

The Staff's resolution on A-43 will require no backfits on any reactors. It will offer the information that has been obtained in a resolution or study of this issue to licensees and applicants primarily from the standpoint of evaluating potential changes in their insulation scheme, their thermal insulation scheme.

I don't know how much that has to do with the GESSAR thing specifically, but the fact is that there will no backfits required by the Staff on A-43.

MR. MICHELSON: Well, that's not a question here I hope. We are dealing with future plants, not backfits.

MR. HERNAN: I understand that. But I was trying to address Dr. Okrent's statement, USI's that are still not resolved, this one is essentially resolved except for the formality of going out for public comments.

MR. MICHELSON: By resolved, you mean in terms of previous or present plants?

MR. HERNAN: Correct.

MR. EBERSOLE: Was the rationale of CRGR that they were going to discount the larger scale breaks, which is the current popular thing and thus would not entertain the notion of energetic events which would scatter tons of plaster all over the floor?

#1-5-SueW

MR. HERNAN: I don't believe that that topic was discussed specifically by CRGR the day before yesterday. It have been in a previous meeting which I was not in.

MR. EBERSOLE: Well, this is a new plant. I think we should recreate the fortunes of the past.

MR. MICHELSON: Well, I'm having difficulty understanding you. I think you indicated that you are dealing with large LOCAs here.

Is that what you meant?

MR. SCALETTI: Yes.

MR. MICHELSON: And the problem only exists if you have I think fairly large LOCAs, right?

MR. SCALETTI: That's my understanding.

VOICE: This A-43 was large break LOCAs.

MR. MICHELSON: And then would you repeat real briefly what you said again, because maybe I misunderstood?

MR. SCALETTI: What I said was, the resolution as far as GESSAR is concerned -- well, the explanation in the SER says that we believe that it probably would -- due to the oversized strainers on the RHR intakes, the UPPS system, the alternative makeup system, we believe that A-43 is resolved.

MR. MICHELSON: It's the UPPS that bothers me, because I thought UPPS was not designed for large break LOCAs or anything like that. And, therefore, what does it

#1-6-SueW

have to do with this argument at all?

MR. SCALETTI: Well, by the time the strainers would be plugged I would believe that it would be --

MR. MICHELSON: Well, you will have to go through the scenario for me to show me you have done the analysis that shows that UPPS will handle large break LOCAs if they cause a plugging of the input strainers or the cyclone separators, or whatever.

I haven't seen that kind of analysis. Have you done that?

MR. SCALETTI: No, we haven't.

MR. MICHELSON: Until you do that, then how can you make your statement?

MR. EBERSOLE: In fact, I think there is two distinct phases of UPPS --

MR. MICHELSON: Well, hold it. Let me -- I would like to get the answer to my question first. And then you can --

MR. SCALETTI: No, I said we have not done that analysis.

MR. MICHELSON: Okay. So, really what argument are you presenting to me?

MR. SCALETTI: Well, the argument we presented is that we feel -- I was just summarizing briefly -- I will have to go back to the SER Supplement 4.

#1-7-SueW

MR. MICHELSON: I'm interested now in the UPPS aspect. Now, you are taking credit for it somehow as helping us out of this problem.

And have you done the analysis that shows you that it will even be effected for this case?

MR. SCALETTI: I believe it will.

MR. MICHESLON: That's a belief. But I want to discuss it.

MR. SCALETTI: I clearly cannot support that with an analysis. However, it is going on the assumption that the strainers are blocked immediately.

MR. MICHELSON: No, no. I'm not going on any assumption. I just want to know the basis for your statement.

MR. SCALETTI: The basis for my statement is that there is an alternative makeup to the core. It does not rely upon the suppression.

MR. MICHELSON: Now, what bothers me is GE made it very clear earlier I thought that UPPS was not designed for large break LOCAs.

And I think you have made it very clear.

MR. VILLA: That's correct.

MR. MICHELSON: And now you are telling me I am going to somehow take credit in large break LOCA cases if the large break LOCA causes the plugging.

#1-8-SueW

I said: Fine, you can do that. Give me the analysis that shows the time relationships and whether UPPS can now take over at that point in time and so forth.

It's not out of hand obvious, particularly when GE says it isn't there for that purpose. You can say it will work but you've got to do something more than just say: I believe it will work.

MR. SCALETTI: Well, I think --

MR. MICHELSON: Then, you will convince me.

MR. EBERSOLE: Well, I think his rationale is entirely in order, that you've got a makeup system for the rapid rate you will need. Then, I don't see any point in beating the bush. You've got it.

MR. MICHELSON: You have it in time, Jesse.

MR. EBERSOLE: Oh, for heaven's sake, Carl.

MR. MICHELSON: Do you know how much time you are talking about?

MR. EBERSOLE: Well, I don't know.

MR. OKRENT: You have to reflood, Jesse.

MR. EBERSOLE: I'm talking about after a reflood.

MR. OKRENT: That's the point. That's the point.

MR. EBERSOLE: Well, if you plug up before you reflood you are in real trouble.

MR. MICHELSON: It depends on the scenario. You have got to name your scenarios and look for your worst case.

#1-9-SueW

And if it keeps you out of your worst case, that's all there is to it. I just think it's not obvious.

MR. SCALETTI: Okay. Again back to the point. The point that Ron Hernan had made previously.

There is no prescribed backfit for the existing plants and existing FDAs. I don't -- the GESSAR now again is not out yet. I assume that GESSAR FDA, in the situation that it's in, would fall under the no backfit scenario of the guidance that is coming out.

I will have to question that and follow it up a little bit further for you.

MR. EBERSOLE: I don't think the fact there is no previous commitment to do this is an admirable predecessor decision to this process we have at hand.

MR. SCALETTI: Well, I don't think -- it doesn't totally rely upon UPPS. It relies upon other analyses that have been carried out.

MR. EBERSOLE: Well, if GE, as it does in the FSAR, insists on using these little hydroclones I think it's imperative that they define a mechanical source term which they are supposed to digest and that will in due course look at insulation as well as paints and other debris processes.

And it will look not merely at the strainers that -- for heaven's sake, it's a suction but right out into the seals

#1-10-SueW

and the elastomers, parts of the bearing, et cetera that are potentially degradable by this grinding substance.

MR. MICHELSON: And it apparently becomes now a time dependent examination, so that you can show if in time the degradation does occur that by that time UPPS can take over and do the job.

MR. EBERSOLE: Better than that, to preclude the use of flammable insulation by using laminated stainless or whatever else is suitable.

VOICE: That's what was done.

MR. MICHELSON: It's my understanding you are not going to use fibrous insulation in this plant?

VOICE: That's correct.

MR. SCALETTI: Okay. The Staff's evaluation is not totally dependent upon UPPS. It is an alternative make-up.

It relates to the diversity of intakes, position of the intakes with regard to the suppression pool bottom, the oversize of the strainers; everything is included.

MR. EBERSOLE: I understand that the field now is currently removing these cyclones, hydroclones, and there is a random field attitude about their value or detriment to safety.

And I think it would be prudent for GE to resolve this and put, what I would think, deep bed filters if they

#1-11-SueW

want anything.

MR. OKRENT: Excuse me, Jesse. We are going to have to go on to other -- another item. We don't want to forget this one.

But let's let the Staff go through on each of these.

MR. SCALETTI: All right. On USI A-47, safety implications of control systems, I had indicated earlier this morning that much of the design evaluation required to resolve the concerns is outside the scope of GESSAR II and those are so identified in the Safety Evaluation in Section 7.

The overfill transient which the Staff believes has been adequately addressed and has been resolved by the inclusion of commercial grade level trips, level 8 trips, for feedwater and turbine, in GESSAR II the independent high level safety-grade trips also provide the reactor core isolation system and high pressure core spray system.

In addition, GESSAR employs high level strands, reduces consequences of overfill transients.

MR. EBERSOLE: Why do you use commercial grade trips for the biggest ones and the safety-grade trips for the littlest ones when the risk potential is inverse to that?

MR. SCALETTI: I can't answer that.

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VOICE: This is an event in which you don't have a --

MR. EBERSOLE: The main feed is overrun.

VOICE: And you don't have a hostile environment to deal with.

MR. EBERSOLE: Well, you are going to drain the water down to the turbine on the main feed -- by the way, will the main feed lines hang together when you do that and take the impact to go with it?

Since you have commercial grade overfills.

VOICE: Yes.

MR. MICHELSON: Excuse me. Is it a design requirement that it do?

MR. SCALETTI: Excuse me, what's the event?

MR. EBERSOLE: Steam generator overfill from the main system, boiling system, vessel overfill from the main steam -- main feedwater pumps running on --

MR. VILLA: The isolation valves are designed to still close.

MR. EBERSOLE: No, you have overrun. Do you overrun -- wait a minute. Y[illegible] close the isolation valves with safety-grade clos[illegible]es [illegible] safety-grade high water level.

MR. VILLA: Yes.

MR. KNECHT: No, no.

MR. VILLA: Overpump. The feedwater --

#1-13-SueW

MR. KNECHT: Trip the pumps.

MR. MICHELSON: With safety-grade. If it's commercial grade, it's single track, subject -- the same power supply that gets your high level trips might also get your control valves going wide open.

For instance, one failure can cause the overfill.

MR. EBERSOLE: There is no discipline that prevents it.

MR. MICHELSON: I see no credit for that whatsoever. To even mention it is a little strange. If it isn't safety-grade, it isn't worth anything in terms of protecting against this type of event.

VOICE: Excuse me. But that's exactly the logic that we did not use. The level 8 trips.

I'm sorry, for the feedwater event they don't see a hostile environment. There is no reason required that they be hostilely qualified.

MR. MICHELSON: I don't know. He said commercial grade. That's the only information he gave me.

On that basis, the same power supply that controls the feedwater can also be the power supply to the instrument.

VOICE: They don't.

MR. MICHELSON: Yeah, you say they don't but you didn't --

VOICE: A-47 was primarily driven by B&W plants

#1-14-SueW

with an ICS in which feed flow and feedback logic was used for that. And all different sorts of intricacies can be fed.

This plant uses feedback exclusively type control systems. We did do a fair amount of looking at GE class of plants with respect to A-47. And we are reasonably satisfied that there weren't hidden control system interactions.

But juding on requiring that it be commercial versus safety-grade was in part based on looking at what events you would like to protect from. For instance, should it also be seismically qualified. The answer was no, because you are looking at an event initiated by a control system failure.

It needed to be a harsh environment qualified.

MR. MICHELSON: You are giving me far more information that I asked for. And I think what other plants do has nothing to do with GESSAR II.

You only look at the GESSAR II drawings and you tell me what the arrangement is. Now, tell me what the GESSAR II arrangement is and if it's redundant instruments and separate power supplies. Then, don't tell me it's commercial grade, but rather tell me how good a commercial grade it is and I would be quite happy.

MR. EBERSOLE: I don't think environmental

#1-15-SueW

has --

MR. MICHELSON: No, I don't have any problem with the environmental question. I do have a problem if it were single track, for instance.

In other words, you have already analyzed the GESSAR II design and are sure that no single failure of a non-qualified system or component will cause this vessel overfill. You are assured of that.

That's apparently what you did when you tell me it's redundant and so forth, it will meet that --

VOICE: My problem is that I know this was done --

MR. MICHELSON: And is that an interface requirement. It would be nicer if it were just stated as an interface requirement.

VOICE: That's part of our system.

MR. MICHELSON: You are designing the commercial aspect on the feedwater system?

VOICE: Yeah.

MR. MICHELSON: The feedwater welds and so forth?

VOICE: Yes.

MR. MICHELSON: Than, it's all in your control and you know that it's single failure proof. And it is commercial grade and single failure proof?

VOICE: Yes. But let me point out that A-47 in particular is focusing on feedwater events because of B&W

#1-16-SueW

ICS. The reason that it is left as an open item here is because GE doesn't have full scope to supply. And you know that the control system tentacles go out, and you are wanting to close on A-47 without DOP design.

That's not to say that we didn't look at the --

MR. MICHELSON: I think GE just assured me that they designed this aspect of the control system?

MR. VILLA: And let me make clear, because I think you repeated what I said differently.

I want to make sure that you understand what it is. There is no single failure on this commercial grade system that would cause a vessel to overfill.

MR. MICHELSON: Yes.

MR. VILLA: Okay. That's what I meant.

MR. MICHELSON: And you've chased out all tentacles in looking for your single failures?

MR. VILLA: Yes.

MR. MICHELSON: So they've chased all the tentacles hopefully.

VOICE: The reason we chose to leave A-47 open rather than closing was because of the DOP scope and supply and nagging concern of interdependence.

It's not to say that we didn't do all of the tentacles.

MR. MICHELSON: Okay.

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MR. EBERSOLE: Tell me, is there a ritual of testing and verifying that the backup system will -- is always operational?

That is, do you have a discipline in the ritual testing of this like you would a safety system?

Or, do they just let it sit there and when they need it, it's not there?

MR. VILLA: I can only give you a generic answer, and the answer generically is yes.

MR. EBERSOLE: There would be some periodic check of the backup?

MR. VILLA: Yes. If you want a specific answer, we know that it is.

MR. EBERSOLE: Right. And you have the ritual comparable to a safety system?

MR. VILLA: Yes.

MR. OKRENT: We have got to go on to the next one.

MR. EBERSOLE: We never did settle whether the main steam lines could carry water.

MR. OKRENT: Well, ask.

MR. EBERSOLE: Can the main steamlines carry water and the impact to go with it in case our systems don't work, the old mitigated philosophy?

MR. VILLA: Right.

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MR. EBERSOLE: Can they do that?

MR. VILLA: They can carry water. The valves are qualified to carry water and --

MR. EBERSOLE: And the weight?

MR. VILLA: -- remain closed. And I guess I don't have the answer on that.

MR. EBERSOLE: I think it might be substantial, because that is a lot of water if you are full flow.

MR. VILLA: Yeah.

MR. OKRENT: Let me ask a question. I thought as a decay heat removal, you could fill the vessel up to the steam lines --

VOICE: So then it carries the water.

MR. VILLA: Right. That's right. As I said.

MR. EBERSOLE: So, it's the impact.

MR. MICHELSON: So that you don't have to depend on the hangers then, for instance, to carry the water?

MR. VILLA: That's correct. They are designed and tested to carry water.

MR. MICHELSON: You are not going to tell me those RCIC turbines can carry the water also, are you?

MR. VILLA: No.

MR. MICHELSON: Okay. Because we know from recent experience they are incapable of carrying water.

MR. OKRENT: We had better go on. How about B-6?

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MR. SCALETTI: A-48 first.

MR. OKRENT: All right. I thought we --

MR. SCALETTI: All right.

MR. OKRENT: -- had covered A-48, have we not?

MR. SCALETTI: Well, we have. In other words, Staff considers it resolved for various reasons of inclusion of igniters, dedicated backup power supply, UPPS and also the capability of ten-hour station blackout without a --

MR. OKRENT: But you don't have a requirement that the igniters be seismically qualified?

MR. SCALETTI: That's correct.

MR. OKRENT: Go ahead.

MR. SCALETTI: The B-6, loads, load combinations, stress limits concern is the coupling of LOCA and SSE events for mechanical systems, removal of pipe restraints will improve access to equipment areas and result in reduced occupantional exposures.

Also would result in large cost saving to the industry due to reduced construction, testing and maintenance.

The Staff did consider the GESSAR design with inclusion of the pipe removal restraints. So, the design has been reviewed.

GE does have an application, leak before break application, in with the Staff which is underway -- not full steam, but it is underway.

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The computed reduction in core melt frequencies for BWR is based on NUREG 0933 which prioritizes the generic issues, is approximately -- I have it down, very small anyway. It's one point two times ten to the minus six.

There is also --

MR. OKRENT: What is the thing that meets this reduction?

MR. SCALETTI: The removal of the pipe with restraints.

VOICE: This does not include any seismic contribution. One might conclude that the coupling of the loads might actually on a GESSAR specific calculation show it to be some seismic risk.

I doubt if you see much benefit at all. In fact, it might turn out that you have a decrease in safety when coupling the loads.

MR. OKRENT: Yes, it might. In fact, I wonder, did the Staff look at any of this, when you are looking at snubbers if the risk or the cost benefit in improving snubber reliability --

MR. SCALETTI: No.

MR. OKRENT: I've heard a lot of concern about snubber failure, especially if mechanical, leading to problems. I've also heard it stated -- I don't know if it's

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a fact -- that the Japanese have a much lower rate of snubber failure in service than the U.S. plants. And I asked them why when I was last there, and they said they required the vendors to fully test with snubbers for life and so forth before they are allowed to supply them.

In other words, they are not tested in service, as ours apparently have been.

I wonder if the Staff has ever looked at that.

MR. VILLA: We have the same requirement on our vendors.

MR. OKRENT: What is the history of snubber behavior on GE plants?

MR. VILLA: I don't have this specific history, but I do know that the snubbers that we supply for various plants are tested by the vendor before they are delivered.

MR. OKRENT: Well, the word test is --

MR. VILLA: I mean, fully functional test under design, design conditions. You know, safety limits, that kind of -- nothing beyond design basis.

MR. OKRENT: Water cycle kinds of tests?

MR. EBERSOLE: The question is, how long will it stay that way?

MR. VILLA: No, I don't think so.

MR. OKRENT: Well, I suggest one has to look at the whole picture and see whether what you are requiring is

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the same. I'm merely reporting what I know only by conversation, which I assume is correct, that the snubber record is much better in service in Japan.

The Staff seems to have gone the route of -- the Staff has gone the route of assuming snubbers are going to be failure prone rather than trying to say we should have snubbers that have a very low unavailability; I have never understood that approach, I must say.

Well, let's see. GSI B-58, what is that?

MR. SCALETTI: On Item 6, I said that we reviewed it with the snubbers and pipe restraints in place. One of the reasons it is a medium priority or high priority generic issue is a large cost savings to the industry.

The Staff feels that there would be little or no risk reduction associated with removing them at this time.

But there is an application before us.

B-58, passive mechanical failures. This again is another GSI that gets its medium priority rating due to the high cost savings to the industry.

The Staff doesn't believe this is a large safety significance. Therefore, believes that this issue is resolved for GESSAR.

Now, GE has indicated that passive failures only run twelve percent of total overall failures.

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MR. OKRENT: What is the issue, you would say?

MR. SCALETTI: Passive mechanical valve failures. Those failures occur over a period of time and go undetected between surveillance testing.

MR. OKRENT: So it should be mechanical valve failures?

MR. SCALETTI: Yes. I said mechanical valve failures.

MR. EBERSOLE: You mean like the disk coming off?

MR. SCALETTI: Any passive failure I guess that would go undetected.

Pardon?

MR. EBERSOLE: I don't know whether that is passive or not.

MR. OKRENT: Okay. Go on.

MR. SCALETTI: GSI 82, design basis -- beyond design basis accident in spent fuel pool.

Two concerns. First, fuel is being stored instead of reprocessed adding large inventories of fisson products in the pool, increasing the heat load on the pool system, decreasing the distance between the fuel assemblies.

Second, certain laboratory studies and reference memorandum of August 10th, 1983 and NUREG CR0694, there is documentation that possible fire propagation between

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assemblies in air cooled environment. These two reasons together provide the basis for accident scenarios not previously considered.

The resolution, the Staff believes the GESSAR design is seismic Category 1, is located below grade in a seismic Category 1 building, .3(g)SSE. The bottom of the pool is twenty-three feet below grade and sits on the basement of the fuel building. This reduces the likelihood of any drainage. It makes possible manual filling easier to accomplish.

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The staff believes because of the increase in seismic design location of pool and the frequency of siesmic events causing pool drainage should be much less than GESSAR relative to those assumptions in NUREG 0933.

Therefore, the Staff considers this issue was resolved with GESSAR.

MR. EBERSOLE: May I ask a question about the fuel pool. Are there are there any degrading effects of having to resort to open pool boiling of the fuel pool if you have to do that?

MR. EBERSOLE: It is an ancient question. You know, if I have lost my cooling, and I am going to just keep it for fire pumps or something, is that okay?

MR. SCALETTI: If that is the last resort, I guess it would have to be.

MR. EBERSOLE: I am going to permeate critical electro --

VOICE: I can't answer that.

MR. EBERSOLE: Would anybody care to speculate?

MR. VILLA: I don't think we have done.

MR. EBERSOLE: It is an old question. If you lose the coolant and you do boil it --

VOICE: I the GESSAR design, since that is all contained in the building, and that building is separate from any of the essential equipment, I don't think it would

cause any proboem?

MR. EBERSOLE: I think the boiling of the reactor in the open configuration -- can you do that into the containment? During the refueling phase.

You know, that is when we tend to lose all our cooling-.

MR. OKRENT: Let's take that up at another time on the agenda, Jesse. I want to get through this.

Anything- else on GESSAR 82?

VOICE: Interfacing LOCAs on BWI is a concern. Is isolation failure system over-pressurization, or potential over-pressurization in high and low pressure emergency cooling systems. If it is not mitigated in time, it could lead to a LOCA outside the primary containment.

This issue as a GSI is not directly applicable to GESSAR, because the prioritization of this relates only to those BWRs that were licensed before 1980.

However, the Staff did consider it in GESSAR because each ECCS equipment is located in individual rooms with subsequent floor drails. There are level alarms at each of these ECCS rooms.

The doors are provided with double redundancy seals, and there is a whole series of events that must go wrong before a core melt, where high outside consequences would occur.

Additionally, the Staff will require in the interface issue, that the utility applicant demonstrated the intended design capability of the isolation valves, by performing on a prototype basis, closing and opening tests with full design pressure flow.

MR. MICHELSON: A clarification on your statement. In addition, of course, to ensuring that the valve is closed, you want to make sure they close in a timely fashion and to make that decision you have to look at the affluent that is released up to the point where the valves are finally closed.

Don't you -- are you going to require such an analysis for whatever closing time?

You see, they can fix valves by making them close in five minutes instead of five seconds. But are you requiring in addition demonstrating closure, that they demonstrate that it is timely, namely they show by analysis that that is an acceptable time.

MR. FRAHM: The details of the test haven't been worked out.

MR. MICHELSON: Of course, that is not a test you understand. It is a calculation.

You have to do the calculation of how fast it has to close.

VOICE: There will be a detailed in plant flooding

analysis which this will be part of.

MR. MICHELSON: That flooding analysis, though, is not a part of the FDA approval.

VOICE: Yes, it is.

MR. MICHELSON: So -- as I recall, I couldn't find the flooding analysis, a good one at least, of the reactor water cleanup failure, for instance, and we discussed that at some length at Sandia.

You know, it is not clear that you chased the water as well as the steam, and you have chased the effects of water as well as the radioactivity release offsite.

If that is all the analysis you are going to do that is in the FSAR now, then I will have to go back and take a hard look at that.

VOICE: There is a requirement for a detailed analysis of internal flooding.

MR. MICHELSON: Wait a minute. There is a requirement. I thought you just said it is in the FSAR already, or there will be.

VOICE: The Staff SER says that we will require flooding review, fuel --

MR. MICHELSON: So, flooding, that is not a part of the FDA approval. You will approve it later.

MR. SCALETTI: Later.

MR. MICHELSON: I misunderstood the reply.

MR. OKRENT : Before we leave the subject, I am a little interested why is the flooding, internal flooding not part of this review?

VOICE: There was an analysis completed by General Electric, staffed by contractors, that was extremely plant layout specific, actual locations, physical locations, of all the auxiliary equipment, all essential equipment.

The barriers and barrier penetrations are very critical, and we felt at this time the confidence was not great, that we could make a complete determination.

We would rather have a concrete plan in front of us.

MR. OKRENT: I want to understand. Are we talking about the GESSAR scope, or are we talking about something not in the GESSAR scope.

VOICE: A number of these items would be outside the GESSAR scope.

MR. OKRENT: What is outside the GESSAR scope that you are talking about?

VOICE: We did a very cursory review on the internal flooding of the GESSAR Plant. One thing -- there are certain difficulties in doing a comprehensive review, and also the reason is that we lack of detailed information for such critical components.

MR. OKRENT: Aren't these GE components? GE has defined the buildings, if I understand correctly.

MR. MICHELSON: And the component location.

MR. OKRENT: So, I am trying to understand what is this information that is missing? You are not talking about something that is in the turbine building.

VOICE: No, it is within the ECCS room, for instance. In order to do a review thoroughly, I think one would want to know exactly how high certain components are mounted from the floor.

Given the uncertainty of the flood rate and the discharge of effluent, this directly influences the applicability of certain components within that room, and also we have looked at the inter-room connections, whether there is a potential of water spilling from one room to another.

And the limited review that -- indicates that there was potential of water going from one room to another.

We are not able to say that the flooding is not a problem, because if one puts certain components around certain cables, or whatever, at very low elevations, this could potentially impact the operation of certain equipment.

MR. OKRENT: But we are talking about equipment within the GESSAR scope, I believe, at the moment. I would like to understand if this is an FDA, why there is

not enough information available concerning things that would influence flooding risk, internal flooding risk as it arises from the GESSAR scope.

Not a BVA, it is an FDA.

MR. VILLA: I GE's opinion, there is enough information available, and we do perform a flooding analysis.

MR. OKRENT: But the Staff's position is that an applicant, reference GESSAR, would have to do a flooding analysis.

VOICE: Correct.

MR. OKRENT: Each applicant would have to do it. If there were five -- could there be differences in the plant from one applicant to another?

VOICE: It more than likely would be one evaluation. I would think that once it had been done it could be relied upon.

MR. OKRENT: Could there be differences in the plant layout from one to the next

VOICE: I think there definitely could be differences on the way the AE runs the pipes through the ECCS rooms.

MR. OKRENT: Despite the fact that this was in the GESSAR scope?

VOICE: A lot of this piping that was going through the nuclear island may not be in the GESSAR scope.

MR. OKRENT: Just for the moment address ourselves to the piping, and the pumps and components within the GESSAR scope.

VOICE: They would be consistent.

MR. OKRENT: But you just don't know what they are?

VOICE: That appears to be part of the problem, yes, sir.

MR. MICHELSON: I thought the design was in the GESSAR scope, and was already defined as part of the FDA?

VOICE: It is in GESSAR scope.

MR. MICHELSON: Well, if it is already defined as part of the FDA, you have all the information you need. And if you don't it is because it isn't fully defined.

MR. OKRENT: A bit of confusion in my mind.

VOICE: He qualified that. He said not GESSAR scope pipe. The piping for the ECCS and all probably is tied down, but how about surface water piping, and other kind of piping.

MR. EBERSOLE: That is in the aux building.

VOICE: Just off the top of my head, I could make -- find the following two areas where they might be differences or exceptions, and one might be in drinking water, potable water, or something like that where routings are made by an engineer or builder.

Another area might be the fact that a different pump can actually have a different set of mounting holes, for example, or the discharge valve -- specific pump might be one foot this way, or one foot that way.

But the actual location of the pump is defined by our layout and arrangement.

MR. MICHELSON: I guess there is a fundamental difference of view then on the part of the Staff and you as to whether or not a flooding analysis can be done at this time.

MR. VILLA: I think so, yes.

MR. EBERSOLE: I have been fascinated about this being limited to mere flooding.

MR. OKRENT: Let's hear Mr. Chou on flooding.

VOICE: I think I would like to reiterate some of the things. There was a flooding PRA done by General Electric.

The flooding are really based on the FSAR analyses, and the conclusion was it was very low. We would like to -- BNL would like to take the position that internal flooding is very dependent upon the location of certain components, such as transmitters -- electrical components -- especially electrical components.

The AE could monitor the transmitters and run certain cables in certain contexts, and that could

potentially jeopardize the operation of certain equipment.

However, we estimated if we assume that the rooms are leak tight, and if we assume that the critical components is not located at the lower elevation, then we would agree the probability of core melt due to internal flood would be small.

But we do have the concerns that based on what we have looked at from other plants, that they are, for instance, one -- they are --non-safety related cabinets that could be located within a particular part of the room, that because of fluid coupled the trip, which could eventually lead to an MSIV closure for instance, causing a transient, and so on and so forth.

So, we have a concern on the location of critical components.

Now, that we were not able to have from General Electric to make that determination. That is in addition to safety equipment locations. You could have -- that could have an impact on the operation of the plant as well, causing a transient.

So, I would like to just interject at this point as to our approach. And I think the Staff eventually took the position that a more thorough review would be needed when the plant is built.

MR. VILLA: I would like to point out we are not

getting anywere on this argument. But I would like to point out that the information that it provided in GESSAR in terms of the arrangement and layout of these rooms, is no less the information that has been established and provided in the FSAR, with the exception of the exact pumps and motors, the exact equipment.

MR. MICHELSON: In having the three dimentional model available for inspection though, which you don't have.

MR. VILLA: These design drawings describe the plant that was 60 percent built.

MR. MICHELSON: Yeah, but you have now defined a hundred percent design.

MR. VILLA: My point is --

MR. MICHELSON: Which means, I assume, location of cabinets, what is in the cabinets, and if it isn't there, it is because either you haven't found it, or General Electric really doesn't have it, I don't know which.

VOICE: We have it.

MR. MICHELSON: You know exactly where the transmitters are. The height above the floor and so forth.

MR. VILLA: Sure.

MR. MICHELSON: As I understand it from everything you design, that is defined, and it it isn't there is something wrong.

I don't know what it is.

MR. EBERSOLE: And as I said earlier, there is in the FSAR paragraph 6.2.3.2.2, I say it reflects a gross misstatement of tolerence of pipe breaks in the auxiliary building, including these that we are talking about, the through lines.

It does not account for the loss of electrical apparatus function, inclusive of looking at the relief panel designs which allow the vapors to permeate the plant indiscriminately throughout the various physical channels of separation or function, or at least I can't find the language that says I have a Limerick type plant, which did provide compartmentalized divisions of vapor fans to atmosphere, and so protected critical channels of function, or redundant or diverse ones, in the event you have a lot water or vapor release, which goes to cold electrical apparatus, these are said to be modest or mildly minors, yet they can be severe environment in the presence of fairly modest steam leaks including those of delayed valve functions which Carl is talking about.

So, you just don't look at the water how high it gets; you had better look at what happens when you get condensation, even though the water didn't get within ten feet of it.

Do you follow me. You don't need to wet it with water. You can wet it with condensation and get the same

effect.

And since the equipment is precooled with respect to the new environmental temperature, you get surface condensation wherever you have open electrical apparatus.

I would suggest a blank coverage of all electrical apparatus in the aux building to be -- perhaps not water tight, but vapor tight, and that wouldn't be a big problem.

I am done with that comment.

MR. OKRENT: Okay. There are a couple of questions about generic issues yet to be prioritized.

VOICE: I believe we have addressed that --

MR. OKRENT: I believe you have, but let us hear it.

VOICE: The generic issues will continue to be considered as they become prioritized, up until the point of the severe accident FDA as issued. Whenever that will be. We will consider them up to that point, as we considered this newly prioritized issue on GSI 105.

At that time, once the FDA has been issued, then the generic safety issue would have to go through the backfit procedure to make any design changes .

MR. OKRENT: You are considering only the medium and high --

VOICE: Right.

MR. OKRENT: On GSI 105, I gather the answer implied that the recent series of events where one lost isolation, high pressure/low pressure system in plants around the country, is being handled in GE not by a reduction in the frequency of that event, but by having a lot of these systems located inside the containment building where you would detect something if it occurred, and shut off something, or whatever?

VOICE : That, along with the required prototype testing of the valve, which would reduce the frequency of the event.

MR. OKRENT: If the valve were available to close. And as you may well remember, sometimes it was maintenance or something that deactivated the valve.

Okay. I just wanted -- apparently you don't feel the way to go is to try to reduce the frequency of the original event.

VOICE: I wouldn't say --

MR. OKRENT: More valves or more something. I mean after WASH 1400 there was more inspection, but that didn't seem to -- five years af WASH 1400, there was request for more inspections. We have had a lot of loss of isolations, I would say.

VOICE: I wouldn't rule that out. This has just recently become a generic issue. When it is reassessed a

little later down the road, the people doing the work will have the benefit of the 105 study. It will be invaluable to them.

MR. MICHELSON: What schedule is it on, roughly, do you know?

MR. FRAHM: I believe it is the end of '86.

VOICE: The trouble that I have is in one case a check valve was opened for it to close, because the transmitter was installed wrong.

In another case, a maintenance error. The man stroked up an isolation valve inadvertently.

There were three events that occured in the last count, and they were all maintenance tests to the starters. I don't see the qualification of the valve as changing.

On the other hand, I am not quite sure what GE is to do about it, and that is the problem.

The way that plant is maintened and run and tested is going to be an ultimate applicant's burden.

VOICE: That is true, but it is a redundant isolation valve. It has the capacity to close at full blowdown forces.

MR. OKRENT: There are other ways one could make it impossible. You would not have enough torque to open against system pressure.

MR. EBERSOLE: That is a contradictory thing. That would indicate a trouble when you tried to force it closed.

VOICE: We do have low pressure interlocks.

MR. EBERSOLE: Secondary controls that override a basic problem.

VOICE: Primarily these are open systems.

MR. EBERSOLE: I understand the foreign reactors cannot open at excessive pressures. They simply don't have the physical torque to do it.

Now, what they do about reclosing at full hydraulic flows, I don't know. What you need is a valve that can't open on excessive pressure, but can damn well close against full hydraulic flow.

VOICE: A cleanup system has to be open?

MR. EBERSOLE: That is one of the best cases in point, this cleanup system.

MR. MICHELSON: Is there -- we had better get back to the items that we didn't finish this morning.

Before we do that, there is something that will come up tomorrow that perhaps we should at least ask GE to think about.

We had a couple of reports recently concerning auxiliary feed water turbines on pressurized water reactors, namely the most important one being at Turkey Point recently,

in which they found that the Woodward governor on their auxiliary feedwater turbine, which was your standard -- small size that you use on RCIC, they found that the Woodward governor had problems with the bleed off rate of the oil pressure after trip, such that you had to wait about thirty minutes before you restarted the turbine, or you would get an overspeed because the valves -- the control valves were still partially open because of residual oil pressure.

This puzzled me a little bit from the viewpoint of the use of that turbine on boiling water reactors where I think you routinely trip it on high level, and restart it on low level in the vessel, and I think those routine trips can occur a few minutes apart, depending on the scenario.

So, I am greatly puzzled as to how in one case a problem with thirty minutes, and in your case I haven't heard of problems in a few minutes.

So, what I would like to know is do you know anything about that, and can you clarify it.

VOICE: We have had a few problems with overspeed and we made some design changes which are part of this.

MR. MICHELSON: Did they do the residual oil in the governor system?

VOICE: Part of the problem had to do with the

governor.

The main problem we found is with maintenance of the system, where the tolerances are hard to -- well, what we did to get around this, we put in a time bypass valve on the inlet to the turbine, so that initial roll wasn't quite as strong, and it didn't tend to overspeed.

So, if you made that physical change to get around the overspeed. And we also made a change -- one of the TMI changes as far as the Level A trip, we no longer trip the turbine itself. We close the steam line upstream of it, so that we don't physically trip the hydraulics.

MR. MICHELSON: But in the process of going from high to low level on GESSAR II, you do trip the turbine and restart it.

VOICE : It has the capability to do that. That is one of the advantages of the operator taking manual control.

MR. MICHELSON: If he does that, it trips at the high level --. and restarts at the low level.

VOICE: Yes.

MR. MICHELSON: And that is the normal way in which I think it is supposed to operate, unless the operator intervenes.

VOICE: I think normally the operator here means it is expected that it would be --

MR. MICHELSON: You have designed -- you are assured in GESSAR II the system can do this in the fastest possible trip time between high and low level.

Do you know what that is? Is that five, ten, fifteen minutes, or what?

VOICE: Bleed down from level 8 to level 2, where it restarts, -- I can't give you the exact number, but it is several minutes.

MR. MICHELSON: I thought it was several minutes, but it was not like thirty minutes. Shorter than that.

VOICE: Ten or fifteen minutes.

MR. MICHELSON: So you have done something to solve this problem for GESSAR II, and for the boiling water reactors as well.

VOICE: We did it for the boiling water reactor several years ago.

MR. MICHELSON: So, the fact that the pressurized water reactors have got this problem must mean they haven't learned from you what you did. It is no problem for you?

VOICE : No.

MR. OKRENT: I am reminded that the Staff was going to tell us right after lunch something about a question from this morning, I think, related to what is in the FDA and so forth.

How did we leave that?

VOICE: My understanding was there was some concern over whether what we reviewed as far as design drawing, and how they were reflected, how they were indicated as to amendment et cetera, and how did we assure that what we reviewed was what was part of the application, et cetera.

Again, due to the short lunch break, I didn't get to it, but I will try one more time.

It would indicate that --

MR. OKRENT: Look. If you don't have any more information, don't repeat the previous.

VOICE: All right. But I just want to say that all drawings that come to us are identified with an amendment number and revision number on the drawings, okay.

MR. MICHELSON: And do you identify in your SER or wherever you say, that is it, have you identified that that is the last revision of that drawing you have approved, and if there is another revision, it has to be reviewed.

MR. SCALETTI: No, we do not do that specifically. However, if an amendment comes in, then the reviewer would have to look at that amendment, and if the drawing had been changed he would have to revise his evaluation.

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MR. MICHELSON: He would look at the revised drawings collectively, right?

So you are going to do it by re-amendment to the FDA?

MR. SCALETTI: Yes. No, amendments to GESSAR.

MR. MICHELSON: I'm talking about after the FDA is issued, what do you do about changes in drawings?

MR. SCALETTI: We hope there are none.

MR. MICHELSON: Well, you are unrealistic if you think there are none, totally unrealistic.

MR. SCALETTI: Again, I must say it would have to be treated -- they are undergoing this process now on C side. They are amending C side which would be related to some changes which were made during the course of the Palo Verde review, of the Palo Verde construction.

We would have to do the same thing in GESSAR.

MR. MICHELSON: All I'm asking is in one of your SERs, before we issue one of these FDAs must state how you are going to handle future revision to this design, because some people think standard design, it's all frozen and done, there aren't many more revisions.

If they think that way, I think they are unrealistic.

MR. SCALETTI: Revisions to the design will have

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to be so taken care of and approved through an amendment to the FDA.

MR. MICHELSON: And that process should be defined.

MR. SCALETTI: We are. We can define that in the SER, in Supplement 5, or in the FDA amendment which will be issued.

MR. MICHELSON: Which in essence means the FDA doesn't cover those future revisions.

MR. SCALETTI: Absolutely not. I agree with that.

MR. MICHELSON: Is that GE's understanding also of how this should be handled?

MR. VILLA: Not exactly. But I have to confess that I'm not familiar with the NRC approval process that follows an OL, for example.

And what I'm getting at is I would suspect, fully suspect, there would be changes for a long time after the design is approved.

But my understanding was, from reviewing the regulation, is that insignificant changes need not be reviewed again by the Staff. And a significant one would be when a design correction was made.

MR. MICHELSON: Yeah, clearly. That's fine.

MR. VILLA: But major changes I believe would be

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approved by the Staff under the same regulations that an OL would be approved.

MR. MICHELSON: Yeah.

MR. VILLA: And I'm not familiar with that process.

MR. MICHELSON: I was just trying to find it somewhere to assure that's how it was being handled. I could not quite find it.

So then I looked to see, well, is there some kind of a -- do you still have to have some kind of a listing of your breakoff point. Where did the FDA review through?

MR. SCALETTI: That will be clearly identified in the FDA.

MR. OKRENT: We are going to have to proceed to another topic. I'm sorry. We're really running late now.

Let's pick up Item 10.

MR. KNECHT: Ready?

MR. OKRENT: Yes.

MR. KNECHT: The question is on containment venting and criteria I think for when we plan on going to containment.

First off, we follow the Emergency Procedure Guidelines. Notice in the pressure control section of the guidelines, require venting after you have attempted the normal pressure control, perhaps the standby gas systems, or

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use of containment sprays.

There is other actions that are taken to control pressure before you would ever get to a venting point.

MR. EBERSOLE: May I ask a question? Before you ever get near that, let me hypothesize, you have lost core cooling. Okay. I am not putting any water on the core, all right. I'm going to have to maintain level in the reactor to keep the core cooled.

That means introduction of water from the UPPS system which is a partially open-ended process because some of it is going to aggregate in the suppression pool and not go out some vent you are going to open.

MR. KNECHT: It will be increase in the suppression pool.

MR. EBERSOLE: Right. So you have got to accommodate that potential increase and limit it somehow and allow eventually -- it's certainly going to continue to pump water in containment and it certainly does fill up.

There is a neat little piece of work to be done here to figure out how you find a through path to outside using UPPS and not overfill due to condensation inside the containment which must certainly allow the water in the suppression pool to go to saturation temperatures.

We don't have any picture of this yet. Now, I'm talking about long before there is venting and core damage,

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and long before there has been any containment pressure, am I not?

MR. KNECHT: Well --

MR. EBERSOLE: I've got to cool the core first.

MR. KNECHT: Right. And that's the first function.

MR. EBERSOLE: Right. That's long before I jeopardize the containment.

MR. KNECHT: What you are saying is there a risk of overfilling the suppression pool?

MR. EBERSOLE: I don't know. I know all the water ain't going to come out. It's going to stay --

VOICE: Excuse me. You have a million gallons of water in the pool, and you have to add let's say five hundred GPM to keep the pool --

MR. EBERSOLE: I don't know.

MR. KNECHT: It is a slow process.

MR. EBERSOLE: All I want is a description of what to do. Now, remember I haven't got any containment pressure so I didn't need to vent for that reason.

MR. KNECHT: Not at this point.

MR. EBERSOLE: So I need the progressive evolution of when you use the vent right on up through the time that you are going to be releasing radionuclides, because now you have gone beyond the damage point.

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All I'm asking is the continuity in the venting process description.

MR. KNECHT: The venting process with UPPS doesn't preclude simultaneous injection. It is a totally separate function.

MR. EBERSOLE: Yes. But I think injection may demand venting.

MR. OKRENT: Could we find out what the venting criteria are? Why don't you go through and state the different situations in which you would vent and what the criteria are?

MR. KNECHT: First off, I can't give you a venting pressure for GESSAR. That will be something that is determined in terms of the operating procedures for the event that the applicant will have to define

We do know what the criteria are, but there are some things that are undefined. So that's why we can't give you a number.

Now, the criteria --

MR. OKRENT: Excuse me.

MR. KNECHT: I'm going to go through the criteria.

MR. OKRENT: Well, criteria enables setting the pressure.

MR. KNECHT: Yes. We don't have numbers to hang

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on some of these criteria. Now, one of them is the air system that operates the SRVs, because as the containment pressure increases you can reach a point where the SRVs are not longer able to open.

And that point is about ninety-five pounds less than the air system pressure, which on GESSAR gives us something in the neighborhood of fifty or sixty pounds of containment pressure. Where we need to vent before that point in order to prevent loss of the pressure control.

That compares the eighty-three pounds of ultimate containment pressure. So we are already down below that.

Another potential connotation is the operating -- the valve operator capability. And that is a detail we have not specified yet. But assuming that the valves are available, we could specify it higher than this SRV air pressure. I'm thinking that's probably the limiting.

But we don't know right now. This is a design detail to work out. If it turns out that we have to find a valve operator with a lower capability, or that's all that is available, then we would lower the pressure in the procedure.

Another potential cutoff, it may be lower than these others, is the range of the available containment pressure limitations. Now, right now we have a commitment to raise that to sixty pounds, generally a sixty pound range.

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A sixty pound range from the thirty pound range that is in the current documentation. But we have committed to changing that range.

So I think with that change, venting pressure will be somewhere between thirty and fifty, something like that.

Now, any other criterias, as I said, of the ultimate containment pressure is well below that for minimum limitations. So, whatever is limiting that would possibly prevent you from venting is what you use in the criteria for picking those vent pressures.

Since we haven't selected the components and defined the valve operators and whatnot for the system, we have to hold off until that's done, therefore, creating a definitive pressure.

MR. OKRENT: Okay. And the venting is initiated remote manually?

MR. KNECHT: The venting is initiated, yes, remote manually from the up station or from the control room using the normal ventilation exhaust line. Either way you could use for venting.

The UPPS system vent could be used in the event you don't have power to those normal vent isolation valves. So, there is really two different ways, that normal system and the UPPS.

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MR. OKRENT: Let's see, the power for the venting system as well as the venting system itself is seismic Class 1?

MR. KNECHT: Yes. Power for the normal venting -- yes, those are also doubled as containment isolation valves so it's seismic Class 1.

MR. MICHELSON: Are they designed for the differential pressure that exists? In other words, the internal containment pressure at the time you desire to start the vent?

MR. KNECHT: I don't know the answer to that. That's one reason why we need to be careful on the UPPS system to take that into account.

MR. MICHELSON: You are talking about sixty pounds?

MR. KNECHT: Probably not. You know, on the --

VOICE: At least not yet.

MR. KNECHT: I don't believe they are. I doubt if they are. On the other hand, if they could be opened, if by some fluke they opened, or whatever, they just happen to be strong you would want to use that.

MR. EBERSOLE: Is the discharge path through the standby gas treatment?

MR. KNECHT: No.

MR. EBERSOLE: Does it go to an elevated point?

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MR. KNECHT: Yes.

MR. EBERSOLE: A stack?

MR. VILLA: Not a stack.

MR. EBERSOLE: But just kind of a vent somewhere upstairs?

MR. KNECHT: Top of the roof, wherever it --

MR. MICHELSON: You might also worry about the design pressure of that whole piping system, that you don't blow it out on the way to the roof.

MR. KNECHT: That's another concern. You asked about some of the objectives --

MR. OKRENT: Excuse me. Before we leave this, this is in the GESSAR scope or the balance of plant, this venting system?

MR. KNECHT: UPPS is GESSAR scope.

MR. OKRENT: Well -- okay.

MR. SCALETTI: The venting would be -- it is required by utility/applicant referencing the design, the venting procedures.

MR. OKRENT: It can't be an interace requirement? Or, is it one?

MR. SCALETTI: It is identified as an interfacing requirement.

MR. MICHELSON: This is part of the scope and supply, isn't it?

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MR. OKRENT: The operating procedures are not.

MR. MICHELSON: Not the operating procedures but all the hardware is.

MR. SCALETTI: Sure.

MR. EBERSOLE: How do you design a system without a skeleton set of operating procedures?

MR. KNECHT: We have a skeleton set which is the guidelines which we write. We know them.

MR. EBERSOLE: The operating concept, you have to furnish the operators?

MR. KNECHT: Yes.

MR. OKRENT: Let's see, is there any plant now that is allowed to vent a containment which is going to high pressure?

MR. VILLA: Limerick.

MR. OKRENT: So they have a design which the Staff has reviewed and so forth?

MR. VILLA: Yes.

MR. EBERSOLE: How do they rationalize the release of radionuclides in order to prevent a worse release later? It seems to me --

MR. SCALETTI: One of the reasons GESSAR wants to preserve the wetwell in containment is that there was some question over at what pressure you would lose your pool. And this is one of the rationales for venting, so you don't

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lose the pool so that hopefully then you aren't venting radionuclides.

MR. EBERSOLE: Well, the bottom line is you are releasing something to prevent a larger release. How do you strike a reasonable balance?

MR. KNECHT: In the absence of any --

VOICE: The GE PWGs, sponsored by the Owners Group, primarily focused on what I will call the TW event, one where you can reject heat through the primary system to the pool. Eventually you overpressurize containment and you are concerned that overpressurization would fail containment. Much of their analysis focused on that.

MR. EBERSOLE: The reason --

VOICE: So, we said: Let's sit back and, say, okay if you have an ATWS or you have a transient other than the TW, or you have TW, it would be better to vent or not to vent. And you should consider more whether you are going to vent, or some chance you won't be able to reclose the valve in case there is inadvertent opening of the valve.

And so the Staff and sponsors examined these various aspects, and came to the conclusion -- this is mostly MARK II work, that it was better to vent. Now, let's go to the MARK III. The vent on the MARK III is on the wetwell, not on the drywell.

The failure location of the MARK III is the wetwell.

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Releases that we had with one TL3 would be a typical type release due to wetwell failure where we saw a ten to the fifth rem, person rem. So, we came to the conclusion that the -- two conclusions to draw.

One is that for all boilers, it would make sense to have a wetwell event in order to ensure that it's the wetwell that you get fission product scrubbing. Well, that's not an issue on IIIs. It is on MARK Is and IIs, just because of the physical layout of the plant.

And, hence on this plant whether you vent intentionally or not, you are going to end up with similar type releases.

MR. EBERSOLE: What is the design that is not a wetwell release? I did not catch that.

VOICE: On a MARK I, a MARK II, if you let it overpressurize itself then there is a good chance of drywell failure.

So, what you would like to do is force a wetwell venting in order to take advantage of pool scrubbing.

MR. EBERSOLE: So it's still wetwell.

VOICE: By having -- by doing it by intentional venting.

MR. EBERSOLE: Of any --

VOICE: But this plant, which we are talking about, the MARK III, you vent the wetwell or if you fail to

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vent that wetwell it will fail in the wetwell above the pool. So, it's far less a significant issue in terms of risk reduction whether you vent or not on this type of design.

And we do look at the range of events and we decided that it was better to vent rather than allowing catastrophic random failure. It would still be in a better position for ultimate recovery.

MR. EBERSOLE: When you strike this balance of relative risk like that, I would suspect that a hoard of folks, mostly from California, would intervene and ask a lot of funny questions about how you struck the balance.

You know, this is a breaking of a precedent of long standing, that you don't let anything go anywhere. And it ain't going to come easy I don't think.

MR. OKRENT: What is the saturation temperature at fifty pounds gauge per --

MR. KNECHT: Around 250, something in that order.

MR. OKRENT: So, it's like roughly 40 degrees Fahrenheit above atmospheric --

MR. KNECHT: Yes.

MR. OKRENT: So if you had the pool up to that temperature and then the containment failed, there would be some flashing?

VOICE: Yes.

MR. OKRENT: Some loss of fission product with the flashing.

MR. VILLA: That's right.

MR. KNECHT: A small amount.

MR. OKRENT: A small amount, not enough volume, not enough stirring so you get not only -- now, you get not only a loss of volume but you are going to get double formation essentially.

MR. KNECHT: One of the things we are trying to achieve is --

MR. OKRENT: I'm not talking now in the venting case. In the case you don't vent and then you depressurize quickly -- in other words, Jack was saying there may not be much difference between whether you fail the containment above the wetwell or whether you vent to go down.

I'm trying to understand this one seeming difference and the nature of the rate at which the pool goes back down to a lower temperature. I'm not -- it's not clear to me that that is a trivial affect. It might be.

MR. KNECHT: I think the fractions when it does flash are relatively low. I'm not sure it would be -- there is a difference, and you are right there.

MR. OKRENT: I don't know how to judge at the moment.

MS. HANKIN: We looked at a great deal of

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evaporator data versus the churnning and the flashing. It's very much more vigorous than you would ever have in the pool. We did calculations on the surface of the pool so we could see what the evaporazation rate would be for various pressurizations, and it's a very mild event, much more like the swimming pool in the Winter with the steam coming off of it, or water sitting on your stove boiling away.

MR. OKRENT: Yes. I'm thinking of my 1974 Ford. However --

(Laughter.)

Okay. In any event, we had better go on. By the way, does Grand Gulf have permission to vent?

MR. VILLA: I don't know.

VOICE: If generic EPGs are approved, with each plant to come in with its pressure and identification of which specific valves it opens in which order. I don't know if they actually have generic approval, and I can't vouch if they have closed the loop.

MR. EBERSOLE: A quick question. If once you decide to vent, is there a particular critical requirement that you may like to stop venting which would affect this valve design and increase the cost, you know, make a four-valve matrix?

Is there any reason that one should want desperately to stop venting?

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MR. MICHELSON: If you blew off the vent line you would want to.

MR. EBERSOLE: I don't know. You know, if you do it's going to buy you four valves.

MR. KNECHT: I think it's best to leave them open.

MR. EBERSOLE: And so then once you get started you are going to argue you can leave them open?

MR. KNECHT: That's right.

MR. MICHELSON: You are not going to throttle with them now?

MR. KNECHT: No.

MR. MICHELSON: Because they may not throttle.

MR. KNECHT: I guess the throttling would be by selecting different lines.

MR. OKRENT: Okay. If I may, I'm going to change the order of agenda items. They may be changed again, but I'm going to bypass 11 and 12 for the moment with the intent that we do pick up 11 before we finish, and 12 may be something that we use in an abbreviated form tomorrow.

Let's see, when I asked about 14 earlier the Staff --

MR. SCALETTI: We still don't have our --

MR. OKRENT: Okay. We want to pick that up today, but we will go to 15.

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General Electric has asked if we could modify the order somewhat, so let's go on to 15. I suspect 16 and 17 in the next group. And then we will see where we are. Okay.

And I guess GE would start. Whose question -- this was yours, wasn't it, Carl?

MR. MICHELSON: I think it's Jesse's.

MR. OKRENT: Jesse's, okay. I will let you carry the ball.

MR. KNECHT: Why don't I just give you a couple of charts on it. It would probably be easier to do it that way.

And some of this has been addressed already in talking about the interface requirements. But I think just a quick summary to put this thing in perspective as far as -- is that in focus?

(Slide.)

On the GESSAR design, because the containment isolation valves are within the GESSAR scope and supply, we are specifying a purchase requirement on those valves. And those purchase requirements involve both a LOCA environment, a high steam environment, in the vicinity of the valves, and define that they be able to close against normal operating flows, and also because their performance is for closure against breaks, those valves that are normally

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opened need to close against break flows. Those conditions will be specified in valve purchase documents.

Now, we have also committed to the environmental qualification program for all of those valves, which includes testing of the valve operators to show that they can carry out their closure function.

MR. EBERSOLE: Is the external valves -- and this would only apply to the external -- are they qualified for the transient environmental changes which are associated with the immediate release?

MR. KNECHT: Yes, they are qualified for a break in the room.

MR. EBERSOLE: For which they are protecting?

MR. KNECHT: Yes.

MR. EBERSOLE: I don't think that's standard practice. I'm glad to hear it.

MR. KNECHT: I know that's true on these GESSAR valves. I won't speak for every plant.

MR. EBERSOLE: So they can sit in the environment in which they are trying to diminish?

MR. KNECHT: They qualify like 340 degrees.

MR. MICHELSON: Are you talking about the drain valves now, 340 degrees?

MR. KNECHT: I'm talking about the isolation valves, like the reactor water coolant valves.

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MR. MICHELSON: You are not talking about the steam system yet?

MR. KNECHT: No, no.

MR. MICHELSON: Which item are you on?

MR. EBERSOLE: He is on 15 at the moment I think.

MR. MICHELSON: Okay. I was getting mentally oriented for 16.

MR. KNECHT: You jumped ahead. The agenda mentioned something about an aging concern, and I'm not exactly sure what you are after.

The way I view it, at any rate, is this maintenance program of the utility really addressed that by periodic inspection and testing and whatnot.

MR. EBERSOLE: Let me explain what that is. You do a test, probably a pilot test, on a design, you know a type test. And it defines the valve capability to intersect these high energy flows.

Now, there must be some parameter that you measure. It may be torque or whatever, which you can subsequently, twenty years from now, measure and say: I've still got it. Because you are not going to measure these flows ever.

And you've got to listen to the gears grinding and whatever. Maybe there is a host of ways to try to translate

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the continuance of this capability. And all I'm saying is how do you -- what is the onous that you carry to say: Once having been able to do it, I still will?

MR. KNECHT: The environmental qualification program includes an aging affect on the operator before it's tested. So, it's attempting to evaluate them at an aged condition.

MR. MICHELSON: How are you aging the valves, not the operator now, the valves? How are you aging them?

I don't think you are, you are aging the electrical portion of the operator and I think --

MR. KNECHT: I think that's correct.

MR. MICHELSON: That's not our problem really at all.

MR. KNECHT: As far as testing them after twenty years of operation to see if they are the same as when they were originally installed, that's part of the maintenance program.

MR. EBERSOLE: Well, there is some sort of cathodic new maintenance for valves. I can't remember the trade name for it, that is intended to extrapolate the original capabilities on into time.

That sounds pretty good. I can't recall it. Maybe you know, Carl.

Anyway, that was the purpose of the question,

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once having obtained then you must put on the operator the requirement or define for him what he has got to do to ensure that the continuance to perform, the capability exists.

I don't think he will do it voluntarily. You've got a responsibility spread across time once you've built one of these things I think. If you just don't sell it and run off.

MR. KNECHT: It's a program that will pick that up. It's a periodic, you know, within a maintenance type program.

MR. EBERSOLE: Right.

MR. KNECHT: (Slide.)

You know, you asked about a reactor water coolant cleanup example. I'm not sure you want to spend much time.

This just shows you the reactor coolant water system that we have and the multiple barriers. Obviously, the valve closure issue is separate.

But on the suction side, there are at least four valves. The ones with the swiggle on them are the automatic closing valves. There are also two valves in this section that can be manually closed from the control room.

MR. EBERSOLE: Right.

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MR. KNECHT: And then on the discharge side, we have got this string of four check valves, with one of them being a stop check. And also I point out here, these isolation valves are in different environments, so there is that matter of diversity in there.

MR. MICHELSON: I think -- and you are taking care of the closing under the blowdown condition for those two isolation valves but not for the manual valve.

MR. KNECHT: Yeah, that's true.

MR. MICHELSON: So you really can't take credit for them in isolating a break, you have to count only what you are testing.

MR. KNECHT: There is nothing that will necessarily specify these valves be done that way, although in all probability they will wind up being --

MR. EBERSOLE: Let me ask you this. In case we have one of these unfortunate common mode failures, of which I've given you losts of examples, and these valves in fact don't mitigate that break out here, the prudent thing to do is to do what was done at Limerick, and that is to say the heat exchanger and the demineralizer and so forth are in compartmentalized environments which ultimately discharge straight to atmosphere rather than running back and aggressively destroying other equipment in the aux building; do you compartmentalize that in that context?

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MR. KNECHT: All of this equipment here is compartmentalized and the heat exchange is in its own cubicle.

MR. EBERSOLE: Where will that discharge the flow of water in case I don't close the valves?

MR. MICHELSON: And the steam.

MR. KNECHT: There are blowout plugs in that room.

MR. EBERSOLE: To atmosphere?

MR. KNECHT: Yes, they eventually get to atmosphere.

MR. EBERSOLE: You say eventually. I don't want to hear that.

MR. VILLA: In a steam tunnel.

MR. EBERSOLE: In a steam tunnel. Is it deliberately and carefully oriented to go to atmosphere from steam tunnel without going into the critical equipment rooms?

MR. VILLA: Yes.

MR. KNECHT: They will not go back into the critical room.

MR. MICHELSON: Well, you didn't hear quite enough yet. He told you what happened to the steam; he didn't tell you what happened to the water. The water doesn't go through --

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MR. VILLA: We traced that down. We traced exactly --

MR. MICHELSON: That was the question he raised before.

MR. VILLA: -- and we followed the water out hrough the steam tunnel.

END #3
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MR. MICHELSON: You mean it has to rise until it goes out the same hole that the steam was passing out?

MR. VILLA: Yes.

MR. MICHELSON: So the room is completely sealed below that opening?

MR. EBERSOLE: I think that is great. That is all I am after.

MR. MICHELSON: And then after it gets in the steam tunnel, that water eventually -- well, it is going to go to the turbine building.

MR. EBERSOLE: No further questions.

MR. MICHELSON: I have one further question. In the process of going through the dynamics of all this, the pressures in the room and all this, the rising -- whatever you have done a pressure analysis to show the walls remain intact?

MR. VILLA: And the doors.

MR. MICHELSON: And the doors. Okay. Was that written up anywhere where I can read about it?

MR. VILLA: I don't think we wrote it up, but we presented it in -- was it the last subcommittee meeting --

MR. MICHELSON: That is why I didn't hear it.

MR. OKRENT: I don't think so. We would not have put it on the last one I don't think.

MR. VILLA: Then it was the previous -- it wouldn't have been the last one, because I wasn't here.

MR. OKRENT: I think that kind of question we tried not to take up in July or August, Carl, so it --

MR. MICHELSON: I was just wondering if he had written it up just to see how you handle it for GESSAR II case.

MR. VILLA: We can assemble that information and give it to you.

MR. MICHELSON: Send it to us. It sounds like you have taken care of the problem nicely here, and it would be useful to have that.

The key, of course, still is getting the valves closed in a timely fashion, and I assume part of your calculation was to verify how much time in which you must close those valves.

MR. KNECHT: Those times are also specified in the FSAR, and those times are specified there. They are based on your radiological --

MR. MICHELSON: It isn't radiological we are worried about here, it is environmental.

(VOICE): I understand.

MR. MICHELSON: That might be the controlling condition and not the rate of release out into the atmosphere.

MR. OKRENT: We had better go on to 16, I think.

MR. EBERSOLE: I seem to recall the issue -- to look at kind of an equalizing line between those two dog legs.

MR. PFEFFERLIN: You asked a general description. My name is Hank Pfefferlin, with GE.

I have a couple of charts here that I will try to address the question.

(Slide.)

Let me start with an overview of what the system does. We do have two separate scram discharge volumes, each with its own instrument volume, which are then connected.

MR. EBERSOLE: There is a one inch line between the two volumes?

MR. PFEFFERLIN: Between the two volumes.

MR. EBERSOLE: So, you have a single volume. So the scram system won't work.

MR. PFEFFERLIN: That is correct.

MR. EBERSOLE: If I invoke the level switch. If I go in and take a hammer to it.

MR. PFEFFERLIN: That is correct. We do have one volume in that sense, but each half of that volume contains redundant and reverse level sensors.

The communication -- if you lost all of the

sensors on one side, because of that same communication, you would gain protection from the other side, so there is --

MR. EBERSOLE: I think I asked you to do a simple analysis of what is the value or detriment of having that one inch line. I think there is going to be a detriment in safety, because you at least would get half the rods in if you got one half volume filled.

MR. PFEFFERLIN: We didn't do that analysis to my knowledge.

The probability of the instrumentation failure against the --

MR. EBERSOLE: What I am doing is eliminating total flooding.

MR. MICHELSON: Maybe you can tell us why you think the one inch line is needed. What the plus side is on it.

MR. PFEFFERLIN: The plus side is that we do have redundant and reverse instrumentation.

MR. MICHELSON: And that is why you put it in there?

MR. PFEFFERLIN: We have it without that communication. All we do is we have doubled u p the instrumenation. A failure of instrumentation in one leg -- if then the level increased, it would be indicated in the

other leg.

That is the plus side. Negative side is if you assume all the instrumentation fails --

MR. EBERSOLE: Let me tell you how I look at that. You cross tied the patch which you had provided, and having a potential for flooding.

I have some very simple items here that says there is a problem both in the logic of having closed volume for discharge, and one in the logic which says you are going to close it by closing the vent valves prior to executing some confirmation that the rods are home.

I cannot help but think that eventually it will come to light you must have a discharge which is open, such as suppression pool in both of those volumes.

You only close it after the rods are in, and I think I handed out a number of events that happened at Hatch and subsequently at Oyster Creek that says irrespective of your thought that redundant systems protect you, they don't always work.

And so, it is better not to provide a system which is susceptible to trouble, and then try to patch. It is better to supply one which isn't so susceptible and put some enhancement on it.

MR. PFEFFERLIN: Philosophically I would agree with you, and we have talked about this before.

I think that practically speaking, it is very difficult to come to that idea, and I submit that if you were to have a system such as you described with a valve that you would close after you scrammed, the question that you would be asking is: What would happen if that valve closed and you didn't know it?

I think we would be back looking.

MR. EBERSOLE: I am not going to refute your level systems.

MR. PFEFFERLIN: No. I am saying you would get very quickly back to the same level system, and the question would be if I can fill the system up through some mechanism, why can't I postulate this valve closes?

I think what we have tried to do in this system is to build a detection capability into it, and rely on that detection capability. Because if you do that, you know you have volume available.

MR. EBERSOLE: My idea is you have built in a vulnerability, and then you patched against it, which is not the right way to design.

MR. PFEFFERLIN: I think you have to have a valve in that system which would close at some point in time.

MR. EBERSOLE: No question.

MR. PFEFFERLIN: And after it closed -- the only question is do we close with scram or later.

MR. EBERSOLE: I am only augmenting what you have already got.

MR. PFEFFERLIN: I understand your comments.

MR. EBERSOLE: Really, I am eliminating a challenge if it works right.

MR. PFEFFERLIN: I don't know. Don or Debbie, do you have any idea about the relative merits? My view is that we put our emphasis on the diversity and redundancy in the systems, and I feel personally that it is a plus to intertie, because now -- if you were to fail for whatever reason, that you do get some protection from the other side.

MR. MICHELSON: Have you done that in the present day plan as well; intertied the instrument volume?

MR. PFEFFERLIN: That is the standard design.

MR. EBERSOLE: That you intertied the mitigated apparatus at the expense of introducing the challenge. If you put a common dump volume which will commonly fill in order to reach over and grab the other level gauges, whereas you would without that you would never fill but one of the dog legs, or hockey sticks you call them.

I have a feeling if you look at this on a mini PRA basis it is going to come out different.

MR. KNECHT: It may. I am not sure it would be very significant in terms of total.

MR. EBERSOLE: I don't know. There is another

thing I want to point out, which I will try to kind of casually talk about.

This system is a beautiful place for malpractice if I were to create a little problem.

I could defeat your mitigated system easily.

MR. PFEFFERLIN: By disrupting the instrumentation.

MR. EBERSOLE: My analogy would be in the context of I have a bomb with the fuses hanging out, and I don't like that, and I think you can interpret what I mean.

Do you follow me?

MR. PFEFFERLIN: I understand what you are saying.

MR. EBERSOLE: It is a plushy bomb, but it is pretty good.

MR. PFEFFERLIN: I don't know how to respond to that other than to say --

MR. EBERSOLE: My other proposition was on the reactivity system and literally a two-page proposal here, was to attend to the physical defense of the system so it can't be tampered with.

MR. PFEFFERLIN: That is certainly a solution.

MR. EBERSOLE: I don't want to close up unless you want to close up and talk sanitizing. I am on the ragged edge of it, but I am not talking about it.

MR. OKRENT: We are going to talk --

MR. EBERSOLE: We are going to talk about that

later.

MR. PFEFFERLIN: We talked about the instrumentation. They are redundant venting, and drain valves to solve the the problem.

MR. EBERSOLE: I would have you look at Oyster Creek where they both didn't work recently, not too long ago, and look at the ill effects of what happened at Hatch, and then that fascinating set of events at Davis-Besse, which you can extrapolate to your own equipment.

MR. PFEFFERLIN: As far as the scram is c ncerned, you know the vents and drain valves are there to allow us to reset and to prevent discharge into the pool. As far as the scram is concerned, I submit again that we were interested in the volume that is available if we assume that the instrumants work.

And as you probably very well notice, this basically is what the system looks like, and we are talking about the instrumentation over here.

(Slide)

I think there were two other questions: Could we drain the system after you call for a scram, and the answer is yes we could drain it if we can clear the scram signal.

MR. EBERSOLE: That was a problem in Hatch. It looks itself up because of containment high pressure,

and the operator apparently couldn't back out of that at Hatch.

They didn't depressurize, they didn't do anything. They sat there with the pressure rising as you know, and a progressive regression of conditions -- environmental conditions --

MR. PFEFFERLIN: Because of failure of this valve.

MR. EBERSOLE: They could not reset and shut the leak off. That is when they had only one valve, and now they have two valves or whatever.

MR. PFEFFERLIN: The answer is we can reset the scram. These valves will open.

MR. EBERSOLE: But there are inhibits against reset that prevented them from doing that thing, and perhaps there should be a really violent way to open and blow it apart with a detonater if you wish to the containment.

MR. PFEFFERLIN: And then you got the other side of the problem, the continued leakage.

MR. MICHELSON: Is this GESSAR II you are showing us here?

MR. PFEFFERLIN: This is a typical GESSAR II.

MR. MICHELSON: Where is this one inch line?

MR. PFEFFERLIN: I apologize. This is only one-half.

MR. MICHELSON: And where are the redundant drain

and vent valves, which I think you also have on all of the plants now?

MR. VILLA: We didn't bring --

MR. MICHELSON: Well --

MR. PFEFFERLIN: This is very schematic.

MR. MICHELSON: It is hardly worth looking at. In fact, for this problem --

MR. PFEFFERLIN: There are two hockey sticks, and they are joined at the bottom and top through these valves. The reason for showing this was primarily to get into the next question, which was how about the AVWR, how does it differ, and basically it eliminates all of this, but requires a higher pressure on the accumulator side.

MR. EBERSOLE: A grand concept.

MR. PFEFFERLIN: Well, what you lose is the ability to scram at reactor pressure, so again it is a trade off.

MR. MICHELSON: Reduce what?

MR. PFEFFERLIN: This system, you pressurize under the piston --

MR. MICHELSON: Yeah, I understand this system. You said you lost something.

MR. PFEFFERLIN: It has high pressure here, and the leakage goes back into the vessel, so that you don't require --

MR. MICHELSON: You said you lost the ability to do something.

MR. PFEFFERLIN: On this system you will scram by reactor pressure because you are pushing against atmospheric, so you eliminate that with the advance system. So, that is an offset by that.

So, here we do have this pressure plus reactor pressure, which will drive in against, hopefully, atmospheric pressure.

MR. MICHELSON: Plus you do not have the open path. It is a closed piston design.

MR. EBERSOLE: Does it crash against those stops when you have a LOCA? Or do you retard it so it doesn't. You must come in with a lot of force with that high pressure.

Well, that is another design detail.

MR. PFEFFERLIN: I can't answer that.

MR. EBERSOLE: Right. I understand.

MR. OKRENT: Have you wrapped up the discussion on this, Jesse?

MR. EBERSOLE: I am done with this.

MR. OKRENT: All right. Let's go on to 17. May I ask if you have any more questions?

MR. MICHELSON: Why don't we do it that way. I will start. I think I heard Brookhaven say at some past meeting that if there happened to be a fire, you would not

have update available.

Is that correct?

MR. KNECHT: Whatever its capability, it won't necessarily prevent the fire system from operating. I don'+ think we put anything -- certainly not into the concept that says that the UPPS would isolate if you had a fire.

So, I think you can run both simultaneously. Whether or not it would degrade the fire protection system if both were running or not, I can't answer that.

MR. OKRENT: I don't know how much capacity you have in your fire protection system, whether it is one small fire or three small fires, or you know, five small fires, or one large fire.

MR. KNECHT: I am not sure how much it takes, but it is about -- I think it is about 1500 dpm -- the diesel fire pumps about 1500 dpm.

MR. EBERSOLE: Can I say something. We just talked about radioactivity control system, and once you get that squared off we can get the reactor shutdown, okay?

That was Part A of the general proposition here. The second is how are we going to cool it afterwards when we got beaucoup systems out there, and UPPS comes in with a supremely simplified system to cool it down if everything else doesn't work, and I ask just a question: Why can't we extend the scope of the UPPS to accommodate, or certainly

to consider all accidents in Chapter 15 relevant to containment or core heat removal, one by one, to see what we can do with UPPS since it is so simple and cheap.

I am not talking about cheap in increasing the cost of it on percentage basis.

Consideration of fire, power failure, mini-pipe breaks, cooling failures, and failures of various sorts, and then require as an adjunct to the design, and I am going to introduce just a general thesis -- sabotage -- looking at UPPS as the ultimate sabotage protection against containment and core heat removal by incorporating most of its elements in the containment, or with an adjunct, highly defended external building on the perimeter of the containment.

VOICE: The UPPS system can be used for any of those events that you described, because I think the ones that you described are all events that don't have a large loss of coolant, and those are the only events, because this is a manually initiated system, and it is located somewhat remotely from the control room, will take some time for someone to get to the cage, this is a locked cage, and all these events that you are talking about, can be helped by having the UPPS available.

MR. EMERSOLE: You always liked these colorful ads in magazines about what good designs you have. I think

this UPPS system if properly designed, could be -- provide a substantial impact on public favor.

MR. OKRENT: Right now, I must confess I don't know what the UPPS system is -- or what it is designed to handle and I am trying to find out still if you had a fire of some size, would it negate the ability to use UPPS, and what size fire is that?

MR. VILLA: I guess we don't have the answer to that.

MR. OKRENT: I want to see what GE has to say, and what the Staff has to say.

MR. KNECHT: We haven't looked at that trade off of both needing UPPS, which is a low probability, and having a fire simultaneously.

MR. OKRENT: Have you looked at the potential for earthquakes that cause fires?

MR. KNECHT: I don't know the answer to that.

MR. EBERSOLE: The Staff made the decision years ago that they didn't cause fires, and that is why they didn't qualify the fire protection system, but I don't believe it.

MR. OKRENT: Does the Staff have any position now on the likelihood of earthquakes causing fires.

What does your seismic safety panel say, if anything.

MR. SCALETTI: They aren't here.

MR. OKRENT: What happens to oil lines and things

like this, --

MR. EBERSOLE: Hydrogen pipes on the turbine?

MR. SCALETTI: I think that is outside the scope of GESSAR II.

MR. OKRENT: They are in the scope of the PRA, and we are talking about UPPS now, which is using the fire system.

So, I am sorry, but we are really in the scope.

MR. MICHELSON: And it is relevant in the turbine building also, if I recall, is that right. UPPS goes through the turbine building.

MR. EBERSOLE: Well, UPPS is scattered all over now.

MR. OKRENT: I seems to me they don't really have a handle on UPPS. The Staff has said as much in different ways. And I guess I, myself, have a basic question that I am asking myself. At an FDA, what is the level of design or performance, or criteria, that is relevant now, or specification in any event, that is appropriate?

There are some other questions. I have a little bit of a laundry list that I will probably introduce at some time, but with regard to UPPS, it seems to be more elusive than should be at this stage.

It doesn't seem to me to be close.

MR. SCALETTI: The definition of the scope of

GESSAR II -- of any design approval is up to the Applicant, the vendor, for that approval. To decide what he wants within his design --

MR. EBERSOLE: Oh, gosh.

MR. SCALETTI: We are not approving UPPS based on final design. We will, again, review UPPS with the final design if that information does come in. However, much of GESSAR has been reviewed to final design. This is one part that has not.

As I indicated earlier, it will be so identified in the FDA that this information will have to be provided.

MR. EBERSOLE: Mr Chairman, I have a violent -- I will write it as a supplement to a letter -- objection to repeating the disaster which we had when we threw the aux feed water to the PWRs when it was the only means of cooling the core unless you had an accident, and we had the feed water fiasco which we still have after 25 years.

This is the ultimate feed water system for this plant. When everything else fails, this works, and I think it is virtually just tragic that you don't impose on GE the refined developement and evolution of UPPS to their satisfaction as an integral and competent organization to do it, not these dad burned vendors or AEs and utilities which don't have the sophistication, or for that matter dedication, to do it.

MR. SCALETTI: This is the GE design item, or will be, and I assume that GE will finish the design.

However it is presented to the Staff. Be it presented to the Staff through a utility in referencing design, or directly from GE some time prior to an application for a reference plan for GESSAR II, I don't know. And I can't --

MR. EBERSOLE: The parent of this thing is GE.

MR. VILLA: We fully intend to be the designer, the detailed designer.

MR. EBERSOLE: And I say take the bit in your teeth. The hell with our AE or utility, and drive it.

MR. MICHELSON: I am bothered a little bit by the concept that you are going to approve later the UPPS system.

That means that they can come in later with whatever they want. Even if you don't approve it. What is the difference. It is not a part of the FDA.

MR. VILLA: It is a requirement.

MR. MICHELSON: If it is a part of the FDA, how are you going to define what their comments will be on UPPS?

What are the requirements? What will you accept as a minimum UPPS, and you have got to put that in the FDA.

MR. EBERSOLE: I don't like, 'minimum.'

MR. MICHELSON: You have got to put in the FDA what your requirements are somehow, otherwise it is open ended, and it can be anything.

VOICE: In the relative reliance that we seem to be putting on the aux system versus what I think I hear from you, we look at the plant without UPPS. We decided that the risk of the plant, which was very low without UPPS. We decided that the plant handily met the safety goals without UPPS. Now we look, what could we do to suppress the risk even further to lower values, given that a safety code -- recognizing that we have to do the things that seem cost beneficial.

I think that we would have approved the design without UPPS.

MR. MICHELSON: Then there is no requirement for UPPS.

VOICE: I mean subsequently we wrote into the SER that GE had volunteered UPPS, and that we were required --

MR. MICHELSON: That means it can be whatever they volunteer later, is that it?

VOICE: In my mind the acceptability of the design hinges on the low conditional consequences that I get for a wide variety of core melt scenarios, as we reported to you.

For instance, zero early fatalities for --

MR. MICHELSON: Is that without UPPS.

VOICE: Additional -- the conditional consequences without UPPS. That to me was the hinge point.

MR. MICHELSON: Yeah.

VOICE: Now, the assessment was that UPPS would reduce the core melt frequency by a factor of five to ten, and it seemed the prudent thing to do, but five to ten reduction to an order of magnitude is not a make or break in this design.

But just from where I set --

MR. OKRENT: I am sorry, because you keep talking about the low early fatalities, but using your Table 15.1, I see latent fatalities that are not a trivial number, and they are rising for all sequences that lead to core melt down to the floor.

So, please in the same breath when you say that you are not finding early fatalities, say but I do calculate hundreds of latent fatalities. Leave the perspective there, would you? Because it has not been presented.

MR. EBERSOLE: I hate to see this blind faith in this absolutely limitless complexity of these PRA studies that lead you to these conclusions.

I think what we eliminate is the gross uncertainty that exists in this complex of calculations, and this fiendishly complicated systems, which is a daisy chain

configurations all over the place.

And you introduce a simplicity which anyone with common sense, and the public at large, will begin to believe, they they do not even begin to believe now, nor would I recommend they do so.

VOICE: But from our perspective, we are trying to advise that UPPS is worth a factor of five.

MR. EBERSOLE: You are defending a pile of patches.

End 4.
SueW fols.

#5-1-SueW

VOICE: Now, apparently from your perspective, an UPPS like system --

MR. EBERSOLE: You should start with UPPS.

VOICE: -- with some super-high reliability -- let me retrack the word "super", but some high reliability --

MR. OKRENT: That's okay. You can leave it in.

(Laughter.)

VOICE: More than a factor of five to ten is a king pin in the design and a critical element. And so I see a discontinuity with where we are coming from.

And it's far more basic than the details of --

MR. EBERSOLE: Let me say that UPPS is a system you should have started with, and then all of this other stuff should have come behind it.

Then, you would have a different approach. And the fact of life is that you started with the other pile and UPPS came in late. And latecomers always, politically and otherwise, have a hard time.

And you are really defending a complex system, although GE is better than any other as far as I know.

MR. OKRENT: Go ahead. One or two more minutes. This is going to be a subject on the full Committee agenda.

MR. SCALETTI: I agree with Jack as far as the low risk of GESSAR II. But I don't know if I totally agree with him whether we would have accepted GESSAR without UPPS.

#5-2-SueW

The original requirement, or the original reason, for UPPS was to supplement the hydrogen control system from the standpoint of lowering the risk. We agreed that we give them twenty-five percent credit for adding this system.

Now it does have other benefits which Jack has alluded to. But as far as the design goes, we believe it is a relatively simple design. It is only conceptual at this time.

The ultimate design functions of the UPPS contain the venting, depressurization, makeup water to the core, some way of getting water there without depending upon suppression pool. They are there, they are identified and the system will have to achieve these functions when the final design comes in.

MR. EBERSOLE: The method of depressurization, by the way, on UPPS I think needs a little hard looking at.

MR. OKRENT: Jesse, I'm going, if I can, to end the discussion on UPPS.

MR. EBERSOLE: Okay.

MR. OKRENT: It will be on the agenda for tomorrow.

MR. SCALETTI: We are prepared to discuss the systems interaction if you wish.

MR. OKRENT: Let's see, you have a presentation.

#5-3-SueW

MR. SCALETTI: We have someone here able to answer your questions.

MR. OKRENT: All right. Well, why don't we get it done and off the list. Let's see, that was Number 14.

Okay. There is a question listed here, how will this interface requirement be specified in detail. And you have provided some information, if I remember correctly, on this handout. And I guess the question that was asked earlier was, why is seismic interactions, namely non-seismically designed systems interactingwith safety systems or other kinds of systems important to safety not on this list?

MR. COFFMAN: I think I've seen the list, yeah. Frank Coffman, Reliability Risk Assessment Branch.

Let me give you my reaction to the question and make sure we are talking about the same subject, and that is that seismically induced systems interactions fall within the category that is generally referred to as spatially coupled systems interacting.

MR. OKRENT: I don't see any reason why they have to be spatially coupled, but go ahead.

MR. COFFMAN: Well, for those that are spatially coupled to reflect the Staff's thinking --

MR. OKRENT: Relays are an interaction which are I would say not spatially coupled. But, go ahead.

#5-4-SueW

MR. COFFMAN: Okay. Speaking to both of those, but first to those that the Staff considers spatially coupled systems interactions, those -- if, in fact, there are requirements to search for those, or perform an analysis for those systems interactions, that will have to come out at the time. It can't be done before the plant is built, which is one of the items.

And the other is that any additional requirements would be as a result of A-17. Admittedly, that is a broad brush response but I think your interest is more apparently --

MR. OKRENT: I would like a direct answer to the question. Will the systems interaction studies for GESSAR II plants require an examination of seismically induced interactions between systems? Okay.

MR. COFFMAN: Yes.

MR. MICHELSON: Including non-seismic interactions with seismic systems, non-seismic systems?

MR. COFFMAN: Yes, to the first question. Predecisional at this poin+ the second question.

MR. MICHELSON: What does pre-decisional mean?

MR. COFFMAN: It's part of the A-17 considerations.

MR. MICHELSON: You haven't decided yet?

MR. COFFMAN: That's right.

MR. OKRENT: What was the first question you

#5-5-SueW

answered?

MR. COFFMAN: That seismic interactions are already considered and particularly on that equipment which is listed to be seismically qualified.

MR. OKRENT: See, my question was sufficiently general that it included all seismic interactions. So, if you said yes to mine you included all interactions.

So, you interpreted it in a narrow sense and apparently --

MR. COFFMAN: That's right. And that's what I'm trying to communicate with you.

MR. OKRENT: But it's not right to take a general question, interpret it in a narrow sense and say yes.

MR. COFFMAN: But that's why I kept on, to explain that. The reason for saying yes is that there are presently requirements for considering seismically induced systems interaction. Whether that is extrapolated to considering interactions between non-safety related equipment and safety-related equipment is a consideration under the Staff's A-17 program.

And so I can't say that it will or will not be.

MR. EBERSOLE: Why can't you force it? Let me give you an example. At Browns Ferry, there was a hugh domestic water storage tank that was put on the roof. It had

#5-6-SueW

a saddle. Under the non-seismic design condition it would fall off and go clean through the control room. So, it was seismic. And nobody told us. It was just common sense.

And I don't see why you can't write rules with common sense here.

MR. OKRENT: Okay. Well, I think I understand your answer.

MR. MICHELSON: What is the answer as you understand it?

MR. OKRENT: I think my understanding of the answer is that they do look at the interaction of one safety system on another safety system to the seismic events. They look at a selected set of scenarios which one has to, because you look at a steam line break and its possible effects on things, so that once you have looked at it, if it an earthquake causes it, you've looked at it.

But they do not look at currently -- currently require any looking at the failure in a general way of non-seismically designed equipment failing in such a way as to damage the function of things important to safety, safety-related or things important to safety.

MR. MICHELSON: The problem you get into in non-seismic is you have to wonder about how many failures occur in non-seismic equipment under seismic stimulation.

It's irrational to believe that everything fails;

#5-7-SueW

on the other hand, it's irrational to believe that nothing fails.

But how do you select one, two, three, four, five or six seismically induced failures in equipment which was never necessarily designed for the earthquake to begin with?

So, once you decide you are going to do it, then you are going to have to tell me how you decide how much equipment fails. It's not easy, I realize. It's a problem with electrical; it's a problem with mechanical.

MR. COFFMAN: Yes. And I think we, at this point, recognize the considerations. We think we have a pretty exhaustive list of the considerations. It's not just a matter of classification in equipment.

MR. MICHELSON: Have you decided that issue? Or, have you just got it on your list?

MR. COFFMAN: No. It is being worked on. And progress is being made on it.

MR. MICHELSON: But it's a key issue in dealing with non-seismically designed equipment and how to speculate if there are seismically induced failures, how many. Although one failure might be acceptable, perhaps two or three or four would not be.

MR. COFFMAN: Yes.

MR. MICHELSON: And it isn't random failure you

#5-8-SueW

are dealing with. It's common mode seismic induced failure. And it's all the equipment simultaneously. Everything shakes at once.

Now, how much of that equipment which wasn't designed for the shake will actually fail? Now, that is not an easy question.

MR. COFFMAN: Admittedly, it's not.

MR. MICHELSON: But your analysis is not valid until you have been through that part of the question.

MR. COFFMAN: Which analysis?

MR. MICHELSON: The analysis of the effect on non-seismic equipment on safety-related equipment.

MR. COFFMAN: Okay.

MR. OKRENT: I think this is --

MR. MICHELSON: We will never get done with this today.

MR. OKRENT: So I'm going to propose we take a ten minute break now. We have been going over two hours.

And we will begin again with Number 19 I guess.

MR. VILLA: So, we finished 14, 15, 16 and 17, then; is that right? The whole page.

MR. OKRENT: Yes, depending on how you define finished.

MR. FRAHM: Are you picking up 14?

MR. OKRENT: 13, yes. I'm sorry.

#5-9-SueW

MR. FRAHM: Are you going to pick up 14 at tomorrow's full Committee meeting again?

MR. OKRENT: Well, we will talk about the agenda of the full Committee meeting again. And I can't guarantee what questions the vendors may have.

I'm going to leave time. Okay.

(Whereupon, a recess is had at 3:27 p.m., to reconvene at 3:35 p.m., this same date.)

MR. OKRENT: Can you go ahead with 18?

MS. HANKIN: Yes, we can go ahead with 18.

MR. OKRENT: If I could do it in five minutes it wouldn't hurt my feelings.

MR. VILLA: Do you want to just ask questions?

MR. OKRENT: There are a couple of questions there.

MS. HANKIN: Right.

MR. OKRENT: So maybe you could answer them.

MS. HANKIN: We can only answer the first one. The second one is really the Staff.

MR. OKRENT: All right.

MS. HANKIN: On the first one, the answer is no.

MR. MICHELSON: What is the first one?

MS. HANKIN: Does GESSAR interface information and instruct him to calculate the probable maximum flood and frequency of the maximum flood.

#5-10-SueW

MR. MICHELSON: Okay.

MS. HANKIN: There is no requirement to calculate the frequency of the maximum flood.

All the information that is provided is required by the NRC and it has to be consistent with Reg Guides 1.70 and 1.59. That's basically site information on flooding and --

MR. MICHELSON: Let me ask you, in the case of an FDA wherein in the FSAR you say that you-all will comply with reg guide so and so, that becomes a requirement now to comply. It is no longer just a statement or guidance.

You will comply unless you take exception. If you do, you will state it in the FSAR.

MR. VILLA: That's correct.

MR. MICHELSON: Okay. Okay. So, I can read it like requirements and not like guidance.

MR. VILLA: That's correct.

MS. HANKIN: Yes.

MR. MICHELSON: Okay. Thank you.

MS. HANKIN: The second part of the question I believe is directed to the Staff.

MR. OKRENT: What does the Staff have to say about the questions that are listed under 18?

MR. SCALETTI: Regarding external flood? We provided a response to --

#5-11-SueW

MR. OKRENT: Maybe you could read it, because I must confess --

MR. SCALETTI: In essence, the Staff is saying that -- well, we are saying that at this time we do not require a probability analysis associated with probable maximum flood. We do not require a determination of exceedance or the frequency of exceedance.

The position of the Staff is now that if you design to the probable maximum flood, then that is safe. That assures you of being safe.

There is some concern over whether -- and I guess there is mixed opinion throughout the industry and the experts in the field whether you can adequately assign a probability to the probable maximum flood.

The Staff right now is in the position that designing for that flood, as long as you are above that flood, it's good enough.

MR. OKRENT: Okay. I guess we have the answers. We won't try to comment on whether we find them appropriate or not.

Number 19.

MR. VILLA: Again, do you just want to ask us any particular questions?

MR. OKRENT: No.

MR. KNECHT: Well, we have not determined any

#5-12-Suew

seismic fragilities for the fire protection system, because we did not include the UPPS in our seismic PRAs. It's a -- we have not -- I assume the thrust of the question is the seismic capability of UPPS.

MR. OKRENT: No. It's related, but it's just a more general question.

MR. KNECHT: No, we have not determined any seismic fragilities for the fire protection system.

MR. MICHELSON: To state it a little differently, what requirements are you putting on the -- well, the fire protection in the reactor building is yours, the nuclear steam supply, it's all yours. So, you are setting a requirement and you are making it a non-seismic system, for instance?

MR. KNECHT: Right.

MR. MICHELSON: As I understand it.

MR. KNECHT: Right.

MR. VILLA: Right.

MR. MICHELSON: And, of course, if it's a non-seismic system I assume that all of those components are potentially fragile and I'm going to make the worst case assumption that if all the fire protection systems go off during a seismic event.

MR. VILLA: That's why we didn't produce any seismic fragility.

#5-13-SueW

MR. MICHELSON: Is it correct for me to assume you might have a number of inadvertent actuations during a seismic event, both of CO_2 systems and water systems?

And then the next question is, to what extent have you designed for the possibility of an adverse interaction between this non-seismic system now and the various safety-related components?

In other words, have you handled the water, the CO_2 and whatever coming out during earthquake?

MR. OKRENT: And has the Staff reviewed that?

MR. SCALETTI: As I said, the water supply for the fire protection system is outside the scope of GESSAR. We haven't reviewed that.

We have done a deterministic review on the fire protection system which is presented in the SER. If the fire protection system was not included in the PRA --

MR. OKRENT: I'm not talking about the PRA.

MR. SCALETTI: Yes, we did review the fire protection system.

MR. MICHELSON: But from the viewpoint of its functionality, its usefulness and so forth, not from the viewpoint of its adverse interactions?

MR. SCALETTI: I agree.

MR. MICHELSON: And that's the only question I raised was the adverse interaction. I assume that you

#5-14-SueW

have got good fire protection people. They know how to put a system in there to put out fires.

But it may not be acceptable during an earthquake.

MR. VILLA: For that part, I don't have an answer. But, of course, in the flooding design we account for the inadvertent operation.

MR. MICHELSON: Yes, but not of -- you know, you took one at a time. You took a particular system and you said you didn't inadvertently actuate it. And then you watched the water go. And that's fine.

But now, more than one system is going to be set off because none of them are seismically qualified, including your actuation mechanisms. So, you've got to assume multiple fire protection actuations.

I think in your flooding analysis, you took them one at a time to show that you are okay. And that's a good analysis.

MR. VILLA: We took them compartment by compartment.

MR. MICHELSON: Yeah, that's generally the way the fire protection was designed, by compartment.

But now I am going to have several compartments and the water is going to drain through common drain systems, and I don't know what all, and I don't know what's down below

#5-15-SueW

the compartments and where the water goes to and so forth. And it's a different analysis from the usual one that's done for so-called inadvertent actuations.

MR. VILLA: I think we misunderstood the question.

MR. MICHELSON: This is common mode actuation.

MR. EBERSOLE: May I comment on this? On the other hand, the SQUD outfit, have you interfaced with the SQUDs?

MR. VILLA: What's that?

MR. EBERSOLE: It's a team that is studying the seismic damage to commercial systems of various sorts.

MR. VILLA: Oh, no.

MR. EBERSOLE: They are beginning to be able to define the degrees of damage, which is surprisingly low.

MR. MICHELSON: For certain components.

MR. EBERSOLE: I would not hold forth this is a dismal area to look in at all. It looks pretty good. How are we going to use that, I don't know.

MR. OKRENT: Right now, we are trying to find out whether this matter was reviewed since it's not a design basis.

And I gather the answer from the Staff and GE both is no.

MR. SCALETTI: That's correct.

#5-16-SueW

MR. MICHELSON: I think it's a design requirement that it be reviewed. You know, you are doing these reviews on all the plants in the country right now for Appendix R, and there I hope you are looking at inadvertent actuation.

MR. OKRENT: Well, they associated in their minds earthquakes from fires --

MR. EBERSOLE: Yeah.

MR. OKRENT: -- early on. And it sort of creates a mindset.

MR. EBERSOLE: Yeah. By the way, this is infestant of the environmental control of -- the environmental qualifications of this SQUD outfit that's looking into the seismic damage levels, so it's under the broad scope of environmental qualifications.

And it looks pretty good.

MR. OKRENT: Well, okay. We had better go on.

MR. MICHELSON: How do we handle this one, then? It's just an open item for a letter or som.thing?

MR. VILLA: I would prefer to send an answer to you.

MR. MICHELSON: That would be nice, but when?

MR. OKRENT: Well, let me say I expect the full Committee will start thinking about the GESSAR II case at this meeting. But I think we have already advised the Staff that at least the Subcommittee Chairman doesn't expect

the full Committee to finish deliberations at this meeting, okay.

So, in fact, if there is additional information as a result of the meeting today or tomorrow that you think will be helpful it will not be too late if it comes in before the next meeting, I have no doubt. Okay.

MR. VILLA: Okay.

MR. OKRENT: And at this stage I can't even tell, since I don't know what is on Mr. Ebersole's list, for example, whether we are going to get through this list today in this meeting.

It has a finite ending time, since there is another meeting that has already begun that I'm going to have to go to. Okay.

On 20, I guess that is something to the Staff. Can they give us a short answer.

MR. SCALETTI: Very short. We have not got anymore information to give you as yet.

MR. OKRENT: So, it's still open?

MR. SCALETTI: It's an open issue.

MR. MICHELSON: I have one small suggestion now. When you decide to give us the information, one of the questions that will come back if it isn't included is, are you looking at relay chatter of non-qualified equipment in terms of what affects again the common mode

#5-18-SueW

disturbance of an earthquake is going to have on safety-related equipment. And it gets to be quite an interesting problem on power systems that are tied together, some of which are non-seismic, controlled by non-seismic relay, and what do I expect in terms of actuations or lack thereof during this whole event.

So, look at it just like it's fire protection and so forth as a common mode challenge to all non-qualified relays.

And then while you are thinking relays, please be careful. It's also any type of movable contacts that can be actuated during an earthquake. Many types of instruments, the contacts will chatter during earthquakes. They chatter also when you jar them with your arm or whatever.

So, it's more than relay although the common term is relay chatter. It is instrument and contact and control contact that chatter. You worry about both.

MR. OKRENT: Let's go on to 21. I guess this is General Electric.

MR. VILLA: The --

MR. KNECHT: The question has to do with the water hammer potential of the core spray system. And we've gone through this before.

I will show one picture just to summarize what

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is going on with this.

(Slide.)

I will give you a quick explanation and then you can ask the questions. This is a simple drawing here of the spargers. There are actually two spargers, one above and one below. The upper one for the HPCS and the lower one for the LPCS.

The scenario we are talking about, first the water level has come down in the vessel below this ring, all right. And now we start getting a slug of cold water coming in from the injection. As the water level gets down below here, this all becomes saturated. As the cold water comes in up here, it draws the water out of this spray header or the ring up into these pipes, you know, a saturated frothy kind of mixture.

And when the water slug hits it, it gets dampened by all of that. We find that the pressures are only about twenty pounds in this configuration. And so it doesn't turn out that the water hammer is any kind of problem in these things.

MR. MICHELSON: Are you accounting for rapid condensation, the steam which is the more likely thing filling the void than even water?

It's flashing to steam and there is a high volume of steam in there, and it's rapid steam condensation,

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steam knocking we are really talking about, not the normal momentum change water hammer.

Was that included in your analysis?

MR. KNECHT: I believe so.

MR. MICHELSON: Well, you know so, I hope.

MR. VILLA: Yes.

MR. KNECHT: I would say yes.

MR. MICHELSON: And you are saying that steam condensation is not creating unacceptable mechanical problems?

MR. VILLA: No.

MR. KNECHT: No, there are none with this type of design.

MR. VILLA: They are significantly lower than the design level.

MR. OKRENT: Is there something in writing that gives this analysis that you just mentioned, 20 psi or something? Somebody did some analysis, came up with some numbers?

MR. VILLA: Yes.

MR. OKRENT: And made some assumptions and so forth. Is that possible to get?

MR. VILLA: Yes.

MR. KNECHT: I assume it is.

MR. EBERSOLE: Let me get on the other side of

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the question. Maybe it doesn't matter if you knock off the spray head. My understanding -- and that's one of these long questions here, my understanding is that later studies of the core spray system was not anything to speak of anyway, except in some of the old designs, that the flooding process achieved by the core spray system was the primary means of cooling because you have standing water on the core and it goes down by virtue of flooding the top plate, and the distributive aspects of spray was not necessary in these new designs.

Am I wrong?

VOICE: That's correct.

MR. EBERSOLE: So it doesn't matter?

MR. MICHELSON: Yes, it does. What you didn't show here is where the shroud is and the fact the break --

MR. EBERSOLE: Okay.

MR. MICHELSON: -- one might be outside the shroud. And so he needs to show the shroud on here, and in the analysis --

MR. EBERSOLE: That would be critical.

MR. MICHELSON: -- if you break inside the shroud I think you are okay. If you break outside the shroud, it's not clear --

MR. EBERSOLE: I will buy that.

MR. MICHELSON: Is that where the shroud is?

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MR. KNECHT: (Pointing.)

Here are the nozzles. Here is the shroud, and here is the penetration.

MR. MICHELSON: Where is it relative to the piping?

MR. KNECHT: It's right here.

(Pointing.)

MR. MICHELSON: So, it's all that vertical piping.

MR. KNECHT: All of this is outside.

MR. MICHELSON: Okay. I thought the penetration pipes came down inside.

MR. OKRENT: Why does one have headers if they are not worth anything? Why don't you just cut them off and have a pipe running --

(Laughter.)

VOICE: Tradition. It's just a continuation of design with had with the BWR-3. We just continued with the spray headers and we never changed, never took them off.

MR. EBERSOLE: That's from the days when you had buckets out in the yards.

VOICE: That's right.

MR. MICHELSON: You actually haven't done any tests with this analysis; is that right?

MR. VILLA: I don't know.

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MR. MICHELSON: Have you actually done some scale testing?

VOICE: We may have in our quarter scale test at Lynn, Massachuttes. We may have done tests there.

MR. MICHELSON: That was a test of the sparger distribution. I mean, spray distribution.

But I'm thinking about suddenly depressurized sparger which is what you get from a big pipe break. Have you ever done any tests of what happens now when you inject the cold water?

VOICE: We would have to let you know.

MR. MICHELSON: Because there have been no operating experiences quite comparable.

MR. KNECHT: Why don't we just provide you that report?

MR. EBERSOLE: If you don't need it, you can show it doesn't break outside.

VOICE: That's right.

MR. OKRENT: I guess, although I facetiously suggested taking the core spray away --

VOICE: And just have a flutter.

MR. OKRENT: -- it's not so obvious that you don't have three dimensional distributional affects even above the top that are different, given some kind of a sparger or a pipe. So, don't take the sparger or --

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(Laughter.)

MR. PFEFFERLEN: We took your comment as facetious.

VOICE: We have actually considered that and decided to stay with the spray in the highly unlikely event of a bottom out failure, then you would have hood spray distribution.

END #5
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MR. OKRENT: Let's see. Under 21, there were questions of, again, for a water hammer related to pump logic and sequence.

Is there anything, Carl?

MR. MICHELSON: I just have one question. Is a part of any of the MARK I and MARK II type testing, did you ever have a pump in the system that was also pumping the fluid that was frothing and so forth?

In other words, was there ever an attempt to see -- to actually pump fluid that results from a blowdown or results during a blowdown?

Was there any -- I am acquainted with the test, but I don't know if you ever lashed --

MR. KNECHT: You are talking about the air entrainment pump right now?

MR. MICHELSON: Well, yeah. This is a question now of pumping the fluid that is frothing during the initial phase of the blowdown.

MR. KNECHT: There is a lot of operating experience where --

MR. MICHELSON: But that is not even comparable. It is trivial. The real worry is that early on, even though the pumps may be able to move the fluid, even though it has ten percent entrained there, or whatever, that air is accumulating at various parts of the suction line up to the

pump, and there are some nice places for it to accumulate, that can later give you real problems.

And we have seen in actual experience the accumulation of air in such sysems, and its loss of pumping function.

So, we know that air will do it, but the question is air much air under blowdown conditions can I expect to have end up in the suction inside of the system?

MR. KNECHT: The distance between our vents and the suction screen is specified.

MR. MICHELSON: Between the vents --

MR. KNECHT: Between the drywell vents and the strainers to the RHR pumps.

MR. EBERSOLE: You don't think the bubbles will get that low?

MR. KNECHT: We don't think they are going to get over that. There is more than ten feet --

MR. MICHELSON: I looked at your MARK I test and so forth, the whole thing froths up for a while.

MR. KNECHT: It is much different.

MR. MICHELSON: How much time do you think? These pumps start in ten seconds. They are there to sequence to come on immediately after the accident.

Even then they are not doing anything, but they are pumping. If there are these big breaks, they are pumping

in ten seconds.

VOICE: If we have onsite power.

MR. MICHELSON: Sure, yeah. Assuming that everything is working right, those pumps are up and pumping this froth from the time -- you know, ten or fifteen seconds into the accident, when I think you have a very frothy vessel.

We are worried about the entrained air and the water now, and it is separating out in the suction lines. The worse place -- there is a return line into the suction of the RHR system. That is a nice, vertical place for all of this to accumulate, and it starts building up, and finally it comes right down and starts to choke the flow.

MR. KNECHT: The other point, on the diesel -- GESSAR design, is that it is mainly your top vents that you are really worrying about, and those are significantly above these strainers. The bubbles don't go down. It is going to tend to rise, and the areas where the strainers are, it is going to be relatively free of air.

MR. MICHELSON: For MARK III, it is --

MR. KNECHT: I think we have a different situation.

MR. MICHELSON: That is why I am asking what do you know about it, and have you made any estimate of what you think entrained air is in the fluid early on?

VOICE: It is very low.

MR. MICHELSON: Later on it is quite low on the aux.

VOICE: Even for the initial blowdown, we don't estimate.

MR. MICHELSON: Go back and look at it.

MR. EBERSOLE: On this same matter of quick pump starts, let me ask this. You know, an operator before he starts a pump, he will always close the discharge and move it open. He never does it the other way.

I have for a long time wondered about the capacity of the pumps to handle, from the start, a valve configuration which is wide open, because the valves work pretty quick, so the pump actually is in open discharge when it starts.

Are we sure that the motors can carry loads like this? That is, the unorthodox way of starting. Should we not have these valves programmed on a timer to open up as the pump picked up speed?

We always assumed, you know --

VOICE: Our starndard procedures is to have the valve closed before they start. I hear what you are saying. It is not an empty system, of course.

MR. EBERSOLE: Well, on a LOCA, which I don't agree we are going to have, but on a LOCA you have lost a lot of pressure.

VOICE: I can't answer your question directly.

I think there is enough margin in there.

MR. EBERSOLE: There may be, I don't know.

MR. MICHELSON: You ha . better also look carefully at the same situation when you lose offsite power after you have started the pumps and opened the valves, and the pumps are tripped and the valves aren't closed. They are on AC power, they can't close.

So the line is partially drained. And now you restart the pumps with partially drained system, and if you want to watch something exciting, just try that once.

And now that is going to happen during a LOCA, because you are going to restart the pumps automatically.

The operator doesn't go back and restart it. As soon as you get the power transfer made, they are programmed to restart. But the valves aren't programmed to close first.

MR. EBERSOLE: This is a facet of a broader problem. There is this notion that it fails, it fails cleanly, and never recovers is not right.

MR. OBENT: Let me ask you if you have a question on which you want more information from the Staff or GE in this area, and if so, would you --

MR. MICHELSON: Only in the area of air entrainment. What does GE know about the air entrainment and so forth, that is the only part.

Have you ever pumped it, and if not, are you using

calculations, and the basis for the calculations.

You must be using at least an assumption. Tell me you just assume it is two percent. First, make sure you tell me what happens to that two percent. I think you will find two percent for very long is a problem, because it does strip out nicely at certain points in your piping system, depending on the arrangement.

VOICE: You may get more than two percent, but they will continue to pump.

MR. MICHELSON: The pumps will continue to pump, but the air will accumulate.

MR. OKRENT: Look, I am going to request that we not discuss this matter any more. That GE look into the situation and get us additional information. Not by tomorrow.

Now, I think what I will propose to do, since I don't think it will take very long, is that we go into closed session, and pick up Item 11 for not more than fifteen minutes. Will GE and the NRC look to see if there is anybody in the room who is not with the NRC or GE?

MR. MICHELSON:: That is a poor way to do it.

MR. OKRENT: Those who don't have a NRC badge, I assume are with GE, is that correct. You have some Laboratory people, but --

VOICE: Everybody is accounted for.

MR. OKRENT: Everybody is accounted for. And we take now a record, but it is separated.

(Whereupon, a CLOSED SESSION hereupon follows.)

(Whereupon, OPEN SESSION continues at 4:21 p.m., this same day.)

MR. OKRENT: We are back in open session, and -- I think we should take on Items 23 and 24, and then we will get to your other questions, okay?

Now, let's see, was it you or Carl that was -- Carl always had interest in chilled water it seems to me. Do you have questions for the Staff?

MR. MICHELSON: I am trying to read what is here first.

MR. OKRENT: I think this was left over from June or May, or April.

MR. EBERSOLE: At one time, you were worried about the material problems.

MR. MICHELSON: Not on this one.

End 6.
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MR. EBERSOLE: Do you need the chilling function in a safety context?

MR. MICHELSON: Well, I assume that they need -- you know, that you have chilled water, because you need it for whatever specification you put in, your cooling water, your service water.

I assume that based on your service water temperature allowances that there is a need for chilled water systems, in that a number of these are safety-grade and for which you have only written some interface requirements, if anything.

And I'm a little at loss for the moment as to what this paraphrasing was really suggesting in terms of questions.

MR. EBERSOLE: The thrust of it must have to be, do you need chilled water in a safety context, not just to make people comfortable.

MR. MICHELSON: The first two items are for non-safety.

MR. OKRENT: There once was a materials question about what they were using was able to go as the temperature.

MR. MICHELSON: I thought that was cleared up. But let me ask it to make sure. This was the question of whether, since you are operating chilled water systems, as

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I recall it, 42 degrees or somewhere there, there was a question of the proper selection of the carbon steel piping in terms of the MVT transition for the piping. Were you specifying in your interface requirements, for instance, what the transition temperature had to be, since the piping can be potentially brittle at 40 degrees, depending on how you bought it?

A-106, which is the likely piping you use here, can have a transition temperature anywhere from about minus 20 to plus 80 or 90, depending on how you bought it. And if you didn't specify anything, you are likely to get the high end simply because people that specify get the low end, and the rest, whatever is left over they sell to you.

MR. VILLA: I don't know if you saw the interface package we gave you.

MR. MICHELSON: I did not see a package on it. But, just tell me.

MR. VILLA: It just demonstrates the places we specified the temperature range.

MR. MICHELSON: But you've taken care of MVT on chilled water systems by specifying what the transition temperature must be?

MR. VILLA: On the chilled water systems, I'm not exactly sure.

MR. MICHELSON: That was one of the questions.

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MR. VILLA: Generically, we specify the temperature requirements for the whole system.

MR. MICHELSON: Yes, but unless you caution the user that he has to worry about MVT on the pipe nothing will happen, specifying temperature, because that A-106 is perfectly good at minus 20 and perfectly good at 90 if you are not worried about brittle fracture.

If you are worried about brittle fracture, then you had better keep it towards the minus 20 side.

MR. VILLA: I don't have an answer to that specific question.

MR. OKRENT: Does the Staff have any comment?

MR. LE FAVE: Bill Le Fave from the DSI Branch. As far as the rest of the SRP requirements for the chilled water associated with that, I will answer your questions.

MR. OKRENT: Well, there was just a question asked on chilled water systems. What does the Staff look at with regard to the temperature of materials?

MR. LE FAVE: That's mechanical. That's a different branch. I can't address that.

MR. OKRENT: Can you talk to each other?

(Laughter.)

MR. MICHELSON: We have pursued this on Shearon Harris without a suitable resolution. And I just wondered if you people had pursued it on your plant and suitably

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resolved it. You've got to go in and do some arguments about wall thickness and so forth, but you are a little bit flakey depending on what pipe sizes. These could be very large pipes. They could be ten or twelve-inch pipes, and they could -- there could be wall thicknesses at five-eighths to three quarters of an inch, depending on just what you specified as sizes and so forth.

You might have to worry about the MVT on the metal if you are going to seismically qualify. Now, part of this is not seismic, and then I worry even more because it's even a further fragility of the systems in case of a seismic event.

MR. VILLA: You are referring to systems outside of our scope and supply?

MR. MICHELSON: Well, inside and outside. I assume the safety-grade control building chilled water is yours.

MR. VILLA: Yeah.

MR. MICHELSON: And the non-safety is others.

MR. VILLA: Right.

MR. MICHELSON: And it's a problem with both, of course.

MR. OKRENT: I guess we would like to know what the Staff has to say about things that are not in the scope as well as in the scope on this question, not today

#7-5-SueW

apparently but I think within the next month.

MR. MICHELSON: It would be nice to look at it. Shouldn't it be a part of your review to make sure the piping is -- the interface requirements on the piping are acceptable.

GE should -- I should be satisfied that GE has looked at it, and now in the case of the building, control building, I'm less concerned because it's probably not more than six inch piping, although I may be wrong. It may be 8. And it probably is even, of course, thinner wall. And the thinner the wall the less likely, you know, a problem.

MR. OKRENT: Okay. For now, let's go to Item 24. Who is up first? GE.

MS. HANKIN: Dr. Okrent, I think this was your question.

MR. OKRENT: Yes.

MS. HANKIN: I think it stemmed from the fact that we excluded bottom head rupture as the initiating event in the PRA.

MR. OKRENT: No. It stems from back around 1966 when we started to look hard.

(Laughter.)

MS. HANKIN: Most recently, in my involvement it has come up when we mentioned excluding bottom head rupture.

MR. OKRENT: Okay.

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MS. HANKIN: And so I've got two slides here, one that addresses the rupture of the bottom head itself and the other one addresses weld failures.

(Slide.)

There are about nine welds in the RPV bottom head. Most of them are accessible for ultrasonic testing from inside the support skirt. The ones that are not inspected are the attachment welds, the CRDs and their housings.

They have been exempted from inservice inspection because the leakage area produced is so small. We have those rod catchers underneath, so that the only leakage that can develop is in an annular area. And that gap is only about point zero one five inches.

So, you are talking about point three square inches for one CRD involved. If all close to two hundred would go, then you are probably are only talking about 60 square inches of leakage area. And the normal makeup system can handle that kind of leakage.

Also, there are drains that pick up any leakage that might form.

MR. MICHELSON: Well, I thought you were going to tell me there is a drain line there. And how are you handling the drain line and its welds?

MS. HANKIN: It's a two inch drain line.

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MR. MICHELSON: That's a lot more than three tenths of an inch. It's a big leak if it ever breaks.

MR. VILLA: It's inspectable.

MR. MICHELSON: Well, it wasn't on the list. I thought she was about to tell me that the drain lines are also inspected.

MS. HANKIN: Okay. Sorry.

MR. MICHELSON: The two inch drain at the bottom is inspected?

MR. VILLA: Yes.

MR. MICHELSON: It's fully -- I guess it could be fully reached from inside the vessel. Is that where you have to go after it?

MR. OKRENT: No, they can't get from inside.

MR. MICHELSON: How do you get from outside with all of those control rods?

MR. VILLA: From the bottom.

MR. MICHELSON: From the bottom of what? You mean you are going to remove a bunch of drives?

It's up on the vessel and it's totally surrounded by control rod drive thimbles.

MR. HANKIN: We will check on that one. I remember we discussed it.

MR. MICHELSON: It's a big leak if it breaks. It's a worrisome one.

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MS. HANKIN: Okay. We are going to talk about big leaks now.

MR. MICHELSON: It bypasses the shroud capability, too.

MR. OKRENT: Before you go into the hypothetical leak and so forth, I would like to understand a little bit more about the bottom of the vessel.

You said -- do you have a picture?

MR. VILLA: Yes, I do. I have a very rough sketch.

MS. HANKIN: I can't show it. I can pass it around.

MR. MICHELSON: It's not a flimsy, then?

MS. HANKIN: No.

(Ms. Hankin gives a document to Mr. Ebersole.)

MR. EBERSOLE: Thank you.

MR. OKRENT: Now, there is a second kind of question. In addition to the welds, there are a lot of penetrations.

MS. HANKIN: Instrument lines and things like that.

MR. OKRENT: Well, control rod drives. Each of them involves a penetration into the vessel. And in the same way that 747s and some other planes perhaps in the past got failures in areas, or maybe getting failures in areas

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where the designers would say they shouldn't occur, and they may not be along the welds, I'm interested in knowing how we know over forty years or more that these people are talking about that something isn't occurring in this region at the bottom which is not easily looked at?

In other words, that you somehow are not getting a crack, not in the weld, but from penetration to penetration, and some kind of weakening perhaps related to vibrations or something, I don't know? But it is my impression there is no inspection program.

Correct me if I'm wrong. That some parts of the vessel might not be looked at over the life of a plant.

MR. VILLA: That are not welds, you mean?

MR. OKRENT: That are not welds.

MR. VILLA: Yeah. I think that's true. We focus on welds.

MR. OKRENT: For example, every ten years you don't pull off all drives and leave the thing bare, as it were, so that it can be looked at.

Anyway, my question is trying to ascertain from both GE and the Staff why it is adequate to have some welds I guess which are inaccessible and some regions which are inaccessible? And these are not simple regions, because they have things appended to them and so forth.

Why is it adequate?

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MR. VILLA: Well, it's adequate not to have certain welds -- to have certain welds not inspected because we have -- let me see, we have accounted for their failure and the subsequent leakage in the design.

For example, the core, the CRD housing.

MR. OKRENT: That's one.

MR. VILLA: It's 200 and something.

MR. OKRENT: No, no.

MS. HANKIN: You are asking about the vessel itself.

MR. OKRENT: In fact, I was there when you added that rod injection that was done back in connection with Oyster Creek. And it was really to prevent the reactivity, the severe reactivity transient.

MR. VILLA: Right.

MR. OKRENT: Okay. Now I'm trying though to understand why we have this very high confidence that I see stated in PRAs about the likelihood of vessel failure, high confidence that it won't fail when we have a bottom -- as I say, where there are some welds which are very inaccessible and a region of the vessel where there may not be welds but where it is not as just a nice simple uniform with no penetration.

MR. MICHELSON: It's not inspectable pipe, as well. Namely, a two-inch drain line which is a natural crud

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entrapment with no control.

MR. OKRENT: I don't know. I don't know what the inspectability is. And so I would like to hear from both GE and the Staff why this is okay.

MR. VILLA: Well, from our point of view in general regions like that are okay because sooner or later the line gets small enough that we feel that we can accept the consequences, shut the plant down safely before something like that were to get out of hand.

MR. MICHELSON: Leak before break, I think you are saying.

MR. VILLA: No, no, no. I'm talking leak detection systems.

MR. MICHELSON: That assumes a leak before a break.

MR. VILLA: You are right.

MR. OKRENT: But I suspect no one has tried to analyze -- at this stage it is a rather complex geometry there where you have these holes. And if something -- if you happen to be developing cracks, I will say, because since I don't know why they are there -- I can think of more than one being there, and so you might have a region of the bottom which is vulnerable.

MS. HANKIN: That was the analysis we did, was to assume a section of the bottom between the CRDs here. If we have four CRDs here and assume that this section of the vessel

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were to fail -- and traditionally they have taken the triangular section and analyzed it, and it's about a four hundred centimeter hole, about point three square feet. You could take easily up to a three square foot. So that would be a variable of --

MR. MICHELSON: Easily from the viewpoint of what? You mean, water or --

MS. HANKIN: No. I'm just running through what would be the results of such an event. And what happens is, you are not going to be able -- even with this size hole, you won't be able to reflood the vessel.

MR. MICHELSON: By reflood, you mean you won't even get to the two-thirds core level?

MS. HANKIN: Right. So the vessel will depressurize. ECCS will operate. It will be spraying and flooding but it's going to drain out.

So, eventually you overheat at the core, but the drywell will be flooded and so when the corium melts down it will go into a flooded drywell and as such you will have no evaporazation release.

So, from a core melt standpoint that's a very, very benign scenario.

MR. MICHELSON: Well, yes, from that viewpoint.

(Laughter.)

From the investor's viewpoint it would be a total disaster.

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MS. HANKIN: And then there is something in between which is cracks, but you don't go into the full core melt down.

MR. MICHELSON: I just wondered, have you looked at the two-inch drain line in terms of, can you keep a two-thirds core level, and you keep, of course, putting water in the containment and you've got to eventually do something about that -- have you actually analyzed a two-inch line break?

MS. HANKIN: We've analyzed a 350 square centimeter, and I don't know what that would turn out to be -- but for that size, the ECCS will handle it.

MR. MICHELSON: By that you mean that you will keep it above the two-thirds core level?

MR. VILLA: Yes.

MS. HANKIN: It keeps the core below 200 degrees Fahrenheit. It meets all the ECCS criteria.

MR. EBERSOLE: Ms. Hankin, you just answered an earlier question about severe accidents, and you said it's nice to have water in the drywell. The early one was, why don't you have it there anyway.

MR. VILLA: Well, beyond that, the explanation of why we feel this is acceptable, really I think we are going to a materials discussion then, you know, what measure to take to ensure that we don't have these, why do we inspect so

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many and this kind of thing.

MR. OKRENT: Well, in fact, I'm not sure if you have the kind of failure shown there that your rod catcher would be effective.

Have you looked?

MR. VILLA: Not with that kind of failure.

MR. OKRENT: So, in fact, there would be a reactivity transient possibly super to initiate the event?

MS. HANKIN: It doesn't matter, it --

MR. OKRENT: Oh, it does matter. I'm sorry. If it's a big enough reactivity transient, it matters very much, because you now have a very different --

MS. HANKIN: You are only affecting four CRDs out of a hundred and eighty-eight.

MR. MICHELSON: That's enough I think. Four together --

MR. OKRENT: Four together at the center of the core. You are talking about a reactor which is critical, and if you are injecting four in a group this would be rapid, very rapidly, this would be an event that makes the ATWS look like child's play.

(Laughter.)

MS. HANKIN: Okay. Now, you would have to describe your failure mode.

MR. EBERSOLE: I understand this produces a

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shockwave.

MR. OKRENT: I think we have to be a little cautious about saying -- again, I'm trying to understand how solid is the foundation for the exceptions that are granted with regard to non-inspection.

And I'm not sure -- I'm not hearing an answer.

MR. SCALETTI: The Staff has nothing to add. We discussed this back in July.

MR. OKRENT: I'm sorry. I don't recall this being --

MR. SCALETTI: In-Service inspections. I believe it was. We said that the Staff considered the PRA --

VOICE: We said that we had not considered any PRA consequence analysis. I would perhaps have a little pessimistic interpretation of the potential consequences, because for such an event there would be no primary system; two, I don't necessarily think that the deep-bed coolability of --

MS. HANKIN: I didn't say deep-bed cooled. I said no --

MR. OKRENT: You start with fuel evaporazation.

VOICE: And the last point we had was that there was no special program at this point --

MR. EBERSOLE: Is this grid below the core to

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catch the rod housing? Is it good for only one housing?

MR. VILLA: No, no. It catches the -- the grid goes below all of the housing.

MR. EBERSOLE: I know that. But it's good for only one at a time.

MR. VILLA: Its intention is -- I don't think so. But I don't think we have ever considered that, but its intention is to lodge the housing so that it can't travel anymore than six inches and the rod won't shoot out.

MR. EBERSOLE: If it's more than one rod at one place, would it carry it?

MR. MICHELSON: Well, Bellville springs I think were designed for the loading of one rod injection.

MR. VILLA: I don't know.

MR. EBERSOLE: I suspect it's just one rod.

MS. HANKIN: I will check that.

MR. MICHELSON: Whether it could --

MR. VILLA: They are beams now. They are not just springs; they are beams.

MR. MICHELSON: They are beams and springs. It's a heavy load, but I think it's one rod. It's quite an injection.

MR. OKRENT: Well, we will leave this as a question at the moment.

MR. VILLA: What do you want us to do with it?

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Do you want us to address it again?

MR. OKRENT: Well, I think, as I tried to indicate, its assessment as a leak -- if you get some kind of a rupture at the bottom -- is unfortunately not clearly an adequate assessment.

MR. MICHELSON: Would it be reasonable to bring this up to the Metal Components Subcommittee as something for them to look into?

I mean, if it's a real problem -- it's far more immediate on MARK Is and IIs and IIIs and --

MR. OKRENT: I don't know if it's a real problem. I'm trying to understand --

MR. MICHELSON: That would be a place to raise it. Is it a real problem for operating reactors?

MR. OKRENT: In the first place, what kind of difficulties might arise here and why, whatever is being done is adequate, if it is.

Considering that it might in fact be equivalent to a BWR-1. Still, I think I can only speculate but that if enough reactivity is involved and vaporized significant parts of the fuel at the beginning of the transient, then one hasn't followed through the subsequent course of events.

VOICE: We could -- do you want us to send you some material or be prepared to discuss it?

MR. OKRENT: I think Michelson's suggestion that

#7-18-SueW

the Metal Components Subcommittee review it is useful from that point of view.

I don't know --

MR. EBERSOLE: Well, the standing record is that one rod injected will detonate the --

MR. OKRENT: I don't know that any single rod will. But I would be willing to bet a small part of all my savings that four rods together would be a mighty interesting --

MR. VILLA: Clearly, if you follow the NRC criteria to calculate the event it would -- you would get an extremely high reactivity very fast.

MR. OKRENT: Yes.

MR. VILLA: Clearly, with four rods. But I guess my problem is, where do we go? If you want the vessel -- to take the vessel break that way, we know that we have got, you know, a bad situation.

Where do I focus -- do we need to focus on this anymore?

MR. OKRENT: I guess since it may be a very undesirable situation, usually what one has done in the past, for example, talking about pressure vessels, one went back to see whether the existing methods of fabrication and quality control and so forth, and the in-service inspection, were adequate for the past.

#7-19-SueW

Here, maybe one can think of things. I don't know. There may be a method of monitoring an area ultrasonically so that if cracks are in an early stage but growing one will get signals. I just don't know.

Okay. Or, maybe the people who are expert in materials can have some basis for saying what is being done just will lead to a no-failure record and this is why everyone will say yes, yes, everyone who knows anything about it, even the skeptics.

But at the moment, it seems to me what we -- at least, I haven't seen a careful, well documented evaluation that says yes, yes, it's okay.

MR. VILLA: Okay.

MR. MICHELSON: So, what are you going to do, for my information?

MR. VILLA: Well, I think what you want me to do is to give you a -- let me see, a more complete explanation of why we have confidence that cracks don't more easily appear in a vessel than they do on welds and why we think it's acceptable to leave some welds uninspected.

But a more global explanation, maybe including some QA and fabrication discussions.

MR. MICHELSON: Be sure to include a discussion of the drain line coming out to the first -- as far as the first isolation valve.

7-20-SueW

MR. VILLA: I will.

MR. MICHELSON: Which might be some twenty feet or more from the vessel.

MR. VILLA: But I don't think it's fruitful to have much further discussion on rod injection, because I think we know what the consequences are.

MR. OKRENT: I wasn't suggesting that we analyze that at this stage.

MR. EBERSOLE: Can you invoke leak before a break, and why?

MR. VILLA: Okay, I will.

MR. MICHELSON: I hope you don't do it on that two-inch line.

MR. OKRENT: Okay. Jesse, I think I'm ready for your questions.

MR. EBERSOLE: I'm going to try to rush through these in view of the time.

MR. OKRENT: Excuse me a minute. I think you should pick out those you think are important, and I would rather have you get to them in Subcommittee than in full Committee. Do you know what I mean?

MR. EBERSOLE: Sure, I know.

MR. OKRENT: And you have at least forty minutes. How is that?

END #7
Joe flws

8-1-JoeW

MR. EBERSOLE: I don't think I will need that. Let me see. I ask that you go back now and look at the FSAR in its present configuration, and join with me on whether we think we should harden it and more sharply define what it should say against your drawings, rather than it being left in its present ambiguous state.

The first item I picked up was I thought a requirement of harder language to ensure that that third diesel generator was going to be truly independent, electric, and pumping function.

VOICE: Are you going to give us a section or page.

MR. EBERSOLE: I am going right down from the first volume through the 12th or 13th. I don't have them numbered. I can do that later, but this is just topical.

I have a few numbers I will give you.

VOICE: Okay.

MR. EBERSOLE: I didn't find what I call a conservative basis for containment spray system capacity and sizes, considering the conservative bypass allowance.

I just couldn't find it.

VOICE: I don't understand what that means.

MR. EBERSOLE: The containment bypass -- the containment spray system I read in the FSAR -- earlier in the first volume -- was designed in the context of providing

a major cooling function for the bypass. It is a way to cool the back side of the suppression pool, and I didn't find in there a succinct and comprehensive statement of what that gross bypass might be against which you size the containment spray.

Okay. It may be in the detail of the drawings later on. I couldn't get to them for heaven's sake.

As a general requirement and philosophy I thought it would be appropriate, if nobody else can do it, that you take a crack at defining the criteria with which you define whether you are going to automate a function, or leave it to the operator.

Somebody has got to do it, and why shouldn't you lead the pack? Decide you are going to automate or not automate. And the reasons for it. The simplicity, the display, the reversability, or whatever.

It seems to me that kind of a general basis for starting a design -- when am I going to automate and when am I not --

VOICE : That discussion is in Appendix 1-A.

MR. EBERSOLE: I didn't find that to do the job. Now, I am going to give you a number here. Redefine 1.1.1.2, which is paragraph 28, to properly state the hypothetical control control room conditions, and also for paragraph 1.2.1.2.7, in respect to the capacity for the

backup control pumps.

If there is still in there that ancient language from GDC 17 -- 19, which is unoccupiable, there is no statement in there about the degree of damage which you could accommodate in the control room under the new Appendix R consideration.

It still carries antique language that all you have to do is hook up to terminal boards and run off to a distant place to control the function.

I would have thought you would have at least tried to induce the buyer to provide you with some power diversity or some greater flexibility in the main feedwater system than just turbines, like the Japanese do.

They use motors, or a mix of motors or turbines. But that is just a suggestion. It is something that has to do with the commercial attractiveness of continuity of generation.

There is nothing in there -- and really I say this in the background of the Davis-Besse case, where they don't have anything but turbines, in which you know had everybody excited recently.

Surely there should be some language in here some place about diversity of feedwater supply.

I didn't find how the division of water flow was explicitly designed and would be obtained when you divide

the flow between the RHR flow that goes to the core to keep it covered, and that which you have to maintain a full mass flow to do the containment cooling pumps.

I recall years ago we had a split valve, a three-way valve which we modulated, to get a desired flow to cover the core; the remainder doing the containment cooling function through the heat exchange.

I thought that was a crude way to do it, and I thought you should probably explicitly say when you are forced into the RHR mode how you are going to get 'X' gpm of water on the core, and why for the main containment cooling pumps. Do you follow me?

VOICE: Yes.

MR. EBERSOLE: I found nothing in narrative form. It may be back there buried in the drawings. I don't know.

It seems to me that you all would take a lot of credit, and do yourself a lot of credit, to do something to justify or not justify something other than going to this full crash scram every time you trip out, and you have to go through that agonizing process of coming out with the minimizing systems, all the money it cost you to get back to power.

I think there is in being a gang withdrawal pattern that -- I am not sure where you stand on this --

or at least some sort of option to get rid of this horrible delay you have of getting -- going again once you drop all the rods in.

And I don't know why it doesn't make very much common sense before you go to a full scram you just don't go to a set back and see if you can't come out of that.

I don't find any defense for that. I think set back should be importantly considered.

MR. MICHELSON: I have a comment on that. I don't think they can set those back without pulling the scram volumes.

MR. EBERSOLE: Then get another scram volume, for God's sake.

MR. MICHELSON: Yeah, that is a possibility.

MR. EBERSOLE: Or use one of the two you have got.

MR. VILLA: I am confused.

MR. EBERSOLE: I just want to knock the power down and hold.

MR. MICHELSON: You have to go through hydraulic valves. And, of course, when you do it you dump a lot of water. In fact, you don't stop dumping the water with your mechanism. You can't partially scram a rod. It has to go all the way and then some.

It could get very complicated.

MR. EBERSOLE: I think you ought to look at cost the operators have of coming back to power after scram, and see what you can do with that kind of money.

Let me go back in history a little bit and the problem we bumped into at Brown's Ferry that we had the 67 percent -- it was certainly less than 100 percent.

It was just a few years prior to that you permitted to go less than 100 for safety valve capacity, and it was invoked on the basis you would always get a scram. ASME bought that.

Subsequent to that, or as a matter of fact, in the aftermath of looking at that low level release, the ATWS issue was born. That was the trigger at least as far as I am concerned. We started looking at delays in the rod concession, with limited release, and found this extraordinary pressure, so ATWS grew up.

I wonder if one shouldn't take a back view at the logic of not having less than a hundred percent release or higher bypass.

MR. OKRENT: You mean bypass or safety?

MR. EBERSOLE: Both. I am talking about both. And in the back view of the ATWS issue, it might look better to have more relief. Again, the Japanese, what do they have, a hundred percent. So, they can take an ATWS and just blow. They are going to heat up the containment, but they

blow.

They don't have a rapid power and escalation of pressure.

VOICE: They don't have uniformally 100 percent. The have a hundred percent in a couple of plants.

MR. EBERSOLE: I am talking about -- the one -- whatever one I asked about -- Fukashima.

VOICE: When I asked that same question, the answer was most of their plants are 35 percent.

MR. EBERSOLE: Maybe they are regressing under the influence of the FDA.

Anyway, I mentioned earlier eliminate the break in the coolant system logic in the AVS system, and I think downstairs at River Bend you are doing exactly that.

But the FSAR still says that the AVS will be invoked on the requirement you have a break in the coolant system, okay, that is what it says.

VOICE: One thing on that. TMI reverses that.

MR. EBERSOLE: Still that is in the FSAR in the present state and not in compliance with the current logic.

Correct the language regarding the low pressure spray system in paragraph 1.2.2.4.8, paragraph 3. Just get it on the record. There is something wrong with the low pressure core spray system language in that paragraph.

VOICE: What was the paragraph?

MR. EBERSOLE: Paragraph 1.2.2.4.8, paragraph 3. There is something wrong about the low pressure core spray system.

It still retains the old notion that you have to get distributive cover, okay, -- you may want to keep it. At your own relief you could eliminate the fast post-LOCA cooling requirement with only the diesel generators, since I think we have all conceded you will not get an offsite power failure coincident with that rare event, and why don't you put it in there and get rid of this permanently. Permanently get rid of this fast start diesel problem. That is the current allowance for the Staff.

Specifically account for all vapor releases, including post-LOCA into auxiliary buildings. Where possible, provide bypass to atmosphere, compartmentalize leakage past two atmospheres in that language.

I am saying put in narrative that you are going to compartmentalize the aux building to get rid of the cases where you have spray -- or rather vapor injection into the aux building, and you need to dissipate it into the atmosphere with regressively destroying all of the electrical apparatus in the rest of the plant.

That is what Limerick did, and what you just got through saying you are going to do for the reactor water cleanup system.

But I think it needs to be said early on in the FSAR and then followed.

Independent generators or batteries for hydrogen igniters. That is something else. Require validation of damper function in HEV systems. I bumped into the fact that it is a general problem that we don't know how well or how reliably, -- the HEV damper functions will be actually obtained when we ask for them for isolation of the environmental system in the building.

I don't think at the present time we have any way to know whether the dampers work or to go fix them, or whatever.

So, I am suggesting we look at the validation of damper functions, or improvement of damper reliability.

Defend the absence of transfer capability between the electrical divisons. I think you are looking at a design that invokes transfer switches to pick up an opposite division from another power supply, and I am trying to evaluate it.

At the present time that is unpopular, but I understand it is being looked at. Of course, it was used early on. Do you follow me?

VOICE: No.

MR. EBERSOLE: I am transferring electrical source power to an alternate using division on the grounds I have

the curious probability if my power source fails over here, and my using source failing in the opposite track, and I need to cross -- it is an ancient problem of whether or not to have transfer switches to obtain the alternate power source, having lost the power source to a good system.

It is an old, old issue, but I understand it is getting popular now again, and I may -- is there an ongoing analysis of the merits of transfer designs?

These may or may not be automatic. It depends on what sort of supervisory equipment you put in as to whether you are going to close on a fault or not. And the effects of closing on the fault or recovering from it.

VOICE: One of the cases we looked at was a cross-tie between Division Three and Division One.

MR. EBERSOLE: That is what I am talking about.

VOICE: And we ultimately rejected it on the groups of complexity and not --

MR. EBERSOLE: Maybe it will be rejected, I don't know. I am just saying defend the fact that you do or you don't.

Define the method of preventing washout of standby liquid control systems in an ATWS. Can you defend the limited amount of boration against this potential problem?

How do you manage this?

VOICE: We manage that in our emergency procedure

guidelines.

MR. EPERSOLE: EPGs. In paragraph 1.2.2.4.21, get rid of the word, 'inaccessible.'

Or include, 'or grossly damaged.' This is the wording that pertains to the level of degradation in the control room, and some kind of an internal accident to it. That old word, 'inaccessible' is still in there, as though the only thing wrong with it is that I can't walk in because it smells bad or something.

MR. MICHELSON: A skunk in the control room.

MR. EBERSOLE: It used to be said there was a skunk in the control room.

I understand again the Japanese have 100 percent bypass.

VOICE: I only say they don't have uniformally a hundred percent bypass.

MR. EBERSOLE: Are we really settled on 35 percent as being the best optimum bypass? I don't know. I just open the issue again.

I don't know why it was 35 percent, and there was no explanation. What is the rationale for 35 percent? Was it just somebody's good, round , grab-out number?

VOICE: I am not the expert, but whenever this comes up again, it turns out that 35 percent is the best answer from the point of view of cost benefit.

MR. EBERSOLE: Is it?

VOICE: Yes. And we don't know of anyone who has decided to go to that for future plants.

MR. EBERSOLE: I understand in turbine driven feed pumps you have expanded capabilities?

VOICE: I think there are other ways to reduce ATWS, and scrams, as the Japanese and Swiss have shown.

MR. EBERSOLE: I thought that you could say a good deal -- and this is No. 20 -- in the aspect of reliability of main feed water controls, since you are now emphasizing a higher reliability on these to increase their availability.

Nothing is said in here to constrain any user or buyer of your plants to, by George, use good feedwater controls. I don't know how you are going to make him do that.

But it has a safety conotation. They use the best main feedwater controls you have got to avoid challenge -- what have you got, two systems -- you have RCIC and high pressure,and what is behind that, blow down.

I had further in here why in the heck don't you have an aux feedwater pump, electrically driven to take over so the little turbine doesn't have to stop, but that is just a sideline.

I was thinking about PWR.

VOICE : A whole building full of pumps.

MR. EBERSOLE: I know it, but you have to blow down to get them. Is it logical you have to go blow down once you lose the first two? Is that a good track to follow?

VOICE: Well, we have a large number of high pressure. For example, CRD pumps are high pressure.

MR. EBERSOLE: Will they pick you up?

VOICE: It all depends.

MR. EBERSOLE: I don't know. I know it is just interesting to see these two aux feedwater pumps here; one diesel-driven and one steam-driven. After that, you have a blow down.

VOICE: The old feedwater controller is commercial grade, and the new one is digital system.

MR. EBERSOLE : Are you going to sort of push the digitals?

VOICE: We are pushing it.

MR. EBERSOLE: Can you make it independent in safety context, on a challenge frequency basis?

VOICE: I don't know. What do you think?

MR. EBERSOLE: I am trying to get the challenge frequency on RCIC and the diesel plant, and the negative aspects of having to blow down.

And I said eliminate the chill water safety function. If you can get rid of the chillers in the safety

context. Not human comfort to do so, so you don't have to let them be a burdon on you with the piping problem Carl mentioned.

Expand paragraph 1.2.8-1.11 to define the service instrument air system safety requirements -- I don't -- specifically electric power for safety needs, not be obtained from the unit in such need.

In short, make the AE get his aux power from incoming station power; not from the units guaranteed to fail.

That is the way it is done now, so say it. Do you follow me? Don't derive critical electric power from the unit that is guaranteed to trip or fail.

VOICE: I see.

MR. EBOSOLE: That is an imposition or interface on the AE to do that. Not just to let him do it like it was so popularly done in the past. I think it will probably clear automatically, but I am not sure. Most new designs don't draw power from the units guaranteed to fail.

And then as you are doing that, include the lighting circuit, because you don't want the unit to go dark, which you need all the light in because that is the one in trouble.

Forbid, positively, electric-driven fire pumps. It depends on AC power, and they should be taken out and

thrown away.

Review the design layout for openness for inspection and maintenance. Have you done that? Do you have an open, loose design like I admired in Japan.

VOICE: We used to have.

MR. EBERSOLE: What happened.

VOICE: They got filled up with everything. That was the whole idea of the MARK III design.

MR. EBERSOLE: Again, I find paragraph 1.5.1.2., the core spray distribution text there is out of date. You could say I am going to keep it anyway, on those dim grounds that you are going to need it for a bottom failure.

Paragraph 1.8.41, there is a flaw in the last paragraph in that all the penetration should be protected with one E circuit protection, not just the safety segments.

All the penetrations have to be protected against overcurrent, safety-grade overcurrent protection . It doesn't matter if they are critical or not, they are protecting the containment function. Do you follow me?

The remote shutdown system, page 1.8-127, I don't find a listed and orderly presentation of the level of damage which you are trying to overcome from the fire problem.

You know there are literally zillions of them, so in the long run you have to abandon the notion of trying to identify all of them, and just say which functions you

shall always preserve irrespective of what happens in the damage context.

In paragraph 1.8.226, define the debris source term, in the context of specs for the painting, insulation, and so forth, including identification of specific gravity characteristics, and get rid of the hydroclones.

I think you would automatically get rid of the hydroclones if you look hard at what they are going to have to digest, especially if you let them use plastic insulation, because I recall setting a bunch of glasses on my desk years ago, and watching the variety of insulations settle over a period of some weeks, and it ranges from those that float to those that go at the bottom, to those that never go anywhere. So, I couldn't figure hydroclone in the absence of any specs for insulation that was -- it may be a decadent to the seals.

Paragraph 3.1.10. All this narrative needs revision to better define the remote shutdosn capability.

Appendix 3.E describes safety related equipment descriptions. It is a list. The implications of being safety related are not clear. I didn't know what that meant in the context of upgrading the discipline for operation, reliability.

This is a list of safety related equipment which in any case is insufficient. It does not include all the

safety related equipment, nor does it say it is a partial list.

So, it leads the reader into a state of mind that he has seen all the safety related equipment, and he hasn't seen but a fraction of it, and then it doesn't say what that means in the design and operational context anyway.

Paragraph 4.616, the scram discharge volume. These drawings still indicate one drain and one relief valve. It is not brought update to include your new requirement of series valves.

I am merely just telling you how badly out of date the FSAR is, and then this is a question I thought a mini PRA should be done showing the effect of eliminating the dump volume common equalizer pipe, and going back to independent volumes to argue that at least you didn't get a common dump volume drill.

Simultaneously, a mini-PRA should be done, I believe, to show the effect of delaying the dump closure until completion of the scram function. You follow me?

VOICE: Yes.

MR. EBERSOLE: This is open discharge to the suppression pool, granting that the valve may be shut.

Next, the safety valve relief capacity code requirements was modified by 1966. Whether you should

look at that -- I have already covered that.

It also pertains to bypass.

Paragraph 5.2.4. -- page 5.2.4, paragraph 5.2.2.1. 3, erroneously states that these valves must qualify for 100 percent of name plate capacity.

I didn't know whether that was name plate capacity on individual valves, or whether it was name plate capacity on all the valves. I think one needs to look at that language. It certainly is not clear.

Now, then let me ask you this. You have a design that latches up the SRV so that as you have a release, they run down to the lowest setpoint valve, and then you identify it as indeed the one that goes off and on to perform the relief function.

So, you impose on it the greatest challenge against sticking. The lowest, lowest setpoint. One of them is going to get the duty.

I guess the operator can distribute that probability -- or rather that duty -- as he wishes, by opening others.

I wonder if it might be prudent to say: Oh, that is a valve like a PWR on the primary loop, so while I am using it in this duty, if it sticks I will shut it.

There is only one that is likely to give me a sticking problem. Do you follow me?

VOICE: Yes.

MR. EBERSOLE: If it gives out -- it is the only one ratcheting up and down, and if it gives out in the course of being on full duty and all the rest of them are resting, why should I face the possibility I am going to go to blow down on that one valve?

Maybe it is not worth the difference. It seems to be worth thinking about.

VOICE: There is a little set monitor.

MR. EBERSOLE: I know it. But if you put all the duty on this one valve, and you don't have a block valve to shut it off --

VOICE: But the way it was set though, I think is it holds the valve open to minimize --

VOICE: That is right.

VOICE: Originally, the concept was we could rotate every valve is the lowest set valve.

MR. EBERSOLE: Distribute the duty.

VOICE: Right. So, they didn't put block valves in for that reason.

MR. EBERSOLE: Well, maybe that is the cheapest course.

VOICE: That was the logic.

MR. EBERSOLE: I see. A block valve in front of the one you intend to use. You will have to take it out of the safety relief section, because it is not allowed by

the Code, but you could do that and say this is the duty valve to protect the others, and maybe stay on line. Are you with me, without even repairing it.

I don't know how many hours you use on fixing subsafety, but it may be more than you think.

End 8.
SueW fols.

#9-1-SueW

Paragraph 5.2.18, the ADS valves have only two actuations available on stored air according to that text. I thought that's shocking. And these may be subject to leakage in the check valve, which is masked by the main compressor capacities which go ahead and feed the leaks anyway, and you don't really have two actuations.

And I would say there should be a diverse means to depressurize, probably involving hydraulics or motor driven valves just to get rid of the common mode pattern of the important function of depressurization especially even as it relates to UPPS.

Next, RCIC still is not explicitely required to be cooled by non-electric means. You don't ask the RCIC be made an entity, self-operating system with cooling, et cetera so that it stands free and clear of electric requirements other than DC.

It would seem important that you say about RCIC, this is the system that you are going to ride on when you have a full AC power failure. And then do it.

This, Carl had mentioned. Overspeed trip, reset of RCIC is still required to be reset outside the control room. You've got to run down and do this thing he talked about.

Is that up to date, or have you done something about it?

#9-2-SueW

MR. KNECHT: You don't have to get out of the control room.

MR. EBERSOLE: Well, it says it in the FSAR. My object really -- and, Dave, I could go on. But what it really means is that we've got to clean up the FSARs.

MR. OKRENT: Well --

MR. EBERSOLE: It's a hash of misstatements.

MR. OKRENT: I'm trying to see where this cluster of comments fits. I don't know, in fact, for some of these there may have been amendments that came in. If not, then -- in other words, if there are things in the FSAR that don't, in fact, conform with what they expect to do, I don't know what that means.

MR. EBERSOLE: Well, where do I start reading and where do I quit reading?

MR. OKRENT: Maybe somebody can help us. In other words, if some of the things that Mr. Ebersole has read from, whatever version of the FSAR he has, still are the way the FSAR reads, is that okay even though it's not expected that that's what GESSAR II would be?

I mean, maybe discussions held one place or another.

MR. SCALETTI: Again, I don't know what version he is reading from.

MR. EBERSOLE: I'm reading from the ACRS Library

#9-3-SueW

copy.

MR. SCALETTI: There may be twenty revisions to it to date.

MR. EBERSOLE: Let me ask you this. Is there a trail of inconsequential and erroneous language at the front end of this process which is never picked up?

And what are the implications of it being that way? Is it inconsequential?

MR. OKRENT: He just read something about the availability of air for the safety relief valves. I heard someone say that's not the way it is.

VOICE: That's right.

MR. OKRENT: But that's the way it is in what he is reading. Okay.

Now, does that mean there has been an amendment which says something different but it's just not ir the version that we have seen, or what?

MR. VILLA: Hopefully it means that. Do you happen to know if your copy is kept current with all of the revisions?

MR. OKRENT: I cannot --

MR. MICHELSON: At least, this is current through Revision 14 for sure. There may be higher revisions in other volumes. But, at least through 14. It's current through 14.

#9-4-SueW

MR. KNECHT: That one item you mentioned about the two reliefs, the ADC accumulators, there is a very confusing set of very specific events where in one case you can get only two. And really, the real case you get five.

And it may have been worded very precisely to mean two. You know, you have to go back and look at it. Sometimes they are tricky.

MR. EBERSOLE: It leaves me feeling a little lost. I would rather see an infinite number of cycles so that I can hook up a pipe and have it all ready that takes me to a compressor or whatever.

MR. OKRENT: It seems like this is a fairly up-to-date FSAR.

MR. MICHELSON: It's through 14.

MR. OKRENT: I can't swear to it firsthand. So, Jesse, that's one kind of a question.

MR. EBERSOLE: Yeah.

MR. OKRENT: And I said --

MR. EBERSOLE: But these things --

MR. OKRENT: Some of the things you read I think you have deeper feelings about than just -- it seems I think that -- let me suggest the following.

Why don't we, in a minute, take a five or ten minute break, not more than that, while you pick out those

#9-5-SueW

things that you consider to be substantive, if that's what the situation is, as distinct from --

MR. VILLA: Suggested design changes.

MR. OKRENT: Yeah. Things that, in fact, are --

MR. EBERSOLE: Let me --

MR. OKRENT: -- and then advise -- in fact, I will leave a block of time in the agenda tomorrow for us to get considered responses, like thirty minutes, but not more. I don't think we can ask for more than that.

I think you should pick out those areas where, in your opinion, they should impact, modify --

MR. EBERSOLE: Let me tell you what I've got. I've got two sheets here. I went through this rationale, and it's a host of things you might call suggested improvements, or certainly some hard line improvements, certainly some clarifications.

And the next one is the case in point. I'm trying to clarify what we've got really. 43. There are alternating current valves in the RCIC system, we know that. There may be some AC valves and so forth in the HVCS system which are connected to AC systems, not derived from the HVCS output.

I don't know. But you don't say there are. There is no language in there that says HVCS is an entity of a system, or it's self-serving to itself. It must be.

#9-6-SueW

But you don't say it.

MR. KNECHT: It's buried down in the drawings.

MR. EBERSOLE: You have a requirement on thermal insulation but it pertains only to leachable chlorides not fragility and dissipation into the water or anything.

MR. MICHELSON: Does it say mirror insulation?

MR. EBERSOLE: Nothing about mirror.

MR. MICHELSON: Isn't there a commitment in the FSAR that the utility uses mirror insulation?

MR. VILLA: Our specification calls for it. I don't know what's in the FSAR.

MR. MICHELSON: Your specification gets me into this first question of the day. What the heck does the FDA cover?

MR. OKRENT: Will the real FDA stand up, you know?

(Laughter.)

MR. MICHELSON: I don't even know if it includes his specification.

MR. VILLA: It does.

MR. MICHELSON: I say I don't know because I haven't seen the list of what --

MR. EBERSOLE: Dave, let me tell you what I've got.

#9-7-SueW

MR. VILLA: You see, the thing is that we overlooked, when we refer to the documents that are listed in the FSAR or GESSAR, is the fact that we have this huge document structure that starts at the top down and makes clear all of the specifications and yet those documents maybe at a top level are referred to in GESSAR.

MR. MICHELSON: You see, what I want to be sure of is that those documents have been sent to the NRC and have been reviewed, whatever they want to do, sample or whatever, but are included as a part of the FDA.

And I can't get a word from the NRC that says, yes, they recognize that they received this set. Here is the list of the set. And we recognize this as part of the FDA.

MR. VILLA: Okay. Generally, those documents are sent to the Staff during the review at their request.

But in actual practice, the Staff inspects our offices for these kinds of checks, spot checks, during the review. I think we have had approximately fifteen or sixteen technical audits by the Staff.

Then, we have pure, straightforward audits by I&E.

MR. MICHELSON: I have my doubts. I have my doubts about checks that are done at your office by auditors in terms of technical review. I don't call that

#9-8-SueW

a technical review. That's just a documentation check to see that the documents exist, not necessarily the contents. See, I want to see a statement from NRC that says they have in a logical manner set down and looked at the full set of information that is going to be a part of the FDA. They have taken logically certain samples, have gone into those samples in enough depth to satisfy themselves that the whole process works.

And I would like -- to do that, you must have a set from which you -- a menu from which you made your choices. And I can't get the menu out of the Staff people from which they made their choices.

It can't be a random process and work, not under any general QA plans that you make the industry use. You can't let that process work. And some kind of a QA must pertain to your work as well.

And I would think the first thing that pertained is a list of what you received and your decisions as to which part of that you even reviewed.

MR. SCALETTI: We have a Standard Review Plan which we go by.

MR. MICHELSON: I realize that.

MR. SCALETTI: I think our list -- the information provided in support of our last Standard Review Plan from the applicant is what we look at.

#9-9-SueW

MR. MICHELSON: For instance, on insulation you can easily tell me that you did or did not look at the specification for insulation. And if you are making it a requirement, whether or not you are making it a requirement of the --

MR. SCALETTI: I was just trying to find the one on insulation in here.

MR. EBERSOLE: I want to make clear, before you go launching off, that part of this stuff was from my own FSAR, which I can't afford to maintain. It would take clerks I ain't got.

Part of it merged with the Staff. I don't know where the dividing line is. I'm going to go back and check and see where I picked up.

Well, let me tell you, Dave, about what all of this boils down to. I thought -- I think GE has got the best design there is in light water reactors, and I would support it on a differential context any day. I'm looking for the absolute improvement aspects.

If I were going to be -- you know, if I had the hammer, I would go back and I would upgrade the reactivity control system to eliminate single volumes and develop the alert --

MR. OKRENT: Jesse --

MR. EBERSOLE: Okay. The sabotage. And I

#9-10-SueW

would change the logic once I proved it was valuable to insure dump to the suppression pool until the rods are seated.

I would find out whether that would buy me something or not. And I would certainly attend to the vulnerability to tampering, to invalidate the thesis we can initiate a mitigated ATWS.

I would then step -- now, that takes care of my reactivity shutdown problem. Okay. I'm shut down. If I can do that, I'm satisfied.

Okay. What have I got to do after that? I've got to get the heat out, and I would then -- and I will read it -- extend the scope of the UPPS design to accommodate consideration of all accidents pertinent to Chapter 15 in aspect to obtaining or maintaining containment and core heat removal.

This includes seismic power, fire failure, many pipe breaks, including failures of various sorts, and sabatoge, et cetera, which means this consolidated design, most of which is inside the containment and the remainder of which is in a reinforced concrete capsule outside the containment.

Hang on. I can't read my writing. Yes, that's incorporating UPPS within containment as much as possible plus a highly defended external structure module.

#9-11-SueW

And then -- we were just talking about the wet design of the drywell. I don't think we have wrestled out whether or not that drywell ought to be wet or dry. I see it's dry now, but I just saw awhile ago that it looked pretty good when it was actually wet.

And I can't help but think there may be a considerable merit in having a pre-installed water cooling supply under the vessel. I don't -- that's just instintively I say that.

MR. MICHELSON: You mean a leg? Is that what you meant?

MR. EBERSOLE: Whatever. Well, it gets rid of Dave saying all the pumps are gone. If the water is there and it acts as a distributive function to get the cooling function transported to other parts of the pool. In other words, it gets rid of the heat.

I think in doing that, one might also incorporate some sort of feature in there that would gradualize or moderate the rate of entry of the hypothetical core into the water.

And that's all I would say. I back down into UPPS in fixing your reactivity control system, and then I'm done with the boiler. And I think we ought to build a string of them.

That's the end of my road.

#9-12-SueW

MR. OKRENT: Okay. Well, I am going to assume that that is it for today on that. Plus we are now running as late as we can with the Subcommittee.

I would like to propose a tentative agenda for the meeting with the full Committee. How much time do we have, four hours? Okay.

I will give time to include presentations, Committee questions, you know. So, it's not supposed to be time only for presentations.

All right. First, this question of definition of what an FDA is that we have been wrestling with in more than one way. And I think the NRC has the lead there.

I used to have ten minutes down. But I now have twenty. There are various ramifications to that question, what does it mean, you know, so forth. How much design should have been done, what has been specified. I hope the Staff will pick up all the ramifications.

MR. MICHELSON: It would be most helpful if you could simply hand to us a short written statement of what the FDA covers, what does that design approval cover. Put in whatever word you want, and we will believe that that is what you are going to do.

If we disagree with it, we will also state in our letter. If we will agree, we will remain silent. But I think at this stage, it would be most efficient if

#9-13-SueW

you would just write it down.

MR. OKRENT: Well, you can try that.

MR. MICHELSON: And we can ask questions for clarification of the writing.

MR. OKRENT: Okay. The second item on the agenda is an item from today's agenda that we mostly did not cover, which is Item 12.

But I don't want to show one full hour for it. I have shown -- what I've got down are major results and conclusions PRA. Qualifications that you have with regard to the PRA results. And it should include Staff estimates of mean core melt frequency.

And I've shown thirty minutes for the NRC and ten for GE. I don't know whether that's going to be enough, but I want to start off at least as if that is going to be enough. Okay?

MR. VILLA: That's total, forty minutes?

MR. OKRENT: Yeah, because you know there are lots of things that we are going to have to go through.

Then, interface requirements and in particular a statement which is clear by the NRC what they think should and is being required in a quantitative way in the interface requirements. And a statement by GE what they have required in a quantitative way with regard to interface requirements.

#9-14-SueW

And this now includes seismic. And let's assume fifteen minutes for the Staff, ten for GE. I don't know if these times are realistic but they have to add up to less than four hours initially or we are in trouble.

Okay. Then, a statement by the NRC on its position concerning what I will call safety goals for future plants and containment requirements for future plants. You may just say what's in Mr. Denton's letter I guess, or whoever.

But it will open up this subject, and the Committee will ask questions if it so chooses. I've shown ten to fifteen minutes here for the total subject. Then, again a review, a brief review, of your -- the Staff's estimate of what I call containment failure likelihood and mode, given a core melt through the vessel. Okay.

And I've got ten minutes down for that.

On the subject of hydrogen control, at the moment I would suggest only that you discuss -- that is the Staff -- why it seems not to have seismic requirements on the ignition part. And I don't know whether it's only ignitors or what.

And GE can tell us what they have. In fact, there is a question of what the Staff itself thinks should be the requirements. These could be, you know, two separate things. GE may have more than the Staff itself has

#9-15-SueW

in its requirements. I felt there may be a brief statement here from GE what it is doing with regard to seismic capability of the hydrogen control system.

Okay. On the USIs and GSIs, of the ones that we talked about it would seem to me that on A-43, Mr. Ebersole had some questions about the cyclone pumps still, and there were some questions about Staff's statement it was relying on UPPS where there was no detailed analysis.

So, we would want to hear something about that one. I don't know whether any other of the USIs or GSIs require calling out -- again, one doesn't know what the Committee members themselves will want to hear in this regard.

But I think we will want to hear about the Staff and their consultants --

MR. SCALETTI: Are you reserving a time in hydrogen control?

MR. OKRENT: Ten minutes I have, concerning evaluation of internal flooding difficulties from a PRA point of view.

I think ten minutes from GE and again that includes a discussion about containment venting, your design, your criteria, I guess they are really.

Then I have the subject of UPPS, what is its currently proposed nature, design requirement as the

#9-16-SueW

Staff and GE see it. The question of its capability, given fire of different size.

And I've got -- I've shown twenty to twenty-five minutes with no way of knowing how much time there will be on UPPS.

Under systems interaction, the question of what the Staff is proposing for GESSAR and why, if I understand it correctly, at the moment they are not including under systems interactions review of adverse affects caused by failures or spurious actuations in non-safety systems.

END #9
Joe flws

MR. OKRENT : And if I understand it correctly, there is not an assessment of the potential for problems for fires caused by earthquakes, and I have got there a total of twenty minutes for the Staff and GE to offer comments and answer questions.

VOICE: On both the subject of system generation and potential cause of fire?

MR. OKRENT: Yes. Okay. Now, having done that, let's see -- I think I have used about three hours?

VOICE: Three hours and fifteen minutes.

MR. OKRENT : And fifteen minutes. Which is more than I should have, so -- okay, we need then, I think, a -- I will say fifteen minutes for Mr. Ebersole to -- not to state his summary position, but to indicate the -- what he seems to find, and I will use the term, deficiencies in the verse of the FSAR.

MR. EBERSOLE: Of information mismatches.

MR. OKRENT: Or whatever he read, and you may be able to help out by telling us in many cases that has been changed. If in fact -- at least the subject should be raised for what it is worth.

That is fifteen minutes, including discussion. So, I am not going to give you fifteen minutes, Jesse, for presentation any more than I would give --

MR. EBERSOLE: I don't want it.

MR. OKRENT: And then I will leave 30 minutes for other questions. Other topics. So, we should -- we have to assume there is going to be other topics. So, I recommend that we try to use, if we can, a little bit less rather than more on the things here, recognizing that there are a lot of members around the table who may ask or raise a question.

This is -- and there will be -- I will give some introduction at the beginning, which will use five minutes.

VOICE: Okay.

MR. OKRENT: Okay. This is a try -- the members may want to shift these times around just by their interest.

VOICE: Are you going to discuss schedule and plan for closure for the review -- completion of the review?

MR. OKRENT: What I told you is that it is my expectation that the Committee will sort of begin trying to deliberate on the GESSAR II at this meeting. It is on the Saturday agenda.

I told you I don't expect the Committee to be finished on Saturday. I think it is highly unlikely. In fact, what I will try to do -- partly these topics and party via what ever kind of -- it may be a draft letter or it may be a draft report of issues, I don't know yet, that they have to face, okay?

And to sort of force a beginning of the thought process. Well, in this thing we are satisfied; here we are

not or whatever.

Here we want something. You know.

We may have some better feel after this meeting as to whether one more meeting, or -- I don't want to predict.

You have to recognize this is the first FDA or standard designed to be reviewed under the new accident policy. You have to some extent feel our way through.

It may take a little digestion. Okay.

Thank you.

(Whereupon, the meeting concluded at 5:47 p.m., September 11, 1985.)

* * * * * * * * * *

CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of: ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Name of Proceeding: ACRS on GESSAR II

Docket No.:

Place: Washington, D. C.

Date: Wednesday, September 11, 1985

were held as herein appears and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission.

(Signature) Garrett J. Walsh, Jr.

(Typed Name of Reporter) Garrett J. Walsh, Jr.

Ann Riley & Associates, Ltd.

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(Signature) Myrtle H. Walsh

(Typed Name of Reporter) Myrtle H. Walsh

Ann Riley & Associates, Ltd.

NRR STAFF PRESENTATION TO THE ACRS

SUBJECT: GESSAR II STAFF REQUIRED INTERFACES

DATE: SEPTEMBER 11, 1985

PRESENTER: DINO C. SCALETTI

PRESENTER'S TITLE/BRANCH/DIV: PROJECT MANAGER / SSPB / DL

PRESENTER'S NRC TEL. NO.: 492-9787

SUBCOMMITTEE: GESSAR II

SEVERE ACCIDENT INTERFACES

Supplement #2

15.6.2 Quality assurance and interface requirements

Utility applicants referencing GESSAR II must provide an evaluation to support the PRA interfaces and assumptions to demonstrate that the PRA's applicable.

15.6.2.3 Internal and external flooding analysis (Page 15-19)

Internal flooding-analysis should consider that rupture of lines to the suppression pool has the potential for bypass pathway. The impact on plant risk must be addressed.

External flooding - provide PMF information required by the SRP.

15.6.2.3 Aircraft Strike (page 15-19)

Demonstrate that the probability of aircraft impact is less than 10-7

15.6.2.3 Hazardous Materials

Provide information that the risk from hazardous materials is low. Utility applicants will provide a determination of the design-basis events with probabilities of greater than 10-7 per year and have potential consequences serious enough to effect the safety of the plant to the extent that 10 CFR 100 guidelines could be exceeded.

15.6.2.3 Snow and Ice Loading (page 15-20)

Assess the risk impact from snow and ice loading

Appendix C Systems interaction (USI-17 (page 15-20)

(1) Provide system-level failure modes analyses

(2) Include RPS, RCIC, RHR, Remote shutdown SBGT and HVAC systems in the FMEA.

(3) Include BOP systems in the analysis

(4) Analysis of spatially coupled systems

Appendix C <u>Behavior of BWR Mark III Containment, GSI B-10</u>

Address staff acceptance criteria for LOCA-related pool dynamic loads identified in NUREG-0978 and in Section 6.2.1.8.3 in the GESSAR II SER

Appendix C <u>Reliability of open cycle service ice water systems, GSI 51, (page 19)</u>

To be addressed by utility applicants

Appendix C <u>Probability of core melt due to CCW system, GSI 65, (page 20)</u>

The major portion of the CCW is outside the scope of GESSAR II

A utility applicant must show core melt and risk from an accident will result in no significant change to PRA.

Appendix G <u>CP/MC rule items</u>

Provide required information required by 10 CFR 50.34(f) for those items outside GESSAR II scope.

Supplement #3

15.6.2.3(1.5) Critical component and structures list. (page 15-12)

Develop a critical components and structures list for the plant with due consideration of Table 15.1. Perform fragility analyses of all critical structures and components and show that they are bounded by the values presented in the GESSAR II seismic risk study, and clearly indicate all supporting assumptions and calculations incorporated into the fragility analyses. In this context, bounding the fragility value means that the plant specific median values should be greater than or equal to the GESSAR II median values and that the plant specific logarithmic standard deviation values should be below or equal to the corresponding GESSAR II values. For critical components not included in the GESSAR II list, an applicant should satisfy the Case 1 alternate fragilities presented in supplement 3 (Table 15.2).

Site specific hazard function analysis

Perform a site specific hazard function analysis, and justify that the mean and mean plus one standard deviation of the site specific hazard are bounded by the mean and mean plus one standard deviation GESSAR II seismic hazard function as indicated in Table 2-3 of the "GESSAR II Seismic Event Uncertainty Analysis," December 1983.

Seismic analysis interface assumptions

For the balance of plant features not included in the GESSAR II or the Case 1 analysis, and any plant specific seismic vulnerability to be determined from a plant specific walkdown, show that the as-built plant satisfies the assumptions utilized by the GESSAR II analysis.

In the event that these analyses indicate that the above conditions are not met, the utility applicant shall demonstrate that this does not result in any significant increase in risk.

Supplement #4

15.6 Containment venting procedures, (page 15-2)

Provide guidelines and procedures for containment venting below the ultimate containment pressure-carrying capability of 83 PSIG

15.6.3.4.4 RCIC room cooling

Utility applicants must investigate what actions are available to facilitate RCIC room cooling for extended operation during a station blackout.

Appendix C Safety implications of control systems, USI A-47, (page 3)

Provide the necessary evaluation of control systems required by NUREG-0979 and that will be required by resolution of USI A-47.

Appendix C Interfacing LOCA, GSI 105, (page 10)

Demonstrate the intended design capability of the isolation valves, at least on a prototype basis, by performing a closing and opening test with full design differential pressure and flow across the valve disk. Such a design test is recommended in addition to the leak and operability testing of isolation valves as required by the BWR Standard Technical Specifications.

In addition to the interfaces listed above the staff will condition the FDA to require the following modifications discussed in SSER Section 15.6.3.5.

1) Seismic upgrade to UPPS
2) Dedicated power supply to hydrogen igniter system
3) 10-hour station batteries
4) Ability to power a dc battery charger from the backup igniter power supply

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

September 6, 1985

MEMORANDUM FOR: Raymond E. Fraley, Executive Director
Advisory Committee on Reactor Safeguards

FROM: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

SUBJECT: ACRS REVIEW OF GESSAR II

The purpose of this memorandum is to provide follow up to a meeting on August 29 between you and your staff and my staff. The purpose of the meeting was to clear up some misunderstandings which had developed in regards to the ACRS's severe accident review of the GESSAR II standard plant design. The meeting also included discussion of the remaining steps in this review and agenda items for the September 11 Subcommittee meeting.

As discussed with you on August 29, issuance of Amendment No. 1 to the GESSAR Final Design Approval (FDA) on August 9, 1985, in no way changes the scope of the ACRS's severe accident review. The amendment was issued to implement Section B.3.b(1) of the Commission's recently-approved Severe Accident Policy Statement (50 FR 32138, August 8, 1985). This amendment would allow a prospective applicant to submit a CP application referencing the GESSAR II design. However, as stated in paragraph (6)(c) of the amendment, the staff cannot issue a CP or OL until ACRS has completed its severe accident review of the GESSAR II design. It was also pointed out that neither the Severe Accident Policy Statement nor 10 CFR 50, Appendix O precludes ACRS's review of any portion of the GESSAR II design for purposes of a forward-referencable application. The staff also pointed out that a similar FDA amendment is anticipated for the CESSAR System 80 design pending receipt of a request to do so from Combustion Engineering. Following the completion of the ACRS's severe accident review of GESSAR II and resolution of any ACRS comments, the staff will publish a Federal Register notice per Appendix O and will issue an appropriate amendment to the GESSAR II FDA in accordance with the Severe Accident Policy Statement.

In my August 6 memorandum to you on this subject, I used the term "deterministic review". In using that term, I did not mean to imply that aspects of the design reviewed by the ACRS in 1983 prior to the FDA issuance should not be revisited during the current PRA-oriented review. In fact, the Severe Accident Policy Statement clearly requires "Completion of a staff review of

CONTACT:
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Ext. 29787

the design with a conclusion of safety acceptability using an approach that stresses deterministic engineering analysis and judgement complemented by PRA." The intent of my comment was to encourage the Committee to focus on those aspects of the design which were found by the PRA to have the higher contributions to risk. Those aspects should be the core of any severe accident review. By the same token, those aspects of the design which are found by the PRA to be insignificant risk contributors should require little or no re-review by the staff and the Committee.

During the meeting on August 29, D. Crutchfield of my staff outlined the impact on the staff of this prolonged review and requested your assistance in developing ways and means to allow its completion within the next month or two. In order to accomplish as much as possible in reviewing the remaining issues of concern to the Committee during the September 11 Subcommittee meeting and the September 12 full-Committee meeting, the staff agreed to provide written responses to several of the scheduled agenda items in advance of the meeting. Those responses are included in the Enclosure. The staff expects that these responses will reduce the amount of valuable meeting time necessary on those specific issues.

I hope this memorandum has clarified any misunderstanding regarding the ACRS review of GESSAR II, however I would like to reiterate the concerns expressed in my August 6, 1985 memo to you. By the end of next week there will have been a total of 13 ACRS meetings over a period of 18 days related to the severe accident review for GESSAR II. Because of the substantial demands this is placing on the staff's resources I must ask again that the ACRS take the necessary steps to complete its review of GESSAR II in a timely manner.

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosure:
As stated

ENCLOSURE

Responses to ACRS Questions on GESSAR II

(Reference: R. Major Memorandum dated 8/23/85)

A. GESSAR-II PRA Meetings

Meeting No.	Date	Type
1	10/18/84	Subcommittee (SC)
2	10/19/84	SC
3	12/04/84	SC
4	12/05/84	SC
5	02/14/85	SC
6	02/15/85	SC
7	03/08/85	Full Committee (FC)
8	03/27/85	SC
9	03/28/85	SC
10	03/29/85	SC
11	04/12/85	FC (Closed Session)
12	05/09/85	FC
13	06/06/85	FC
14	07/12/85	FC
15	08/07/85	SC
16	08/08/85	FC

B. Responses to ACRS Questions

Agenda Item #3

The estimated core melt values presented in the staff's SER supplements are essentially mean values. In their evaluation of of GESSAR II PRA, BNL calculated mean core melt frequencies for the dominant sequences of the internal events. BNL also prepared a limited statistical uncertainty analysis. The confidence bounds for

the internal event core melt estimates were presented in SSER #2.

The core melt estimates for the seismic events are also mean values, but in a somewhat more limited sense. Structure and component fragilities were combined to form the mean system fragility curve. However, this level of detail was not possible for the site hazard since no information was available on the distribution of the site hazard function. It was believed that large uncertainties existed in this area. Without an actual site, it was not possible to develop a meaningful hazard function and associated uncertainty distribution. For calculational purposes, the GESSAR II site hazard function was assumed to represent a mean value. When integrated with the mean system fragility curve, estimated mean seismic core melt frequencies are obtained. However, aware of the limitations of this approach, the staff/BNL provided sensitivity analyses to attempt to bound the likely seismic core melt contribution, which was presented in SSER 4.

With regard to the question whether consideration of onsite averted costs (including replacement power costs) would affect the cost/benefit analysis results for the more than 70 potential design improvements considered by the staff in the GESSAR II severe accident review, the apparent answer is that generally inclusion of onsite averted costs would more readily justify design improvements. However, the staffs considerations of onsite costs discussed in SSER 4 section 15.6.3.4.4(4) and table 15.16 indicate that the inclusions of onsite costs would not change the overall cost-benefit analysis of the potential design modifications for GESSAR II. Predicted onsite and offsite monitized risk are comparable; $21 million and $19 million respectively for 40 year operation of the plant assuming seismic upgrade of UPPS and

diverse power for igniters and battery charging and considering both internal and seismic risk. Hence inclusion of onsite costs would not change our cost/benefit analysis by more than a factor of 2. Staff recommendations are based on screening potential design improvements to within a factor of 10 to 100 based on cost/benefit and final selection of design improvements based on engineering judgement.

The issue of onsite averted costs will be further discussed with the Safety Philosophy, Technology, and Criteria Subcommittee on October 9, 1985. The staff considers additional pursuit of this controversy on September 11 would be unwarranted.

Agenda Item #4

This item references a proposal in a H. Denton to W. Dircks memo dated June 12, 1985 wherein the NRC guideline would be stated as follows: "likelihood of a nuclear reactor accident that results in a large scale release of fuel and fission products from the reactor coolant system should normally be less than one in 100,000 per year of reactor operation." The EDO has taken this proposal, as well as others, under advisement. However, the Commission has not finalized the Safety Goal Policy and will not have by September 11. The staff discussed the Safety Goal Policy with

the ACRS on July 10 (subcommittee) and July 11 (full Committee) and the ACRS issued a letter to Chairman Palladino on July 17, 1985, stating that the NRC is not ready to reaffirm and implement the policy. As noted above, the staff plans to continue discussion of this policy during the October 9 meeting. Further discussion of this matter at the GESSAR II meeting on September 11 would seem to be unwarranted.

Agenda Item #5

This item also pertains to the Safety Goal Policy issue. Therefore, the comments under Agenda Item #4 also apply to this item.

Agenda Item #6

As noted in the July 17, 1985 ACRS letter on safety goals, the NRC staff has not developed a containment performance guideline and that development of such a guideline "warrants high priority." The staff has deterministically re-reviewed the GESSAR II containment as documented in Chapter 15 of SSER #4 and two BNL reports (BNL-NUREG-51789 and BNL-NUREG-51790). The staff's evaluation has been discussed in detail during the past several ACRS meetings on GESSAR II. Specifically, the drywell vulnerability to core melt sequences was discussed at Meeting Nos. 13, 14, 15 and 16. To summarize briefly our review of the containment performance, both GE and the staff and its consultants have examined containment threats due to steam and non-condensible gas production, hydrogen deflagrations, diffusion flames, hydrogen detonations and the potential for containment bypass such as seal failure and leakage. We have assessed the risk due to these potential containment failure modes and conclude that the risk to the public is small. The most probable failure mode is predicted to be slow overpressurization due

to non-condensible gas production, and for this failure mode, suppression pool scrubbing of radionuclides effectively reduces the consequences to the public. Conditional consequences of core melt events are shown in SSER 2 and 4. Containment event trees are shown in SSER 2. The release fractions shown in Table 15.16 of SSER 2 show that a large fraction of the non-noble gas radionuclides are retained in the primary system or containment following a core melt accident with a resulting low risk.

Agenda Item #7

The proposed hydrogen igniter system for GESSAR II relies on vital ac to power the igniters. Since such a system would not be operable in the event of a station blackout, and since the dominant GESSAR II core melt sequences arise from station blackout, the staff has required a dedicated back up dc power supply be provided for the hydrogen igniters. This position is discussed in detail in Section 15.6.3 of SSER #4, and was discussed during meeting No. 15. It should be noted that GE has committed to provide the requisite back-up power source. With regard to the source of power for the containment sprays, the GESSAR II sprays are an integral part of the RHR system and are thus powered from the emergency diesels. The containment heat removal function of the spray system in the GESSAR II design can be accomplished by the containment venting function of the Ultimate Plant Protection System (UPPS). The UPPS is independent of the ac or dc systems. Moreover, our analyses indicate that hydrogen burns extending over the period of time of hydrogen production will not overpressurize the MK III containment even without active heat removal. Containment sprays are not needed to preserve containment integrity in a station blackout core melt event.

Agenda Item #8

See response to Item #3

Agenda Item # 9

The staff's list of interface requirements which it believes necessary to assure the PRA performance requirements are achieved are identified in Section 1.10 of the SER and its supplements. The severe accident interfaces are listed in SSER-2, 3 and 4. The quantitative requirements for these interfaces, if so required, are identified in the Section of the SER identified in table 1.10. A list will be compiled for the September 11, 1985 meeting.

Agenda Item #11

The staff reviewed features of the GESSAR II design which would mitigate the effects of sabotage. This review was conducted in the context of resolution of GSI A-29. The staff concluded that the GESSAR II design contains a number of features that limit vulnerability to sabotage and concluded that the risk from sabotage is low. Features which would, by their nature, be site specific would be reviewed as part of an application referencing the GESSAR II design. The staff has discussed this issue extensively with the ACRS during at least three subcommittee meetings and three full-Committee meetings. Sabotage is not considered in this PRA or any other PRA. Lacking definitive guidance from the Commission, the staff considers it has carried review of this matter to the extent intended by the Severe Accident Policy Statement.

Agenda Item #13

The staff is prepared to discuss these specific USI and GSI resolutions at the September 11 meeting. In regard to the question on generic safety issues (GSI's) which have not yet been prioritized, the staff

has stated in a number of GESSAR II meetings that the Severe Accident Policy Statement requires technical resolution for medium and high GSIs. Therefore, an issue which has not yet been prioritized are not required to be included in the GESSAR II review.

The staff has stated in previous meetings with the ACRS that USIs and medium and high priority GSIs will be reviewed on the GESSAR II docket up until such time that the severe accident FDA amendment is issued. (See pp. 169-173 of transcript for Meeting No. 4).

Agenda Item #16

General Electric would be expected to review system design and capability in response to the items listed on the CRD Scram Discharge Volume. The staff reviewed this system and found that it meets the SRP and the ATWS rule. The staff, therefore, did not pursue or request General Electric to submit a more advanced CRD system such as that contemplated for the ABWR design nor does the staff consider that the Severe Accident Policy Statement need be construed as to require it to do so.

Agenda Item #17

The staff performed an evaluation of the degree of risk reduction the UPPS, as conceptually proposed, would provide in combination with other design improvements. This evaluation is documented in Section 15.6.3 of SSER #4. Although a detailed design has not been submitted, the staff considers that the likelihood of this system initiating or exacerbating an off-normal situation is very small because of the system's simplicity and mode of operation. GE has noted the potential for inadvertent SRV actuation and depressurization with the implementation of UPPS. The staff agrees with GE that this concern may be addressed adequately by taking certain precautions (procedures) and that ESF action provides

further protection if needed. Since the proposed design is unique and in the conceptual stage, the NRC has not specified performance criteria as such. Likewise, no assessment of associated uncertainties has been made.

Agenda Item #18

It is the staff's position that, for any plant whose safety related systems, components, and structures are located above the level of the design basis flood (DBF), the risk from external flooding is acceptably low. The DBF may be the PMF on a river, local PMP, the probable maximum tsunami, probable maximum surge or seiche, or a dam failure flood.

As a result of the Federal Dam Safety Program, considerable research is presently being undertaken in the area of extreme flood probability. A study by the National Research Council (Ref. 1) concludes that "the probability that rainfall will equal or exceed current PMP estimates is indeterminate but probably not uniform for projects in different parts of the country." The working group on PMF risk assessment under the Hydrology Subcommittee of the Interagency Advisory Committee on Water Data recently released a draft report for Agency comments entitled "Feasibility of Assigning a Probability to the Probable Maximum Flood" (Ref. 2). One of the conclusions of this work group is "that no procedure proposed to date is capable of assigning an exceedance probability to the floods in a reliable, consistent or credible manner." Others in the scientific community think that the determination of probabilities, with acceptable confidence limits, for extreme flood events is a tractable problem. To pursue these possibilities the NRC is contracting with National Research Council for techniques estimating

probabilities of extreme floods.

At present the staff thinks that any assignment of a probability to the DBF will be arbitrary and of limited value. For those plants here structures such as walls or levees protect the plant from relatively frequent floods as well as the DBF, a PRA analysis involving flood probability and structural fragility might be justified.

A utility applicant referencing GESSAR II will be required to meet the applicable sections of the SRP for all interface items that is in effect at the time of the application.

Agenda Item #20

As indicated in meeting No. 15, the staff has not completed its consideration of the issue of relay chatter. No additional information is available at this time.

Agenda Item #22

The issue of adverse effects of air entrainment in the RHR system pumps was discussed during Meeting No. 4 and the subcommittee appeared to dismiss this as a GESSAR II issue and concluded it may be a problem at Hope Creek. (See pp 212-213 in transcript for Meeting No. 4)

Agenda Item #24

This item was fully discussed during Meeting No. 14. Further discussion by the staff would seem not to be warranted. No additional information is available.