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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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SUBCOMMITTEE ON THE WESTINGHOUSE AP1000 DESIGN

CONTROL DOCUMENT AMENDMENTS AND NRC DRAFT

SAFETY EVALUATION REPORT WITH OPEN ITEMS

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TUESDAY, OCTOBER 6, 2009

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ROCKVILLE, MARYLAND

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The Subcommittee convened at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Mr. Harold Ray, Chairman, presiding.

SUBCOMMITTEE MEMBERS:

HAROLD RAY, Chairman

SANJOY BANERJEE, Member

DENNIS C. BLEY, Member

MARIO V. BONACA, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

CONSULTANT TO THE SUBCOMMITTEE:

THOMAS S. KRESS

NRC STAFF PRESENT:

MICHAEL LEE, Designated Federal Official

WEIDONG WANG

EILEEN McKENNA

DAVID JAFFEE

OM CHOPRA

PATRICK DONNELLY

PAUL PIERINGER

JOHN HONCHARIK

PHYLLIS CLARK

KENNETH SEE

CHANG-YANG LI

JERRY CHUANG

ALSO PRESENT:

MARK DEMAGLIO

ROBERT SEELMAN

ROB SISK

ED CUMMINS

PAUL J. HUNTON

JULIE REED

DALE WISEMAN

GREG MEYER

DONALD LINDGREN

AMY MONROE

A G E N D A

P R O C E E D I N G S

(8:57:42 a.m.)

CHAIR RAY: The meeting will now come to order. This is the first day of the meeting of the AP1000 Reactor Subcommittee, the first day of this two-day series. We are a standing Subcommittee of the Advisory Committee on Reactor Safeguards, or ACRS. I'm Harold Ray, Chairman of this Subcommittee.

Other ACRS members in attendance today are Sanjoy Banerjee, who will join us shortly, Dennis Bley, Mario Bonaca, Bill Shack, and Mike Ryan. I don't think I've overlooked anyone. Tom Kress, an emeritus of the ACRS and former Committee Chairman is also seated here at the table with us today, and he is invited consultant to the Subcommittee for this work.

Mike Lee of the ACRS Staff is a Designated Federal Official for this meeting, and he's also joined by Weidong Wang, also of the ACRS Staff. Sorry for the German pronunciation.

The purpose of this Subcommittee meeting over the next few days will be continue with a review, and discussions concerning Revision 17 of the Design Control Document, describing a standard plant design for the AP1000 pressurized water reactor. The most recent Subcommittee meetings on this subject were held

this past July.

By way of background, we're reminded that the Westinghouse Electric Company submitted Revision 17 of the DCD to the U.S. Nuclear Regulatory Commission, and that since its submittal, the NRC Staff in the Office of New Reactor Licensing have been engaged in review of those revisions, and have complemented this review with meetings with Westinghouse representatives, and members of the AP1000 Design Center group.

Upon completion of this review, the Staff will issue a Final Safety Evaluation Report related to the certification of the revised standard design. As part of the design certification process, the NRC Staff are required to obtain the views of the ACRS. Today, and in subsequent meetings, this Subcommittee will hear from the Staff on the results of their review of the DCD Amendments. And we will hear, also, from the Applicant.

I understand that copies of the detailed meeting agenda have been made available. When looking at the agenda, you will see that each chapter, a standard briefing template will be followed that consists, essentially, of three elements, a discussion of the Revision 17 changes to the DCD by

representatives of Westinghouse, and the significance of those changes over the NRC certified Revision 15. A discussion of the Draft SER prepared by the NRC Staff corresponding to the DCD Chapter that has just been described by the Applicant, and a discussion of any applicable open items by the Staff.

In summary, this Subcommittee intends to gather information, analyze relevant issues and facts, and formulate proposed positions, and actions, as appropriate from this meeting for deliberation by the Full Committee of the ACRS at a later date. We may also determine additional meetings on one or more of the items discussed over the next two days merits further discussion, and study by the Subcommittee.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register. And I'll note that that notice also indicated we would begin at 8:30. We've had a number of changes, including the room location. We're starting at 9:00 today. And, I guess, tomorrow that will be the same. Is that right?

MR. LEE: 8:30.

CHAIR RAY: 8:30 tomorrow. Okay. So, we'll all be on time at 8:30, as we were this morning.

I believe we received no written comments, or requests for time to make oral statements from interested members of the public regarding the subject of today's meeting. I understand that we have a speaker phone in operation today, and we'll ask that those individuals participating in this Subcommittee over the telephone bridge lines place their speaker phones on mute.

As stated earlier in the Federal Register Notice, a transcript of this meeting is being prepared, and will be made publicly available in the near future on the ACRS website; therefore, we request that anyone wishing to address the Subcommittee on the record use one of the microphones located throughout the meeting room. We request that you first identify yourself, and your affiliation, and speak with sufficient clarity and volume so that your comments may be readily heard, and recorded.

We also request that if you're in possession of cell phones, or some other type of electronic paging device, you adjust it to the silent mode, or, alternatively, turn it off so as not to interrupt the conduct of the meeting.

Now, with those introductory remarks, we'll turn to Eileen McKenna to introduce the Staff,

and any comments that she wishes to make before the presentation by the Applicant. Eileen.

MS. McKENNA: As he said, my name is Eileen McKenna. I'm a Branch Chief in the Office of New Reactors, responsible for AP1000 projects, in particular, the review of the Design Certification Amendment for AP1000 design.

As you indicated, in July we met with the Committee on a number of chapters of our SER with open items for the amendment. And, today and tomorrow, we will be meeting on three chapters, Chapter 8 on Electrical Power Systems; Chapter 18 on Human Factors Engineering, and a significant portion of Chapter 3 on the design of Structures, Systems, and Components. There is another portion of that chapter that will be covered at a later meeting, which covers the seismic analysis, of structures, in particular.

As you indicated, the focus of the Staff's review is on the changes that have been presented in the application since Revision 15, so the Staff focuses on the changes, and any potential impacts of those changes on the rest of the design. This is not a complete review of new design certification.

Also, note that we did issue to the Committee two other chapters of the SER with open

items, these are Chapter 2 on Site Characteristics, and Chapter 13 on Conduct of Operations. We don't plan a formal presentation on those topics, because we don't think that there is any significant technical issues that the Committee would not get into on other occasions. For example, there is some geotech information that is closely coupled to seismic analysis, so you would hear about that at a later time. If you have questions on those chapters, of course, we'd be happy to answer them, but we don't plan formal presentations with the Committee on the SER with open items.

We also have on the agenda today a session to follow-up on some of the questions that came up in the July meeting. There were a number of topics for which the Subcommittee requested further information, and Westinghouse will be responding to a number of those questions later today. I will just note, also, that in terms of our slide presentation, the Staff's slides are all in one package in the order in which they will be presented.

At this point, I will turn to -

MEMBER BLEY: May I?

MS. McKENNA: I'm sorry. Yes, sir?

MEMBER BLEY: May I slip in a question.

MS. McKENNA: Of course.

MEMBER BLEY: You probably don't expect them in the beginning.

MS. McKENNA: Any time.

MEMBER BLEY: Can you briefly describe to me how -- as you review something that's changed, how you remember other places in the old DCD that might be affected by the thing that just changed?

MS. McKENNA: I think it's a matter of the understanding of what is the feature, the aspect of the design that's being changed in a particular area, and the technical reviewer being cognizant of that. And I'll also say the first premise, the Applicant's responsible to identify, if because they're changing something in Chapter 4, they need to change something in Chapter 15. That should be included in their application, so that's kind of the first level of confirmation. The second level is the Staff being aware of well, if I'm changing something on this valve, then, maybe, I need to check whether the tech specs need to have a change, or whether some ITAAC need to be adjusted based on what that particular change is all about, or the safety analysis may need to be looked at to see whether, as a result of that change, the safety analyses might need to be

revisited. So, I think that's the process of the Applicant doing their job, and the Staff doing its job, being familiar with what the -- how an FSAR, if you will -

MEMBER BLEY: I guess what I was trying to get at is, these reviews, I'm sure, are partitioned out, and it might be a new person who isn't familiar with the whole design. And I was really hoping there would be some -- either some tracking process from the earlier review, or someone who is the grant integrator on your side who really is familiar with the whole design, and could double check the things people are doing.

MS. McKENNA: I think there are tracking mechanisms. There are change bars, for example, and things like that, and lists of what has changed from 15 to 17, so I think that level of information is available. And then, as I say, you're right. We do reviews by technical discipline, and by standard review plan section, and then we bring them together into the chapters, which is how the design control document is structured, and how our earlier SER was structured along chapters. And sometimes that does bring together input from a number of branches to cover a particular topic area. And we are, certainly,

cognizant of looking for those kinds of impacts, and awareness to make sure that we don't, inadvertently, approve something as a change, and it's inconsistent with something else in the document.

MEMBER BLEY: Thank you.

CHAIR RAY: We're going to stick with you for a minute or two here, Eileen, because I know Dr. Ryan may want to pursue a point here in a moment, but I'd like to follow-up on what Member Bley just asked you about.

There is a change matrix. You and I were just looking at it a minute ago. The version I have is from October 2008. Is it kept up-to-date?

MS. McKENNA: I think I would ask Westinghouse to discuss that in their remarks. I mean, this was a document they provided to us, as a tool to assist us.

CHAIR RAY: You're not aware of it being kept up-to-date then. Is that correct?

MS. McKENNA: I haven't seen an updated version.

CHAIR RAY: Okay. We'll get to Westinghouse in a -

MS. McKENNA: What we get, typically, is when there is a response to an RAI, for example, a

question that we -- yes, there would be a markup of the Design Control Document, as a result of that RAI, with particular information that's proposed to be changed in the DCD, with redline and strikeouts so we can see what kinds of changes are being proposed. And that we then anticipate getting a complete new revision at some future date, with appropriate markings of changes, so that we can see the -- how all those changes are fit together.

CHAIR RAY: The inference, I think, of what you're saying is that all of us, Staff and ACRS, perceive changes by changes in a rather large body of text. Is that correct? That's what you just described to me. That's my understanding of it.

MS. McKENNA: Yes, I think that -

CHAIR RAY: In other words, you perceive that a change is of this size, and shape, and nature, by what effect it has on the text in various places.

MS. McKENNA: Well, I think that's part of it, but I think part of it is, sometimes just a simple change in the text could be a very significant change in the review. And I think we might have an example in our first topic, where we changed one number, but it did trigger some significant review. So, I don't know directly how many words change to the

significance of the change.

CHAIR RAY: I think we're all trying to -- or some of us, anyway - speak for all of us, some of us are trying to understand how a change gets described. And beginning with the change matrix, which is a quite substantial 93-page document, that's one way. You could say well, here's a change, and it affects all these places. Here's another change that affects all these places. That's one way to do it. But if you don't keep it up-to-date, then its usefulness becomes questionable after a while.

MS. McKENNA: I think another thing is that depending on the topic area, and how many changes are going on, on occasion, you may recall in previous discussions we talked about technical reports. And, in some cases, where there might be a lot of changes in play, there would be an update of the technical report. I'll give you an example that will be coming in a future meeting, it has to do with GSI-191, where there were a lot of changes and things going on in the Design Control Document about how the sump screens, and the post LOCA recirculation would work. And there's actually a separate document to put all of those changes together, so that we can see the full picture. So, I think we use things -- mechanisms like

that, where it may be more involved than just changing a couple of words to deal with a very narrow change, to make sure we are seeing the broader picture.

CHAIR RAY: Well, does the Staff appreciate how difficult it is for the ACRS to recognize a change, and define the change?

MS. McKENNA: I think we do, because we've -- it's not always been easy for us, because of how things evolve from Rev 15 into Rev 17, and even earlier Revs of this thing. It is sometimes a challenge to understand how everything fits together, so we just have to work extra hard. And, I'm sorry, the Committee may have to, also.

CHAIR RAY: Well, I understand, and we're trying to learn from this process.

MS. McKENNA: Yes.

CHAIR RAY: But that's the nature of the question, is to ask you, if this change matrix define the changes and are either kept up-to-date, or there were no more changes, neither of which appears to be true, then we could, in theory, track changes by this change matrix, because it tells you what's changed, although very succinctly, and what all was affected by it. But if you don't keep it up-to-date as more changes take place, then that becomes problematic.

And, also, then, of course, one has to question whether this is an adequate road map to recognize what changes have occurred. Well, enough on that for now.

I think you raised an issue of seismic, and that we would discern what things affected Chapter 2 in the seismic area later, but Dr. Ryan would like to pursue that, I think, a little further.

MEMBER RYAN: Just a question, and it's probably not a big issue. It's something straightforward. I guess, a little short briefing, or some more information to help us agree with you, or disagree with you would be great.

MS. McKENNA: I think there we have -- in the Design Control Document in Chapter 2, you're looking at parameters that kind of form an envelope, if you will, for the analysis. And there were some changes there on some of the soil information to allow different sites to, potentially, reference the design. But the real fruit of the analysis, if you will, is in Chapter 3, where you do the seismic analysis with that information to see whether your Structures, Systems, and Components meet the acceptance criteria. So, that's kind of what I meant by kind of get it through that process.

MEMBER RYAN: Maybe somewhere in a future

meeting, a little bit more detail on that would be helpful.

MS. McKENNA: Certainly. Of course.

MEMBER RYAN: Thank you.

MS. McKENNA: Okay.

CHAIR RAY: All right. Anything more at this time, Eileen?

MS. McKENNA: No. I was going to turn it over to Westinghouse, to see if they had any opening remarks before we start the first Staff Panel.

MR. SISK: Good morning, Chairman, Members of the ACRS. Once again, we do thank you for the opportunity to come and continue the review, and discussion around the changes to the DCD. We'll have several members coming through as we go through the discussions today. I won't take the time now to introduce everyone. I would like to introduce, once again, our VP of Regulatory Affairs and Standardization, Ed Cummins. And, Ed, I don't know if you want to say hello.

MR. CUMMINS: Hello. My name is Ed Cummins.

MR. SISK: But we'll have others coming through, as we go forward.

Today, I think, as Eileen indicated, we're

going to continue the review of the amended designs and the changes that were presented through Rev 17. We're going to be talking about Chapter 8, the Electrical section, 18, the Human Factors, and portions of Chapter 3. I really wasn't going to belabor any further comments, and just go straight into it, unless there is any other comments, or any questions from the Committee.

CHAIR RAY: Well, you've heard the dialogue we've had with the Staff. I won't ask you to comment on it, specifically. We've had a half-hour here of time. I think your presentation probably will highlight changes, as such, as opposed to the labor that we've been going through of trying to discern what the changes are from hundreds and thousands of textual modifications. And it's that sort of thing that we're grappling with here. I think you're probably going to address it in a way that will help us figure out what is changing.

MR. SISK: We hope to. I would make one comment to the discussion. The road map that Eileen was referring to, really is the road map through 17. And we provide a road map to help understand what the changes were through 17. It is recognized that through the RAI process, through the open item process

with the SERs that additional changes are anticipated, and, obviously, expected to resolve Staff issues and concerns. And there will be additional changes in the conforming DCD to reconcile comments that come out of these discussions.

CHAIR RAY: Yes. Well, we do realize that. The road map, at least at the moment that it was created, was helpful. We're trying to figure out how to take the road map and adjust it for all these other things. And, basically, keep it real simple, it's hard to look at the many, many changes to the text, and figure out what has happened. And we're struggling with how to better identify these changes so we can think about them the way we're supposed to do, as opposed to just many, many changes to text, and figures, and tables, and so on, and so forth. And that's an ongoing process, as you say. The technical reports that Eileen referred to may be the only way, and the reviewing RAIs, or the SER, itself, which we get in dribs and drabs, so we're struggling. I want you to understand that our effort is to try and move this along in an efficient way. And, like I say, we look forward to your presentation.

MR. SISK: Anything we can do as we go through questions, clarity to help in that process, we

certainly want to maintain that -

MEMBER SHACK: Just a quicky.

MR. SISK: Yes, sir?

MEMBER SHACK: What's the difference between a blue change, and a green change?

MR. SISK: What we were doing was color coding the changes based on what the Staff had seen, and not seen previously.

MEMBER SHACK: Oh.

MR. SISK: Black dots were basically the certified text. The blue text and the green text depended, there was a technical report that was issued, 134, which covered changes that the Staff had reviewed and looked at, so we were trying to say these are changes that you've seen, but they weren't in the DCD.

MEMBER SHACK: Here's the green dot.

MR. SISK: That's the green. That's correct.

MEMBER SHACK: Okay.

CHAIR RAY: There's a key at the top of my version, Bill. I don't know if it shows up on your's, because I've got a hard copy, and you're looking at something different. But, anyway, that tracks these against the various, Revision 5, TR134 is the green

text, according to this legend.

Okay. Well, enough about that for now. We'll doubtless have reason to come back and ask questions further. Perhaps, if we plunge into Chapter 8.

MS. McKENNA: Okay. Before we start, I might suggest the Staff members to join Westinghouse at the front, and say that's -- we kind of had done this, I think, at the last meeting, where we had the Staff and Westinghouse at the front table, and Westinghouse will present first, and then the Staff will present the results of its evaluation and conclusions.

CHAIR RAY: As you wish.

MR. SISK: We'll focus on you guys for now.

CHAIR RAY: Go ahead.

MR. SISK: Okay. With that being said, the first chapter is Chapter 8. I'd like to introduce Bob Seelman, our Licensing -

MEMBER BONACA: Could I ask just a question? As we go through, I've been asking myself what's driving all these changes? And, so, I'm trying to learn about it, irrespective of AP1000 alone. Okay? Clearly, we have different motivation for the

changes, but still I'm left with a question in my mind of when we reviewed the DCD, originally there was a presumption on our part, a naive presumption that that was it. Well, now I was looking at this over the weekend, and that's a lot of changes. And I understand there will be different sources, but could you give me a sense of what's driving the most of these changes?

MR. SISK: Part of the -- I think what drives the changes is partly continuing through the design process, itself, doing the refinements of the design and moving towards constructability. I think that might be a key area. Obviously, as we go through those design refinements, we have COL holder items that we're looking to close out, we have three DACs that we're going to be talking about over time that need to be closed out. And as we go through the holder items, the DAC, and plus some other design refinements, we continue to have a dialogue, interaction with the Staff, and look to resolve their questions and concerns, which drives a lot of the changes, as well. So, that's really what's driving it, closing out the COL holder, addressing the DAC issue, carrying on through design refinement finalization, and then resolving Staff issues and

concerns.

MEMBER BONACA: Okay.

MEMBER BLEY: Just to follow-up on, as you go through these things, especially electric power, for me, if whoever is presenting that could give a hint of why some of these changes were made, that would be helpful.

MR. SISK: We'll keep that in mind, as we go forward. Okay. Without further delay, then, I will turn it over Bob Seelman, and we'll go into Chapter 8.

MR. SEELMAN: Okay. Thank you, Rob. Thank you, Mr. Chairman, Members of the ACRS. My name is Bob Seelman. I'm going to be presenting the changes, the major changes to Chapter 8, Electrical Power. To my right is Mark Demaglio, he's the subject matter expert.

COURT REPORTER: Sir, can you speak into the microphone.

MR. SEELMAN: All right. First, I'd like to provide just a brief overview, the basis of the AP1000 Electrical Design. AP1000 Electrical Design does not require Class 1E alternating AC current electrical power, except that provided by the Class 1E direct current batteries and their inverters to

accomplish the plant safety-related functions. The changes from DCD 15 of the certified design to DCD 17, included basically three major changes to the chapter, on-site power systems, containment electrical penetrations, reactor cooling pump breakers.

In terms of NRC guidance, the AP1000 Electrical Design conforms to the reg guides, and the Class 1E IEEE standards. And with that, I'll go into the first major change.

The first major change is a change added a fast bus transfer. The benefit of adding a fast bus transfer derived from adding additional transformer that includes -- the benefits include avoid reactor trip due to component failure or spurious actuation of the protective relaying. Second benefit allows complete bus transfer from the unit auxiliary transformers to the reserve auxiliary transformers. Those are the two primary benefits of why this change was made. The Staff listed this particular item as a confirmatory item.

MR. CUMMINS: Maybe I can make a comment. Ed Cummins. This change was a change which was driven by our customers, and Rob did mention that source of changes, but that was another source of changes, as you get customers, and they organize in a

group. They have proposed changes, and we evaluate them together. And, basically, we designed the AP1000 in accordance with Utility Requirements Document, two UATs, Unit Auxiliary Transformer, and one reserve transformer. And that's a little different than operating plants. Operating plants have -- need more reliable AC power, and they're used to having -- they're used to having two UATs and two RATs so that you can run the plant on either UATs or the RATs, that if we have a failure, they can transfer. So, customers wanted it, and we found it to be an improvement in safety, a small improvement in safety, and no reason not to do it. So, we implemented it.

MEMBER BANERJEE: Are you making a similar change in your plants in China?

MR. CUMMINS: Yes. The idea is that the plants in China be the same as the plants here.

MEMBER BANERJEE: So, all the -- several of the changes that you're making are already going to be in the Chinese plants by the time -

MR. CUMMINS: Yes, they are. And we may have an exception or two. I don't believe we have an exception in this Chapter 8. They have, we understand, a 50-hertz AC system with a different voltage, but yes, the battery voltage, and other

changes were made in China, as well.

CHAIR RAY: Okay. Well, that's a very helpful insight, because the inference is that the certified design wasn't -- this wasn't an error or omission in the certified design. I guess it would have worked as certified, but the benefits, as you say -- for example, I'm not expert enough to understand how an incomplete bus transfer would have been problematic. Can you explain that a little bit more?

MR. CUMMINS: Well, I think Mark will go into that, but, basically, the concept is that if you have any problem that is on the ISO-phase bus, or on the common line between the unit auxiliary transformers, if you had a short, or any kind of problem there, you would not be able to operate the plant, and you would have really capacity only to have half of the AC power loads of the plants supplied by one RAT. When you have two, you have the capability of operating the plant, and, hopefully, even preventing a trip of the plant. Mark, I'll go to you now.

MR. DEMAGLIO: The original design of Revision 15.

CHAIR RAY: Introduce yourself, first.

MR. DEMAGLIO: Oh, sorry. I'm Mark

Demaglio. I'm the Electrical Engineer working with the AP1000 project.

COURT REPORTER: Speak directly into the microphone.

MR. DEMAGLIO: Try again?

CHAIR RAY: We apologize.

MR. DEMAGLIO: That's okay. In the original Revision 15 design, there was no automatic bus transfer feature, at all. The reserve source was truly a maintenance source. With a dead bus transfer the plant would come off of line, and you would select either the odd group, or the even group of non-safety buses to transfer to the reserve source, so it was a true reactor trip/turbine trip scenario. You'd come down. You'd have a maintenance source available. The addition of the fast bus transfer, hopefully, precludes that reactor trip on faults in the zone of protection.

CHAIR RAY: Thank you.

MR. SEELMAN: Okay. Thank you. Bob Seelman, Westinghouse. The next change is the change in the Class 1E DC distribution. This is a change in system voltage loads from 125 Adc to 250 Vdc. The change in voltage allows us to reduce cable sizes, while still providing the required power. This is a

change to Tier 1 section of the DCD. Any questions?

CHAIR RAY: What experience is there with a 250 versus 125?

MR. SEELMAN: Mark Demaglio.

MR. DEMAGLIO: Experience with the 250 versus the 125 in nuclear power plants, and the existing GA fleet, they do use both voltages for DC motor-operated valves. They use them as reactor building LOV boards, but there is experience in the industry with component use, and batteries supplied at this voltage. And it's probably a little more limited, and is probably more focused on using batteries as truly a motor source versus just a control source, and we are using them, obviously, as a motor source.

MEMBER BLEY: I think if you look outside of strictly nuclear experience, you'll find quite a bit.

MR. DEMAGLIO: Yes, sir.

MR. SEELMAN: Thank you, Mark. Okay. The third change in the on-site power system, and the last change in that section, is a change in the non-Class 1E DC and UPS system. Reduce your subsystem to provide greater flexibility to service a non-Class 1E version of the DC and UPS systems. This is also a

Tier 1 change. Mark, do you want to add the benefits of the why.

MR. DEMAGLIO: The design as it evolved was evaluated. We began looking at the actual loads, particularly the loads of the turbine generator motors, evaluated those, and were able to determine that the original configuration of three system level UPSs, and a fourth DC system that was largely dedicated to those motors was inadequate at 250 volts. I'm sorry, inadequate at 125 volts DC. We added a fifth battery in the turbine building area. It is now dedicated solely to the turbine lube oil pump and hydrogen seal oil pump, the DC emergency pumps, as they're referred to. And took the advantage, at the same time, to take what had been the fourth battery as only a DC system, and fully implement it as a full UPS system, allowing flexibility of two full load groups of non-1E DC UPS. Whereas, we had a Battery 1, 2, and with UPSs on them, inverters on them, we implemented, or supplemented that to a fourth full UPS system, and added flexibility capacity in that system by doing that.

MR. CUMMINS: This is Ed Cummins. If I would characterize the cause of this change, in design finalization we figured out that we couldn't really

run lube oil pumps from the battery as we had it designed, so as we thought about the possible changes, we decided to keep the battery and use it for, I'll say control functions, and install a new battery close to the diesel oil pump that would adequately handle the demand for the diesel oil pump, for the lube oil pump.

CHAIR RAY: Okay.

MR. SEELMAN: Thank you, Ed. Bob Seelman from Westinghouse. The next change deals with containment electrical penetrations. We change the module separation criteria to allow conductor modules in the penetrations of the same service class. This is a Tier 2 change that affects Tier 1. And I'd again defer to Mark to explain the -- expand on the why of that.

MR. DEMAGLIO: What we actually did -- what we did here was realized that we were not intending to use a given penetration to accommodate service levels, different service levels of the cables, and we had identified a criteria by which we would be utilizing ground barriers, isolate different service levels within a same penetration assembly. We do not do that other than within our what we call it low-voltage power and control, but for those in the

same, and do not specifically require a barrier between those in accordance with the standard.

We had had a statement that we would use additional separation within an assembly. We are not going to use one assembly to handle more than one service level, other than the allowance for the controlling below power, which do not require grounding, so we removed that provision, that restriction.

CHAIR RAY: Dennis, anything?

MR. SEELMAN: Okay. Thank you, Mark. The final change I'd like to present, the final major change involves reactor cooling pump breakers. We add the breakers to each variable frequency drive to permit servicing in the variable frequency drive without taking the reactor cooling pump off line. Mark, would you like to give additional whys on that.

MR. DEMAGLIO: Sure. As you know, the AP1000 is licensed to operate with the reactor coolant pump variable frequency drives in bypass during normal operation, when the reactor trip breaker is closed. We've always had the bypass breaker in the design. What this did was added an input and output isolation breaker, in addition to the bypass breaker. This was done in discussion with our supplier, the supplier for

the variable frequency drive. It allows you to completely isolate the drive while you're in plant operation for 18 months, and do any service or maintenance you desire to on the machine. Again, the drive is already in bypass during normal plant operation, and is only used for startup and shutdown in the United States. In China, that is slightly different design.

MR. SEELMAN: Okay. Thank you, again. One final note on that one. As a Tier 2 change, it impacts Tier 1 of the DCD. Are there any other questions now before I proceed with the open items? Okay. I'll turn through the open items.

There are approximately six or seven open items. The first one is confirmatory item, the fast bus transfer. This confirmatory item was addressed in the discussions on the first major change with the fast bus transfer. This issue has been resolved with the Staff.

The second open item - let me clarify that. The first was confirmatory. It was not an open item. The second item is an open item, EEB-03, load profiles. These deal with the load profiles on the 24/72-hour batteries. The profiles will be available in the first quarter of 2010.

The next open item, 04, provide a qualification test program for the 24/72-hour batteries. This document, a draft of this document was presented to the NRC, or given to the NRC back in August of `09. Westinghouse currently has an action to set up a meeting with the NRC to discuss that document, and obtain NRC comments to that document.

We move on to 05, EEB-05, next slide. Excuse me. EEB-05 addresses a number of calculations, including battery sizing, terminal voltage, short circuit cals, motors draw for safety-related batteries. These cals will be available also in the first quarter of 2010, when we expect to have -- we plan to have the design review.

And, finally, or second-to-last open item, EEB-08. I'll just read through the statement on the open item. "Explain how Westinghouse will insure consistency and transfer of design information to the Applicant related to voltage regulation ratings for equipment such as circuit breakers, and assumptions used to determine equipment sizing." Westinghouse's response to that open item is, "Non-safety design calculations, including plant ETAP analysis will be transmitted to the COLA with plant finalization document turnover as part of a configuration control

process. These design calculations will include the design inputs, assumptions, methodology, acceptance criteria used in the development of the sizing basis, settings, low-flow, short circuit, and voltage regulation." Just a note, there's a typo in the second paragraph in that response, and that should read low flow.

MEMBER BLEY: I understand how these things work. That leaves this as a DAC item. Is that right?

MR. SISK: No, sir. We do not see this as a DAC item right now. We do not have DAC in Chapter 8. We are hoping to resolve these issues working with the Staff, and resolve these open items.

MEMBER BLEY: Before -- okay. All right. It will be transmitted with a COLA that is -- that will be done before the design cert is complete. Go ahead.

MR. SEELMAN: Okay. Finally, the last open item, EEB-09, addresses voltage transients on the AC systems. I'll read the statement, again. "It is necessary that the safety-related battery chargers and inverter trips to be coordinated, such that the associated inverters do not trip during voltage transients on the AC distribution system." And

Westinghouse's response to this is, "The AP1000 recognizes the need for voltage protection, that battery chargers and inverters in accordance with IEEE 446. Westinghouse will require suppliers to provide protection that coordinates the input voltage protection of the charger and the inverter." Any questions?

MEMBER SHACK: Well, this is one of those changes, it seems to me, how is this different from the earlier versions of the Design Control Document? And this seems like a design issue that should have been resolved sooner.

MR. SEELMAN: We'll go to Mark on that.

MR. DEMAGLIO: I don't want to try to speak for the Staff. We don't feel that the change we made with regards to the voltage here from 125 to 250 changed the way in which this question is asked, or is addressed. This was something that we would always do. The only difference, of course, would be the set point on the real numerical basis will change, but on a per unit basis it will still be the same set point.

MEMBER SHACK: It clearly has to be reviewed, once you've changed that voltage.

MR. SEELMAN: Okay. The next slide contains the conclusions. Staff review of Chapter 8

Electrical Power resulted in 11 RAIs. Westinghouse has responded to those RAIs. There are currently five open items, and two confirmatory items, which have been resolved. And, finally, the last two slides on this package contain sketches that show load flows from the off-site power through to the battery chargers. Unfortunately, the first slide is a skinny-downed version of 11 by 17, so it's kind of difficult to read. And Mark can certainly walk you through these, if you'd like. And the second slide takes you into the battery chargers sketch. Any questions?

CHAIR RAY: Questions of the members? Well, we are precisely, as close as we ever get, on time. So, we can proceed with the Staff.

MS. McKENNA: Okay. Can we bring up the Staff slides? David Jaffee, the Project Manager for this chapter will start off the presentation, and he's joined at the front table with Om Chopra, who is the lead technical reviewer on this topic. I'll introduce also Ronaldo Jenkins, who's the Branch Chief of the Electrical Engineering Branch. We somehow failed to get him a tent card, so we don't want him to be incognito here.

CHAIR RAY: Thank you.

(Off the record comments.)

MR. JAFFEE: Good morning. Sorry about the difficulty with the slides. My name is Dave Jaffee. I'm Project Manager in NRO reporting to Eileen McKenna. I'm here in the capacity of Project Manager for Chapter 8. Okay. I'd to introduce Om Chopra, who is our Principal Reviewer for Chapter 8. He'll be presenting for the Staff. Also, we have this morning with us Ronaldo Jenkins, who is the Chief of Electrical Engineering Branch.

The Staff had previously prepared a safety evaluation for Chapter 8 for the Design Certification in that that reflected Amendment 16 to the DCD. Subsequently, the Staff received Revision 17 to the DCD, and we reviewed those changes, and provided an updated safety evaluation report that we made available to the Subcommittee. We marked that up in such a way that we hope to identify where the changes were going from Rev 16 to Rev 17 of the DCD.

As Westinghouse previously indicated, we had two confirmatory items that were resolved. And those confirmatory items represented changes that Westinghouse had proposed to the DCD. And when Revision 17 arrived, we confirmed that, in fact, they had made those changes. But, as a result of our review of Revision 17, we found that there were five

open items, all associated with the change from 125 to 250 Vdc in the DC power systems. Om Chopra will now address Chapter 8.

MR. CHOPRA: I'm Om Chopra from Electrical Engineering Branch, Office of New Reactors. Basically, my presentation is the same, what you just heard this morning from Westinghouse. And I'm going to go over the same things that you have already heard. And here is an overview. In Section 8.2, off-site power system, they added two new transformers, one reserve auxiliary transformer, and one unit auxiliary transformer. They also incorporated a fast bus transfer scheme. And on the on-site power system, they revised nominal power rating of various pieces of equipment, and updated diesel generator loading tables. And they also replaced a diesel-fired auxiliary steam boiler with a electric steam boiler.

And in DC power system, they changed the system voltage for the operation of Class 1E Adc loads from 125 volts DC to 250 volts DC. And electric penetration area is still different. I thought this item was most significant because the non-safety-related penetrations were not originally listed as qualified for harsh environment. So, the Staff had a concern, and sent a RAI to Westinghouse, and,

subsequently, the non-safety-related Class 1E penetrations were included in the list of qualified equipment.

And in the reactor coolant pump, they added input and output isolation breakers to each RCP pump variable frequency drive. The next one.

Now, the purpose of the -- they just explained this morning, the purpose of the fast bus transfer is to make sure if you have any fault in the auxiliary transformers, or ISO phase bus, you don't trip. You can transfer all your reactor coolant pump buses to the unit, to the reserve auxiliary transformer, and maintain operation.

This bus transfer scheme also provide additional plant availability, and enhances the off-site power supply to the battery chargers. Next slide.

Now, they added two isolation breakers. This is mainly to perform maintenance without tripping the reactor coolant pump. And diesel generator, again, they made some load changes. However, we verified that all automatically loaded loads are still within the rating of the diesel generator, so it really did not affect any safety systems.

In the boiler design, originally, they had

a diesel-fired steam boiler, and they are replacing that with an electric steam boiler in order to reduce the size of the boiler. So, this necessitated another -- addition of another third auxiliary transformer. Again, this is a non-safety-related change that they have made. Next slide.

In the DC system, they changed the system voltage, instead of 125 voltage DC, to 250 volt DC. And we had five open issues. And what I heard this morning is that this information is going to be available to the Staff at the end of this year, or early next year. And we will report our findings when we get the information back from Westinghouse. Next.

The same thing with these two items. The -- I think I heard that this information on the AC system, as well, will be provided to us at the end of this year, or early next year. And we will report our findings on that, too. That concludes my presentation.

CHAIR RAY: These qualification test plans and so on, they presume to have some connection, ultimately, with surveillance testing, or technical specification requirements for maintaining the capability of the batteries for the life of the plant. In other words, does this translate to requirements

that verify the capability of the batteries during the life of the plant, discharge test, whatever the appropriate -

MR. CHOPRA: Yes. They -- according to the technical specifications, these batteries have to be tested periodically to demonstrate their ability to power the loads.

CHAIR RAY: These qualification tests will, at least in principle, affect the surveillance test program, in terms of what the requirements of that program are.

MR. CHOPRA: Well, Westinghouse has submitted a draft report, how they are going to qualify these batteries for this service, because these are long-cycle batteries, 72-hours, and 24-hour batteries, and there is no standard, IEEE standard that really qualifies battery up to -

CHAIR RAY: I guess that's what I'm groping here, but, basically, because of that, what you just now said, my thinking goes to -- well, how would this same performance be assured 20 years into the plant life?

MR. CHOPRA: By periodic testing.

CHAIR RAY: They don't have to have some kind of in-service testing.

MR. CHOPRA: Yes. Periodically, every 18 months, or 24 months.

CHAIR RAY: Does that have to be developed now, the way this will be verified after 20 years?

MR. CHOPRA: It's normally in the technical specification, that they have a battery service test, and they have a battery discharge test. They are already in the tech specs.

CHAIR RAY: And that will suffice.

MR. CHOPRA: Yes.

CHAIR RAY: That will suffice.

MR. CHOPRA: Yes.

CHAIR RAY: Okay. Any questions? All right. Does that conclude Chapter 8?

MS. McKENNA: That concludes our Chapter 8 discussion, if there's no more questions.

CHAIR RAY: All right. Any follow-up from the Applicant, anything you want to say on Chapter 8?

MR. SISK: No, sir. As indicated, we do recognize that we have a little bit more work with the Staff to close out these items. And, as indicated throughout the rest of the year, first part of next year, we're going to be working to close out the rest of these open items.

CHAIR RAY: Okay. All right. I'm going to

anticipate that we may spend some more time than we've allotted here to the -- what's shown on the green sheet here, agenda, as Item 7 later in the day. So, I think we should take advantage of any opportunity that we have to advance things as we go, and give ourselves some more time, if we can, at that point in time.

Chapter 18 is the next discussion.

MS. McKENNA: Yes.

CHAIR RAY: And we're 15-minutes before the scheduled break. Item 18 is scheduled for an hour, so I'm going to ask that we go ahead and break now for 15 minutes, as planned, and resume at 10:15.

(Whereupon, the proceedings went off the record at 9:56:33 a.m., and went back on the record at 10:13:29 a.m.)

CHAIR RAY: Could we, again, come to order. Again, I'm trying to take advantage of time opportunities in order to expand, if need be, Item 7 this afternoon. We have the benefit of additional members here that were not at the July meeting. I want to give them an opportunity to pursue any items of interest to themselves, as well as hear from the Staff, as planned. So, I'll continue to try to take advantage of time opportunities.

We have, during the break, passed out, and

before us now, the Westinghouse presentation on Chapter 18, which I presume we're ready to begin with, Rob. Is that correct?

MR. SISK: Yes. Thank you, Mr. Chairman. We're prepared to talk about Chapter 18, the HFE issues. And for that, I'd like to turn it over to Mr. Paul Hunton, our Program Manager, and Julia Reed, our Human Factors lead to walk us through it. Paul.

MR. HUNTON: Thank you, Rob. Thank you, again. My name is Paul Hunton, and I'm the Program Manager for AP1000 Electronic Systems, and Human Factors. And both Julie and I appreciate the opportunity to be in front of you today, and to describe for you the efforts we have been pursuing since design certification of Chapter 18, the Human Factors portion of the AP1000 DCD.

So, moving on to the first slide. Okay. First of all, I'll just provide a general overview of Chapter 18, what is driving Westinghouse efforts, and then going to move particulars as to how it applies to the DCD. So, our governing NRC guidance is the Human Factors Engineering program. We have two revisions of that document, the initial revision in July 1994, and Revision 1, May 2002, essentially lay out what is expected by the NRC Staff for the Human Factors

program for a new plant.

In addition to that, we have the Human System Interface Design Review Guidelines, NUREG-0700. Now, NUREG-0711 specifies that a style guide be generated for use in the development of Human System Interface Resources, and that is NUREG-0700 provides generic guidance that the NRC Staff provides. NUREG-0711 allows vendors to customize the information provided in NUREG-0700, and generate a specific style guide. And that's what we've done for AP1000. It's described more in Section 18.8 of the DCD. And, the Staff has found that style guide to be acceptable.

Okay. Moving to the next slide. This slide depicts the elements of the certified HFE program for AP1000. It lists the organizational elements we need to do, operational experience review, function requirement analysis and allocation, task analysis, staffing, integration of Human Factors Analysis with Human Factors Engineering, Human System Interface Design, procedure development, training program development, verification, validation, inventory, design implementation and Human Performance Monitoring.

Now, when the AP1000 design was certified in Rev 15, many of these program elements were fully

addressed. So, go to the next slide. So, our effort since design certification have been to implement the outstanding HFE program elements that remained in Rev 15 of the DCD. Again, in Human Factors space, the program was certified, not the individual completion of elements that were identified in the program. So, obviously, since our work since the DCD Rev 15 certification is being used, credited to close the COL information items, and the design ITAAC. Any questions so far?

CHAIR RAY: Well, one of the questions I'm thinking about here, you haven't mentioned DAC. Are there no DAC involved?

MR. HUNTON: There are design ITAAC, DAC.

CHAIR RAY: Oh, that's what you mean by Design ITAAC.

MR. HUNTON: Yes.

CHAIR RAY: Excuse me. So, I was thinking the right thought. I just didn't see what I was looking for. Okay.

MEMBER BLEY: They're not as easy to spot here.

CHAIR RAY: Okay.

MR. HUNTON: Any other questions?

MEMBER BLEY: Well, what's your intention

on how far you're going to go in closing design ITAAC while this certification review is ongoing?

MR. HUNTON: It is our intention, as I'll cover in the rest of the slides, to address all of the open design items for Chapter 18, so that there are no COL information items outstanding, and that the design ITAAC are closed.

MEMBER BLEY: When this certification is complete, this will be, in this area, anyway, complete?

MR. HUNTON: Yes.

MEMBER BLEY: Complete package. Okay. Thank you.

MEMBER SHACK: You're doing this with these combined license technical reports. Those become part of the Tier 2 information. They can't be changed? I mean, changing them is like changing any other pieces of Tier 2 information?

MR. HUNTON: I'd have to defer to -

mS. McKENNA: As a matter of fact, many of these documents in Rev 15 were Tier 2*, and I think that will be the case for some of them as they move forward, as well. But I thought of this, that they were Tier 2* because they were -- how they were going to implement the program, and, therefore, the Staff

wanted to have that level of control of what they were. To the extent that the program was implemented, they wouldn't be necessary.

MEMBER SHACK: Do you have an SER, for example, for that task implementation document that they have? You review and approve it somehow, but what's the product, or -- I don't see it sort of done in the SER.

MS. McKENNA: I'll ask the Staff to respond. Paul Pieringer, could you answer that question?

MR. PIERINGER: This is Paul Peiringer, Technical Reviewer. The -- I guess, I need to come back to your last question, but the first differentiation we make is an implementation plan will always be Tier 2*. And that's defined by NUREG-0711. The technical reports that I think Paul was referring to are referenced in the design certification, and they typically would be Tier 2. And they would be -- they would follow the change requirements for Tier 2, which means that the Applicant could change those, if they can pass the 50.59-type criteria that are in the appendix to Part 52.

MR. HUNTON: And, to amplify that a little bit, the analyses that we do, which the Staff is

reviewing for adequacy, as you go through the life cycle of an AP1000, there may be particular changes that occur to the design, and we have to do re-analysis. Well, those analyses would follow a 50.59-type process, Appendix 8 analysis for 52.

MR. SISK: You'd have to change Section 8.

MR. HUNTON: Yes.

MR. SISK: But the answer to the question, I think, Paul, you have it exactly right. This is supplemental information that's used to support the information in the DCD, and would be subject to the change under the 50.59 -

MEMBER SHACK: But, for example, this OS2A implementation plan, has that been reviewed by the Staff? They refer to it, but you actually review and approve it, or -

MR. PIERINGER: Yes, and that looks, to us, like an implementation plan that deserves to be Tier 2*. And this is, I guess I would call this late-breaking inside on our part, we've been reviewing that to make sure that the NUREG criteria are met. Generally, anything we review against NUREG criteria, that makes that document a potential candidate for Tier 2*. And what we didn't do in our evaluation was to make that decision of whether OSA-2, I'll call it a

technical report right now, actually qualifies for Tier 2*. I, personally, believe it does, based upon the research that I've done, but I need to get some of the other tech reviewers engaged in that review. And we have not had the opportunity to communicate this with Westinghouse yet, either.

MEMBER SHACK: Where is your review of that document documented?

MR. PIERINGER: That would be in the SER.

MEMBER BLEY: So, if it says Tier 2*, it'll be in the SER?

MR. PEIRINGER: There's two questions there, I think. One is, our review results of that document are in the SER. And you'll see, we referenced the criteria, and then we provide an evaluation of how OSA-2 met that criteria. The designation of whether that document that communicates the OSA-2 material needs to be designated in the SER in the brackets with parentheses that say Tier 2*. And it's that piece that's missing right now in the SER, is that parentheses with italics.

MEMBER SHACK: So, that review is in there, and I just missed it.

CHAIR RAY: Let me suggest something. You guys are doing very good, and some of us here, in

terms of esoteria of this, generally, but I'd like to ask you to prepare to address this once again when it comes your turn in this context, so you can think about in the meantime, maybe. And we'll go over the ground again, because I need to understand it a little better, as well. So, with that, do you know where you are?

MR. HUNTON: Yes, I know exactly where I am.

CHAIR RAY: Okay. Let's resume, but with the idea that we want to have a chance to talk with the Staff a little bit more about this, without distracting you too much.

MR. HUNTON: Next slide, please. This is just a figure out of the DCD, which provides a good outline of the Human Factors Engineering process for AP1000. There are five major areas. The planning analysis and design phases, pending acceptability review from the NRC Staff we've shown as complete, as well, the development of the verification and validation plans. Next slide, please.

Okay. Chapter 18, Licensing and DCD Rev 17. Our objective in supporting DCD Rev 17, as I stated earlier, was to provide sufficient information to the NRC Staff to allow the Staff to close all

Chapter 18 COL information items. And, as far as DAC, to provide sufficient information to close items 1-4 from Tier 1, Section 3.2.1 of Rev 15 of the DCD. If you look at Rev 15, it will list those first four items. If you look at Rev 17, the first four items from Rev 15 do not exist. Okay? Next slide, please.

Okay. This is just a list out of Rev 15 of the DCD of the Design COL Information Items. These are the ones Westinghouse has responsibility to address. And multiple technical reports and design documents have been provided to the NRC Staff, as a bases to close these COL Information Items, as we just discussed. Okay?

So, this is -- I'm just going to now go through an overview of all the COL Information Items, and the DAC, as they relate to Chapter 18. So, for the first COL Information Item, which was Execution of the HFE program, the Staff has closed this item as being redundant with design ITAAC. Essentially, all the design ITAAC, all the other COL Information Items, essentially, provide the objective quality evidence needed by the Staff to determine that we are properly executing the program.

We, also, did submit here the AP1000 HFE program plan document number listed there. The

purpose of that was to take the certified design -- the certified program in Chapter 18 of the DCD, and to develop more in terms of a user manual, so that the engineers who are actually developing the HSI resources, and performing the Human Factors Analyses, are able to implement that process with a clear set of instructions, essentially written for them. Okay? Any questions on 18.2.1?

Okay. The next one, Design of the Emergency Operations Facility. This is still open. It is Westinghouse's position that all the information needed to close this Information Item from the Westinghouse perspective has been provided to the NRC Staff.

One of the issues here is we've been working with industry, and the Staff to adjust this COL Information Item. It really discussed two major topics. One of them was the location of the EOF. Well, the location of the EOF is really not a Human Factors item, so we're working with the Staff, that we don't reference the location. And the other has to do with the degree to which the AP1000 HFE program applies to the TSC, and to the EOF. Because the TSCs for our customers may incorporate multiple plants that aren't AP1000, the same with the EOF. So, working

with the Staff, we've revised the COL Information Item.

We also took an action to perform a task analysis for the AP1000 actions that are required by the TSC and EOF to insure that the Human Factors elements are properly addressed for those AP1000-specific actions. We have now provided that task analysis to the Staff. And, again, it's Westinghouse's understanding that we have addressed the -- all of the information needed to address the Westinghouse portions of the revised COL Information Item. And, in our discussions with our utility customers and the Staff, it's also Westinghouse's understanding that our utility customers have satisfied what they need to discuss concerning Human Factors with regard to the TSC and EOF, so that there's no additional work required to fully address this Information Item. Any questions on that item?

Okay. Task Analysis. This task analysis really deals with workload in AP1000. You do a function-based task analysis, and then you do two operational sequence analyses in the AP1000 certified program. We've completed both of those operational sequence analyses. OSA-1 was completed some time ago. OSA-2 summary report was submitted earlier this year,

which completely laid out our methodology, but it did not fully address all of the different scenarios that needed to be addressed by OSA-2. So, the Staff has looked at OSA-1, and OSA-2, and has found the method acceptable. But, since the OSA-2 task analyses, there were some that were left out of the initial revision provided to the NRC Staff, that those need to be completed.

Now, capturing that those need to be completed is actually taken care of in DAC, which I'll discuss in just a minute. But the one open item here, as far as the COL Information Item for task analysis, is the final step is to take the results of the OSA analyses, and to demonstrate how those results are captured in the development of plant procedures, and the development of the AP1000 training program.

Now, Westinghouse has identified that these documents need to be produced. We have since completed the OSA-2 analyses that we committed to the Staff, and have provided a completed OSA-2 to the Staff. And we are in the process of generating these two documents listed here to fully address what is necessary to close the COL Information Item on task analysis. So, this is still an open item, and it is our plan to provide the NRC's documents to the Staff

in December of this year.

MEMBER BLEY: We'll look forward to seeing those, ourselves. But can you tell me a little bit more about the first one you list there. This will be a task analysis that will, essentially, be the outline of how the procedures will develop, or is it something different?

MR. HUNTON: I'm going to defer to Julie Reed to answer that question.

MS. REED: Julie Reed from Westinghouse. The two documents written up there, they're not a new analysis. It's more of a combination, and a collection of results, and to present it in an appropriate format to those that are responsible for developing plant procedures, and those that are responsible for developing the programs, the training programs. And the training programs also do their own form of task analysis. But these documents by virtue of all the work that Human Factors has done, we wanted to make sure that we got the results to the right people. So, we go back through the Function-Based Task Analysis, OSA-1, and OSA-2, and extract anything that we think is relevant then to plant procedures and training. We do them both in parallel. So, anything like specific cautions that are implied, or perhaps

more detail in the step, we note that down.

We not only look at the task analysis documents, but we also go back and look at the OER, the Operating Experience Review, and there are other key inputs, as well. All of our engineering tests came up with some findings that were relevant to procedures and training. So, putting that information together, explaining it as we can, and, if necessary, to make it clear, and then forward it on to those people that are responsible for those areas. And we will do a lengthy revision, and I would anticipate that the V&V exercises that we do later on will also generate results we want to capture, and to communicate to the relevant people within Westinghouse and the utilities.

MEMBER BLEY: Can you tell us a little bit about the extent of licensed operator participation in the development of this work?

MS. REED: We have, with licensed operator participation, Westinghouse, we have a number of ex-operators, PWR operators that we -- that review and participate in the work. And the engineering tests use current licensed operators from all the different utilities as subjects, so they're actively involved. And we recorded performance, got subjective feedback,

and measure workload, and had debriefing sessions. So, we have a variety of different opportunities, and different avenues for current licensed operators, and people with operating experience contribute to task analysis engineering tests. And they will be reviewing these documents as they are produced.

MEMBER BLEY: Thank you.

CHAIR RAY: Dennis, could you mention to Mike what -- you said we look forward to seeing these reports when they come in in December, you were referring to, I think. Is that correct?

MEMBER BLEY: Yes.

CHAIR RAY: I just want to make sure we follow-up on that, Mike.

MR. LEE: 18.5-1, that task analysis?

CHAIR RAY: Yes. 18.j

MR. LEE: 18, I'm sorry.

MR. HUNTON: And, to go a little further in answering your question about operator involvement, we had a total of three man-in-the-loop tests, and those are covered under ITAAC Number 3, engineering tests summarizing outcomes of each man-in-the-loop test. We committed in Rev 15 of the DCD to perform two tests. We actually performed three.

The first test was, essentially, just a

small-scale test to evaluate the use of soft controls, and the displays, but the other two were, essentially, using a limited scope simulator as an engineering model. We used that device, and had two, essentially, integrated tests with two groups of fleet operators from industry, and went through a multi-day evaluation of our HSI resources. And the purpose of that evaluation was to, essentially, provide early design input to insure that the HSI resources provided an adequate interface.

MEMBER BLEY: Thanks. That's what I was hoping you would tell us.

MR. HUNTON: Yes. Okay. Moving on 18.5.2., Main Control Room Staff, Roles and Responsibilities. This item has been closed by the Staff. The reference there is the Main Control Room Staff, Roles and Responsibilities document, where we went through the roles and responsibilities of different stations in the control room. The purpose there was to insure that the work stations had the sufficient resources to allow the operator to perform their function.

Okay. 18.7-1, Execution and Documentation of the Human Reliability Analysis, Human Factors Engineering Integration. This item has also been

closed by the Staff. It's addressed by the program plan, which I don't have the number listed there, but it's in the Certified Design Rev 15. And then, we have since provided 16555, which was the identification of the critical human actions and risk important tasks.

Now, the key attribute here is to identify those tasks, and then to roll them into the operational sequence analyses to insure that those tasks are properly addressed in the HSI design. And we have done that, and we have completed those two analyses, and provided the summary reports to the NRC.

Okay. Next one is 18.8-1, which is Execution and Documentation of the Human System Interface Design Implementation Plan. Again, the Staff determined that this was redundant with the DAC item, DAC Item 3. And the DAC item talks about functional requirements, design guidelines, which I discussed earlier, design specifications, and the man-in-the-loop test reports.

Okay. The next one, 18.9-1 is Procedure Development. The SER shows this as being open, currently. It is Westinghouse's understanding, however, that we have provided all the information we need to provide to close this item. The open item in

the SER alludes to an audit of our computer-based procedure program. That occurred on September 15th, and it is our understanding that the Staff was fully satisfied with what they saw during the audit, and will use that audit report to close this information item.

MEMBER BLEY: Mike, I don't -- we got a lot of stuff, I might have missed it. I don't know that we've seen that audit report.

MR. PIERINGER: It hasn't been produced yet.

MEMBER BLEY: Oh, it hasn't been produced. That's a good reason. Thank you.

MR. LEE: I infer, though, from your observation it's something that the Committee would like to -

MEMBER BLEY: Yes.

MR. LEE: Thank you.

MR. HUNTON: That would have been pretty good to get that report done in two weeks.

All right. The next item, 18.11-1, Verification and Validation of the Human Factors Engineering Program. Again, the Staff found this to be redundant with ITAAC, or DAC Item 4, which I'll discuss more in just a little bit.

So, that addresses all the COL Information Items for AP1000, as we go from Rev 15 to Rev 17. It's our position that when the Staff has reviewed all the information that we either have submitted, or plan to submit in the very near future, we'll have no more COL Information Items.

As far as DAC status, DAC Item 1, again, just integration of the Human Reliability Analysis and Human Factors Engineering Design, closed, as I just previously discussed. Okay. DAC Item 2, Task Analysis is performed in accordance with the Task Analysis Implementation Plan. As I discussed earlier, this is where the Staff captures that they have yet to complete their detailed review and document that review for the second revision of OSA-2 summary report. This revision addresses all of the analyses that we've identified as being required. And that was provided to the Staff last week, so we expect this to be closed.

Next item. HSI Design is performed for the operation control centers in accordance with the HSI Design Implementation Plan. Again, functional requirements, design guidelines, engineering tests, and this lists design specifications. Now, in the Staff's SER, they're satisfied with the increasing

level of detail as we go from the functional requirements to our specifications, but at the time the SER was written, two outstanding documents remained to be submitted to the Staff. Those are listed here. Those were, also, provided to the Staff last week, and pending a satisfactory review, they will be -- this item will be closed, as well. Any questions on that item?

Okay. Next one is DAC Item 4, HFE Program Verification and Validation Implementation Plan, which is Tier 2*, is developed in -- the programmatic level description, at this point, is Tier 2*, but the plan is developed in accordance with the programmatic level description listed there of AP1000 V&V plan.

Now, Westinghouse has provided all five of those documents that are listed, which are the test support verification plan, the design verification plan, the integrated system validation plan, Human Error Discrepancy Resolution Process, and the Plan for Human Factors Engineering, Human Systems Integration at the time of plant startup to the Staff. The Staff has found four of those five to be acceptable. The remaining one, which is the Human Factors Engineering Integrated System Validation Plan, we are revising that, as we speak, to address RAIs we've received from

the Staff. So, we are working to resolve those RAIs. We're looking to have a face-to-face meeting with the Staff to address their issues. And our intent is to provide a revision of that document in the January 2010 time frame.

Currently, the Integrated System Validation is scheduled to occur about two years from now. So, some of the issues that we have here are more timing issues, and real specific details as to how we're going to perform the Integrated System Validation, so we have some work here with the Staff to reach agreement as to what things we can resolve in the near term, and what things are going to become clearer as we get closer to Integrated System Validation. Okay. Next slide, please.

So, conclusion. Westinghouse is performing all of our actions as we committed to do in our Certified Design Rev 15. Of the COL Information Items, six of the nine have been closed. The remaining open ones have to do with procedure development, awaiting the results of the 9/15 audit. The EOF/TSC item we are just awaiting NRC review of provided documentation. And the one COL Information Item that we have documents still to provide are the ones for training program, and procedure development

based upon the OSAs. Last slide, please.

And as far as DAC, DAC Item 1 is closed, 2 and 3, we are expecting the Staff to close pending satisfactory review of the documentation provided. And number 4, we've completed four-fifths of what we needed to complete, and have the Staff find acceptable. And we're working on the ISV plan. And that concludes Westinghouse's slides, with the exception of here's a picture of our current AP1000 main control room, as it appears in the design.

CHAIR RAY: Okay. Questions from members? Dennis, let me ask you on this one open item in DAC here, that looks all right in terms of the timing?

MEMBER BLEY: I think so. I mean, I'm really pleased to see that they're pulling this together. I wish they'd be here at our meeting talking about DAC later this week.

CHAIR RAY: Okay. Well, that's why I'm wanting to focus a bit on that issue. We'll hear from the Staff on the fifth out of the five items in DAC in a minute, I guess.

Okay. Hearing no requests for further information, we'll proceed with the Staff, which was scheduled to occur after lunch, but we'll do it now, if we may, Eileen, please. Go ahead.

MR. DONNELLY: All right. Thank you, Mr. Chairman. My name is Patrick Donnelly. I'm the Project Manager for Chapter 18. To my left is Paul Pieringer, he's the Lead Reviewer. You've already heard a little bit from him this morning. Assisting him was Molly Keefe and Jacqwan Walker. There was a question earlier this morning about going from Rev 15 to 17, how -- making sure that the changes were, as far as the entire design, how that worked out, and making sure that everything came together. And we understood how the changes changed the design as a whole. And Jim Bongarra was the person who reviewed Rev 15, and he was used as a consultant in this role. In addition, we had contractor support from Jim Higgins, and John O'Hara, and they were reviewers and consultants during the review. And I'll turn it over to Paul.

MR. PIERINGER: Good morning. I'd like to start first by going through objectives, and giving you some background on what we are looking for in the evaluation. First of all, NUREG-0711 is divided in four sections, and a support slide at the very end of your package, you'll see an outline of those four sections. But, in brief, they're planning and analysis, design, V&V, and implementation and

operation. And I'll refer to those four sections as we go through here.

Our first objective was to make sure that implementation plans, and result summary reports for the planning and analysis phase elements were completed. Now, that was important to us, because it's this planning and analysis phase that is identifying design inputs to the subsequent design phase. And what we wanted to do was insure that design inputs, as best could be done in a DAC ITAAC area where completed.

We recognize the design process has an iteration cycle to it, so things you discover at the end come back and affect that design. But the intent was, in our review, is to reach completion on this planning and analysis phase. That includes things like operating experience review, function analysis, task analysis, and the HRA.

CHAIR RAY: Can you explain how your objective is different with regard to Rev 17, than it was with regard to Rev 15?

MR. PIERINGER: Yes, sir. The Standard Review Plan defines three levels, programmatic, implementation plan, and results. And Rev 15 was submitted at the programmatic level. What we've

learned is that when you get a programmatic submittal, it, basically, outlines the commitments that are going to be met. It's a set of promises. It doesn't tell you how those commitments are going to be implemented. And because it doesn't tell you how, it doesn't give you very much detail in terms of acceptance criteria that you can use to measure the ITAACs against. So, when we came to this Revision 17, and when we've come to the new design applications, what we are doing is looking for an implementation plan level submittal, because it provides that detail needed in the DAC ITAAC area for measurable discrete acceptance criteria.

CHAIR RAY: Okay. Well, this is a little different take on what's happening in moving from one certified design to an amended certified design, because it's presuming a different standard, I guess you would call Implementation Plan Standard, as opposed to the Programmatic Standard, if I can coin that. And that's part, I guess, of what we're trying to understand here. We're not, necessarily, talking about changes, except they are changes in the sense that additional information can be thought of as a change, I guess. Well, what you said was helpful. I just have to mull it over a little bit further,

because we're, as you may have heard already, we're trying to understand, are we talking about changes, are we talking about something else, as between 15 and 17. And you've helped clarify that. Thank you.

MR. PIERINGER: The subject also comes up again in later slides, too. And, actually, it comes up right now, because our next objective was to make sure we had implementation plans for each of the 12 sections that are defined by NUREG-0711. And that's for the purpose that I just described. We wanted discrete measurable acceptance criteria for ITAACs.

MEMBER BLEY: Can I ask you a question that's purely of interest to me? When Chapter -- I mean, when Revision 15 was certified, you included a set of DAC for addressing all these issues, the ones you just spoke to, too.

MR. PIERINGER: Yes, sir.

MEMBER BLEY: Now that they're giving you the detailed information and meat, you're going through it, have you tried to play what you're looking at now against those DAC and understand -- get any feeling for how well those DAC could have established the adequacy of these systems, if there hadn't been the kind of review you're doing right now?

CHAIR RAY: Would they have sufficed, in

other words?

MEMBER BLEY: Yes. Have you even looked at them, and played them against your review?

MR. PIERINGER: Let's see. I'm trying to restate your question a little bit. Would the Rev 15 DAC have sufficed?

MEMBER BLEY: If we came in -

MR. PIERINGER: My answer is yes, but the COL applicants would have had a huge amount of work to do, because the COL applicants would have had to submit implementation plans. And those implementation plans would have had to have been reviewed against NUREG-0711. So, they would have been starting at a very basic level, and would have had to develop a lot of material.

Now, in this case, Westinghouse has developed the implementation plans, and implemented the implementation plans, so we're reviewing both implementation plan and results report as part of Rev 17. That's the big picture on Rev 17 for Chapter 18.

MR. HUNTON: This is Paul Hunton. What that does for us is, it promotes design standardization. By accomplishing that, it not only helps Westinghouse, but it, subsequently, helps all of our customers.

CHAIR RAY: Well, the nature of the inquiry has generic implications not particular to even factors, but it has to do with the adequacy of DAC, full stop, to define a design. Okay.

MEMBER SHACK: But, on the DAC, you have added no additional criteria. You have added no additional criteria. The DAC worked as DAC were expected to work, would you say?

MEMBER BLEY: But they're not actually reviewing against the DAC, or are they?

MEMBER SHACK: Well, they -- I guess, maybe now they don't have to. It is a DCD. They're changing, so they don't have to do that.

MR. PIERINGER: There is a series connection here. There are some DAC that we cannot review until we get the implementation plan, which is, itself, a DAC. So, if they were to give us an HSI design X, and we didn't have the implementation plan telling us what that design was supposed to be, and we only had the NUREG criteria up here, we would have to jump from the NUREG criteria, down to the design. That's not a good jump, because there's a lot of detail that you need in process space to tell you how that process works, to make sure that the design is complete. But we didn't have -

CHAIR RAY: This is a generic issue, so this is very helpful for us to hear you explain that. But a minute ago you said yes, but the COL applicant would have had to do a lot that he's not now going to have to do.

MR. PIERINGER: He would have had to prepare the implementation plans.

CHAIR RAY: But, would that have been workable?

MR. PIERINGER: Well, that question gets into, does the COL applicants know enough to write the information plan? My opinion is no, that many of these implementation plans, particularly in task analysis space, were in the architect engineer arena. And it needed the architect engineer's input. Now, that's not to say that the COL applicants couldn't have acquired that, so you could have made those arrangements. But the way it worked out, in my mind, was the most reliable, and the most cost-effective.

CHAIR RAY: Any other questions?

MR. CUMMINS: This is Ed Cummins. If I could just maybe help a little bit here. The industry has said that they would like these DACS or these ITAACs to be specific, so that you could tell whether -- any reasonable observer could tell whether you

passed it, or whether you failed it. That is a very hard standard for DACs, because it says sort of make a plan, implement the plan, do a good job, all those things are subjective kinds of things. So, I think what you're seeing in the difference between the level of the DAC, and the ability to make it subjective in terms of whether somebody passes or fails, the more information you put it in, the more you can have general agreement of whether it was implemented properly, or not implemented properly. And from the risk to the ultimate user, the risk goes down, if it's clear well, you pass or fail, the DAC or the ITAAC. So, I think there's elements in -- the more general you write the DAC, the less clear it is how you close it, and the more possible for contesting, whether you passed or failed to complete the DAC.

CHAIR RAY: Very excellent summary of our thought process, as well. We hope to memorialize that in the transcript, and revisit it, because that's a good description of some of the concerns that we have. This is an area where, obviously, the issue is being addressed in the most effective way, as you said. But that's not true everywhere. Okay. Are we ready to proceed? Bill, you -

MEMBER SHACK: No, I was going to say, I

think the point of your question was, suppose it had been left to the COL, suppose we were working from DCD 15, do you think the DAC would have been sufficient control for you to go through the implementation plans? Were they in truly necessary and sufficient conditions enough for a reviewer to then go on and review the implementation plan? That turns out to be a moot thing here, at this point, but on a conjectural level.

(Simultaneous speech.)

MR. CUMMINS: It is true that that becomes a DAC, it becomes the COL's responsibility, but it doesn't mean that the COL has to implement that. And, in fact, most of the DACs would have been -- they would have expected the designer to implement it, and required it as part of their contract, or part of their agreement. And, they would have wanted to have a standard answer for the whole fleet. So, they would have passed it back to Westinghouse, and Westinghouse would have, ultimately, done what we did. And what we have done here by accomplishing it, is we've reduced the risk of closing this vague DAC.

MEMBER SHACK: That's looking at it from your side. From my side, I want to make sure the NRC has enough -- has the box been made tight enough by

those DAC?

CHAIR RAY: As I say, I thought he did a very good job of summarizing our own questions here. And, as you say, Bill, it is a matter that we need to be satisfied, not just acknowledge that well, this will get worked out by sending it back to Westinghouse, anyway. We need to understand how these things work better than we do, and that's why we spent the time we have asking about this example. And, as Bill said, it's a potential good test of the process to ask the question, well, did the DAC turn out to be sufficiently constraining on these implementation plans that you're now reviewing, or not? And I'm not sure what your answer is to that, but you don't need to answer without thinking about it some more, perhaps. Let's proceed.

MR. PIERINGER: Okay. Going to the next slide. This is just a summary slide. I draw your attention to the areas where there are no changes documented. That just means that I won't be talking about it for the rest of this presentation, because Rev 15 is the same as Rev 17. I will talk about each one of the other areas, specifically, as we move on. So, I'll go to page 6, which starts with Section 18.2, HFE Program Management.

(Off the record comments.)

CHAIR RAY: Go ahead.

MR. PIERINGER: DCD Rev 17 added a new reference. It was AP1000 HFE Program Plan. We reviewed that program plan, and found that it did support the existing safety conclusions that were made in Rev 15. It was a document that provided more detail on how the implementation plan was going to be administered. And, specifically, it providing the engineering staff with additional implementation guidance, so we thought that it was an excellent step in reaching a lower level of detail that the engineering workforce could use to implement the plan

COL 18.2-1 asks the COL to execute or implement the HFE program. We reviewed this, and believe it to be redundant to the ITAACs, in general, 1-13. When I'm talking about ITAACs now, I'm using the Rev 15 numbering system. And I'll draw your attention to where I'm reverting, or going on to the Rev 17, because they're renumbered in 17, so we have to be a little careful here, make sure we're talking about the same one. So, I'll be using Rev 15.

So, we closed that. To the ITAACs, in particular, ITAAC 5 in Rev 15 speaks about the verification and validation program. And, in

particular, the way the HFE program works, as you know, is we have a validation, which brings together the actual design with the operators, with the procedures, and with the training, and make sure that those four things work together they way they're supposed to be. And, besides that, we look at each of the elements as they're executed. For example, we'll look at task analysis, we'll look at the OE analysis. So, we do those within ITAACs, making this ITAAC redundant.

COL 18.2-2 discussed the HFE plan as it pertained to the Emergency Support Facilities. I want to talk about this a little bit more. Westinghouse proposed a tailored approach for this, in which they put heavy emphasis on operating experience, functional analysis, and task analysis. Well, you'll recognize that those three areas are directly from NUREG-0711. We reviewed their submittals in each one of those areas, and they did a real good job of taking the criteria, the applicable criteria from NUREG-0711, and translating that into an Emergency Operating Facility construct, and applying it there. Now, like HRA wouldn't be applicable to the design of an EOF directly, so that was not part of this tailored approach.

And then they supplemented this approach with actual observations at two different plans, Harris and Summer, and they picked up, actually, identified additional tasks, and verified that the tasks they identified through procedural reviews are, in fact, accurate. And then coming -- using that information, they developed the HFE program that was to be applied to the EOF.

Now, I will tell you that 90 percent of this is covered within the AP1000 scope. Most of that is dictated by the dictated by the controls, displays, and alarms that have to be available in the Emergency Operating Facility, and Tech Support Centers for their functions to occur. However, there was 10 percent - these are my numbers, they're not measured, or anything, just a relative value - there was 10 percent, things like panel layouts, anthropomorphic, off-site dose measurement, that were, in my opinion, the responsibility of the COLAs. I don't think we had a disagreement over that, but what happened is, in AP1000 Rev 17, the actual COL Information Item was changed so that it omitted that design responsibility on the part of the COL applicant. We had a series of requests for information exchanges, and from that, we reached the conclusion that Rev 17 would be written --

rewritten to include that responsibility for the COL applicants. And we also took out the location, as Paul referred to earlier, because there is no dependency in HFE space for the location of the EOF, for the Tech Support Center. So, at this point, that's actually a confirmatory item. We're waiting to see the -- we have an RAI response that we reviewed, and we're waiting to see that incorporated into the design certification.

The other part of an implementation plan commitment was that the task analysis they did would be documented, and that was to be done as part of the OSA-2 task analysis. And, as reported earlier, that work has been done, and the document was submitted on 9/28, and it's awaiting our review.

On the next slide, we talk about task analysis, Section 18.5. And, in this case, Rev 17 deleted a description of a specific theoretical model for operator workload, it's pretty much those words, and they substituted a detailed implementation plan for the Operational Sequence Analysis II. This is the second iteration on the Operational Sequence Analysis. It's part of an iterative task analysis process that is described in the NUREG. And the detail there, the processes used, the information that was being

collected were all in line with what the NUREG criteria advocated. And we considered that OSA-2 implementation plan a good plan, and it supported the existing safety conclusions from the previous Rev 15.

COL Information Item 18.5-1, said that the applicant was to conduct an HFE task analysis. As reported earlier, the task analysis is done, with the exception of documenting the training, and procedure inputs. This is just a matter of completeness. And those documents are due to be submitted in December, and we'll review them at that time. That should close that Information Item.

COL 18.5-2 is to define operator responsibilities. Those were all defined in TR-52. We found that acceptable. And then ITAAC design commitment number 2 was to perform a task analysis. You can note the similarity here with COL Action Item in this case. We had the complete task analysis implementation plan, that was judged to be satisfactory. There was also results reports submitted, I should say a partial results report submitted. It was lacking the analysis of 24 maintenance, testing, inspection, and surveillance tasks. The part that we reviewed was good. The tasks had sufficient detail that you could, through

analysis, identify controls, displays, and alarms that were needed in the design. There was good documentation, so the part of the work that we've looked at is very satisfactory, and we're waiting for completion. Actually, that work is completed now, and submitted on 9/28, and waiting our review.

On the next slide, we move to Human Reliability Analysis. COL 18.7-1 says the applicant will execute the HRA Implementation Plan. This was closed. Risk important actions were identified in accordance with the implementation plan. And, more importantly, and there should be another bullet here, more importantly, those results were applied to other portions of the HFE process. Most noticeably, that -- most notably, the task analysis procedures, training, and staffing, and quals, where the results are integrated into those parts of the program. So, that COL item is considered closed.

ITAAC Design Commitment 1, Integration of HRA activities with HFE is a similar activity. Again, the implementation plan had already been considered satisfactory. We were looking for integration. Well, identification of the risk important tasks, and integration of those tasks into the other parts of the HFE program. And, in reviewing the task analysis, as

I indicated earlier, we found excellent detail that well supported the analyst's ability to identify controls, displays, and alarms that needed to be provided for in the HSI design.

In Section 18.8, the Human System Interface Design, COL Information Item 18.8-1, says to execute the HSI Design Implementation Plan. This is closed. It's redundant -- considered redundant to ITAAC 3, which I'll discuss in a minute. They also introduced additional information in the, what I call the style guide, in Westinghouse terminology is the AP1000 HSI Design Guidelines.

In my opinion, this is a very important part of the submittal that comes in under implementation plan space, that's not in the program space. The style guide, or the design guidelines. It's basically the specifications on HFE design, similar to what you'd find in NUREG-0700, talks about height of letters, the colors you're going to use, the details, the anthropromorphics, and details on HSI interfaces. And it is probably the largest piece of the design plan that gives you specific auditable information. So, we were very pleased to get that style guide. It did integrate, and include all the pertinent 0700 guidance, as well as a number of

additional inputs from other industry documents. It was, in my opinion, a very thorough integration of information from various HFE sources, including the information provided from the NRC.

Okay. ITAAC Design Commitment 3.

(Off the record comments.)

MR. PIERINGER: Okay. ITAAC Design Commitment 3, Design Development. The way this is characterized in design certification, is you start with a series of generic requirements, functional requirements, and those stem from that design analysis and input phase that I described earlier. And what we are interested in seeing here was the translation of these generic functional requirements into specific design specifications; specifications that were specific enough that engineers could use them to engineer from, regulators could use them to inspect from, and purchasers could use to purchase from.

And we actually performed two audits in this area. One was in October 2008. It was, basically, more of what I'd call an Appendix B styled audit, where we looked at procedure controls, documentation controls, things of Appendix B nature to make sure that what was in the HFE program was falling under the appropriate controls, and we found no

problems there. We did do a very quick review, where we checked design functional requirements to verify that those had been translated into specifications. And we had a whole series of documents, and so we'd spot check. We found no deviations there.

What we did find was that they had developed a lot of specifications, many of which were not specifically listed in the acceptance criteria for this particular DAC, which is a good thing. The bad thing was that they had not completed some of the specifications that were listed on the acceptance criteria, so we decided not to close this until those specifications were completed. And, in fact, now those have been completed, and are waiting for our review. They were, also, submitted on 9/28.

CHAIR RAY: I wish I could capture what you just said on a video, because it so perfectly illustrates what we were talking about earlier, about the insufficiency of the specifications in the DAC, originally, and the fact that you waited to require that the things that were listed in the DAC before were completed, that were there. Because it's an example of what we're wrestling with in our own mind here about the ability to write DAC that's sufficient to say that's it. Okay.

MR. PIERINGER: And that first audit was really just kind of a learning opportunity for the Staff, when I look back at it. The second audit was done in September 2009. It was specific to the computer-based procedure system. We chose that area, because, one, we had some questions in procedure space, which we'll come to shortly, as to just how this worked. Two, it's a new HSI application. I don't want to say new technology, because the technology has probably been there a while, but it was a new application, and the Staff really wanted to see how it worked in real life. So, we opted to go to Westinghouse, ask Westinghouse to run their simulator for us, so that we could actually see operators under various scenarios, plus a scenario where they actually failed the computer-based procedures, and we could watch how that worked. We, also, brought Jim Higgins, and John O'Hara with us from BNL to make sure we had all the expertise to really evaluate the application of this new HSI design.

What we found, I guess I'd say it was just very insightful for us, because what we saw matched very well with the specifications. And that's what we were looking to do, is given these detailed specifications, can we actually see how they've been

translated into the working plant condition. And I won't -- this was an engineering simulator, so it wasn't a certified training simulator. And they haven't completed all the programming for the computer-based procedures. And there's still design work to do on some of the interfaces, but it was the first time we were able to actually look at a design, compare it to the specifications, and say yes, we see correlation. And then we did, actually, 100 percent review of the NUREG criteria that applied to computer-based procedures, and verified that all of those had been translated into functional requirements. And then, in turn, we took the functional requirements, again, and verified that they had been internalized in the specification level.

So, from that - now, this is a very narrow piece. Right? It's only computer-based procedures, but from that slice, we were able to show a complete transition from the guidance, to the actual design with all the documents in-between, having all the appropriate documentation. So, we'd like to do a couple of more of those audits, more on -- not just for Westinghouse, but there's been plans submitted to the Branch Chief to try and include that type of evaluation, along with our review of the design

certifications, as they come in. Yes, sir?

MEMBER BLEY: I believe this is -- is this the first time Staff has been able to look at an actual implementation of the ideas that were in NUREG-0711 to see how they were all carried through to the end?

MR. PIERINGER: It's the first time we've done it.

MEMBER BLEY: Is there others scheduled soon? This can become a confidence-builder and process.

MR. PIERINGER: No, sir. There's no other -- well, there's other -- we have other audits that we've done to look at more of the paperwork, to evaluate like the implementation plan, the implementation plans reference other reports. I'm speaking generically now, not just AP1000. And we've gone to look at implementation plans, and then looked at these reference reports to make sure that there's sufficient information for us to do certain types of reviews.

That's not what I'm talking about in this computer-based procedure audit. And we don't have any other audits similar to what I just outlined for computer-based procedures scheduled. But that's where

we'd like to be, but we have not scheduled that. Maybe I should say, that's where I would like to be. I have -- the Branch Chief is not here today, but he likes the idea, but we haven't really a programmatic approach to it yet.

Okay. Going on to the next slide. This takes us to Section 18.9, Procedure Development. COL 18.9-1 was Execute the Procedure Implementation Plan, which requires writers guides to be completed, which they have been. And they were considered to be of good quality.

This is where we had an open item to track resolution of the questions associated with computer-based procedures. Based on that audit, this open item is being closed. The bullet I gave here is just an example. This wasn't meant to be Westinghouse's commitment. It's just to document what we saw while we were at the simulator. But it looked like a reasonable approach. It actually worked well in the simulator. The operators were able to go to this printer that was there, pull up the procedure, which is kind of like a sequence of events, except it's specific to procedure actions. It doesn't contain, obviously, all of the controls -- all of the alarms that are coming in. And the operators were very

easily to take that and just continue to step down through the remaining steps.

MEMBER BLEY: So, the plan is there won't be an actual hard copy in existence? They'll print out what they need, if this thing goes funny?

MR. HUNTON: There is a hard copy available in the control room. And this is one particular way to, if there's a fault in the electronic computer-based procedure, that they can transition to paper-based procedures. And what Paul is saying, is this is one technical implementation. There are others, which would include an electronic file, which captures this, so you're not just generating reams of paper. This is one way to do it, but we are definitely exploring others.

MEMBER BLEY: Okay.

MR. SISK: There are procedures in the control room.

MR. HUNTON: A hard copy set, and one of the procedures in there is what do you do when the computer-based -

(Off the record comments.)

MR. CUMMINS: This is Ed Cummins. I think the point is to tell the operator once he shifts to his paper, where he is.

MEMBER BLEY: No, it makes sense, but -

MR. HUNTON: And that's the point, if he knows exactly where he is, but doesn't have the book, that would be a problem.

MR. PIERINGER: Yes. We were, particularly, concerned about the transition, and that's what we wanted to see, how place-keeping was done during that transition. Yes, I'm done with that, and moving on to Section 18.11, Verification and Validation.

COL Information Item 18.11-1, Develop and Execute A V&V Implementation Plan. We closed this. We thought it was redundant to ITAAC Design Commitment 4 and 5. And I'll talk to those immediately here. ITAAC Design Commitment 4 was develop V&V Implementation Plans. Four of those have been developed. I'm not going to go into -- they're good plans. They're thorough. Where the real challenge in this area is, is putting together a validation plan, integrated system validation. That's the open item. That's what I was referring to earlier, is where you integrate the training procedures, operators, and design. And we are -- I guess I would characterize it as an excruciatingly detailed review of integrated system validation. The NUREG-0711 criteria is very

detailed. It requires scenario development, but not just naming a scenario. You've got to put together acceptance criteria. You've got to put together situational factors. You've got to put together your test plan, how you're going to measure it, how you're going to train people.

And the submittals we've got up to this date have all been too general in the integrated system validation area. We are looking for a very specific set of criteria, and that's what we're working with Westinghouse right now, is getting to the right level of detail. There are some areas we found, particularly in scenario development, where some of your acceptance criteria aren't available to you, because they do depend on some design that hasn't been -- some equipment design that hasn't been completely determined yet. So, what we do have is the ability to take a sample of scenarios, and review that sample. So, that's our strategy here.

We do have a number of outstanding RAIs, and this is always a challenging area, to get this done, but I think we're in a -- we certainly, I think, understand the expectations, understand where we're headed here. We've got, I think, good communications established on working out the details.

And then the last one is an open item for the Staff. I want to make sure that you're aware that this is not a Westinghouse open item, this is a Staff open item. There's an implementation plan they provided us that talks about validating the installed configurations during startup activities. It's a short procedure. It's been reviewed. It is satisfactory. I have to write up those results in the SER. That's not done yet, so that's an open item to the Staff.

So, to my conclusions, following closure of the two open items on task analysis, Chapter 18 of the Westinghouse DCD was satisfactory, addressed all implementation plans, and result summary reports will be complete for the planning and analysis phase of NUREG-0711. In other words, all the design inputs that are identified by the program will have been completed.

Second conclusion, Chapter 18 of the Westinghouse DCD provides implementation plan information in sufficient detail to provide reasonable assurance that the COL will implement an HFE program that meets applicable regulation and guidance. In other words, we have implementation plans that give us sufficient level of detail, and prescription to be

able to evaluate the designs as they are produced, either by audit, or by the ITAAC that remain.

And Chapter 18 of the DCD, and the associated ITAACs provide reasonable assurance that the acceptable HFE practices and guidelines will be incorporated into the COL plant design. In other words, we have reasonable assurance of safety for the HFE program. Any other questions I could answer?

CHAIR RAY: You have been very helpful in many ways, but this issue that we've commented on a number of times, which is the movement from the programmatic phase, to the implementation plan phase in this area is, obviously, a good step, and completing it will be a significant milestone.

We want to learn from this experience all we can. And not to -- probably not to question each of the things that you've done, but just what difference it makes in going from Rev 15 to Rev 17, and what we can -- lessons we can draw from that, that are generic to other things, as well.

So, anyway, that's my observation. Anybody else have anything else they want to pursue related to Chapter 18?

MR. PIERINGER: I had one IOU, and that's to talk about OSA-2, and the discussion about Tier 2,

Tier 2*.

CHAIR RAY: Yes.

MR. PIERINGER: On page 18-16 is specific documentation on OSA-2. And that is on a criteria-by-criteria basis.

CHAIR RAY: What was that page number, again?

MR. PIERINGER: 18-16 in the SER.

CHAIR RAY: Oh, okay. Where?

MR. PIERINGER: In the SER.

CHAIR RAY: Yes, I know, but where on page 16?

MR. PIERINGER: It should be close to the bottom.

CHAIR RAY: 5.8-2, Evaluation. Staff review of the OSA-2 summary report.

MR. PIERINGER: Yes.

CHAIR RAY: Okay.

MR. PIERINGER: Provides results of OSA-2 for the AP1000. Yes, right at the bottom there, second paragraph down.

MEMBER SHACK: It's all there. I just didn't get to it.

MR. PIERINGER: Okay.

MEMBER SHACK: I will say one other thing,

though. Staff who wrote Chapter 18 should instruct the Staff who wrote Chapter 3 on how to use levels.

CHAIR RAY: How to use what?

MEMBER SHACK: Scanning levels, so that you can make a PDF with bookmarks in it.

(Off the record comments.)

CHAIR RAY: All right. With that compliment, I guess, is there anything else? We are now at the point, just slightly beyond 11:30, when we were, according to the agenda, to break for lunch, but we have accomplished the first item due to be taken up after lunch. Therefore, at the moment, Eileen, we will wish to proceed with Item 7. Given that it's now past 11:30, we'll begin at 12:45, and expand that, hopefully, into as much discussion as is needed for those members here today, that were not present in July, and may have interest in things that are not on your follow-up list. But, also, of course, to go over with you the follow-up items that you have identified. So, we'll commence that discussion at 12:45. Hearing nothing more, we'll end.

(Whereupon, the proceedings went off the record at 11:32 a.m., and went back on the record at 12:44 p.m.)

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(12:44 p.m.)

CHAIRMAN RAY: Okay. This afternoon we are going to begin with what on the agenda I referred to before is identified here as Summary and Followups from the July 2009 ACRS AP1000 Subcommittee Meeting.

We are also, though, going to take advantage of the fact that we are ahead of time schedule to invite queries or requests for later responses on other items not identified during the July meeting but now needed -- needing some further review than we were able to give it then.

So those two things will take place during this segment, and then we will wrap up the day with a review of Section 3.4 of the DCDA and the associated SER, as we did this morning.

So with that as our agenda, Eileen, I will ask you to tell us how you would like to proceed.

MS. McKENNA: Okay. Thank you. Eileen McKenna again. What we -- as you may recall, after the last meeting we had I'll say maybe about 15 or 20 items where the Committee asked for some specific information. In some cases it was provide a particular document, and in a number of cases it was looking for more technical detail on a particular topic.

And what we would like to do today is go through several of those items that Westinghouse is prepared to provide the information at this time, and in other cases they will indicate when they think would be the best time to provide that information, for example, along with the related chapter that you will be seeing at a future meeting, so you will see it in the broader context of the chapter.

So if that's --

CHAIRMAN RAY: We will not be talking about our COL items.

MS. McKENNA: No, since we don't -- this is a DCD meeting, COL items will have to be covered in some other meeting or process.

CHAIRMAN RAY: We have our own punch list. Have you -- has that been shared with you?

MS. McKENNA: Yes, yes.

CHAIRMAN RAY: All right. Fine.

MS. McKENNA: I think we are working from the same list.

CHAIRMAN RAY: All right, good. That will always --

MS. McKENNA: Yes.

CHAIRMAN RAY: -- help the conversation.

MS. McKENNA: Yes.

CHAIRMAN RAY: All right. Proceed.

MS. McKENNA: All right. In that case, let me turn it, then, to Westinghouse to go through the items that they felt prepared to discuss today, and also the -- what future plans they have.

MR. SISK: Thank you, Eileen and Mr. Chairman.

Just a couple of comments and preamble, if you will, to going through some of the questions. First and foremost, I think we need to be able to discuss this at a level, at least in this forum, as a non-proprietary. If we do need to go at a level due to the ACRS interest, we may have to either defer or figure out a way to capture the details at a later date or later time. But our intent is really to talk, to the extent practical, in a non-proprietary manner.

CHAIRMAN RAY: Understood.

MR. SISK: Some of these items as well will fit nicely with future discussions that we will be having with the ACRS. For example, Chapter 15 or even Chapter 7 are two likely places where we will be picking up on some of these items.

With that as being the preamble, and perhaps one other caveat, we do have a few experts here to address some of the issues that we are going

to discuss on the list. That is by no means to limit the questions from the ACRS, but recognize we do not have all of our experts here today and would most welcome any questions.

If we can't answer them today, we will try to bring them back tomorrow. If we can't do it tomorrow, we will obviously be prepared to follow-on at the next meeting, just as we are doing with this meeting.

Thank you.

Okay. With that as our starting point, the first question that was identified as a Westinghouse action on the list that we have is ID number 2, the non-condensable gases, and can they affect flow from IRWST. That discussion will primarily be deferred to our Chapter 15 discussion.

We are conducting a full safety system review consistent with Generic Letter 2008-01, but I think to go through the details at this time would be a little bit premature, and we would recommend deferring that until we do the Chapter 15 review.

CHAIRMAN RAY: Okay. Any comment on that plan?

(No response.)

Thank you.

MR. SISK: The next item for Westinghouse was the RTD relocation, a question about the impact on dead band and their locations. And for that particular item I would like to turn it over to Mr. Dale Wiseman to discuss a little bit about the RTD location.

CHAIRMAN RAY: One minute. I thought for a second there on item 2. Mike, we need to make a note. Said needs to make sure he is aligned with this subsequent discussion, Chapter 15, because he was particularly interested in that subject.

MR. LEE: Thank you.

CHAIRMAN RAY: Item 3, go ahead.

MR. SISK: Mike, briefly I guess we will talk about the RTD location. I'm sorry. No, not Mike. Dale.

(Laughter.)

MR. WISEMAN: I thought somebody else was --

(Laughter.)

My name is Dale Wiseman. I'm from Westinghouse.

On the RTD relocation question, I think there were a couple of issues here. I think the first one was on the wide-range RTD on the location. There

was some confusion whether a location was -- the wide-range RTDs are used for post-accident monitoring, and they are located in the upper half of the hot legs. And I think at our last meeting there was some confusion as to whether they were -- exactly where they were.

CHAIRMAN RAY: Well, there was a reference that said "top" in one place, and then --

MR. WISEMAN: That's correct.

CHAIRMAN RAY: -- a comment about "upper half," so it led to a discussion about, well, which is it? So at this point, then, the answer is just upper half.

MR. WISEMAN: Upper half is what --

CHAIRMAN RAY: Okay.

MR. WISEMAN: -- is the requirement, yes.

There was also some movement of the narrow-range RTDs. At one point, they were downstream of the pressurizer surge line, and they were moved upstream of the pressurizer surge line, because of the impact of the surge that could -- if you have a cooldown and you get the out-surge, it can give you a hotter reading, which would tend to drive your rods in the opposite direction that you want them to go. So those narrow-range RTDs were moved upstream of the

pressurizer surge line.

We don't believe there is any impact on the actual location of those RTDs as far as dead band to the control rods. The wide-range RTDs were also located upstream of the passive RHR heat exchanger connection, and that is so when the passive RHR is in operation that measurement is another safety-related measurement in that flow path.

So, in general, that is -- that is our -- where we are on RTDs.

MR. SISK: Are there any additional questions? Did that address the ACRS's concern with regard to RTD relocation?

CHAIRMAN RAY: To the best of my recollection, it did. Again, I think the member who raised that particular question is not able to be here today, so --

MR. SISK: Okay.

CHAIRMAN RAY: That's fine. You've given an answer on the record, and that will suffice. Thank you.

MR. SISK: The next item was the reactor coolant pump flywheel design, and there was a question regarding what the inertias were. And I do think we talked a little bit about that the last time around.

But as for the record, again, I will defer to Dale, and we will go to the next one.

MR. WISEMAN: Yes. In the -- there was a change in the reactor coolant pump inertia. In Rev 15 of the DCD, the inertia was 16,500 pound-foot squared, and that inertia was increased in Rev 17 up to 23,500 pound-foot squared.

There is really no impact to the safety analysis here, because the safety analysis coastdown curve did not change between Chapter 15 and Chapter 7 -- or Rev 15 and Rev 17. What changed is, as the pump design progressed, the calculation of the friction and the losses was more detailed. And so the increase in inertia is essentially maintaining the same margin that we had before that -- just based on the bigger motor and the better calculation of the losses.

MEMBER BLEY: Which apparently you wouldn't have had if you stayed with the old one.

MR. WISEMAN: Well, that's correct. That's correct.

MEMBER BLEY: So it really does change.

(Laughter.)

Go ahead.

MR. WISEMAN: But the safety -- what's used in the safety analysis, the coastdown curve --

MEMBER BLEY: You made it good.

MR. WISEMAN: -- is the same. Right.

MR. SISK: Okay. And I think there was a question as well regarding the flywheel missile analysis. A flywheel structural evaluation report was submitted to the NRC July 2009, but basically we don't think there is any significant missile impact from the RCP flywheel.

MR. WISEMAN: Yes. That missile analysis took into account the revised flywheel design to get higher inertia, and the conclusion in that report was the same as previous in that the pressure boundary would contain -- contain any flywheel missile. If the flywheel would happen to have -- have a break in the flywheel, it would all be contained within the pressure boundary.

CHAIRMAN RAY: Yes. I remember pursuing that query somewhat, and I can't recall the details, other than the origin of the concern right now. Let me ask Eileen -- what is the status of that review, Eileen, do you know?

MS. McKENNA: Well, as was indicated, the report came in relatively recently. So I don't think we have finished a review of that, just timing-wise of where we are with looking at these different chapters.

CHAIRMAN RAY: All right. We'll have -- I would just like to make note that we'd like to at some future time be updated, when the staff is prepared, on the results of that, please.

MS. McKENNA: Of course.

CHAIRMAN RAY: Because it is an interesting challenge to have significant missile potential within the reactor coolant pressure boundary. And how that is dealt with is of interest.

Yes, Tom.

DR. KRESS: Did you have to change the design of the pump exterior to -- because that's a significant increase in kinetic energy, and --

MR. WISEMAN: The length of the pump increased slightly, because the -- we made the lower flywheel a little bit longer, but we are talking about an inch or two.

DR. KRESS: When you make a missile analysis for a circular flywheel, do you assume part of it comes apart and -- or half of it, or how do you --

MR. WISEMAN: The assumption was that there are -- the flywheel is made up of segments.

DR. KRESS: Segments, okay. So one segment may come apart.

MR. WISEMAN: Well, the assumption was they all --

DR. KRESS: They all come --

MR. WISEMAN: They all come apart.

DR. KRESS: Yes, but that was -- it would be the same as assuming one comes apart.

(Laughter.)

MR. WISEMAN: It's very -- yes.

DR. KRESS: Yes.

(Laughter.)

MR. WISEMAN: Because the one segment is going to impact in one area. The second segment is going to impact around.

DR. KRESS: Do you use the standard kinetic energy relationship to see whether it will penetrate or not?

MR. WISEMAN: I believe so, but I have to check and make sure in the report.

CHAIRMAN RAY: Well, that would be something we are interested in looking at at the appropriate time. That's all we need to note here, because it's an interesting problem.

MR. SISK: Okay. The next item that we had on the list was a discussion on the pressurizer due to the shape change that was identified, did it

have an effect -- what was described as a chugging effect with ADS discharge.

This is another item that will be ultimately discussed in the Chapter 15 review in November. And without going into --

MEMBER BANERJEE: Which dates are those reviews?

MR. SISK: I'm sorry?

MEMBER BANERJEE: What's the dates for the reviews?

MR. SISK: November 16th and 17th?

MS. McKENNA: I think it's 19th and 20th, isn't it, Mike?

MR. LEE: I don't -- I can -- next break I can --

CHAIRMAN RAY: 19th and 20th.

MS. McKENNA: Yes.

MR. SISK: Okay.

MEMBER BANERJEE: Can you go ahead and discuss the chugging effect on the ADS discharge?

MR. SISK: I know that the impact is -- again, recognizing that we are in an open forum, we will discuss that as a part of the Chapter 15 analysis.

CHAIRMAN RAY: Should we plan a

proprietary review?

MS. McKENNA: Well, this is something we hadn't --

MEMBER BANERJEE: Maybe. I don't know. I have to look into it.

CHAIRMAN RAY: Okay.

MS. McKENNA: I think in November we will need to have some time, some part, some of the sessions be proprietary for other reasons. So we may want to take -- I will be discussing that with the staff.

CHAIRMAN RAY: Let's just assume that --

MR. LEE: We can do that. We can do whatever is necessary. But I just want to -- a followup item at the break. I want to get back and look at our schedule, because there has been some shuffling of --

MS. McKENNA: Oh, okay.

MR. LEE: -- chapters over the last couple weeks, and I want to make sure that the record -- you know, if it's November, it's November. Whatever. But I just --

MS. McKENNA: Yes.

MEMBER BANERJEE: So in this effect, though, are you going to look at the implications that

it might have on the best estimate LOCA analysis? Or are you referring to the isolation --

MR. SISK: You're referring to the redesign of the pressurizer and what its impact is on Chapter 15?

MEMBER BANERJEE: Yes.

MR. SISK: Ed, do you want to --

MR. CUMMINS: Yes. This is Ed Cummins. Listening to the staff, basically they had an extensive RAI on what is the impact of the pressurizer change on the safety analysis. And we submitted a big report that went through each of the safety analyses and gave an assessment of the impact on -- and, generally, the assessment was minor change or positive change or no change. And so -- and there were no curves of -- typical curves you would find in Chapter 15 as part of that.

So the analyses were run again. Actually, they were run again for both the pressurizer change and the flowskirt change, and another panel analysis for the flowskirt as well.

MEMBER BANERJEE: So for the flowskirt, did you actually have measurements that you used, or -- sorry, can you hear me on the --

PARTICIPANT: No, we couldn't hear you.

CHAIRMAN RAY: He indicated -- he said he could not hear you. Ask your question again, please.

MEMBER BANERJEE: For the flowskirt change, did you use measurements that you had made on a scaled model, or --

MR. CUMMINS: No. I think it's just the code predicting the phenomenon of going through the -- back and forth through the flowskirt. So it was not -- we have done some model testing, but that's completely independent of the safety analysis.

MEMBER BANERJEE: So this you put some loss factor or something on --

MR. CUMMINS: Yes.

MEMBER BANERJEE: -- with that.

MR. CUMMINS: Yes.

MEMBER BANERJEE: Okay. And it looked like a reasonable -- you did a sensitivity study or something?

MR. CUMMINS: Yes. There was some special effects thought process about flow in both directions through the flowskirt, depending on where your break is, what might occur. And there was a little bit of confirmation, a scale model test, of some of that, but just in a generic way.

MEMBER BANERJEE: You also changed the

methodology to best estimate plus uncertainty for LOCA, right?

MR. CUMMINS: Yes, we did. That's for large break LOCA.

MEMBER BANERJEE: Only for large break.

MR. CUMMINS: Yes.

MEMBER BANERJEE: Okay. And how did you factor in the pressurizer effects on ADS discharge potentially, if there was any?

CHAIRMAN RAY: Sanjoy, I think you're trailing off the recording.

MEMBER BANERJEE: Sorry. It's so hard to -- I thought these mics were improved.

(Laughter.)

MR. CUMMINS: I don't know. I mean, I think that we just ran the model and had it predict what the results were. But I'm -- I think we should cover the details of this when we cover Chapter 15.

MEMBER BANERJEE: Yes.

MR. CUMMINS: Right.

MEMBER BANERJEE: So this will be covered under Chapter --

MR. CUMMINS: Yes.

MEMBER BANERJEE: And you have submitted these reports.

MR. CUMMINS: We have submitted the results to the staff.

MEMBER BANERJEE: And you brought also the methodology. Now, did we approve ASTRUM for AP1000 or not?

MR. CUMMINS: We are asking for it to be approved as part of this Rev 16 and 17.

MEMBER BANERJEE: As part of it.

MR. CUMMINS: Yes.

MEMBER BANERJEE: And --

MR. CUMMINS: You hadn't previously -- you had not previously --

MEMBER BANERJEE: We had not.

MR. CUMMINS: -- had not previously approved it.

MEMBER BANERJEE: But what is the best estimate quote that you are using for large-break LOCA?

MR. CUMMINS: COBRA/TRAC.

MEMBER BANERJEE: And did we approve that for --

MR. CUMMINS: Yes, you did.

MEMBER BANERJEE: Okay. Okay. So it's just ASTRUM.

MR. CUMMINS: And that's a probabilistic

look at COBRA/TRAC results, yes.

CHAIRMAN RAY: All right. So we -- and lastly, Sanjoy, do you wish to see any of that material before our November meeting, assuming it's on for November as Westinghouse thinks?

MEMBER BANERJEE: Yes.

CHAIRMAN RAY: Okay.

MEMBER BANERJEE: We need to see it. Of course, I'm hoping that Weidong will help me to find the pieces that I should look at in more detail.

MS. McKENNA: This probably goes back to your initial comment about in this case there is -- you know, there was a specific report on ASTRUM, as mentioned there were specific RAI responses on the pressurizer change and the effects on the safety analysis, which it sounds like might be of interest.

And then, ultimately, the staff will be providing its safety evaluation report that will blend all of that information together to present the results of its review and the changes that -- which have been put forward, which include, obviously, the ASTRUM, the pressurizer, flowskirt, among others.

MEMBER BANERJEE: Is the power in the plant primarily LOCA limited?

MR. SISK: Is the power LOCA limited?

MEMBER BANERJEE: Yes. Or DNB. It's LOCA, isn't it?

MR. SISK: Let me defer.

MR. CUMMINS: Yes. This is Ed Cummins again. You were near the LOCA limits on the AP1000 design cert, and the ASTRUM -- use of ASTRUM puts us well below the LOCA limits.

MEMBER BANERJEE: Right.

MR. CUMMINS: So we didn't really look at power effects, and we are already -- we are quite happy with where our power is at the moment.

MEMBER BANERJEE: And the DNB limits are part --

MR. CUMMINS: The DNB limits have requirements to have at least 15 percent margin -- is the URD requirement that we still -- we met that before. We continue to meet that.

MEMBER BANERJEE: Nothing has changed there.

MR. CUMMINS: No.

MEMBER BANERJEE: Well, we will need to look at this in some detail, because of course you get a lot of margin with ASTRUM.

MR. SISK: Well, recognize we -- we also had to submit a LIN, and we're looking for the staff

conclusions on that, looking forward to that.

CHAIRMAN RAY: Well, let me just make this observation, then. Without wanting to impose any requirements that don't already exist on the staff, or what not, it could facilitate our meeting in November if Dr. Banerjee had a chance to look at anything that is available that is relevant to this discussion ahead of time.

MS. McKENNA: Yes.

CHAIRMAN RAY: No promises, but if that's possible and can be done, it might make things go --

MEMBER BANERJEE: Well, yes. It would help if it was sufficiently in advance that we could take a close look at it as well, because it's going to be a lot of --

MS. McKENNA: Well, those documents are available in the record, so we should be able to get them to you very shortly.

MEMBER BANERJEE: Thank you.

MS. McKENNA: Yes.

CHAIRMAN RAY: All right. Let's see, anything else on -- were we on 6 or 5? I believe we were on 5.

MS. McKENNA: We were on 5.

CHAIRMAN RAY: Yes. Okay. Anything now

on 5, then?

(No response.)

Proceed.

MR. SISK: Okay. Item 6 was the flowskirt. Actually, you will see a picture of that tomorrow in Chapter 3, the discussion. But there were a couple of specific questions that the Committee had regarding flowskirt, and for those I want to turn it over to, again, Mr. Dale Wiseman.

MR. WISEMAN: I think the question from July was what our min to average and peak to average results were. Basically, we did our initial analysis, our initial CFD analysis. Our min to average was in the range of about half to 75 percent -- and this occurred, the min occurred, in the periphery. Our peak to average was in the -- between 1 and 115, so -- 1.15.

It was the min that caused us concern, because of the large crossflows that this can impart in the peripheral assemblies. So we modeled the flowskirt, we modeled a lot of different changes, but the flowskirt, we were able to increase that -- those numbers in the periphery into the range that our fuels people wanted to see, and the peak to average didn't really change very much.

And so that was consistent results, and the peripheral assemblies were still lower, but much closer to the average. And so that was the basis for introducing the flowskirt into the design.

MEMBER BANERJEE: So what did that ratio become? Or can you speak with that --

MR. SISK: To get into specific numbers, we would like to have a proprietary discussion for specific details.

MEMBER BANERJEE: Yes, okay. But this was on the basis of the CFD calculations. What quote did you use?

MR. WISEMAN: These calculations were done with CFX.

MEMBER BANERJEE: CFX, okay. So this was a little bit -- a few years ago.

MR. WISEMAN: Yes.

MEMBER BANERJEE: All right.

MR. WISEMAN: Yes.

MEMBER BANERJEE: And was there any validation of this? I seem to remember there was a scale model or something.

MR. WISEMAN: Right. To validate, to confirm this design, we initiated a one-seventh scale test program. That program is still ongoing. We

don't have final results at this time. But the -- our initial results, our initial preliminary results I should say, are -- they show the same trends.

The overall trend is consistent with the CFX analysis, in that the peripheral assemblies are on the low side, lower. The higher flows are in the center. So we are still in the process of validating that. We are also in the process of doing additional CFD analysis with a more detailed model to use in the verification process.

But the initial test results would show that the trends predicted by the CFD are confirmed by the -- at least by the initial test results.

MEMBER BANERJEE: This is a fretting concern for the fuel.

MR. WISEMAN: Yes. Yes.

MEMBER BANERJEE: Okay. And the fuel is, you know, CFD calculation being modeled as a porous media, or you are actually modeling the sub-channels?

MR. WISEMAN: In the CFD, the -- it's really the core support plate that is sitting -- the core support -- lower core support plate. In the test, we had individual venturis at each fuel assembly location. So we are measuring at each fuel assembly location.

MEMBER BANERJEE: So the flow resistance of the fuel itself is mocked in in some way by the venturis or by some --

MR. WISEMAN: No, not --

MEMBER BANERJEE: -- particular --

MR. WISEMAN: Yes. Not the whole delta P of the core, but a substantial part. And maybe Greg Meyer can --

MR. MEYER: Yes. My name is Greg Meyer with Westinghouse. I have been working with Dale on the one-seventh scale model in the CFD.

To answer your question, it is kind of a combination between using preliminary test results, say from calibration results, getting resistances for venturis. We are modeling the localized resistance right above the lower core support plate, but still along redistribution from the legs of the fuel.

So in the CFD, there is a one-seventh scale CFD. There will be a full-scale also, a revised model. But they will also allow -- it's above the lower core plate with legs, with using resistances, at least for the one-seventh scale CFD model, that were in the model itself as measured, or something close to that as measured.

So it is in individualized columns, if you

will, that actually model venturis themselves, a lot of the redistribution.

MEMBER BANERJEE: So let me get this clear. The CFD is actually putting in loss factors which are sort of the loss factors you are finding in the experiments, is that it?

MR. MEYER: In terms of modeling the model at one-seventh scale, so we can actually understand the model scale in CFD space also, that's correct.

MEMBER BANERJEE: Okay. So now when you go to trying to look at a full-scale system, how is the resistance in the fuel being mocked up? Is there some sort of loss factor associated with things above the core support plate, or how are you doing that modeling?

MR. MEYER: Yes. The initial models that Dale spoke of, it was modeled as just a general porous media --

MEMBER BANERJEE: Okay.

MR. MEYER: -- with a general resistance applied to that. The newer models being constructed, the higher fidelity, will have more specific information from test data.

MEMBER BANERJEE: But these loss factors are obviously not isotropic, right? They have to be

anisotropic. So the crossflow loss will be different from --

MR. MEYER: That's very important, actually. They have to allow the variation in the one-seventh scale from venturi to venturi, and what you may have in the actual fuel assembly also.

MEMBER BANERJEE: So is this matter now put to bed, the matter of the flowskirt and -- or is there a report coming out that we can look at? Because I guess what you are really saying is that you are going to have, with this flowskirt, enough flow at the periphery of the core not to have a fretting problem.

MR. MEYER: That's the intention.

MEMBER BANERJEE: That's the intention. I imagine that you want to be sure that that's true --

MR. MEYER: Correct.

MEMBER BANERJEE: -- for your customers, too. But are you sort of submitting this material to the NRC, or do you consider this the results? I mean, are you sending the details of the calculations in for review?

MR. CUMMINS: This is Ed Cummins. I don't think we intended to, because it wasn't part of the scope of the review, really. This is kind of what we

would call equipment engineering design or final equipment design. And I would say that it -- the flowskirt that you are asking -- the flowskirt is definitely part of the design.

Could we alter the whole pattern or do something in it? I believe the answer still is yes. Depending on the test results and the analysis results, we could make small alterations to it to achieve more uniform flow.

DR. KRESS: Sanjoy, we've been neglecting the friction losses to the core, from the standpoint of redistribution of the flow. The more loss you have the more apt you are to get a uniform flow through the whole thing I think.

MEMBER BANERJEE: Right. So it depends on -- they are not neglecting the losses. They are putting it as --

DR. KRESS: They're putting in a coefficient.

MEMBER BANERJEE: They are putting --

DR. KRESS: Well, my point was that may be worse than just neglecting them.

MEMBER BANERJEE: Well, if I understand what they are doing, they are putting in the anisotropic porous media, so you get crossflow.

DR. KRESS: Yes. But, you know, that sometimes -- you know, depending on your flow rates and those numbers, that sometimes doesn't make a good model of flow to the core. I would have neglected it and said I was conservative, but --

MEMBER BANERJEE: Neglected would certainly be conservative, but probably they don't want to do that. They want to get a realistic.

DR. KRESS: May not get the right answer, okay.

MR. MEYER: You could completely -- yes, you could come up with unrealistic -- a completely unrealistic number that is not of design value or input value.

DR. KRESS: Yes, that's true. They don't really know what you have.

MEMBER BANERJEE: I guess the issue is -- my concern here is not to do with the normal operation, because they have to figure that out. And if they don't, the customers will go for them. It's more an issue of what it does in certain, you know, transient calculations, and how you might model that. So that is probably the issue that I am concerned about.

But I think it can be handled -- the

appropriate loss factors and things, but just how you are doing -- what loss factors you are using and how you are supporting that is really the issue.

MR. CUMMINS: So I believe that our view of what you are -- we have the view that your concern would be your concern.

MEMBER BANERJEE: Yes.

MR. CUMMINS: And we have done analysis to show the impact on the flowskirt, all of the safety analysis. So the details of whether we get the exact right flow to each of the fuel elements is sort of our problem. But the safety analysis is sort of the NRC's -- in the NRC's purview for being reviewed and assessed.

MEMBER BANERJEE: So we'll take a look at it and see. I guess the supporting information that -- if I was doing the calculation, I would probably take the CFD results and the validation and put in the resistances and stuff like that based on that. That's probably what you've done in the safety analysis. And then, you have done some sensitivity study. Is that roughly the correct view?

MR. CUMMINS: I don't know exactly. I don't think so. I think that we have been -- we haven't used the CFX for the safety analysis. We have

used our safety analysis codes, and we have modeled it with nodes into our safety analysis codes. So --

MEMBER BANERJEE: So how did you then model the loss factors associated with the skirt? Because I guess the skirt is redistributing things so -- redistributing the pressure losses and things.

MR. CUMMINS: Yes. There is certainly a pressure drop across the skirt.

MEMBER BANERJEE: Right. So you have simply taken a sort of measured loss factor and put it in there or how -- that's what I'm asking. How did you do that? Did it come out of the CFD calculations? Did it come out of the measurements? Or was it some amalgamation of the two?

MR. CUMMINS: I believe it was calculated by COBRA/TRAC, but I'm not positive.

MEMBER BANERJEE: How can COBRA/TRAC calculate the loss factor for a skirt?

MR. WISEMAN: This is Dale Wiseman. I believe what went into this safety analysis is -- was our best estimate of resistances based on our historical values for the downcomer in the lower plenum, plus our best calculation that we could make on the flowskirt losses.

And so that -- the overall delta P between

the inlet and the inlet to the core was determined with our best estimate. And we had what we believed to be a conservative value that we put in there, conservatively -- we had a range to look at.

And the -- actually, the preliminary pressure drop data from our test shows that our calculated pressure drops on a normal flow basis are right in the range that we predicted them to be. So the initial test results are confirming that the range of pressure drops that are looked at in the safety analysis is probably a valid number.

MEMBER BANERJEE: So this flowskirt must add some flow resistance, because you are redistributing the flow.

MR. WISEMAN: Yes.

MEMBER BANERJEE: So it's a higher pressure loss going both ways. I mean --

MR. WISEMAN: Yes, during an accident. Right.

MEMBER BANERJEE: During an accident.

MR. WISEMAN: It was during an accident, so --

MEMBER BANERJEE: So it's not obvious what is conservative, what is not conservative. There is all sorts of issues, right? Because it acts as a

resistance to the blowdown if it's reversing the flow.

MR. WISEMAN: Right.

MEMBER BANERJEE: So the main issue here is really, if the results are not very sensitive to the flow resistance, then it is not a big deal. But it would be interesting to see how sensitive the results are, and you have done some sensitivity analysis or not on this, to see, you know, if you change it by a factor of two, what happens.

MR. WISEMAN: I am not sure exactly what happens. It all has been run in the safety analysis case, so I think we'd had to check on that.

MEMBER BANERJEE: But you have submitted a safety analysis case, which --

MR. WISEMAN: Yes.

MEMBER BANERJEE: -- we can look at.

MR. WISEMAN: Yes.

MEMBER BANERJEE: And I guess that's what we should do, and try -- the impact of the flowskirt that we are interested in, of course, is only various accident scenarios. So we have to take a look at that and see.

MR. LEE: Is the Committee asking for I think another little breakout session on this particular issue, not unlike what we -- was asked for

with the pressurizer, item 5?

MEMBER BANERJEE: Well, it could be that the two things could be put together. I mean, you are probably going to need to look in some detail at several issues related to this. There is a change in methodology, there is a change in flowskirt, there is a change in pressurizer. I'm not quite sure how we will organize this, but we talked to Harold, and then, you know, see what was the best way to --

MR. LEE: For Eileen's benefit or --

MEMBER BANERJEE: Right, yes.

MR. SISK: I would point out one item as just an aside, not to move -- like I say, we can go into more details at the appropriate time. But I would point out as well that the flowskirt is not modeled, it is being used in the operating fleet. So, I mean, there is some additional information out there, and obviously some experience with flowskirts as a whole that plays into all of this.

MEMBER BANERJEE: Is it very similar to what you are using in the operating fleet?

MR. SISK: From the context of the flowskirt, yes.

MEMBER BANERJEE: Yes.

CHAIRMAN RAY: Yes. I think that at this

point what we should do -- and I'm going to look to Eileen, as I did before -- is define what exists that would be helpful to a review that can be readily assimilated in advance of we'll call it the November meeting, for the sake of making an assumption here.

And the purpose of that is only to facilitate discussion at that time, not to answer questions that might properly be posed. If there is a set of documents, technical reports, that can be provided in advance of that meeting, that may well be helpful. Otherwise, we need to probe this quite thoroughly, and probably as part of the proprietary section of that meeting. Is that satisfactory?

MEMBER BANERJEE: Yes. I think if we got the documentation, so we could also have it reviewed by our consultants -- probably Graham Wallis, because I'm not going to have the time to do it between --

CHAIRMAN RAY: Sooner rather than later.

And so, Mike, from your standpoint, Sanjoy has indicated that we need expertise in this area to conduct a review of the material.

MR. LEE: We'll tickle the keys.

CHAIRMAN RAY: Let's not get into that, just take it as needing to be done.

MR. LEE: Yes, right.

CHAIRMAN RAY: Okay. We can only do what we can do, but we can try and do what needs to be done. Okay.

MEMBER BANERJEE: So we can move on.

CHAIRMAN RAY: Yes. Well, I want to make sure you've got all you need at this point.

Okay. We are still on item 6 until you move us on. There is an item over here that says, Eileen, "DNRL to provide background documents from AP1000 review that may help ACRS better understand the issue." I'm not sure if that was --

MS. McKENNA: It's probably a -- probably the topic, the whole -- it is probably the whole subject of like just the things we were talking about. So --

CHAIRMAN RAY: Okay. So to some extent that was recognized earlier I guess --

MS. McKENNA: Yes. Yes.

CHAIRMAN RAY: -- and we need to actually do it.

MS. McKENNA: Right.

CHAIRMAN RAY: As Sanjoy has indicated, that particular individual he thinks would help us, and we'd better get that going, then.

Okay. Let's move ahead.

MR. SISK: Okay. Moving to item 7, which is the zinc injection. There were some discussions last time with regarding to the operating experiences of zinc injection, its application to 14-foot cores, and a question on exothermic reaction.

And for that, I am going to turn it over to Mr. Don Lindgren, and he will walk us through with where we are with zinc injection.

MR. LINDGREN: I'm Don Lindgren, Westinghouse, AP1000 licensing lead on zinc.

I have been dealing with zinc since before I was working on AP1000, so we have had zinc injection in operating plants. So our use of it is based on that.

The first question was: is there an exothermic reaction? The answer is: no, the zinc is injected into the system in the form of zinc acetate. So it's not metallic zinc. There is also -- it is also a very small amount. It is -- you maintain it at a rate no higher than 40 parts per billion, so there is not much zinc floating through the system.

The estimate is if you -- it was all metallic and it was -- had all the zinc and reacted it with boric acid, you would get about a cubic foot of hydrogen. So there is not a lot of zinc from that

item.

How much zinc coats on the fuel -- once again, from our experience in the operating fleet, it is a very small -- a very thin layer, on the order of a micron. So it's enough to turn the fuel black, but not much more than that.

DR. KRESS: The concern was whether it had any effect on DNB, the coating.

MR. LINDGREN: You end up probably with a thinner layer than you have of the -- the whole purpose for putting zinc into the system is to reduce the corrosion of all of the stainless steel and nickel alloy surfaces. So --

DR. KRESS: I don't know which way that takes the --

MR. LINDGREN: I think if you are -- any time you are reducing a layer of material, you are -- you release less primarily nickel and cobalt into the system. So they are not available to plate out onto the fuel.

DR. KRESS: Yes, I understand that.

MR. LINDGREN: Okay. So in an operating plant where -- when you are introducing zinc, you have to be careful about how you do that, because it will tend to shift the corrosion product that is on the

surface of the fuel and will -- and because some of it is cobalt, it will -- you have to worry about that effect.

In a plant where you are starting it from the beginning, there is -- and you are reducing the zinc and nickel release from the --

DR. KRESS: I was concerned about a -- you know, I knew that it turns the fuel kind of blackish-looking, but I was concerned how that might affect your LOCA analysis, whether or not it approaches the departure of -- I don't know that it does or doesn't. It just seems to me like it could have some effect. What do you think, Sanjoy?

MEMBER BANERJEE: I don't know. I mean, it has been done for a long time, so --

(Laughter.)

We have sort of said it's fine.

MR. SISK: I think, generally speaking, the addition of zinc has been demonstrated to be a general benefit overall in the reduction of corrosion and crud build-up on the fuel. And as such, as --

DR. KRESS: It has beneficial effects.

MR. SISK: Exactly. It has been beneficial, which is why more and more have looked at going in that direction. The real benefits -- and one

of the things that we look at on the AP1000 side of course -- is by putting it in from day one. A lot of plants look at it after the fact, but have found it to have positive impacts after the fact. So --

MEMBER BANERJEE: It's a very complicated thing that occurs. I mean, eventually you get lower radiation fields, of course. That is what you are really interested in. But the exact transport deposition and activation and moving out, it's a complex process, but it certainly does deposit on the fuel. And it certainly does get, you know, some effect. Now, what effect that is, I don't know that anybody has ever tested it.

MR. LINDGREN: Much of what you were talking about, the complex part of it is -- is when you have an existing plant with existing fuel that adds an existing corrosion layer on it. And you do tend to, as part of the process, release some of that into the fuel and have it shift around.

As we said, the advantage of starting off with it, you know, from day one is you don't have to worry about that shifting around of the corrosion. You get primarily the benefit -- just the benefit of reducing the corrosion layer everywhere in the plant, and releasing less of the cobalt and the nickel into

the fluid from day one.

DR. KRESS: That is certainly a good thing.

MR. LINDGREN: Yes. And going back to the fuel and DNB and that -- I mean, we still do end up with a corrosion layer. It's small. It's thinner than before, but it's not -- it's not clean metal. So I would expect that you still have that effect.

MEMBER BANERJEE: I think we will hear something about this later, because we did a study on Leipstadt for exactly this. Looked at -- we looked at the cobalt, where it went, and the zinc. And it's a very complicated business, but anyway, as he says, probably putting it early is better than putting it late, so --

MEMBER BLEY: When you do this early, does that change the way you precondition things and --

MR. LINDGREN: Well, yes. In fact, when you introduce it, I mean, the 40 parts per billion is a maximum level. When you introduce it into an operating plant that already has fuel that has been exposed, you tend to start it like five or 10 parts per billion, because you don't want to get what --

PARTICIPANT: Burst.

MR. LINDGREN: Well, no, not so much the

burst, but the -- let me get the right term -- crud-induced power shift, also known as the axial offset anomaly. So, you know, if you blast it with -- 40 parts per billion is not a lot, but if you start out with 40 parts per billion, you can get the crud that's on the fuel to move around. And that's something you don't want to do, because I'm not sure exactly what happens to the power levels in the rock. So --

DR. KRESS: I assume you keep the level, some level, during the full --

MR. LINDGREN: Yes, this is --

DR. KRESS: -- 60 years of operation? That was another concern, because if it's not played out, it it's continually building up over -- I guess what -- your cycle for fuel is like two years?

MR. SISK: Eighteen months. But, yes, and remember we are replacing fuel on a regular basis.

DR. KRESS: I guess that would be --

MR. LINDGREN: Well, yes, that would be --

CHAIRMAN RAY: I'm glad I took advantage of the time we built up this morning, as we are using it now, to good effect I trust. But I will note we have 24 of these items, and then some further discussion, so maybe we should move on.

MR. SISK: Well, hopefully we don't have

24 more to go, but --

CHAIRMAN RAY: By the way, is this the presentation?

MR. SISK: We have 21.

CHAIRMAN RAY: I know. Is this the presentation at a future meeting that we were referring to here in the comments on this item 7?

MR. SISK: I think it was what we were --

CHAIRMAN RAY: In other words --

MR. SISK: -- discussion, yes. The answer is yes.

CHAIRMAN RAY: Okay.

MR. LINDGREN: There was a -- one final note is that we did provide the staff with the technical report on the zinc addition. It dates from April of '06, so it was one of the very first ones we sent in. And there is that available if --

CHAIRMAN RAY: All right. So, in any case, the ball is in our court to raise the flag on --

MS. McKENNA: Correct, yes.

CHAIRMAN RAY: Okay.

MR. SISK: And I will add one other statement that we didn't make but did come up in July. This has been applied to 14-foot cores as well. Zinc has been applied to 14-foot cores, which was one of

the questions that I believe came up about the core, did that have an impact, and the answer is no.

CHAIRMAN RAY: All right. Onward.

MR. SISK: Onward. The next item that Westinghouse had as an action was the turbine overspeed protection. During the Chapter 10, we had some question about looking at the diversity of turbine speed -- excuse me, turbine overspeed protection. Again, I will defer to Mr. Don Lindgren, and I will put a figure up here on the screen.

CHAIRMAN RAY: Okay.

MR. LINDGREN: This is -- once again, this is Don Lindgren. We have very recently turned in an RAI response revision that addresses this issue -- and this figure in the RAI, which -- it is worth more than 1,000 words, I believe -- these are the two overspeed protection systems.

The top one, there is a -- which is an OVATION -- OVATION-based system, which is the system that the -- which is the same as the control system in the plant. You see that there is active speed probes off of a seed wheel attached to the rotor, two out of three logic, and that sort of thing, that feed into the -- where you actually open up the valve that dumps the fluid that shuts down the turbine.

The lower train -- you've got passive speed sensors on a physically different speed wheel into an emergency trip cabinet that is not OVATION-based. Once again, two out of three logic into a different valve that opens the fluid that trips the turbine. So this is -- we believe this is equally diverse to having an electrical and mechanical trip.

CHAIRMAN RAY: Yes. All right. So the status of that is the ball is in the staff's court now, because --

MS. McKENNA: Yes. I think this was, as you said, very recently --

MR. LINDGREN: Like yesterday.

MS. McKENNA: Yes.

CHAIRMAN RAY: All right. We need to await your review of it.

MS. McKENNA: Yes, yes.

CHAIRMAN RAY: But let me, again, identify to Mike that this is an issue that at the appropriate time needs to be thoroughly reviewed here by the staff with us, so it goes on some punch list.

MR. LINDGREN: The operating utilities are doing the same kind of -- the mechanical trip has been problematic in the past, and probably is the largest contributor to unreliability of the turbine, given the

way you have to test it. So it's a --

CHAIRMAN RAY: Well, I understand the motivation for not having to test the mechanical trip. Trust me, I do understand that. That doesn't fully satisfy the concern, however.

MS. McKENNA: Well, this was an open item in our SER, so that we were --

CHAIRMAN RAY: Yes.

MS. McKENNA: -- going to be coming back at a future time and obviously --

CHAIRMAN RAY: Yes. I just want to make sure that we take cognizance of what the staff's conclusions are.

MS. McKENNA: Yes.

DR. KRESS: How do you test this device?

MR. LINDGREN: This is electronic. You can test this electronically, so you don't --

DR. KRESS: You test the sensors coming out?

MR. LINDGREN: Yes, you don't have to speed the turbine up to --

DR. KRESS: To see if it's getting a signal.

MR. LINDGREN: Yes.

DR. KRESS: At the speed it's going. And

if it tends to overspeed, how do you know it's getting an overspeed signal? I mean, you are testing at one speed, but it really has to work at a much higher speed. I'm not sure I know exactly how you do that without overspeed testing it. And you can do it in an outside rig someway, yes, I could see that.

MR. SISK: I think the actual -- I was looking for the mic. I think we could talk about the actual testing of the sensors later, but it does not require overspeeding. You do crank a signal in, and you can see whether the whole sequence works without actually doing a trip or overspeed on --

DR. KRESS: Well, if you guys think that's okay, why --

MR. SISK: It is --

DR. KRESS: -- have to leave, but I think you need to overspeed that device.

MEMBER BLEY: Well, overspeed, except at the sensor.

MR. LINDGREN: Nobody who owns a turbine wants to overspeed it.

DR. KRESS: No, I don't mean --

(Laughter.)

-- the turbine. I mean, I think you need to have a way to do it that --

MR. SISK: But I was going to say, if you want a specific, detailed answer, I would defer that to our test people on this NSER to the ISC folks to give you a better read-out on this.

MEMBER BLEY: One of you said this is being used in -- or something similar is being used in operating plants. Have some operating plants gotten authorization for this kind of system? And is staff aware of that?

MR. CUMMINS: Yes, the operating plants have --

MEMBER BLEY: In the U.S.?

MR. CUMMINS: Yes.

MEMBER BLEY: Any idea which ones?

MR. CUMMINS: I don't know, but I --

MR. SISK: I don't know that. We could certainly find that out.

MEMBER BLEY: They must have been approved by some part of this agency, I assume.

MR. CUMMINS: I think it probably was. You can buy these overspeed computer devices from vendors. They sell them, so --

CHAIRMAN RAY: Well, the insurance companies are another thing to think about, in terms of what their views are. But in any event, we are not

I think going to run this fully aground here now, so the right thing to do is to identify that it is a work in progress and --

MR. SISK: Okay. I think the only other one that Westinghouse had as a specific item --

CHAIRMAN RAY: Excuse me. Are we moving away from 9, then?

MR. SISK: Yes.

CHAIRMAN RAY: All right. Wasn't there a question about the testing of the low-pressure turbine intercept valves?

MR. SISK: I do not recall a question on that. I will throw it to my --

MS. McKENNA: I don't recall a question on testing. I know there was some degree of confusion, if you will, about the speed control and --

CHAIRMAN RAY: Well, the speed control is one thing, but, you know, the most likely reason to overspeed the turbine is you trip the load and the doggone intercept valve doesn't go shut. So you've got the moisture separator sitting there with all of that energy. It just runs it up and overspeeds it. That's what usually happens.

And there was a question I thought about reducing the testing of the intercept valves, not the

overspeed detection device, but the closure of the intercept valves.

MR. LINDGREN: We are -- as I remember, we have a -- we are saying we're testing every six months, I believe?

CHAIRMAN RAY: There was some change in that.

MS. McKENNA: Yes, there was a change in the frequency of the testing, yes.

CHAIRMAN RAY: Instead of quarterly?

MS. McKENNA: Yes.

MR. LINDGREN: Part of that is based on having enough experience with those valves in any kind of turbine, but just having some experience with those valves, and that is factored into the evaluation of the probability of an overspeed rotor failure.

CHAIRMAN RAY: Yes, that was basically the nature of the discussion, but I didn't think we got closure on it. Basically, what I recall seeing was just basically what you said. We've got enough experience that we can reduce the frequency of this testing, but there wasn't any analysis that showed -- well, you know, that sounds good, but can you demonstrate that that is true?

And so let's make an item -- I mean, I

would at least like to know if the staff is satisfied that there has been enough showing on the change in the reduction in the intercept valve test frequency to justify that kind of change. It may have gotten conflated with this overspeed detection.

MS. McKENNA: Yes. I think the other thing that was kind of part of that discussion had to do with the assumption on the orientation, whether it was favorable or unfavorable --

CHAIRMAN RAY: Yes.

MS. McKENNA: -- with respect to the two units. And so there was a lot of different aspects that were identified at the same time.

CHAIRMAN RAY: I think it just got lost, but I definitely recall that the change in -- reduced frequency of testing the intercept valves was something that I picked up on. And I didn't think we closed that. The discussion was exactly what he said, which was, well, we have a lot of experience with these things, and on a probabilistic basis we can reduce the frequency that you have to exercise the valves.

But I didn't think that was the end of it, and it just didn't get picked up as an action item here. I would just like some more discussion of that

from the standpoint of the staff's review and if they concur in that, because there is a lot of plants out there that would dearly love to reduce the frequency of closing those doggone intercept valves. And if we are going to do that, we had better be clear-eyed about it and not just have it take place one day because we didn't pay attention.

Okay. Proceed.

MR. SISK: Well, the last item that I believe Westinghouse had specifically in sharing it with the staff and the COL application was a discussion on turbine missile generation. This kind of goes back to I think what you were just commenting, Eileen, the favorable/unfavorable orientation.

I think some of that is going to be discussed tomorrow, but, again, I will defer over to Mr. Don Lindgren.

MR. LINDGREN: Yes, we are -- we do include that in the discussion tomorrow on missiles. The short answer is that the analysis of the probability of a turbine rotor failure meets the criteria in the reg guide for a turbine with an unfavorable orientation. I believe it's 10^{-5}, so two AP1000s side by side is no worse than an unfavorable orientation.

CHAIRMAN RAY: Right.

MR. LINDGREN: So that has been our approach. It is really -- since we have -- we have a design certification for a single unit, it is really a COL question. But we've answered it on a generic basis.

CHAIRMAN RAY: Well, at the time, of course, we were sitting there with an R-COLA in the same discussion.

MR. LINDGREN: And these questions -- and we have gotten RAIs on these. I'm not sure whether it was a design certification or a COLA. It's one common answer for all of them, since --

DR. KRESS: To get a probability of missile impact for these things, it brings to mind me probability of TRAC initiation, TRAC worth, and with respect to speed -- I thought these were new rotors that you had in these things. Do we have the information that we need to do that probability calculation, those materials, and --

CHAIRMAN RAY: The reg guide assumes no change from past history, basically, in calculating frequency, assumed frequency of failure.

DR. KRESS: I guess that's okay, if the materials are the same.

CHAIRMAN RAY: That's what I'm saying. I'm just adding a piece of information, which is that the -- I think the reg guide that you referred to says this is what our history has been, and it's --

MS. McKENNA: We have a member of the staff who I think can maybe contribute on this point.

CHAIRMAN RAY: Okay. Sure. Please.

MR. HONCHARIK: My name is John Honcharik. I'm from DE. And I guess the question initially was whether or not the turbine missile analysis that Westinghouse did provide covered by high and low trajectory missiles. Okay?

And I think the first response was that it was only for high trajectory missiles, because the AP1000 single unit is favorably orientated. So low trajectory wouldn't affect any safety component systems. Okay?

But I think the problem then arised where you have COL applicants coming in on the dual unit side -- side by side, thereby it's not favorably orientated anymore. Okay? So, then, the Westinghouse responded to that RAI again, and in there they stated that their turbine missile probability analyses were not dependent on the angle of trajectory. It was basically just an analysis, a fracture of the rotor.

So it did not matter where -- what angle the piece flew out of. So basically you can use that analysis for both high and low trajectory. So it was more of I guess a misunderstanding between, you know, a single unit and the dual unit, you know, because for a single unit you don't have to worry about low trajectories.

MEMBER BLEY: That doesn't answer the question Tom Kress just asked. Are the new rotors of different material than the old ones? And if they are different, why do we have any confidence in the crack initiation idea that -- or quantification that we have used up until now?

MR. HONCHARIK: Most of the rotors are -- have similar materials. The analysis basically takes the material properties and then assimilates -- say that, okay, if you were to do an inspection on it and miss a flaw of a certain size, what would be the likelihood of it propagating before you could inspect it and detect it?

DR. KRESS: That brings to mind the question of: do you inspect these?

MR. HONCHARIK: Yes, they usually have an inspection I think for the AP1000 -- is every 10 years, based on a probability analysis.

MEMBER BLEY: Now, I was under the impression -- and this might be a wrong impression -- that the new technology of the way the rotors and the disks are put together have eliminated some of the sources of cracks we have had in the past. And if that's true, you would think you would be getting lower probability of getting a crack that propagates. Can you say anything about that?

MR. HONCHARIK: Yes. Like this one is -- Westinghouse proposed to use an integral forging, which is basically one-piece forging, instead of several pieces put together and then put onto a shaft, so there is less likelihood of, say, a defect being presented there. So in that case, yes, you are right. An analysis did show that, but yet they are still going to propose a 10-year inspection interval.

CHAIRMAN RAY: That's not a bad idea. You've got to convince more than the NRC. You've got to convince the insurance underwriter also.

MR. LINDGREN: And your comment about the frequency of the valve testing also factors into this evaluation.

MR. HONCHARIK: Yes, and I think -- I'm not sure. I thought there was an analysis done for the turbine valve stop --

MR. LINDGREN: I believe there is.

MR. HONCHARIK: -- frequency.

CHAIRMAN RAY: Yes, we just didn't --

MR. LINDGREN: You haven't been privy --

CHAIRMAN RAY: -- review it or consider it in any detail when it was discussed earlier. Okay.

MR. SISK: Does that address the question on --

CHAIRMAN RAY: All right. We'll have to wait and see here. I guess, Tom, the issue that you have would not be satisfied other than by saying, "Well, we are confident that modern turbines are at least as good as those that are the basis for the regulatory guidance that we presently use."

DR. KRESS: Yes, I think that would satisfy it, particularly if they have this 10-year inspection.

CHAIRMAN RAY: I think that was the presumption everybody brought to the discussion before, which is, well, we don't -- we are not looking to increase the margin or reduce the assumed frequency of a missile generation, because it's quite low already. And so it's not something that we have tried to push.

DR. KRESS: And it also looks like it is

taking advantage of the experience to make it less vulnerable. So those things tend to satisfy me on this issue.

CHAIRMAN RAY: All right. Okay. So is that the end of the Westinghouse items?

MR. SISK: I believe that -- yes, at least the formal questions you had on your list, Mr. Chairman.

CHAIRMAN RAY: Okay.

MR. SISK: If you had others --

CHAIRMAN RAY: We probably will have, but first I want to give Eileen a chance to finish up on her items.

MS. McKENNA: Okay. Well, one of the items that we had that I am just going to speak to briefly was item 8, which had to do with the pressure temperature limits reports, and I think there was some degree of confusion perhaps at our last meeting with respect to how that information was captured in the technical specifications.

This is -- you know, and the similarity to things like the core operating limits report where there is a methodology that is agreed to that is then used on a cycle-specific basis to generate a specific curve or set of parameters that are used to control

the plant during operation.

And, you know, there was some perhaps impression that they were -- something was not in the tech specs. What's in the tech specs is the method -- the use of the methodology to develop the curves, and then the requirement that they follow those curves, obviously, during the particular cycle of operation.

And there is a specific reporting requirement in the case of like the pressure temperature limits that is also in the tech specs that they provide on each cycle. "Well, here is the curve we are going to use, you know, based on the analysis."

And, you know, the idea being that these limits curves that we expect to change from cycle to cycle, you know, this is kind of an experience, lessons learned from back in the '90s of a lot of repetitive license amendments that were doing little more than on a cycle-by-cycle basis reviewing -- we generated the new curve using the same method we have already -- you have already seen before, NRC.

And so there was an improvement item to relocate the actual curves, if you will, out of the tech specs and control it within the tech specs by requiring that this particular methodology that is approved be used to come up with particular curves,

and then follow them of course during the plant operation.

DR. KRESS: Do you ever audit these calculations to see if they were done correctly by the methodology?

MS. McKENNA: They are submitted. I can't speak, since it is primarily experience on the NRR side of business, so --

DR. KRESS: Before they go ahead and restart --

MS. McKENNA: Yes, that's basically what -- on both sides, basically like the core and upper limits, they have a requirement to submit the report. It's available for the staff. I would have to inquire of them as to how much audit and review they might do of those. There is a degree of similarity, obviously, over time that -- in that calculation.

DR. KRESS: I mean, I wouldn't expect too many.

MS. McKENNA: Correct. You know, and I think also, you know, the staff does see the results of the curves, of the analysis. So if something looked really off, I think that would be a reason to inquire.

DR. KRESS: They should look about the

same.

MS. McKENNA: Yes, yes.

CHAIRMAN RAY: All right.

MS. McKENNA: I think most of the other ones were more related to things like the COLs or will come up in, you know, something on -- that we wouldn't -- isn't really suitable for this kind of meeting. I think aircraft impact we know the Committee is interested in, and we will be having a separate briefing when the staff is ready with the results.

CHAIRMAN RAY: What is the status of 10?

MS. McKENNA: Ten, the elbow taps. Yes, I'll say that one kind of caught me -- so the background information -- we'll have to cover that -- have a separate discussion as to -- make sure we understand what background information we have that we need to provide, because I thought there was kind of a different method that had been talked about in July.

MR. SISK: Well, we have an open item that we are working with the staff that --

MS. McKENNA: Okay.

MR. SISK: -- as indicated here. The alternate testing method includes using elbow taps, which is an open item. We have not resolved that issue yet, and we are not ready to -- I don't think we

are prepared to go into details just yet on the results of that evaluation or that testing.

CHAIRMAN RAY: All right. So these relevant Westinghouse submittals are prospective, not something that has happened already.

MS. McKENNA: Correct.

CHAIRMAN RAY: Okay. Could you note that, Mike, please.

MS. McKENNA: Yes. I didn't think we had anything in-house that I could send you on that.

MR. SISK: Well, there was I think a question earlier about elbow taps or something along that line, other --

MS. McKENNA: Yes, there was. I said that's what -- the item had to do with how the -- the uniformity of the flow measurement using these and the -- I think the intent was that this was perhaps a more accurate method than doing the heat balance to measure flow. And, let's see, and --

CHAIRMAN RAY: What is 17? It's too obscure for me to figure out what that is.

MS. McKENNA: Well, I think this is related to the questions that came up partly when we were talking about like the non-condensables, with respect to whether there was plans to do the different

kinds of testing, whether it was if you will proof testing that may have been done in the past to demonstrate that the concepts --

CHAIRMAN RAY: Okay. Those are questions Said was asking.

MS. McKENNA: Yes, yes. And then questions about like the first of a kind -- the first of -- first plant test or the first three tests versus the ones that are more the ITAAC kind of test where, you know, on a plant-specific basis you are looking at, say, the flow resistance in a particular line or something like that.

And there was some degree of perhaps suggestion that some in situ, if you will, testing on non-condensables be done, and I don't think that it was -- the staff or Westinghouse was in a position to agree that that was an appropriate thing to do. So I think that's where there was some degree of confusion about the different kinds of testing that are done and what's their purposes.

CHAIRMAN RAY: Well, and so what's the fate of that issue? That's part of what is going to be discussed --

MEMBER BLEY: Item 2?

CHAIRMAN RAY: Yes.

MS. McKENNA: Well, I think the specific information on the non-condensables will be in item 2 where, as was indicated, they -- Westinghouse does plan to discuss --

CHAIRMAN RAY: Right.

MS. McKENNA: -- what testing, what analysis --

CHAIRMAN RAY: Okay.

MS. McKENNA: -- what other information they have. You know, in a more general context, if there is still interest in going through testing, then that would have to be some issue we would have to perhaps discuss at a future time.

CHAIRMAN RAY: Well, I know that Said is very -- remains concerned about that, and we've got to make sure that he is lined up with that discussion.

MS. McKENNA: Right.

CHAIRMAN RAY: And we will assume that 17 pertains to that as well.

PARTICIPANT: 19.

CHAIRMAN RAY: Yes, 19 we'll come to in a minute, because we are going to turn the floor over to Dr. Ryan here in a second.

Information on digital I&C failure rates. It says we've got to view the transcript to better

understand the item. Member Brown is in the Far East today and not with us. I think we will just have to carry that, because I'm not sure there is anything -- Dennis, do you have any --

MEMBER BLEY: On which ones?

CHAIRMAN RAY: 20.

MEMBER BLEY: We're -- I think all of us are a little skeptical about however that might have been done, but if there is information on where the failure rates came from --

MS. McKENNA: Yes. I think this was in the context of what was considered in the PRA and what -- you know, how common cause and those kinds of things were considered.

CHAIRMAN RAY: Well, what's the action that we should take here? There was a lot of feeling that we didn't have a complete and adequate discussion on PRA. Are we going to come back to that?

MS. McKENNA: Certainly, if there's areas that -- you know, there were some open items, obviously, in PRA, so we were planning to come back on that.

CHAIRMAN RAY: Well, are we going to need to identify anything to you as an issue or --

MS. McKENNA: I think this one

specifically, if you want further on this after you hear Chapter 7, I think we might need to kind of identify a little more clearly what is the specific tasking or request that is being sought.

CHAIRMAN RAY: Will that be an adequate time to answer that question when we hear Chapter 7?

MS. McKENNA: Well, we are hoping to do Chapter 7 in November, so I think there should be time.

CHAIRMAN RAY: November will be a busy time, won't it?

MS. McKENNA: Yes, it will. Enjoy this meeting.

MEMBER BLEY: That wouldn't come up -- this topic wouldn't come up naturally in Chapter 7.

MS. McKENNA: No, it wouldn't, because, as we said, it is really more of an outcome of that and how it affects PRA. What it might help understand is to what degree those failure rates -- the concern about the failure rate, given what the configuration of the I&C might be.

MEMBER BLEY: I guess I have a question. We are bringing -- at least this morning we went through the human factors engineering side and saw that we were bringing a great deal of essentially all

of that out of the DAC area and up into the current --

MS. McKENNA: Yes.

MEMBER BLEY: -- design cert. Given we have more information now on training and procedures that we expect, there could certainly -- and some of the other things that are being done, the PRA could certainly be updated to get much closer to what you would expect at a COLA time. Is the PRA being updated? Has it been updated at all? I wasn't here at that last meeting, I apologize. I had a previous commitment.

MR. SISK: Where we are with the PRA right now?

MEMBER BLEY: Yes.

MR. SISK: We are evaluating the changes to the PRA. We have not done a full update to the PRA at this point in time.

MEMBER BLEY: Will it be updated as part of the DCD 17 design review that is going on? Part of 18, or 19, excuse me, but I don't believe that -

MR. CUMMINS: This is Ed Cummins. Basically, there are some RAIs that demand some specific little things in the PRA. And I think that the answer to your question is no. There is -- part of 10 CFR 52, the latest revision, requires a -- we'll

call it a site-specific PRA a year before core load, meeting the requirements of everything a year before core load.

MEMBER BLEY: So that will be the next major change.

MR. CUMMINS: Yes. We are talking about how we try to do some standardization among the various customers, so that it works out reasonably. But that will be the next major thing. There will be some RAI response kind of tweaks to it.

MS. McKENNA: Yes, I think they --

MEMBER BLEY: So you could just probably consider this item 20 as a heads-up that there will be some real questions about how the digital I&C was incorporated in the PRA at that point in time for sure.

MS. McKENNA: Right. Because I think as we said, I think the specific open items we had were more in -- there was some requantification of some, you know, effects of some of the other changes, and things like that that needed to be done, but not what I think is in the terminology of an update, which is different from --

CHAIRMAN RAY: From what I understood from Ed, though, there is no review that takes place then

that would involve us, for example.

MR. CUMMINS: Ed Cummins again. I think the question, to answer that question is, to what extent did we change the PRA from Rev 15 to Rev 17? And I'm not sure I'm the expert. But we did change the PRA from Rev 15 to Rev 17, and one of the aspects of it is we put in correctly just I&C information now. So we did model the I&C that we are actually using in the design, in the PRA specifically.

And I think there is a lot of questions that I'm not competent to talk about about whether you even can model I&C and PRA, but -- so we thought we did anyway.

MEMBER BLEY: Well, Eileen, I think on this item 2, in follow-up we would love to see some real detail on that addition of the I&C to the PRA and the basis for what was done.

CHAIRMAN RAY: At least in the Chapter 7 meeting tell us when we will be able to pursue that.

MEMBER BLEY: We have that full analysis in addition to just Chapter 19, do you not? I haven't seen it.

MS. McKENNA: I'm sorry. Which analysis?

MEMBER BLEY: The PRA itself. They must have done a requote on the PRA.

MS. McKENNA: There was -- I will call it a Rev 15 PRA that was submitted. And since then, we have seen some of the changes and results, and we are working on getting that information into the DCD. I know the staff has done some audits, and they have one coming up next week I think it is, as a matter of fact.

So I may put a little encouragement in them to, you know, make sure they are prepared on this point for, you know, some --

CHAIRMAN RAY: All right. But listen --

MS. McKENNA: -- action.

CHAIRMAN RAY: -- here is what I think we should do is, as a result of this meeting, we will make a new action item, based on what Eileen has just said, to revisit the status of the PRA at a future meeting, and let -- between the ACRS staff and NRO staff -- this issue be made when and how that will happen.

We've had enough discussion here it seems. Is that satisfactory, Dennis?

MEMBER BLEY: Yes. Perfect.

CHAIRMAN RAY: All right. But we need to keep an open item list as a result of what we are doing.

Anything else in this list here before I move on to the next subject? We've got one item, item 19, that we are going to come back and talk about in just a second.

MS. McKENNA: No, I don't have anything else. Anything else over here? No? Okay.

MR. SISK: No, I think we're covered.

MS. McKENNA: Yes.

CHAIRMAN RAY: Okay. We are going to at least begin a discussion now which, unfortunately, we were not able to align our Committee expert on the areas in Chapters 11 and 12, which were reviewed in July with his availability then. And, at this point in time, what I would wish to do is give him an opportunity to indicate things that we would like to have addressed in the future, probably, maybe they can be addressed now, but I leave that up to him.

But, in any event, based on what he has been able to do subsequent to the July meeting, I would like him to have a chance to identify things that need some further attention. One of them we will wrap in as -- however he sees fit, this item 19 on what I'll call the July punch list. We'll make a new punch list out of this meeting. Okay?

So with that, let me invite Dr. Ryan to go

ahead and pursue his areas of inquiry.

MEMBER RYAN: Thanks, Mr. Chairman. Again, by --

MR. SISK: Mr. Chairman, if I may, one --

CHAIRMAN RAY: Sure.

MR. SISK: Our subject matter expert for Chapters 11 and 12 is not here today.

CHAIRMAN RAY: I understand.

MR. SISK: I was going to say, your choice, if you give me a few minutes we could certainly patch him in by phone to listen, or if you would like to go through the questions --

CHAIRMAN RAY: I am happy to have you do that, or --

MR. SISK: Your call.

CHAIRMAN RAY: -- if you want to just take them as actions for down the line, that's fine.

MS. McKENNA: Yes, I don't think we have the staff members here either, so the --

CHAIRMAN RAY: Yes. I'm sure he's not prepared to --

MS. McKENNA: Right, right.

CHAIRMAN RAY: -- you know, jump up and be on a phone call, so that's --

(Laughter.)

MR. SISK: If there is something you desperately want to address after you've heard what Mike has to say, then we can certainly arrange today or tomorrow still to get him on the phone.

MS. McKENNA: Exactly. And, if not, then it will be on the transcript and we will have it available for future --

CHAIRMAN RAY: But for now, anyway, I have asked Mike to take this time to tell you the things that he would like to hear more about that were part of the July meeting but not adequately addressed by us at that time.

MEMBER RYAN: Thank you. Again, by way of introduction, I joined the Subcommittee shortly before I was unable to attend the first meeting in July, after I joined. I had a previous commitment that just wasn't changeable, so I appreciate your patience with me today.

I guess let's start with this one on the action item list. What is meant by "rad significant"? Boy, I guess I'd like to know that, too.

(Laughter.)

I mean, I don't really understand the question I guess.

MS. McKENNA: Well, my recollection of

this was there had been a recent letter from the Committee on some guidance that had been prepared, and the recommendation was that the guidance not be issued until that term had been better characterized.

My recollection from the meeting was that we were kind of informed of that recent letter from the Committee. I'm going back to my notes.

MEMBER RYAN: No, that doesn't ring a bell.

MS. McKENNA: Doesn't ring a bell? Hmm, I'm going back to my notes here.

MS. MONROE: Eileen?

MS. McKENNA: Yes.

MS. MONROE: This is Amy Monroe from Southern Nuclear Operating Company. That question did have to do with NEI template 08-08. That's where the definition of --

MS. McKENNA: Oh, is that where it was?

MS. MONROE: -- and that's the one in question.

MEMBER RYAN: Oh, the NEI 08-08. Okay. And what was the question about the definition? I'm not sure of the context. And, again, forgive me for not --

MS. MONROE: I don't recall the exact

question.

MEMBER RYAN: Okay.

MS. MONROE: It is reflected in the letter.

MEMBER RYAN: I'll tell you what, I'll look at the letter and then maybe --

MS. McKENNA: Yes. My notes said that this came from a July 22nd letter that the Committee had issued. Yes, and as Amy said, it was on NEI template 08-08, and the concern had to do with this term. And what was said at the meeting was that the ISG should not be issued until -- and the NEI document should not be endorsed I guess until there was some understanding of what that term meant.

CHAIRMAN RAY: Does it pertain to the DCD or to the R-COLA?

MS. McKENNA: Not -- more to the COLA, because this is the template that they would use to assist. That's why Amy was the one who was speaking, because she is with Southern.

MEMBER RYAN: Maybe we can both do a little homework, and I will certainly --

MEMBER SHACK: Well, I have the letter, if you want to know what the recommendation was.

MS. McKENNA: Okay, great.

MEMBER RYAN: Okay. Thank you.

MEMBER SHACK: The definition of the term "radiologically significant" in NEI 08-08 should be changed by revising the significance threshold to address unexpected radiological condition resulting from spills, leaks, unplanned releases, or the identification of radioactive materials in unexpected locations that could have an adverse impact on license termination under Subpart E of 10 CFR Part 20.

MEMBER RYAN: Now I know exactly what it means.

PARTICIPANT: Is this ALARA?

MEMBER RYAN: No, it is not. What it tries to address, as I understand, if we want to go there, the tritium task force kind of --

MEMBER SHACK: Yes.

MEMBER RYAN: You know, having a leak that is compliant --

MEMBER SHACK: It's your letter, Mike.

(Laughter.)

MEMBER RYAN: So it really is more, instead of just an ALARA issue, operating -- it tries to get into the NEI 08-08 treatment of the tritium task force results, and how you are going to prevent a little bit of tritium from turning into a great big

problem, or anything else for that matter.

So I think there's two elements to that, from my point of view. And, again, I would be happy to have your insights to have me adjust my thinking.

One is, how have you dealt with it in design space for things like the rad waste system and other places where these things tend to pop up, blowdown systems, and others? And then, how have you increased your programmatic efforts for identification and remediation, if you do find them?

So that's -- so I know those are very broad questions, and I would be happy to have you refine them for us as you come back with an answer. But I think that's really the key. So I know that's a relatively new thing from NEI, but you've been at this a lot longer than, you know, NEI has been out on the street with that, so I'd appreciate any insights you could share.

MS. McKENNA: Yes. As I said, I don't think we have the right people here. I do know, for example, you mentioned design. We did have -- in fact, I think it still -- it was an open item in our Chapter 12 SER to look at some specific aspects, which were based on some of this operating experience.

And I think the question had to do with

our ventilation systems, whether there were places where you could get condensation that might be trapped, and that kind of thing. And we did have a question to Westinghouse on that point.

You know, more generally I think on the whole subject of minimization and contamination, you know, in the Chapter 12 discussion there had been some effort by Westinghouse to go through the various features and techniques they have gone through to try to minimize possible contamination through how you encapsulate things or materials you use or how you route things, that type of thing.

And the staff had reviewed that, and then there was the specific item that I think, you know, as the task force things were going on kind of in parallel, there was this concern that maybe a couple of specific items like the ventilation thing had been missed, so there was a -- kind of a -- it was kind of an open item before we had the RAI, one of those kind of last-minute items to make sure that this particular aspect had been caught. But that's probably as far as I should go without having the staff members here in the room.

MEMBER RYAN: That's what I was thinking. If we can revisit that, that would be very helpful.

I also appreciate the fact that, you know, a facility-specific R-COLA is really where you marry the facility to the property, so -- and a lot of the issues of 08-08 are relative to environmental monitoring.

MS. McKENNA: Yes.

MEMBER RYAN: And that, of course, is environment-specific, so I appreciate the fact there is going to be some separation where you can't address what is -- you know, what are the environmental aspects.

MS. McKENNA: Correct.

MEMBER RYAN: You can look at the leak aspects, but where it goes from there and how it's addressed, and how you monitor and how you do early detects, and all of that, there has got to be some obvious breakpoint there.

MS. McKENNA: Yes.

MEMBER RYAN: So we appreciate that aspect of it.

MS. McKENNA: And while this today is not a COL meeting, at our July meeting we did discuss Chapter 12 on the COL side. I would certainly encourage you to look at the information that was presented in that SER --

MEMBER RYAN: Yes. If you can provide

some of the writeups --

MS. McKENNA: Yes.

MEMBER RYAN: -- it's not as rich as hearing the whole discussion.

MS. McKENNA: Correct.

MEMBER RYAN: I appreciate that very much.

MS. McKENNA: Understand. Okay.

MEMBER RYAN: I will go back and mine the transcript a little bit on it.

MS. McKENNA: Okay. Great.

MEMBER RYAN: A couple of things. Let's see, let me -- hang on a second. Here they are. Adding three rad waste techs seems like a fairly substantial change to me.

MR. SISK: We will -- I believe we are talking about that -- we talked about that on Chapter 11.

MS. McKENNA: Yes.

MR. SISK: 11 and 12.

MR. LINDGREN: They are monitor tanks.

MS. McKENNA: Yes.

MEMBER RYAN: Okay.

MS. McKENNA: Monitor tanks, yes.

MR. CUMMINS: This is Ed Cummins. This is when the customers requests, and I believe it was

driven by a particular customer. We respond to customer requests only when all of the customers agree. So they all did agree on this. But I think it was driven by a particular customer who wanted to be able to discharge tritium when the lake conditions were right and not when the lake conditions were wrong.

And so these are -- they are clean. They have been processed through the minimizers, and they are clean except for basically tritium. So --

MEMBER RYAN: Almost all.

MR. CUMMINS: Almost all. Almost all.

MEMBER RYAN: Almost all, except tritium.

MR. CUMMINS: Yes. I'll let you be the expert there.

MR. SISK: Was there a specific concern, or is that just an observation?

MEMBER RYAN: I was just curious why -- and that explains it, the hold-up tanks are discharge, which I appreciate. But it seems like everybody has incorporated that as a customer group, so --

MR. CUMMINS: Yes. Someone said that it remains where the water is stored, and so they all kind of agreed.

MS. McKENNA: Kind of as a general matter,

if it's going to be done for all COLs, it's part of the amendment. If there was, for example, one particular customer who for whatever reason wanted to do something on their own, that would be done on a plant-specific basis as part of the COL.

MEMBER RYAN: Right.

MS. McKENNA: So --

MEMBER RYAN: I'm with you. Okay. And that, again, seemed like a bigger change at this stage of the game, and I was just curious why. That helps explain it.

MS. McKENNA: Right.

CHAIRMAN RAY: Nothing further on that.

MEMBER RYAN: Nothing further on that, no, that's fine.

MS. McKENNA: Okay.

MEMBER RYAN: One thing I was going to offer to you as a bit of information, there are two projects underway regarding the GALE code. The staff is updating it with regard to the basic software or framed software approach, and they have a development and support project out on that. And also, an effluent monitoring for new reactors effort.

So I noticed in -- I forget whether it was 11 or 12 -- somebody had used the GALE code, had done

some GALE code work. And I just want to give you a heads-up that's under revision. Now, the old GALE code, which the ACNW wrote a letter on, is written in FORTRAN, and it's not well documented. Anybody that remembers FORTRAN knows if you don't have a lot of comment lines in there, you are not going to really be able to figure it out very easily.

So that's why these two projects I think got started was they knew that had to be updated. And, again, I just offer you that as an insight from a past life on the ACNW, that that might be something you want to poke around in and just make sure you understand where that is going and if that has an impact on anything you are interested in doing.

MR. SISK: Excuse me. Just for clarification, you said there are two items. I picked up the effluent monitoring for new reactors. What was the first item?

MEMBER RYAN: Oh, I'm sorry. It was two projects. One is kind of -- let me just read the words here. It's developing what's called a framed software system, and it's a development and support effort to redevelop the code in that -- on that platform I guess. And the second one is effluent monitoring of new reactors.

And I can give you the project numbers, if that's helpful for you. The first one on frames is N6573, and the next one is N6644.

MR. SISK: Thank you.

MEMBER RYAN: So that's just an information item for you on that one. Let me see. Let me get back to radiation monitoring.

I guess I always keep in my head that NEI's number that the average worker exposure in a plant these days is two rem. How does your projection for worker exposure line up with current projections?

MR. SISK: I don't have that number off the top of my head. I'll look around the room. We can get you an answer.

MS. McKENNA: We discussed this in some of the slides at the last meeting. I'm looking at Amy, because I know you talked about this, you know, the worker exposure. Didn't we have a slide on that?

MEMBER RYAN: It didn't really say anything real specific.

MS. McKENNA: Maybe I'm thinking of something different.

MEMBER RYAN: They were looking at gaseous effluent.

MS. McKENNA: Maybe that's what I was

thinking of.

MEMBER RYAN: But not so much our workers. That's kind of why I asked the question.

MR. SISK: If you can just get back to us.

MS. McKENNA: Yes.

MEMBER RYAN: So if you just get back -- and I would be curious, if you have a report, for example, that kind of gives the buildup of, you know, how you did your worker-dose assessments, time and motion studies, and other things that you might have done, that would be helpful.

MS. McKENNA: Yes, I mean, I know there were in some specific areas like we have questions on DCD on, you know, like in the fuel handling and, you know, because -- the effects of the head package, that kind of thing, but that's kind of very specific as opposed to an average value or maximum value you might expect on a worker basis.

MEMBER RYAN: Yes, you did those specific things. We had changed the height of the --

MS. McKENNA: Yes, exactly.

MEMBER RYAN: You know, there were a number of questions that came up already. But if you just have some general information on how you built that up, that would be helpful to me.

MS. McKENNA: Okay. As I said, you know --

MR. SISK: I'm sure --

MS. McKENNA: Yes.

MR. SISK: -- has that. We could probably get --

MS. McKENNA: And the same thing with -- with the right staff I'm sure we could answer those questions fairly expeditiously.

MEMBER RYAN: That would be terrific. Let's see. I think that was it on the waste management side.

One other question on waste management is, again, do you have any kind of forecast for waste generation?

MR. SISK: Again, we do. I don't have the number. That has actually been a discussion question that we have. I'm kind of looking around to the floor here again to see if anybody has the number handy.

MEMBER RYAN: I'm happy to get it later. That's fine. Just --

MR. SISK: We would be happy to.

MEMBER RYAN: -- put that on the list. That would be --

MR. SISK: Okay.

MEMBER RYAN: That would be real helpful.

Going, again, a little bit by category and type and, you know -- and spent fuel don't worry about. That's off the table. I'm thinking of operating --

MR. SISK: A, B, and --

MEMBER RYAN: Yes, operating list. Yes. I think I understand the reduction of the capacity of the charcoal delay beds by 50 percent. But could you tell me why you ended up with that? Is that a reduction in waste generated? I mean, you're getting the same performance for delay with a smaller bed.

MR. LINDGREN: This is Don Lindgren. I will attempt to answer this. We have two that we -- initially, we thought that one would be sufficient to handle the load. Based upon some new information that I think related to the effective humidity, we had to de-rate the capability.

One was no longer available -- sufficient, so we needed to put the two of them into series. So now we only have one -- effectively one delay bed, instead of two. That is really my understanding, I mean, because we had --

MEMBER RYAN: So reduce the capacity of the charcoal delay beds by 50 percent. So that means

you reduce the capacity by calculating that with humidity that 50 percent effective --

MR. LINDGREN: Well, we had to put two in series, instead of --

MS. McKENNA: Well, I think what you are maybe saying is that you -- the capacity perhaps was changed based on the moisture, is that --

MR. LINDGREN: Yes. Well --

MR. CUMMINS: This is Ed Cummins. The physical design was not changed at all. But the ability of the existing design, the capacity of the existing design was changed by a factor of two, because of this humidity or temperature, some combination of humidity and temperature.

MEMBER RYAN: Relative humidity issue. Okay.

MR. CUMMINS: Yes.

MEMBER RYAN: I understand that. That's fine.

MR. CUMMINS: And that's it.

MEMBER RYAN: I was going to say, if you've got really snazzy charcoal that you can only use half of it, let us all --

(Laughter.)

That would be a neat thing to have.

Let's see.

MR. CUMMINS: This is Ed Cummins again. I got some help from our customers who remember that it was absorption coefficient for xenon and krypton that particularly was of interest.

MEMBER RYAN: Gotcha. Thank you very much. I appreciate it.

I think that's it, Mr. Chairman. Thank you.

CHAIRMAN RAY: All right.

MEMBER RYAN: That's kind of the questions that struck me from taking a look at the slides and the writeups that went with it. But, again, I have not yet had a chance to mine the transcripts, but I appreciate the help.

CHAIRMAN RAY: So there's two or three items there that we will hear more about when it's appropriate.

Okay. We have one more item today, but first we will take a break. We are just five minutes behind the scheduled time. So we will resume at 2:50, please.

(Whereupon, the proceedings in the foregoing matter went off the record at 2:33 p.m. and went back on the record at 2:49 p.m.)

CHAIRMAN RAY: All right. The hour now having arrived and passed, we will take up Section 3.4 and finish the day with a discussion of flooding protection.

MR. SISK: Mr. Chairman, if I may, just to respond back to a question from the --

CHAIRMAN RAY: All right.

MR. SISK: -- Committee, Dr. Ryan was asking a question about the dose for the plant. I just wanted to comment that the overall plant doses are in the DCD Section 12.4.1.7.

And just to put the number on the record here, the estimated annual man-rem for AP1000 in the DCD at this time is 67.1. Also, with regard to the waste generation --

MS. McKENNA: The units?

MR. SISK: That's man-rem.

MS. McKENNA: That's the cumulative.

MR. SISK: That's cumulative, total man-rem. I'm sorry.

(Laughter.)

Also, the question was regarding the waste generation and the various categories. That can be found in Table 11.4-1. I won't read through the table. There is a breakdown, but I wanted to at least

point the Committee to the appropriate location.

MEMBER RYAN: Thank you, Rob. That's very helpful. I appreciate it.

MR. SISK: Not at all.

With that, then, I will -- I think the next thing on the agenda, as indicated, Mr. Chairman, was Section 3.4. And with that as -- where we are at this point, I think we're going to follow through Chapter 3. Everybody got a copy of Chapter 3 slides?

CHAIRMAN RAY: We do.

MR. SISK: Because they are in the order of the agenda, so we will start with 3.4. And, once again, I will turn it over to Mr. Don Lindgren.

MR. LINDGREN: Okay. Once again, I am Don Lindgren, AP1000 licensing. Just one or two -- this is the first of the sessions on Chapter 3. We've got -- they're broken down by NRC review branch. That explains the order.

I wanted to go over what we have in Chapter 3, because it is a fairly diverse chapter. 3.1 is the general design criteria. 3.2 is the classifications -- 3.2 is the classifications of structures, components, and systems. That is the order in -- of the title in the DCD.

3.3 is wind and tornado loadings. Water

level or flood design, which is what we are going to be talking about this afternoon, is 3.4. 3.5 is missile protection.

3.6 deals with the postulated effects of -- dynamic effects of pipe rupture. That's 3.6. 3.7, which we are not doing this session, is seismic design. That would be done at a later session. 3.8, which is design of Category 1 systems, also will be done at a later session.

3.9 is titled "Mechanical Systems and Components." It's also a fairly diverse section, so we will be spending considerable time on that. 3.10 is seismic and dynamic qualification. And then, 3.11 is dynamic environmental qualification.

The slides cover all of those, so don't throw them away when you leave today.

CHAIRMAN RAY: Okay. Very well.

MR. LINDGREN: Okay. Just to -- for completeness, I wanted to -- we've got one slide on 3.1. There was not even a section in the SER on 3.1, which is general design criteria. These were some changes that were mostly due to conforming changes in other sections.

We changed the name of the control support area to technical support center. We changed -- the

way we do main control room isolation changed, and that showed up in the discussion of general design criteria. And then, some of the sources of makeup water for the spent fuel pool also showed up in 3.1.

There are no open items. In fact, there isn't even a writeup in the SER on these, because these changes are really discussed in other sections. But just for completeness, we wanted to include that.

Okay. So we are talking about water level or flooding, which is 3.4. And I am going to try this. The first thing we have is a site plan. You will find this table labeled in the DCD as security-related. It is not. That's a mistake.

The rules are, if you can drive by it and look at it, or in real terms bring it up in Google Earth after it is built, then it is not security-related. So this is not a sensitive picture.

Just for orientation, the building labeled as Number 1 is the shield building and the containment. The building labeled Number 4 is the auxiliary building. Those two buildings together comprise the nuclear island. They are on a common basemat.

CHAIRMAN RAY: Is the containment really oval like that?

MR. LINDGREN: No, this is in effect the fact that we've got a different screen orientation here. And it stretches that picture.

CHAIRMAN RAY: Well, it also does the same here.

MR. LINDGREN: Oh, it did it on this, too?

CHAIRMAN RAY: Yes. That's not quite as bad.

MR. LINDGREN: This is my poor PowerPoint skills. This is my poor PowerPoint skills, so all -- the ovals are all supposed to be circles.

CHAIRMAN RAY: All right.

MR. LINDGREN: But it's particularly worse on --

CHAIRMAN RAY: So noted.

MR. LINDGREN: -- on the screen.

Okay. Seven is the rad waste building. Three is the annex building. Two is the turbine building.

A couple of things that are changed from the certified design was the rad waste building was made slightly longer in this direction. We call plant north up here on the end -- the turbine end of the building. So on what would be the west end of the aux building, that grew some to put in the three monitor

tanks.

We also extended the front of the rad waste building over to connect to the annex building, so that people don't have to go outside to get from one place to the other. And then, from about the end of the north end of the aux building, we added this part of the annex building, which is basically office space. And then, the turbine building grew a little bit longer, not as long as this picture would indicate.

Anyway, the purpose for this -- the real purpose for putting this here is to address some of the tanks we have. 13 and 14, which are up here by the north end of the turbine building, those are fire water tanks, and we do have a question about those.

17, which is next to the turbine here, is the condensate storage tank. 25 is the passive containment cooling ancillary water storage tank. It supplies the water so that we have seven days' worth of water onsite to address containment cooling. The first three days are sitting in the tank on top of the cooling chill building.

20 is a boric acid storage tank. 19 is the demin water storage tank. The diesel oil tanks are up here at level 18. This square -- rectangular

building is the diesel buildings. And then, these shapes labeled 15 are the transformers. We were talking about unit auxiliary transformers and reserve transformers. They are in this row here. And then, five here, those are the service water cooling towers.

A couple of points to remember is this is the -- I will be talking about the rail bay. It goes here. It is actually in the aux building in line with the railroad tracks here. In this area, just north of the condensate storage building, there is an annex -- there is an access through the annex building and the aux building to an equipment hatch.

And then, the actual access -- the personnel access for most of the people to the aux building is through the annex building, and that doorway is up here. So the security is actually inside the annex building.

MEMBER BONACA: I imagine building 4 has further separation internally.

MR. LINDGREN: What's that?

MEMBER BONACA: Building 4 you must have additional separation internally. Walls?

MR. LINDGREN: Building 4 is the auxiliary building, and that has the reinforced concrete building, reinforced concrete walls and ceilings.

MEMBER BONACA: And roof.

MR. LINDGREN: And, yes, there is a -- about here there is a dividing wall between the north side and the south side. The south side is the radiologically contaminated part of the building. The north side is the clean -- is the clean part of the building. It's not -- it contains the batteries, etcetera. And they are separated. There is no way to get from one to the other without going through the annex building.

MEMBER BONACA: Okay.

MR. LINDGREN: Okay? So some of those points come up during the flooding story, so I wanted to orient everyone there.

Okay. Go to the next one.

The changes we made that show up in 3.4, the water level, we added parapets to the roof. This is a plant protection issue, so previously we had a flat roof with no parapets and the water just rolled over the side, so we had to review our roof capability of getting the water off the roof and the water -- the rain load on the roof or the probable maximum precipitation for that change.

We added some waterproofing options. Waterproofing itself is not a safety-related

consideration. But the friction between whatever you are using for waterproofing, and the building, and the soil is a safety-related consideration. And the waterproofing choice is really a choice of the COL applicant and their constructors and site conditions and how -- also, it depends on how you are doing the excavation.

So we added some choices, and we will end up removing the one choice that we did have in there, which was a cementitious choice that it turns out no one is using. So the COL applicant has to define in their application exactly what waterproofing they are using.

MEMBER BLEY: When you worry about water loading, which I think is the weight --

MR. LINDGREN: On the roof.

MEMBER BLEY: Yes. How do you look at, you know, the spring when you might get a big load of snow and then rain on top of the snow?

MR. LINDGREN: That is really a structural question, and we can deal with that. That is a consideration. It is -- actually, you have a snow load, and then you rain on top of it, is the --

MEMBER BLEY: And that may plug all -- whatever drains you had.

MR. LINDGREN: We have addressed that. I don't have the answer here, but --

MEMBER BLEY: Okay.

MR. LINDGREN: -- we'll make sure that when we do get to 3.8 we talk about that one.

MEMBER BLEY: Okay.

MR. LINDGREN: We added some watertight doors down in the bowels of the auxiliary building. That was for plant protection, strangely enough. It wasn't for any kind of flooding story.

And then, we added three waste monitor tanks to the rad waste building. The waste monitor tanks are -- they are 15,000 gallons apiece.

We changed the volume of the fire water tanks that I showed you on the north end of the turbine building from 400,000 gallons to 490,000 gallons. This was based on some design finalization of how much we need for fire, and I believe we also have some contingency uses for that for things like the tank on the roof and spent fuel pool cooling.

Okay. We changed the probable maximum precipitation from 19.4 inches per hour to 20.7 inches per hour. Wherever you are, if you are having this much rain, you are getting a lot of rain. It is really a 15-minute rate. I mean, you can -- at this

rate, you have to deal with the load on the roof, that you get this -- if you get it at this rate in 15 minutes.

So this was to bound a couple of additional sites. It is not clear exactly how it happened, but somehow people didn't look at Florida when we -- they may have looked at Florida. It was very confusing. We now include both Florida sites for our maximum precipitation.

And the impact this has is the structural loading on the roof for the AP1000 design.

The nominal grade elevation is what we call "plant elevation 100." That's nominally the front door and the like. We expect the actual grade will be a couple of inches lower, a few inches lower than that and slope away to direct surface water away.

The maximum water table elevation is 98 feet. That is the number that you come up with based on historic groundwater testing and historic values. There is no practical operational limit regarding -- related to that, because our seismic evaluation, and the next one -- well, the maximum predicted flood level is 100 feet.

You can't operate this plant with the water lapping at the doors. There are no penetrations

below that elevation that would let water in, and so it can work at that level. Practically, people probably wouldn't do that, but -- and we have also analyzed -- the seismic analysis assumes water at that level.

MEMBER BLEY: It's 100 feet from where?

MR. LINDGREN: No, plant elevation 100.

MEMBER BLEY: Okay.

MR. LINDGREN: Okay. So that's the nominal elevation of the -- of most of the doors.

And there is no plus tolerance on this. There is a -- there is a table in Tier 1 that has a plus or minus three and a half feet on the grade elevation. It turns out that that's related to the seismic analysis and not to the flooding. Your maximum flood level is 100 feet, is the plant elevation 100 feet.

So a couple of things to note is that it is -- the plant -- the elevation is plant elevation 100 at the rail -- the truck bay. It is 100 at the entrance that gets you into the annex building, and then to security on the north side of the annex building.

But where you have access to the annex building and aux building to the equipment hatch at

containment, that is at the 107-foot level. So there will most likely be a ramp or something there.

Okay. Open items.

MR. SISK: Any questions?

(No response.)

MR. LINDGREN: We have got -- we do have an open item on the analysis of the use of the parapets, considering the design for the probable maximum precipitation. That analysis is complete. That analysis had to be done to support the design change in the first place, and we have a response in preparation.

The next one is an analysis of an increase in the fire tank volumes. Once again, that analysis isn't complete, and the response is in preparation.

And then, the hydrodynamic loads of the rad waste building, a response is in preparation. This is actually a -- we have do a revision of an RAI response. We apparently were not completely clear on that. And "response in preparation" means that we will probably be getting it to the staff in the next two to three weeks. None of these are particularly challenging.

That's what I have prepared on flood.

MR. SISK: Questions?

CHAIRMAN RAY: I don't believe so. Is that it, Rob?

MR. SISK: Yes, sir. That would be it for the 3.4 today. We have got the other portions in your handout we'll cover tomorrow.

MEMBER BONACA: One question I have is: did the DCD have a water level flooding at outages before? Or is it completely new?

MR. SISK: I'm sorry. I didn't hear.

MEMBER BONACA: I'm saying, did the original design document contain also water level or flooding analysis? Is this an improvement to it, or was it missing completely from --

MR. LINDGREN: It was there. I just was focused on the changes here, and giving you a little background --

MEMBER BONACA: Okay. I'm not --

MR. LINDGREN: -- on the -- well, our containment is designed to flood. That's the whole passive safety story on that. And then, the -- in the aux building, most everything drains to the first floor. There are sump pumps there.

And in some cases it drains out to adjacent buildings next to it. The adjacent buildings never drain into the aux building.

MR. SISK: In answer to your question, the flood level was not a change. It's the other changes that we were really focused on.

CHAIRMAN RAY: All right. Anything else for the applicant?

(No response.)

If not, then we're ready for the staff's comments on 3.4.

MS. CLARK: Okay. I'm Phyllis Clark, Project Manager for Section 3.4, flood protection. I work for Eileen McKenna, and today we are going to review some of the changes for 3.4, flood protection.

The technical staff that will be discussing the changes -- Kenneth See, Chang Li, and Jerry Chuang.

Okay. The number of open items we have for each section, specifically for 3.4.1.1, we have two open items. That's in the protection from external flooding. 3.4.1.2, protection for internal flooding, zero open items. And 3.4.2, analysis procedures, has one open item.

A brief summary for these particular changes, under 3.4.1, we have the design parameters change in Section 2.4 that is potentially affecting the roof design. For 3.4.1.2, protection from

internal flooding, we have the addition of three wastes --

CHAIRMAN RAY: Oh, wait. Before you go on --

MS. CLARK: Okay.

CHAIRMAN RAY: -- let's back up to the first one you said.

MS. CLARK: Okay.

CHAIRMAN RAY: Design parameter change in Section 2.4 potentially affecting the roof design. That leads to an open item.

MS. CLARK: Right.

CHAIRMAN RAY: Okay. Can you share with us anything about this design parameter change? I realize we are not reviewing 2.4. We are going to get to it. I see. You are only giving us a preview. Excuse me.

MR. SEE: We are building the excitement level.

MS. CLARK: Yes.

(Laughter.)

CHAIRMAN RAY: Okay. Well, we need that at this time of day.

(Laughter.)

So forgive me.

MS. CLARK: Okay. That's okay.

Okay. 3.4.1.2, discussion of internal flooding. The addition of three waste monitor tanks to the flooding analysis, and also we are discussing the other flow structure changes.

And for 3.4.2, which Jerry will cover, is an analysis of procedures. And those are changes related to the external flooding events and their impact on the structural integrity of the safety-related building.

Now I'll turn it over to Kenneth See.

MR. SEE: Good afternoon. My name is Kenneth See. I'm a Hydrologist in the Hydrologic Engineering Branch in the Office of New Reactors.

I think Phyllis did a good job of summarizing the open items. The first thing here has to do with the change in their probable maximum precipitation parameter from 19.4 to 20.7 inches per hour. The staff is not questioning that value, but given the design changes, the addition of the parapets, we wanted to know the effect, you know, the combination.

It wasn't clear to us at the time we wrote this open item if there was actually a design change to the roof, or there was just some insertion of

additional text in the document. So given what I have heard today, in the follow-on they have actually made some changes. So that is -- that deals with the first bullet.

And the second bullet deals with the potential --

CHAIRMAN RAY: We have some of the same problems, you know it? We see changes in the text, and we don't know what to make of it. But I guess that was the reaction you had, huh?

MR. SEE: Correct.

And the second one has to do with the increase of the tank and the potential impact on any safety-related or RTNSS-related structures. These remain open. We haven't had any interactions with them yet. Sounds like we've got a response coming, and we'll get them on the phone when we get it in.

So short and sweet.

MEMBER BANERJEE: I guess I'm sort of having the problem, why are these changes being made? They seem very minor. What is the reason for them? I mean, unless there is a rationale, it is hard for us to get --

CHAIRMAN RAY: On rainfall, Sanjoy, he said it was to accommodate --

MR. SEE: There is an EPRI document, utility requirements document, and I believe there is a NUREG -- I think it's 1242, don't quote me on that, even though the transcripts will -- where the staff evaluated these parameters for reasonableness. And the increase from 19.4 to 20.7 isn't a big enough change really to, you know, cause us concern. If they change it to 50 inches per hour, then that would certainly raise red flags.

But, you know, buy into their argument for bounding additional sites, we saw no reasonable --

MEMBER BANERJEE: Going from 400 to 490, is that a big change? Gallons, tank --

PARTICIPANT: Twenty percent.

MR. SEE: Yes.

MEMBER BANERJEE: I mean, is it significant? I mean, in some way, what we -- what I am finding is that you've got massage detail here. It's hard to get your hands on what is significant and what is not significant. And, you know, if it's not really significant -- and the staff doesn't think so -- then --

MR. SEE: The P&P -- GDC-2 requires us to look at the P&P. And so if 20.7 is the bounding value in lieu of 19.4, then they are indeed correct to make

that change.

MEMBER BANERJEE: I am just wondering what ACRS -- why we need to --

CHAIRMAN RAY: I don't know that they can answer the question.

MEMBER BANERJEE: We need to, you know -- there are things that they don't know.

MR. SEE: I understand the question, but I won't answer it. We all --

MEMBER BANERJEE: That's fine. There are things we would like to focus on.

MR. CUMMINS: Ed Cummins. We can give our opinion.

MEMBER BANERJEE: Yes.

(Laughter.)

CHAIRMAN RAY: I'm not asking for your opinion.

(Laughter.)

We may decide to ask for your opinion, but not yet. Okay?

(Laughter.)

MEMBER BANERJEE: All right. You let the --

(Laughter.)

CHAIRMAN RAY: Where were we? Proceed,

please. I'm just trying to keep this train running on time, and so far I have done okay.

MR. SEE: I'm done. I'll turn it back to Phyllis.

MS. CLARK: All right. So next we will cover 3.4.1.2.

CHAIRMAN RAY: Okay. These are open because you haven't reviewed them yet and signed off. Is that it?

MR. SEE: Correct.

CHAIRMAN RAY: Okay.

MR. SEE: We have not received --

CHAIRMAN RAY: That I think partly answers Sanjoy's question. They're just open because they need to be noted as open, because you're not done.

MR. SEE: Right.

CHAIRMAN RAY: Okay. Onward.

MR. SEE: I was here because I was told to come here and talk about this.

(Laughter.)

CHAIRMAN RAY: Okay. All right. Well, after you hear about three or four days of this, you begin to wonder if --

(Laughter.)

PARTICIPANT: We don't need to go through

this list?

CHAIRMAN RAY: I don't know, frankly, because we have -- as Sanjoy has pointed out more than one, we don't yet have a way of not doing it. So let's do it.

MR. LI: My name is Chang Li. I'm with Balance-of-Plant Systems Branch. I reviewed Section 3.4.1.2, internal flooding.

Showing the slide. Staff evaluated this following changes that Westinghouse identified. And we reviewed the proposed change and made a determination for each change whether it could affect existing SER. That's NUREG-1793. The SER's conclusion related to internal flooding.

That is whether the safety-related systems will be adequately protected from flood-related effects associated with systems or component failures in the plant -- in other words, when we look at each item associated with the changes and look into whether that would affect any safety-related system to perform its function.

We found five of these eight changes might affect the previous SER conclusion. We then followed up to ask RAIs for those five changes, and we reviewed all of the RAI responses and determined all RAIs have

been satisfactorily addressed in Revision 17. Therefore, we issued the SER with no open items.

CHAIRMAN RAY: Thank you.

MS. CLARK: All right. Next we have Jerry. He is going to discuss analysis procedures in 3.4.2.

MR. CHUANG: Good afternoon. My name is Jerry Chuang. I will be presenting the review of 3.4.2, the analysis procedure in the flood design. This section deals with the methodology to transfer the static and dynamic effects of the groundwater and flood levels into the loads of the pressure applied to the seismic Category 1 structures.

This methodology is reviewed in the section, but will impact all chapters in 3.8, containment design. There is no changes in the methodology. In this section, which we track the -- you know, already approved in Revision 15.

Let's recall the design basis. The AP1000 flood level is designed up to the elevation 100 feet, as described in the previous presentation. And the groundwater level is 98 feet, which is two feet below the grade level of the elevation 100 feet.

The open item relates to Technical Report 116, namely the addition of the three new rad

waste monitoring tank stability.

Here is -- the slide on the left is the plain view of the rad waste building, and this is the new addition of the three tanks. On the right-hand side is the cross-sectional view of the same tank.

Now, the safety concern is that rad waste building, for example, is non-seismic. Therefore, it is permitted for -- due to extreme environmental conditions, such as earthquake or tornado event. And, furthermore, the location of this building is just next to the nuclear island structure, such as auxiliary building or containment building.

Now, the consequence of the collapse would be, number one, increase flood level a number of feet; and, secondly, to reduce the hydrodynamic load, as our standard review plan dictated that if flood levels are above the ground level again, hydrodynamic event must be considered. This will impact on the loading conditions of containment building and auxiliary building.

So to address the open item issue, then there is the whole rupture of this liquid waste monitoring tanks, it will impact on the flood level, and the design of the hydrodynamic loads on the nuclear island structures.

And Westinghouse were provided bounding analysis and shielded uprates, the site-specific conditions, which abide by the DCD criteria and the bounding analysis results.

Thank you.

MEMBER BANERJEE: So, in this calculation, is it just the load of the level, or do they take sort of a wave into account which comes from --

MR. CHUANG: For example, the hydrostatic loads were influenced by floatation --

MEMBER BANERJEE: Right.

MR. CHUANG: -- which is --

MEMBER BANERJEE: What about, is there any dynamic load?

MR. CHUANG: Oh, yes. Yes, because the --

MEMBER BANERJEE: So you have sort of a wave hitting the structure. Fine.

MEMBER BLEY: And since it's a non-seismic building, could a seismic event cause this so you would have the seismic excitation, too?

MR. CHUANG: Oh, yes, it's all -- both.

MEMBER BLEY: You look at that, too. They looked at that.

MR. CHUANG: Yes, yes.

MEMBER BLEY: Okay.

MR. LINDGREN: This is an open item.

MR. CHUANG: An open item.

CHAIRMAN RAY: They will get back to it.

MEMBER BANERJEE: So the addition of these three tanks, what sort of percentage of the volume are we talking about with this?

MR. CHUANG: We assume all, you know, collapse. We should not assume because there is no seismic, so the --

MEMBER BANERJEE: Right. But, I mean --

MR. CHUANG: So the whole volume of water will flow.

MEMBER BANERJEE: Right. But what is the percentage of the -- what can be ascribed to this?

MR. CHUANG: This three additional tanks alone is about one foot additional, not --

MEMBER BANERJEE: Out of how many --

MR. CHUANG: On top of the -- yes. So it would be above the grade level.

MEMBER BANERJEE: There is an existing --

MR. CHUANG: It was at the grade. Because of this additional collapse was at one foot, and they have some other -- fire, water tank, which is on top of that.

MEMBER BANERJEE: So in the original

certified design --

MR. CHUANG: Yes.

MEMBER BANERJEE: -- what was the flood level? And how much does this --

MR. CHUANG: One hundred feet.

MEMBER BANERJEE: One hundred feet.

MR. CHUANG: Yes.

MEMBER BANERJEE: How much would this cause?

MR. CHUANG: At least one feet. And if you have fire or water tank on the other buildings that were -- only a reasonable level.

MR. CUMMINS: This is Ed Cummins again. The flood level of 100 is zero water level next to the tank.

MR. CHUANG: Yes.

MR. CUMMINS: So that's grade, it's dirt. And it's sloped away. So any water you get from the tank, it might be a little flood -- a little water for a very short period, because it is going to run away. But it -- for the transient, it could have a wave, and it could have some flood level.

MEMBER BANERJEE: If you didn't take the wave into account, there would be just a one foot level.

MR. CUMMINS: There would be no permanent level, because -- there is no permanent level, because the water will run away. But there is a temporary level.

MEMBER SHACK: What was the wave level, for example, from the two 400,000-gallon fire water tanks?

MR. CHUANG: We saw -- didn't consider that yet.

MEMBER SHACK: Those are seismically qualified.

MR. LINDGREN: Those are on the north end of --

MEMBER SHACK: Okay.

MR. LINDGREN: Those have a --

MEMBER SHACK: Those don't get there.

MR. LINDGREN: Those have a turbine building between --

MEMBER BANERJEE: So this is a new --

MR. LINDGREN: This is a new thing, then.

MR. CHUANG: Because the loading is two parts -- hydrostatic, which is including groundwater that is 14 feet, up 14 foot, up to the foundation. You have hydrostatic ratio because of water.

MEMBER BANERJEE: But, I mean, what Ed was

saying is that the water drains away, so there is not a force which is there for any --

MR. CHUANG: Changing effect.

MEMBER BANERJEE: Yes. Dynamic effect is primarily from the wave load, or is it from the --

MR. CHUANG: I don't know. That's too -- you need to analyze it. We don't have the information.

MEMBER BANERJEE: Oh. So they are going --

MR. CHUANG: They have committed to do it.

MR. LINDGREN: That is the open item.

MEMBER BANERJEE: Right. Okay. And how are you doing this analysis, using some standard surface code, or how are you -- is it a shallow water calculation? I mean, that means we lost something, which is interesting.

MR. CUMMINS: I mean, it will not be a complicated analysis.

CHAIRMAN RAY: Anything else, sir?

MR. CHUANG: No.

CHAIRMAN RAY: Okay. Thank you very much.

MR. CHUANG: Thank you.

CHAIRMAN RAY: So this is an open item.

All right. Now, I've got a couple of

things to do. First, let me see if there is any member of the public -- Mike?

MR. LEE: I'm not aware of any requests.

CHAIRMAN RAY: All right.

MR. LEE: And are there any members in the audience?

(No response.)

Nope.

CHAIRMAN RAY: Okay. Thank you.

All right. Let me go around the table and capture the views that we may want to take note of of the members before we adjourn. Bill?

MEMBER SHACK: I thought the discussion of Chapter 18 was very good. Clearly, to me that was -- you know, we need to decide how we are going to do this, and we need to spend less time on looking at, you know, changes in the precipitation rate probably, and yet we -- you know, we are going to look through 18 here, and yet we have never seen, for example, those OSA task analyses.

So, you know, we ought to come back -- to me, that would be the two things that I would see that we would be focusing on here, really, are the -- when they're eliminating DAC, those are things we really didn't review when we did the certified design. And

so when they go from DAC to ITAAC, you know, that essentially opens -- you know, that's -- we have never seen this before, really.

And those are the parts of the -- you know, those are the things in the change of the DCD that I would be most interested in is when they go. And I assume that's going to be happening in Chapter 7 also.

MR. SISK: Partially.

MEMBER SHACK: Partially. So, but, you know, whenever -- when those things go, then that's -- you know, that I think triggers a fuller review. I have a hard time picturing exactly what impacts the Chapter 15 events, but those also seem more significant than I would have expected in a DCD change.

But, you know, from just looking at these things these days, I would have spent less time on some of these other things, more time on Chapter 18, and be ready to spend more time on Chapter 7, as soon as we see how many of the DAC go and what the basis for eliminating those DAC are.

CHAIRMAN RAY: Well, as I said, we have not yet developed, but I think we will develop, a way of sorting these things out. We need to have some

experience to base our decision on how to do that on. But the reason you chose Chapter 18 wasn't Chapter 18, but it was because they were satisfying DAC. That is the important thing.

And we have talked about, in the past, this same problem of when DAC are met, what is the process by which people in this building, including ourselves, get involved?

MEMBER SHACK: Well, I think there will be a difference in the way, when DAC are met after you have had a design certification, and you are meeting them later, and in this case when you are revising the design certification so that it doesn't depend on DAC.

CHAIRMAN RAY: Yes. Well, let me say it this way. If you satisfy -- this is repeating back what you said. If you satisfy DAC without a design certification, without a DCA, that's still --

MEMBER SHACK: That's new process.

CHAIRMAN RAY: Right, yes. This now makes -- obviates that problem, but draws attention to the fact that maybe that's a more significant part of any DCA than other things might be, is meeting design acceptance criteria, what is called here sometimes "design ITAAC" to clarify my thinking.

Anything else?

(No response.)

Sanjoy?

MEMBER BANERJEE: Well, I don't know which DACs I'm interested in, and which I am not. It certainly would be -- if the DVI line was a DAC, and comes ITAAC, that would be -- all I'm really interested in right now is trying to understand what is significant and what is not. I'm having a really hard time grappling with that.

CHAIRMAN RAY: Well, I think doing that is hard for all of us. Figuring out how to do it systematically in the future is the main goal that we --

MEMBER BANERJEE: Yes, if I --

CHAIRMAN RAY: -- who should do it, how should it be done.

MEMBER BANERJEE: Yes. Somehow we have to work out a process, which is a sort of filter. And that really is an important aspect.

CHAIRMAN RAY: It is. We all have some ideas about that, and I think that today's experience helps us develop those ideas. And, as I say, I'm not going to ask Ed, but at some point maybe I will, how to do it better. But, nevertheless, I agree.

Anything else?

(No response.)

Dennis?

MEMBER BLEY: Yes. I am going to reiterate a little bit Bill's items. I think the areas where there are substantive changes that we could really get into -- and I think we owe getting into -- are this human factors engineering. I have not read all of the reports that are available, and I need to get all of those and read them carefully, and then have questions.

And I would like to see some detail coming to us from those. The same thing with whatever details are being added in digital I&C and in the PRA changes. Now, I suspect we will have technical topical reports on -- we know we have them for the human factors engineering. I expect we will have them for digital I&C.

For the PRA, I'm not sure what we will have to look at, but I would sure like to see some detail, either from a good, solid review back from the audits that staff does, or, if there are some reports that have been put together by Westinghouse, that we get to look at that. These are areas that are really important.

And I guess I'd say what we learn from

looking in detail might inform our thinking on how DAC need to be closed in their various forms. And I guess I would -- if our staff could put together -- and I ask this because I find it difficult going through Tier 1 to find all of the DAC the way they are listed in there, if we could put together a list of all of the DAC out of the Tier 1 to look at, just excerpts from the tables, that would be helpful.

MR. CUMMINS: I think I can summarize quickly. The DAC we have on AP1000 are three DAC. One DAC is the DAC we talked about in human factors today. There is a DAC on piping analysis, which we will talk about tomorrow. And there is a DAC on I&C, which really has -- in two sections.

There is a DAC on the -- I'll call it the detail design of a protection system that provides the trip and the ESF AC functions. And there is a separate one that we usually include as part of that same DAC on the DAS, the diverse actuation system, detail design. So you might say there is four DAC, but we usually count the two I&C ones together as one.

MEMBER BLEY: I guess what I meant was the list of specific acceptance criteria for each of those, so we can look at those as we look at the details that we see here.

CHAIRMAN RAY: Is there any reason why you said the DAC for Tier 1 only?

MR. CUMMINS: All ITAAC are Tier 1, and so this is basically -- I think it's the staff way back when saying, "This is essential to my assessment of the safety of the plant. And so if you don't have design there, then I want a commitment that I can see the design in a way that I can approve it or not approve it." That's my perception of what -- why do you get in Tier 1? You get in Tier 1 because it's important to safety.

CHAIRMAN RAY: Anything else, Dennis?

MEMBER SHACK: I think there is actually a table of those in 3.1.

MEMBER BLEY: Is there a single table?

MEMBER SHACK: Yes, AP1000 is --

MEMBER BLEY: I thought I found them scattered.

MEMBER SHACK: You're thinking about the other competing reactor that we --

MEMBER BLEY: Thank you.

(Laughter.)

I get mixed up occasionally on those.

I guess the last thing I -- the only thing I would say, I don't think I said it, I am very

pleased to see an applicant and their clients come forward and trying to close all of these in the certification amendment. I think that is -- it certainly makes everything cleaner and is more in the spirit of what we -- some of us thought Part 52 was all about.

MEMBER SHACK: Harold, if I can just get one -- one additional thing I think that would be a flag is any time that the COL holder was supposed to do something, and now that is being done in the DCD, again, that is something that we have never looked at. It at least should be flagged, and we have to consider whether it's significant or not significant. But it's certainly -- again, it's like a DAC. We've really never looked at it before.

CHAIRMAN RAY: So it would be in the COL -- well, you said it's something they were supposed to have done, and now it's being done on the DCD. An example from today?

MEMBER SHACK: Well, the Chapter 18 is full of them. But I -- you know, what I worry about is that there are others buried elsewhere that I don't know as much about. But that would seem -- you know, if I was looking for criteria, you know, my number 1 one is when the DAC disappear, and number 2 would be

when a COL holder item suddenly gets subsumed, because those are, again, items that we haven't reviewed at all previously.

MS. McKENNA: I think we have tried to point those out in our presentations on them, and they are marked in the DCD. You know, there's places where the COL information items appear at the end of each section. So if that section kind of disappears, goes blank, then -- and there is a summary table of --

MEMBER SHACK: Yes. I mean, I was sitting there with my -- I have Rev 11 rather than Rev 15, so I sit here with Rev 11 and Rev 17 trying to figure out exactly how they changed, and I could sort of see those things. But it is -- you know, it is kind of a tedious process.

MR. CUMMINS: So maybe I can help here, too. Why do we have -- why did we have COL items? I mean, we had COL items because we didn't have enough money or enough time to do the design activities at the time of the certification and/or it really wasn't in the design scope. It was in the customer's processes or the site-specific things.

So if you went back to the certified design Rev 15 -- I don't remember the numbers exactly -- there are 120 COL items. About half of them are

design-related. And Westinghouse said to ourselves, "We are going to close all of these design-related ones ourselves as part of the revision to the certified design. And we are going to leave over to the COL those things that are applicable to their site or to their processes and procedures."

So that's what we have tried to do, and so there will be in almost every chapter some bit of COL open items that we have addressed, and some that we have not addressed.

MR. SISK: One other item to throw into that is, of course, the standardization by closing them out. It helps in standardization. But somebody had asked for an example. We had Chapter 14. Talks about the startup administration manual. We try to close that out as a standard item for all plants, but yet, by staff position, each site has to submit the start-up administration manual.

So we can only go -- I think somebody made the comment before, we can only go 90 percent, but there has to be a COL information item to take to the other 10 percent. So that would be a classic example of where, obviously, there are holder items -- or, excuse me, information items that the applicants ultimately would have to deliver at some point in

time.

MR. LINDGREN: And you will see more examples tomorrow of where we have closed COL information items, and identified them as such in our presentations.

CHAIRMAN RAY: Let me move to Mr. Bonaca.

MEMBER BONACA: Yes. Well, I echo the issue of DAC ITAAC. I mean, it's an issue we wrote a letter about. It's significant I think in general, and I think we will be working with the NRC staff to get closure.

I missed the July meeting, as you know. So, for me, this is the first one in which I was involved in reviewing the application changes and the SERs. And I must say that, you know, I got a sense there has to be a better way for us to review this material. I mean, you know, I spent a lot of time going back from document to document and trying to make sense of it, and finding a lot of the changes were insignificant.

Certainly, in the presentation today I found one way in which this information is congealed so much more effectively. And I think we will need to talk about in ACRS in general, on how we can improve our review process by doing it differently from what

we do. And we -- there is already a proposal on the table to have a mini-retreat to discuss on how we could do this better.

That's it.

CHAIRMAN RAY: All right. Mike?

MEMBER RYAN: Nothing else to add to that.

CHAIRMAN RAY: Tom, do you have anything to say at this point?

DR. KRESS: Well, I am certainly glad to hear these comments about searching for a better way to review these things. I think going through it this first time, I believe it is probably worthwhile. But there are a few things that I think -- looking for criteria on what to review and how to review it, it's probably a good idea for some sort of retreat. I like Mario Bonaca's suggestion there.

You know, we may look for things that are significant, and maybe has safety implications, if any. But we need to figure out a better way, because a lot of this time is spent on things that are, in my view, not significant.

About today's meeting, I think, once again, both the staff and Westinghouse have done a reasonably good job of -- you know, I like what they say, and they have to put to bed a lot of things.

The one thing that I think we need to look a little more at, which might have some safety implications, is the issue of the flowskirt. And I think we have plans to look at that and how it's handled in the calculations, the CFD code calculations.

And one of my issues previously was the issue of zinc injection. I think we've pretty well handled that. I still don't know how you decide whether it has any effect on projects, but probably not much.

I'm good with what Harold Ray said about keeping an update to the change matrix. It might be a good way to follow those things and track the changes.

And I really appreciated the staff and Westinghouse's trying to reply to Mario Bonaca's question about giving us the -- what was the motivation or the driving force behind these changes? I thought that helped a lot. So that might be another thing to put on your retreat list.

I like the new overspeed protection that we heard about. It looks like it's both redundant and maybe even diverse. I still think we have to check that system at the overspeed conditions at the sensor

level, and I think maybe put it on a turbine and overspeed the turbine. We could do it offline somewhere to show that it actually works in overspeed conditions.

And I didn't really understand or see that the change to 250 volts from the 125 volts might not have an effect on the flow characteristics. I didn't know where that shows up, but it was probably in there, I just couldn't find it. That may have some safety implications, if it does.

MR. CUMMINS: Sir, if I might address that. Ed Cummins. There is no pumps. There are no DC in our passive safety systems. There are motor-operated valves that we operate, and there is no pumps that are powered on DC power.

DR. KRESS: Thank you. I guess that takes care of that.

You know, I was -- speaking of pumps, I was somewhat startled to hear that the reactor coolant pump flywheel inertia had to be increased because they didn't have the correct values of the friction flow. I don't know how we missed that, but that was a little bit startling. You know, that's just a comment. I'm sure you caught it. But it seems like it's something the ACRS should have caught.

CHAIRMAN RAY: Okay. And this is your watch, Tom.

(Laughter.)

All right. Well, I seem to have -- you know, we are learning. This is a learning experience for everybody. The role of the ACRS is not the same as the staff. Therefore, we can have a different way of approaching something like this than simply tracking with the staff, at least in principle. We are going to be talking about it.

One of the things, though, that I think, at least as Chairman of the Subcommittee, I have to worry about is the overall workload and getting the work done that needs to be done, however you define that to be.

And one of the things that has to happen, as well as the things that have been talked about here, is a better way of getting information to the ACRS so that it can manage its resources and do what it needs to do.

And simply figuring out what is important and what is not is not the solution to that problem, because it -- as in the case of Mike Ryan here, there are individual members who need to be lined up with the topics to be discussed, and it does seem to me,

just to mention something that hasn't been touched on yet in this summary, that we are confronted with a great need to get things done, but we are not sure which things are going to be ready to get done next time we meet.

And the agenda changes, the things that we look at and talk about aren't the ones that we necessarily expected to talk about, because those aren't ready, and others ones are ready, so we'll do them.

So there is a need for us to figure out a way to be as efficient as possible, so that the end result, which is that all of us get our jobs done as close to expectations as possible, would be better facilitated.

And you saw us having to go back on issues. That is never very satisfying, because you can't really be as confident that you are identifying the things you need to revisit when you go about it that way.

So, in any event, like I say, it isn't just a matter in my mind of sorting out the important stuff from the unimportant stuff, not even clear who can do that for us. But it is also a matter of being able to schedule the stuff to be done in a way that

will allow us to do what we need to do as quickly and efficiently as we possibly can.

Those are all the thoughts that are on each of our respective minds. You have heard mention made of the fact that we are going to talk about this, and this is good experience. This is not something, in my opinion, that is bad that has happened, but, rather, it is something we needed to do and now we need to learn from that and decide how to go forward in the future and be as effective as we can.

We appreciate the cooperation of the applicant here to help us get through this. And, Ed, probably tomorrow I will ask for your suggestions, since you certainly have a point of view that might help us see a way to do this job more efficiently.

MR. CUMMINS: Would you mind if I make one comment on your just recently going around the table?

CHAIRMAN RAY: No, I don't mind.

MR. CUMMINS: So I -- having read all of these human factors technical reports, I believe you will find them extremely frustrating, because they don't really tell you what we are doing. They tell you -- it's about process more than it is about the design of the human interface.

And if it were me, I would -- the best way

to get a feeling of whether you think that the AP1000 control room, which is the primary human interface, is acceptable is to come visit the control room and see how it works. And I think that if you are interested in the process of human factors, then these reports are -- describe the process of how you take steps in the process. If you're interested in the result of the process, which I think I would be more interested in, then maybe we would want to schedule a visit to --

MEMBER BANERJEE: We did, didn't we?

MR. SISK: We did.

MR. CUMMINS: We did, but I don't know that everybody --

MEMBER BANERJEE: Maybe not everybody.

CHAIRMAN RAY: Well, again, that is a perfect example, Ed. We just didn't have the ability to schedule everybody who had an interest in it. It was done on short notice, and so on. But in any event. Mario?

MEMBER BONACA: I would just give you a sense of the impressions one gets getting his feet into the process. I always believed, you know, from what I have been reading before that Tier 1 is in the untouchable. You can't touch it. I mean, that's it, you know?

Tier 2 you can change, but, you know, still, you have to be -- and then, I get this package and I'm beginning to look at it. And these are all of the Tier 1 changes. So now I'm convinced I was wrong in my impression, but the fact is I have got -- I'm flaunting my ignorance I guess in saying that then they are not untouchable. I mean, here they are.

They're all -- so there is a lot of information that comes through, although it's not specifically about a system or a component or whatever, but about the whole process. That, you know, for me it was a learning process, I mean, this amendment or whatever -- Revision 17 -- changes would be so extensive.

MR. CUMMINS: Yes. I think in an amendment process changes to Tier 1 are not so difficult or not so sacrosanct, but it's because in the end it all gets returned into a rule. So it is true that if somebody has a certified design, changes to Tier 1 is very, very significant. But if you are where we are, then you have to take advantage of the time when you are changing the whole DCD to make any changes that you would want to in Tier 1.

And so we don't -- we do put some higher level of sensitivity to it, but we do have a lot of

changes in Tier 1 when you take the whole thing.

MEMBER BONACA: Yes. I mentioned this purely to give you a sense of, you know, what takes place for people that have not been doing the review in detail as part of the staff.

MR. CUMMINS: So.

MEMBER BONACA: So anything about context, for example, why are you doing this change? It's very important, because it tells me why you are doing it, and it tells me that, for example, there is a real basis for doing it now and not simply that we approved before the DCD that it was incomplete.

This is the thought that I had reviewing it. Did they miss the boat on this one? Or you didn't probably, but I was left with that question.

MR. CUMMINS: Yes. That is maybe something that we can think about to make it clear where we did changes. For example, today I believe we missed -- we talked about a couple of changes where the design finalization made us figure out that we missed the boat. I'll gather the two that I think of today.

The battery that is supposed to supply the lube oil reserve pump is too far away from it and too low a voltage, and it wouldn't work. So we had to

create a new battery.

And the other one is the 250 volt -- really, the cable sizing, when you try to hook the cables to either the motor of the motor-operated valve or the containment penetration, you have to change its size five times before you get to -- I mean, it's really ugly how you have to do big cables when you have a small load because of voltage drop. And so we didn't do that.

We hadn't done, I'll say, enough good engineering at the time of the DCD to do -- most of the other ones today, I think all of the other ones, I would say was customer request. It's a little bit better. It is -- there is no penalty in changing now. It is -- so it's not really --

CHAIRMAN RAY: Well, okay. But presumably, having taken this step, this would probably be -- there would not be another round like this, one would imagine, in the future. Right?

MR. CUMMINS: Right.

(Laughter.)

CHAIRMAN RAY: And I'm sometimes sorry we do this round, but --

(Laughter.)

Having built a couple of plants, I would

say that at least, in retrospect, this is predictable. But maybe the process ought to have anticipated it more than it did, because we find ourselves here in a situation where, like I said in my comments, I'm not sure I can see how to get it -- the job done that we need to get done.

Now, obviously, we are trying to figure out how to change the job that we need to get done, so that we can get it done. But the upshot of it is in one sense it is much easier to go through the thing the first thing, because you are going through it chapter by chapter, and there aren't things happening simultaneously that affect multiple chapters, and so on and so forth.

And by the way, let me say you did provide in this change matrix a reason for change statement, but it was like three or four words. You know, I mean, it's -- so it's not like there was no reason for the change given. It's just the reason wasn't very good in most cases.

In any event, maybe this ought to be viewed as a normal consequence of just getting a new design to the marketplace and building the first plant. You certainly wouldn't expect to do this another time, I would think.

MR. CUMMINS: No, you wouldn't, especially after you have learned --

CHAIRMAN RAY: Like you said, I think it's predictable that what we are looking at here would have occurred. You need something to sell. And then, once you've sold it, you need to finish the design to the buyer's/customer's requirements, and that's just the way it's going to be, in my judgment.

But that's enough philosophy. We are past time. We've got another day to go.

Dennis?

MEMBER BLEY: Yes, I've got a funny procedural question, I guess because it's a rule. Now, when this certification is done on Rev 17, Rev 16 is still a certified design, right?

MR. SISK: Rev 16 is not a certified --

MEMBER BLEY: Not that you have to build one, but there is a rule that says that one is certified.

MS. McKENNA: The answer is it depends. I think right now what is certified is Rev 15.

CHAIRMAN RAY: The amendment.

MS. McKENNA: The intention is we would amend 15 and there would become a new -- and I will just call it 18 for --

CHAIRMAN RAY: Yes.

MS. McKENNA: -- so it would be one rule, one design, and that would be one.

MEMBER BLEY: Good.

MS. McKENNA: Yes.

(Laughter.)

CHAIRMAN RAY: Okay. Sanjoy?

MR. CUMMINS: One comment. We started this whole thought process by saying we have these 60 COL items that are design-related, and we have these DACs, and they are design-related, and there would be a big benefit to standardization and a big risk reduction for our customers if we eliminated these.

And we do have customers. I mean, this is -- and maybe the attitude of illuminating their risks helps them be comfortable with us. We don't have that -- we could ask them, but --

CHAIRMAN RAY: We're not going to.

(Laughter.)

My point -- look, Ed, this is a predictable event.

MR. CUMMINS: Yes.

CHAIRMAN RAY: You need something to sell, and once sold it -- once you've sold it, you need then to reflect the customers' best interest in the design.

This is I think predictable.

I just don't know that we have allowed enough space for it to happen. That's the problem.

Yes, Sanjoy.

MEMBER BANERJEE: I wanted to ask you a question related to the last certification. It is more a question to inform us about our process. So you had the AP600 certified, and you have mentioned about the AP1000. The process was somewhat different, if I recall. It wasn't the way we are doing it today.

What do you think -- I mean, maybe this is a question you don't want to answer, but it was done differently. You know, I remember that all of the thermal hydraulic stuff was done by the Thermal Hydraulics Committee. You know, things just went and happened as they would naturally happen, whereas here you have a bunch of people who are sitting through, you know, the minutiae of things that they are not really experts at.

So I'm wondering which was a more efficient -- which do you think would be a more efficient process?

MR. CUMMINS: I think that's hard for me to say. You're asking me about the efficiency of your process before I'm --

MEMBER BANERJEE: Yes. How efficient was it the last time around?

MR. CUMMINS: I think it was efficient.

MEMBER BANERJEE: Yes. My impression, it was pretty efficient.

CHAIRMAN RAY: But, Sanjoy, when you say "it," I've got to make an observation. I think it's -- it was different then than the "it" is now.

MEMBER BANERJEE: How?

CHAIRMAN RAY: Well, I believe what we are looking at are a large number, by my count well over 600 at this point, changes. You weren't looking at changes before. You were looking at topics. And that's -- if we can get the changes burned into topics, then -- and that's what I was talking about at lunch, if we could identify the changes into discernible, identifiable, technical changes -- the way I would think of them -- then it's very much like what was done the first time. You are reviewing thermal hydraulics.

But in this case they are so --

MEMBER BANERJEE: It's not a philosophical discussion here. This is a practical thing. I mean, we are doing the same thing, which they are involved with so perhaps it's of no question to them, but we

are doing it for all of the other reactors the same way. And I think it just is not the right way to do it.

CHAIRMAN RAY: And we are going to take that question up for --

MEMBER SHACK: Actually, you are historically wrong. That's a different question.

CHAIRMAN RAY: All right. Enough. We are actually in public here.

All right. With that, we will see you at 8:30 in the morning.

(Whereupon, at 4:05 p.m., the proceedings in the foregoing matter were adjourned, to reconvene at 8:30 a.m., the following day.)