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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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WEDNESDAY, OCTOBER 7, 2009

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ROCKVILLE, MARYLAND

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, Chair

J. SAM ARMIJO, Member

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

ROBERT HSU

CHENG WU

SHANLAI LU

JENNIFER DIXON-HERRITY

PEI-YING CHEN

RICHARD McNALLY

RENEE LI

TERRI SPICHER

PHYLLIS CLARK

TUAN LE

JERRY CHUANG

TOM SCARBROUGH

ERIC REICHELT

OM CHOPRA

ALSO PRESENT:

ROB SISK

DON LINDGREN

ED CUMMINS

PHIL KOTWICKI

DALE WISEMAN

GREG MEYER

MANO SUBUDHI

MARK DEMAGLIO (via telephone)

C-O-N-T-E-N-T-S

P-R-O-C-E-E-D-I-N-G-S

(8:28 a.m.)

OPENING REMARKS BY THE SUBCOMMITTEE CHAIR

CHAIR RAY: We'll come to order and go on the record.

This is the second day of the meeting of the AP1000 Reactor Subcommittee, a standing subcommittee of the Advisory Committee on Reactor Safeguards, or ACRS. I'm Harold Ray, chairman of the subcommittee.

Other ACRS members in attendance today are Sam Armijo, welcome Sam. Sanjoy Banerjee, Dennis Bley, Marty Bonaca, Bill Shack and Michael Ryan.

Tom Kress, an emeritus of the ACRS and former committee chairman, is also seated here at the table with us today, and he is an invited consultant to the subcommittee.

Michael Lee is the ACRS and is the designated federal official for this meeting. He is joined by Weidong Wang, also of the ACRS staff.

The rules for participation at today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register. I believe we received no written comments or requests 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 ask those individuals participating in this subcommittee meeting over the telephone bridge line to place their speaker phones on mute.

As stated in our earlier Federal Register Notice, the transcript of the 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 have worked to trim those up from yesterday's operation, and we'll see how they do today.

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 are in possession of cell phones or some kind of electronic paging device, you adjust it to silent mode or alternatively turn it off so as to not interrupt the conduct of the meeting.

All that having been said, our meeting

agenda continues from yesterday, and we intend to proceed as published. Let me first ask Eileen if the staff has any comments.

MS. McKENNA: No. I think we are ready to proceed.

CHAIR RAY: All right. Then as scheduled, we will begin, Rob, with - we have a set of agenda items, or Chapter 3 Sections. You will announce them in turn, and proceed. And we will just proceed right in.

MR. SISK: There are some extra black and white copies.

(Off the record comments.)

DCDA CHAPTER 3 SECTIONS 3.2, 3.6, 3.9.1-3.9.5, 3.10, 3.12

MR. SISK: Okay, we are going to proceed then into Section 3.2 the classification of structures, and once again I'll turn it over to Mr. Don Lindgren.

MR. LINDGREN: As we said we are picking up from where we left off yesterday in the package, and we are following the division of these. It turns out it's by branch, review branch.

The classification Section 3.2 of Chapter 3, the changes we made are primarily to the equipment

classification table. It's a table of about 65 pages long that identifies the equipment classification, and the - and generally the industry code to which it is built for all of the safety class equipment and much of the other equipment.

The reasons for the changes were some related design finalizations. That typically is, add a valve here, take a valve off there. We had RAI responses to NRC questions that required additions and deletions and changes to the table.

Of most interest we added ancillary diesels. The diesels that sit in the annex building and supply backup power to the batteries among other things. They are not the large diesels that sit in the diesel generating building.

We added fire protection equipment, and we corrected the hydrogen control equipment classification consistent with what the industry is going.

We also had some changes related to what we were doing with the envelope in the control room.

There are some additional updates to the table required due to RAI responses once again, and also an NRC audit, and our review of what they found in that audit.

CHAIR RAY: Those are the facts. Are we going to at some later time, or at the appropriate point, talk about the reasons for the more significant of those changes?

MR. LINDGREN: Primarily it's RAI response to the request - in response to the NRC requests.

CHAIR RAY: let's take the - from our standpoint, we have a certified design now. It's being amended. For example take the diesel generators. They were added for some reason other than just to respond to an RAI, I'm sure. Would somebody elaborate on that please?

MR. LINDGREN: They are used as backup to provide additional power to the batteries and the pump that recirculates water through the passive containment cooling water storage tank. We had not put them on the table, and the NRC thought we should, and we agreed.

MR. CUMMINS: This is Ed Cummins. We did not add the diesels after the certify was done. The diesels were added in the design prior to design certification. But we omitted including those diesels in this classification paper, and we basically agreed with the staff that that omission should be corrected,

and that we should provide a classification.

CHAIR RAY: Thank you, Ed. That's a lot more insight than what was said up to that point.

So the design didn't change, but the classification?

MR. CUMMINS: Nothing really changed other than we inserted information in the DCD which was not in the DCDs before. That is we recorded the diesels and their classification in the table.

MEMBER SHACK: But you did change the building classification, the annex building, the uniform building code seismic two?

MR. CUMMINS: That was in the certified design. We did that before.

MR. LINDGREN: And the next page, the next slide addresses that. Oh, you got it? Okay.

We did make some minor changes to the structure seismic classification. The NS structures or non-seismic structures, many of them do have seismic requirements; they are just not category one or category two; typical building code. That was explained much better in Section 3.7 than it was in 3.2, so we added a reference to Section 3.7 to define what seismic classifications were.

We made some changes to the annex

building. The annex building, portions are seismic category two, portions are NS, and we moved a wall that divides the two of them, and we added more building in the seismic category NS.

The most significant change was the first bay of the turbine building previously was NS. We have made it seismic category two. The first bay of the turbine building is now a reinforced structure. Previously it was a lightweight construction, so that it would - if it fell into the aux building, it wouldn't damage the aux building.

We have as I said, we have made it a reinforced concrete building. We have made it larger. We have put heavy equipment in there, so it is not seismic category two.

The change in the seismic requirements pointing it at 3.7 is really to clarify the requirements - it was in response to an RAI request. The changes to the annex building were largely in response to customer requests. The change to a reinforced concrete building is a plant protection feature.

The - and as we beefed up that first bay, it could no longer be classified - we also corrected the fire protection classifications, the fire

protection equipment inside the containment, to seismic requirements. That wasn't reflected before, and that is on the nature of a correction.

Questions were raised by the staff during the review about the classification and requirements for regulatory treatment of non-safety systems and defense in depth type systems. We have not changed the classification criteria definitions and requirements that were certified in the DCD and 3.2 AP1000 relies on safety-related systems to shut down the plant and mitigate postulated accidents.

RTNSS and defense in depth systems provide investment protection, and they are not required to support the operation of safety-related systems.

RTNSS is including Class D in section 3.2. You won't find the term used in this section, won't find it used much in the DCD.

These next couple of bullets are copied out of the DCD, so that you understand what this equipment does and how we classify it. A structural system or component is classified V when it directly acts to prevent unnecessary actuation of the passive systems, structure systems and components, both those which directly act to prevent the actuation of a passive safety system are also Class D.

And for Class D structure systems and components, considered to be risk significant as defined in the reliability assurance program, provisions are made to check for operability, including appropriate testing and inspection and repair out of service structure, systems and components.

Our focus on Class D systems is to keep them in operation, make sure they are in operation when you engage in certain activities, particularly during an outage or repair activities, rather than on the qualification of the equipment beforehand.

Then the NS buildings containing Class D structure systems and components, as well as the anchorage of those structures, systems and components, to the building are designed to the seismic requirements of the Uniform Building Code.

The systems and components are generally not designed for seismic loads. In some cases they are adjacent to safety class equipment, which makes them category two. But generally they are not designed for seismic loads.

We do have several open items from the staff. The first one here on the table, the staff has indicated that they think seismic requirements are

required for Class D systems. We obviously have to have further discussion with the staff on this.

The second one was, we didn't include the seismic classification for electrical and some other equipment in Table 3.2-3. That's the larger table I referred to. The guidance indicates that that is a table of mechanical and fluid systems components. We would expect to provide this information in some manner. We haven't worked out the details on what we are going to do, whether we will put the electrical equipment there, add another table, or include it in Chapter 8.

But we will need to talk with the staff when we resolve that.

The staff also asked for augmented QA for the seismic category two structure systems and components. We need further discussion with the staff. The 06 one, they requested a list of systems required for continued operation. We have submitted an RAI response for this. We have not yet heard back.

They asked for supplemental requirements for risk-significant RTNSS systems. We do have the reliability program, so we need additional discussion with the staff on what they think is required above and beyond this.

And then we do need to make additional corrections to the table from the extended condition coming out of the audit. These - we got these open items when they came out with the ESR. We did not have RAIs coming out of the audit. We only fairly recently received these.

CHAIR RAY: I think the observation here is that this seems like perhaps it's coming to us prematurely; it's going to have to come back when these things are resolved.

MR. LINDGREN: We wanted to let you know, we have open items.

MEMBER RYAN: I understand. They're quite significant, and rather than exchange in a debate about them now, it seems like the observation to make is, well, keep up the work and come back when you are done.

MEMBER SHACK: Yes, but coming back to your original question, is this only true for example for the new diesel generators, or was this a question that somehow involves other Class D or RTNSS systems that somehow you thought would have been addressed in the 015?

MR. LINDGREN: They were addressed in Rev 15. We have not changed the classification, or the

requirements for Class D systems. The staff is suggesting that we should. For all of the Class D or RTNSS systems.

CHAIR RAY: I mean I can imagine the debate that is going on on these various topics might be fun to engage in that debate. But it seems like it ought to take place with staff.

Again, I understand these aren't new diesels, these are newly reclassified diesels that were in the original design. What the implications of that are perhaps we will pursue with the staff.

Because when you were describing it, you said, provide added this and added that. Well, that sounds like it's doing something different, not just called by a different name. So any members who have questions who want to pursue this of course we should do that here. But for my part I would just say it seems like we are some distance away from being able to do a full review of this section, given the nature and extent of the open items.

MS. McKENNA: The staff will make a presentation later on what they were looking at, why they were raising these issues, so you can decide at that point whether you want to engage at this time or when you come to closure.

CHAIR RAY: No, I understand, thank you Eileen, we'll do that. It may turn out that, oh well, we understand all this well enough we don't need to come back and review it again. It's just my judgment that with all these open items that we don't want to get in between the staff and the applicant at this juncture with these kinds of outstanding issues.

MR. SISK: I would say, Mr. Chairman, that Westinghouse is clearly going to be working with the staff to close out these open items and continue these discussions.

CHAIR RAY: Sure. Right.

I guess the question is, should we continue to --

MS. McKENNA: Well, let me ask maybe a question with the committee, the way we have it structured is, we have several presentations from Westinghouse, and then several from the staff. And it could be, if it's more understandable, we could do kind of point-counterpoint if you will, let Westinghouse present a particular section and the staff present a particular section; move on then to another topic; so you wouldn't have to keep in your mind, okay, we have these three or four subjects. We are flexible. We are prepared to do whatever you

think would be most understandable for you.

CHAIR RAY: Okay, let me poll the committee - yes, go ahead.

MEMBER BONACA: If you plan to discuss the RTNSS issue I would like to hear about that.

MS. McKENNA: Okay, I believe we have the staff.

MEMBER BONACA: Just to see if there has been any change from what we understood the requirements were.

CHAIR RAY: It's my judgment that probably point and counterpoint works better just for people's ability to track these things. But again I perceive that we don't want to - mediating between --

MS. McKENNA: That's right -

(Simultaneous speakers.)

CHAIR RAY: -- trying to tell you what we think the right answer is before you guys have done your work.

MS. McKENNA: All right, then we can just continue on the path we were on.

CHAIR RAY: Other members have any input? Just so we get to it.

MEMBER BANERJEE: You might have to remind us.

MR. SISK: Don't worry, we will.

MS. McKENNA: Certainly the staff will be covering its open items when it gets into its presentation, so that would be a time to refresh you on where they see the issues.

MR. SISK: We have several sections. Then we'll just work through those.

MS. McKENNA: That's fine.

CHAIR RAY: Go ahead.

MR. SISK: The next section we are going to talk about is 3.6, piping. And once again, Don.

MR. LINDGREN: Okay. Section 3.6 is postulated pipe rupture dynamic effects. The changes we made were to break locations. We updated due to design finalization efforts. The break locations have to be at terminal ends and certain other places.

We changed to balance a plant valve used for mitigation due to turbine changes. Traditionally the non-safety valves on the turbine - the stop valves and the like - are used to mitigate a specific failure of a main steam isolation valve. We changed turbine suppliers that has a different name for those, and some different information, so that changed in that area.

The hot water heating system was a high

energy system. We redesigned it so it's a moderate energy system; this was primarily a customer request. And then the main steam pipe material change was changed as a result of design finalization, and addressing erosion/corrosion.

(Off-mic comment.)

MR. SISK: Can you come to the mike and give your name so you go on the record.

MR. KOTWICKI: Phil Kotwicki, Westinghouse. The material change from a carbon 106B to a B11.

MEMBER ARMIJO: Why did you make those changes?

MR. KOTWICKI: Why?

MEMBER ARMIJO: Yep.

MR. KOTWICKI: As Don mentioned, the velocities in the steam line were a little higher, and as a result of design finalization there was extra margin that was thought to be necessary for that type of material, so it was changed to more chrome.

MEMBER ARMIJO: You are addressing flow accelerated corrosion with that change?

MR. KOTWICKI: Right.

MEMBER ARMIJO: Okay, so my question was along that line. But you changed the mainstream pipe.

Did you change any other vessel material, nozzle materials, in order to accommodate the change to 335?

MR. KOTWICKI: Any connections would have had to have been made compatible. But the components that they tied into, the equipment that they tied into, remain the same.

MEMBER ARMIJO: You didn't change anything like the pressurizer vessel, the steam generator vessels, or anything else?

MR. LINDGREN: The primary components are either stainless steel or clad with stainless steel. And have general stainless steel safings. This is the steamline that we changed to address that.

MEMBER BANERJEE: I guess I have a question regarding the break locations, the updated - you say the design finalizations. Can you give me a couple of examples of what happened there.

MR. LINDGREN: I look to Phil, again. Do you remember?

MR. KOTWICKI: Again, like Don mentioned, most of the break locations are terminal ends. So most of the terminal ends are still terminal ends. I believe one of the things that happened was the addition of the heat exchanger on the pumps which generated actually new locations that were not

identified before, because that heat exchanger didn't exist in the past.

MEMBER BANERJEE: Do you have a sketch showing the break locations, where they are? You've got a piping package finalized now I take it.

MR. KOTWICKI: Are you asking then the DCD or --

MEMBER BANERJEE: You are saying it's updated due to design finalization. But as you know piping package is not finalized. The location somewhere - which I'd like to see.

MR. SISK: This is Rob Sisk, Westinghouse. I think part of that is still ongoing. The staff has been doing an audit of our piping packages. You will hear more about that shortly in the discussions. The piping package are more finalized. I think it usually is finalized. But we are working through that with the staff to get to a point where both the staff and Westinghouse have reached a level of completion on the piping package that is necessary for circulation.

MEMBER BANERJEE: So you haven't finalized the piping package yet?

MR. SISK: The piping packages are not yet finalized.

MEMBER BANERJEE: So the break locations are not finalized?

MR. SISK: By definition, true. But we do have a good idea where the breaks are, as Mr. Kotwicki was pointing out we know where the terminal ends are. By definition until the piping packages are done you won't say that we are completely done. But we have a very good idea of where those piping runs are, where the end points are. We are - have been working with the packages - provided the packages to the staff for review, and there are things that have to be resolved on those piping packages to bring them to completion.

MEMBER BANERJEE: The break locations relate to also forces, reaction forces, what happens to the insulation, how it impacts our thoughts about debris, very wide implications to break locations. So I'd like to see a diagram where these break locations are.

MR. SISK: And we are doing a report, and we will tell the NRC that later this year we are doing a pipe rupture hazard analysis that will discuss where those breaks are.

MEMBER BANERJEE: Oh, so that hasn't been done?

MR. SISK: That is not a completed effort at this time.

CHAIR RAY: Okay, let's take an action item, if I can ask Mike to make sure he follows up on it to respond when the appropriate time the information you are requesting.

MEMBER BANERJEE: Right, because there are other implications that we have to assess. As I said, they are going to do an analysis of reaction forces and supports and all sorts of stuff.

CHAIR RAY: I would have thought give the subject and the discussion that there was a DAC or something that applied to this topic in the certified design, and that this was a process maybe, as we've seen elsewhere, addressing that -

MR. CUMMINS: This is Ed Cummins. I think you have that exactly correct. There is information in the certified design, in the DCD, which lists I'll say rooms, rooms that have high energy piping and interesting targets, let's say, it's a table-like thing. And it doesn't evaluate anything. It just says, here are places where we have a coincidence of high energy pipes with break locations, and equipment that might need to be protected. So it's not a design, but it's a summary of the general

issue of piping and hazards.

There is a DAC that says, perform the piping analysis, and perform the pipe hazards report, and we are going to talk about that later in this meeting, in the section.

CHAIR RAY: All right.

MEMBER BANERJEE: In any case three implications that I am interested in. One is clearly related to the analysis you do of forces and things like that. Second the impact of the jets and so on generating debris. What implication that has on how you deal with some screen blockage. And the third of course is related to LOCA itself. So all of the above are involved.

CHAIR RAY: So this is similar to the discussion we are having on human factors about, well, there was a DAC, and now we are addressing elements of that in a way that we can better understand it. I think at this point it's sufficient to simply take note that your interest is in seeing how that is resolved, assuming it is resolved, during this DCA, during this amendment to the certified design.

MR. LINDGREN: Just to complete the thought on this one, what we are referring to in this changes are like the ADS valve package on top of the

pressurizer was being designed and things were moving around which would move terminal ends, sometimes an elbow - or not an elbow, a T can be a terminal. So that is what we were addressing here, and yes, I will get to it later in my presentation, we are completing a pipe rupture hazard analysis that will require additional changes.

MEMBER BANERJEE: I presume you have also closed the DAC then on the layout of the DBI line.

MR. LINDGREN: We don't have a DAC specifically for it.

MEMBER BANERJEE: Well, you have a general DAC, and now you have --

MR. SISK: We are in the process of trying to close out those - the DAC associated with the piping. We are not through that process yet, and we are working with the staff to hopefully get to a point where we can say they are closed. But it is not yet at this point in time.

MEMBER BANERJEE: Let's say when you close it you then have a design for the DBI line with all its supports, where the valves are any everything.

MR. LINDGREN: We need to move to the next page. We didn't have a DAC on the pipe rupture analysis. We did have a COL information item. We

have revised that COL information item to indicate that most of it will be done as part of the design certification review.

We anticipate that perhaps not all the pipe rupture with restraints become either a license condition or a DAC.

MEMBER BANERJEE: -- the COL then? Or what will be your - I don't know how you are dividing what will be closed in the design certification and what will be part of the COL?

MR. LINDGREN: That would have to be closed by the COL applicants. It's primarily a timing problem.

MEMBER BANERJEE: It would be helpful to know that division at some point.

MR. SISK: Well, the understanding with the staff at this point, and I certainly would not want to speak for the staff, but at the time when the pipe rupture hazard analysis, there is an understanding that all the whip restraints would not be completed at this point in time, and that a license condition would be incorporate to address additional whip restraints.

I think that's where we are at this point But I do want to reemphasize we are continuing to

work with the staff to make sure that we have a great success path to closure on this issue.

MEMBER BANERJEE: And also I guess, is that the same thing with regard to placement of insulation and debris generation? Would that become then something that you close in the COL?

MR. LINDGREN: No, the whip restraints generally don't protect you from ripping up insulation.

MEMBER BANERJEE: No, I realize that. That's a different topic.

MR. LINDGREN: Well, but that is one of the topics that is considered in the break hazards analysis. Now remember that inside containment, we have no fibrous insulation. That is still the case.

MEMBER BANERJEE: That is very laudable.

MR. LINDGREN: Well, it's necessary. But all of that, that is one of many things that we are including in our pipe rupture hazards analysis. We had a preliminary design review on it a couple of weeks ago, so we had a lot of people doing a lot of work to define the break locations, to find the breaks that require work restraints, defining the targets. Once you find the targets in some cases you have to add a whip restraint, because you don't like the

targets you've got.

As we complete the piping packages we are finding a few intermediate break locations, which are - depending on - there is a stress criteria for those. So those have to be added to the analysis.

We as I said, we anticipate completing that activity to support design - in design certification review. We will have all the break locations defined. We will have all the targets of those breaks. We will have defined where we need whip restraints with protection shields. We may not have - we may not complete all of the whip restraint designs. That may be left as a license condition or a DAC.

MEMBER BANERJEE: You also have completed all the specifications of the insulations and the materials?

MR. SISK: We will be talking more about that. We hope to come before the committee in the future to talk about GSI-191, what we are doing with regard to insulation and debris loading, potential fiber loading and debris loading for the - the sump I think was the question or concern you have. And we will talk more about that in terms of its impacts on - -

MEMBER BANERJEE: We also would of course

like to know about jet shields and zone of influence and all the details.

MR. SISK: In terms of what --

MEMBER BANERJEE: The system.

MR. SISK: Absolutely.

MR. CUMMINS: This is Ed Cummins. The Chapter 6 discussion of sump screens and debris generated by the break just because the breaks can be anywhere don't depend directly on the pipe hazards analysis, and depend instead on some conservative assumptions about debris based on the diameter of the pipe and the field of the zone of influence that resulted from that.

So there is not a direct connection between debris generation and the pipe break hazards. There could be, but it would just be infinitely complicated to go around and do break by break analysis of this.

MEMBER BANERJEE: Well, as long as you are conservative.

MR. SISK: It might be best to have that discussion with the GSI.

CHAIR RAY: I think that is the main point, Sanjoy, I just want to capture the full scope of what it is that needs to come back when it's

studied.

MEMBER BANERJEE: It brings back my point yesterday, which is, we need to sort of aggregate these things, so people who are likely to know something about it are here at the time they are discussed. And hopefully they can be aggregated in some way that you don't have to attend meetings where you don't have any expertise.

CHAIR RAY: I'll take that as an admonition.

(Laughter.)

In any event we will do our best to do it. I just don't want to overlook it as well.

I guess we are ready to proceed.

MR. LINDGREN: So we have worked considerably with the NRC on developing our pipe rupture hazard analysis requirements, and addressing the COL information so we can complete it during the design certification amendment review.

The leak before break, there was an as-designed COL information item that we have basically completed. There will be some additional staff review of the final piping packages, and to look at the effects of our change in seismic input from the hard rock to the six soils cases.

So we need final confirmation, and we expect that to happen during the NIC audit of the piping packages.

And then there was - we had an as-built COL information item on leaks before break that we deleted because it was redundant with an ITAAC requirement for the same thing.

We do have a couple of open items of fairly major significance. There is one that addresses the rupture hazards analysis. There was one part of it - wanted confirmation that we were addressing leaky cracks through wall cracks. We are doing that, and it will be included in the analysis, in the reports. And there is also one that says we need to complete the pipe break hazards analysis.

As I said, we are working diligently to do that. As I said, we expect some kind of COL information item license or an ITAAC to address the - any pipe whip restraint designs that are incomplete.

CHAIR RAY: I got a process question at this point.

The statement, complete as designed pipe break hazards analysis report, should I understand that to be something that you decided you wanted to do as part of this amendment to the design certification?

Or is it something you received via a requirement that has appeared after the Rev 15 design certification?

MR. LINDGREN: Part of it is ours. There were COL information items on completing the piping designs and providing design specifications and design reports for all the components including the piping design. It has been a challenge, and we are working through it.

CHAIR RAY: But again I understand it is something you have elected to do as part of this?

MR. LINDGREN: We have elected to do it. There was a - in the next session we will talk about, there was a piping DAC, and we elected to get rid of that as part of our improved design and standardization, so you are getting one design, not multiple designs, from COL applicants.

MS. McKENNA: Just a comment. If something is a COL information item that is in the DCD, then at the time the COL applicant puts forward their application they will have to address those items, so if it wasn't part of the DCD then the COLs would have had an action to do something with respect to this as designed, and I think as was mentioned on several occasions yesterday one of the aims of

Revision 17 was to deal with a number of these COL information items as part of the certification. And this is kind of in that category.

MR. LINDGREN: The second one there is on the leak report break analysis. The NRC reviewed this early in the process. And it's looking to confirm that we still meet the requirements for our expanded seismic spectra for other than hard rock, what we've called the six-soils case. Something you won't be hearing about this time, but it is part of our application, our amended application, is to increase the seismic conditions for which this plant is certified.

As I said we expect this review to be part of the piping DAC.

Section 3.12 is a section in the SER that you will not find in the DCD. We put the piping requirements in Section - some in Section 3.9, some in Section 3.7, but the SER has a piping package - well, there is one major open item that we need to prepare for NRC review. Class 1, 2 and 3 risk-significant piping analysis to complete resolution of the piping DAC. We have been working toward this goal for a couple of years now. We included piping analysis packages, 48 of them are the risk-significant piping

packages, that was a list of the - what the NRC determined based on the information we gave them, we provided them for NRC review from February through June of this year.

The analyses address stress analysis, port designs, fatigue analysis. Some of the analysis information is based on the envelope of preliminary values, such as weight and CG of the valves, since we haven't prepared the valves yet.

The staff has done review, started an audit. They consider the piping packages are not complete due to open items and other issues. We understand the staff to consider complete means analysis package that shows you meet all ASME code requirements. We are continuing to work on the design packages to complete them. We are performing an extended condition evaluation to look at the packages the staff did not review to see if there are other areas that require additional analysis to address the same open items.

We do continue our piping design efforts to prepare CFC design documents for plans for building. That's not something we provide to the staff, but it's more than just the licensing schedule that we are working to.

And a final audit meeting is needed to complete review and response to NRC questions and issues. We have not scheduled that yet. We need to move towards completion on the analysis packages and know when we are going to complete before we schedule that meeting.

MEMBER BANERJEE: Just a question. Are those sorts of industry use packages which evaluate the stresses and things like this?

MR. LINDGREN: You mean the analysis codes?

MEMBER BANERJEE: Yes, so do they take into account things like thermal stresses and --

MR. LINDGREN: Bill, would you like to address this?

MEMBER BANERJEE: Because I assume there is thermal striping possibilities, all sorts of things can happen, right. So I just wanted to be informed about how this analysis is done for the stresses.

MR. KOTWICKI: We have standard industry codes --

CHAIR RAY: Give your name.

MR. KOTWICKI: Phil Kotwicki of Westinghouse. We have standard codes that we use that are identified in the DCD. So we have already done

piping benchmark programs for those codes. The one we use for most of our work is a program called Pipe Stress, so that's where we would handle most of the work that is associated with your standard piping analysis.

If you need to get a little more detailed you can get into some time history analysis with programs like ANSYS.

MEMBER BANERJEE: Oh, you need to get into that detail?

MR. KOTWICKI: Not that often.

MEMBER BANERJEE: But now these have loads due to valves and bends or whatever, but of course there are loads due to flow, there are loads due to temperatures, potentially loads due to stratification and vortexing, all sorts of things. How do you put that into your calculations? For example I remember the French had this big problem with dead ends where they had vortexes that used to go in and out of this dead end giving a cyclic load, and eventually a fatigue problem. How is that sort of thing handled just as a matter of information.

MR. KOTWICKI: We have identified certain locations where thermal stratification or striping, like TASCS's is kind of the terminology used for it.

But we can be doing a basically a CFD analysis that will provide the profile that the pipe cross section will see associated with those events. And that can be fed in, again, to an ANSYS or a Pipe Stress model, which if you've got a Class 1 line can also be incorporated into the fatigue analysis.

MEMBER BANERJEE: So eventually you evaluate the high risk areas in some way, and if you decide you need to do more detailed analysis you use a finite element code or something like that?

MR. KOTWICKI: There is a screening evaluation that is done to identify locations where we think there may be that potential. You do a certain amount of analysis to see whether that potential has been realized, and in some cases you go to the next step and actually do a more sophisticated analysis to generate the inputs that you would need to evaluate it in a piping analysis phase.

MEMBER BANERJEE: I guess this design in many ways has got features like ADS valves and things like that which are not that common, or not there in other systems, and these valves of course have dead ends, I mean they are sticking out of the pipes. And I remember some very interesting experiments that I saw in Chatou in EDF, that they were looking at the

formation of structures that went into these dead ends, and they went back and forth, field structures, vertical structures. And they gave risk to a cyclic load in terms of thermal stresses.

And that's the sort of question: is the staff using - well, I should ask the staff that question. But maybe we have to wait until the staff decides to tell us what they are doing. But let's see your calculations. Do they take phenomena like this into account?

MR. KOTWICKI: And, again, I explained there is a certain amount of evaluation that is done. We do count on things like cold traps where you have got hot water and you've got stagnant conditions basically. And you've got a difference in elevation where you expect hot to be up here, and cold to be down here. And we do need to do some kind of an evaluation to verify that, so analytically we show that that is true, and we can analyze the stratification that occurs in going from the warm to the cold, and that is incorporated into our analysis. I mean without getting into a ridiculous amount of detail.

MEMBER BANERJEE: Right, you're just giving an overview, so you can't get into the details.

But I had sort of remembered that this used to be quite a problem with some of the TWRs, the dead ends, sticking on to their pipes, and that is really the reason for this question.

CHAIR RAY: Do you want to follow up on this issue of dead ends? That seems to be a particular phenomenon --

MEMBER BANERJEE: I need to find out what the French did at the end. If they are still alive. The problem is these things go back 25 years.

MR. KOTWICKI: And there have been EPRI programs that have gone out and measured these things, and that's where we are getting kind of our screening criteria. There are documents out there that say when you have got these kinds of conditions, you need to look for this kind of profile for instance.

MEMBER BANERJEE: Let me ask the staff, is the staff aware of this issue with dead ends and vortex formation and oscillations in piping which gives rise to cyclic thermal loads?

MR. HSU: Okay, this is Robert Hsu.

About the condition you are asking about, this was the PWR. In the PWR design history we haven't seen that issue yet.

MEMBER BANERJEE: I thought the French

built PWRs.

MR. HSU: Those were BWR or PWR?

REPORTER: Back away from the mike a little bit.

MEMBER BANERJEE: P as known as pressurized. I thought the French were building PWRs. I didn't know about French BWRs.

MR. LINDGREN: If I can, we have - we identify in the DCD the lines that we identify as potentially susceptible to stratification and striping. We - and those are ones that require additional analysis.

Part of the advantage of the AP1000 is we were starting designing after we knew about these issues, so you will see design features that we have to avoid and it's generally simple things like keep the pipe continuously rising so you don't have a dip, and if you have looked at our pressurizer surge line, you will see that there are quite a few sets of criteria to come up with that shape.

CHAIR RAY: Okay, but it's clear that Sanjoy is talking about something that is different than what you are just now discussing.

MEMBER BANERJEE: Well, no, I think he is addressing some of it.

CHAIR RAY: But striping and the dynamic effects that you are talking about that give rise to fatigue stresses aren't the same. It just seems to me like it would be advisable for us perhaps later today come back and see if we can't better answer your question, Sanjoy, Or at least identify it as something to be answered later. Because it sounds like it's something that needs to be --

MEMBER BANERJEE: As an informational item, I'm sure they probably have looked at what happens to say the ADS-4 line. I'm sure that Westinghouse would have done that. I don't know exactly what you did. I think the staff knows what you did. So just tell us what you did.

For example that is a dead end. What do you do with that? So take that as an example. If you have this ADS core line sitting on - I guess wherever it's sitting precisely, and is it facing vertically up or is it horizontal?

MR. KOTWICKI: The ADS-4 line comes off a hot leg, comes off each hot leg, and is tied into squib valves that will open during certain events. But it has this difference in elevation that we talked about. It's basically a stagnant line that has, as I mentioned, warm on the top and cool on the bottom. As

you go from warm to cool you have something going on from a thermal systems point of view, or a thermal hydraulic point of view, could generate little cells that could move water around. I think the main issue from our point of view is to put something into our evaluation that conservatively addresses that kind of issue, so we've got - we've basically got the stratification part of that, and if it is appropriate we would account for the movement of a boundary.

MEMBER BANERJEE: And that's exactly what is found in experiments, that the boundary moves up and down with a certain frequency.

MR. KOTWICKI: And the CFD codes, these computational fluid dynamics codes, that tries to handle these kinds of things, you can turn them on and start them running and let them go for months at a time to try to determine where this thing ends up. What we try to do is a much more straightforward - we are doing piping analysis. We need to do a lot of it. You need to try to bound it if you can by what we know, and I'm not sure we know all that much. There is some data out there that suggests that when you deal with this kind of analysis you get this kind of thing. Some of these have actually - not this particular configuration, but stratification has

caused some leakage because you get this kind of thermal cycling that gets you enough cycles of enough magnitude to cause a problem.

MEMBER BANERJEE: So that is really - because as you know, we all agree, CFD codes are not reliable . First of all most of them have been tuned to handle sort of steady, relatively steady flows. So what we are talking about here is an oscillation which most commercial CFD codes would not be at all reliable in estimating. So you are basically having to rely on experiments. And there have been a lot of experiments done. But they are rather geometry sensitive. And so if you have taken a conservative approach to this, then clearly it's fine, and you have enough margin and stuff like that with regard to the cycling.

But as you know this cycling has caused problems in the past. So -- and it's not only in BWRs, PWRs as well. So it's sort of - you know, I'm just trying to get my hands around how the analysis was conducted. And I'm sure that Westinghouse identified in some ways the regions which are high risk and went through this in some systematic way and the information is available.

And we don't have the time to get into the details here. But really the question then goes to

the staff, how did this sort of confirmatory analysis was formed to make sure that there were not locations that could lead to high stresses and things like that, or fatigue, or cycling were missed or not. There is an audit function. So perhaps I should just hold this question until we have the staff up here and then we'll ask them.

MR. WU: This is John Wu from the Engineering Mechanics Branch. To answer Dr. Banerjee's questions, there is a dead end which occurs a lot, and very often in PWR. These kinds of situations normally you define as acoustic resonance. That means you have a dead end pipe go to the ADS, and then fluids getting in and out through it, when you fit in pipe, the length is about one quarter of the whip length. In this case also the baseline geometry, that means the pipe - this is - you know you got some kind of vortex - vortex shedding, those kind of stuff.

MEMBER BANERJEE: I don't want to stop you, but I think we are talking about two different phenomena. I think I am talking about a phenomena where this pipe is full of a single phase liquid, which relates to the vertical structures which form at the dead end, and the vortexes are not steady; they move in and out. And if you have stratification

above that then the front moves back and forth, causing stresses, and it's been known to lead to some problems.

Clearly this is something which Westinghouse is aware of and has certainly taken a look at. I'm wondering whether the staff has or not.

MR. WU: What I am using is probably different, maybe should look at - yes also depend on the vortex shedding frequency, in this case

MEMBER BANERJEE: Not shedding --

MR. WU: When the vortex go in the go in the pipe, go in the stagnation pipe, go in the stagnation pipes and come out.

MEMBER BANERJEE: It sits in the --

MR. WU: Right, right, similar to the full line --

MEMBER BANERJEE: It's not an acoustic phenomena. Nothing to do with acoustics.

MR. WU: It's also related to the whip length. Because it's something to do with vortex shedding frequency, and that is a - yes.

MEMBER BANERJEE: It's a vortex shedding phenomena. It's nothing to do with acoustics - it's nothing to do with an acoustic wave.

MR. HSU: Okay, this is Robert Hsu

speaking. The issue you are talking about, which is already addressed by the interchange which is proposed, this is called a swirling turbulence penetration. So coming back and forth. And this industry already proposed in the MRP-146, and issues they are talking about what kind of geometry when you have this kind of thing. Your vertical length, and then if you can meet those vertical lengths of design configuration then you are not going to be subject to the horizontal thermal stratification. This case is already - staff has already addressed in the KCD.

MEMBER BANERJEE: Let us take this up when you come up. And maybe you can in the time in between check what other people have done on this, because I think there is a lot of work that has been done on this, and I have seen some very beautiful experiments. But I don't know that they are completely resolved in terms of how to scale them, and the situations which occur. So you have to take probably a fairly conservative approach to trying to estimate the kinds of loads and cycling that occur.

And what I am really asking, I'm sure they have screened it, they have found where it occurs, they have taken an approach - they have probably taken a very conservative approach, and everything is fine.

But how did the staff determine that? That's really the question. How did you do an audit calculation, and how did you find out what the stresses were? So let's hold this, and come back to the situation.

CHAIR RAY: Thank you.

MR. LINDGREN: We are ready to move on? To close out piping, it is a critical issue with us, and we are working with staff to resolve the open items.

To move on, now I get to an even finer breakdown, start going by subsection here. In 3.9.1, the primary part of 3.9.1 are the design transients we use. There are a couple of other minor additions such as the codes we use.

But the changes we made, we added a specific daily load follow transient to the tune of 17,800 events. We reduced the unit loading and unloading transients by a like amount to 2,000 events. If you add up the two, that comes out one a day for 60 years of life.

We revised the reactor coolant pump startup and shutdown transient - now, okay, those, the reasons we did that was design finalization. We had difficulties satisfying peak requirements for - I believe it was the steam generator, but one of our

components - internals - okay. We revised the reactor coolant pump startup and shutdown transient to more accurately reflect the reuse of variable speed drives to start and slow them down.

We increased the pressurizer spray and heater cycles for load regulation to more accurately reflect how these things work, and we revised the RCS pressurization transients specifically for the steam generator to have a combination of causes rather than one, basically, because of the results of the fatigue analysis, the way we use passive safety features in this plan is a particular challenge across the two steam generators.

MEMBER ARMIJO: Let me ask a question on your load volume transients. Now those were not in the original DCD?

MR. LINDGREN: What we intended to do was have the unit loading and unloading transients handle the load to follow.

MEMBER ARMIJO: So you basically took the original 19,800 loading and unloading transients and broke it up into two parts, a milder load following, and then the more severe loading and unloading?

MR. LINDGREN: Yes, that's what we did.

MEMBER ARMIJO: Okay, I understand you,

thank you.

MR. LINDGREN: So these really are a result of design finalization, and people doing the fatigue analysis for the components, so lessons learned out of that is why these were changed.

We have some open items that are not associated with transients. There is also a table in this subsection that deals with the computer codes one uses. We have a code in piping analysis called WESTEMS that does fatigue analysis. And we did not include it in that table; we will include it in that table. And it's part of the audit of that that we have some open items that are related to validation and verification. That's one of the open items in 3.9.1 that are about fairly detailed and technical --

CHAIR RAY: I'm sorry, I thought you were going to elaborate further.

Can we go back to the prior slide before that? This is no doubt trivial, but in the second to the bottom bullet, there is apparently an editorial problem of some kind. Is that 19,800 went to 75,000?

MR. LINDGREN: 750,000, three-quarters of a million.

CHAIR RAY: Fine. And on the table then that you just finished with these open items, I guess

I'm less sanguine about the ideas that these are merely details to be worked out, and trying to discern that myself, here. But in any event, I would just note that these are open items the resolution of which we can't foresee as we are sitting here now.

MR. LINDGREN: Yes. This is a code that does not have the - do the validation and verification aspects, and benchmarking.

CHAIR RAY: Well, often we do get involved as you've seen in these kinds of details, and the adequacy of codes and so on.

MR. LINDGREN: An important lesson we learned here is, do not benchmark your code to a code that has not been benchmarked. Yes, I guess I have a lesson learned.

CHAIR RAY: Okay, Bill.

MEMBER SHACK: But this is your equivalent to FatiguePro, which we --

MR. LINDGREN: Yes.

CHAIR RAY: Bill, do you have anything else?

MEMBER SHACK: No, considering the problems that staff has had with FatiguePro, I'm sure that they are going through the same kinds of questions with this version.

CHAIR RAY: Okay, 3.9.2 and 3.9.5 focus on the reactor internals. 3.9.2 is actually dynamic vibration kinds of things, and 3.9.5 is the design of the reactor internals. There was a COL information item on providing the reactor internals vibration assessment and the predicted response, once again, as part of our amendment review we completed that generically and went to remove that COL information on it.

We completed and evaluation of the core support material for a COL information item that focused on void swelling, and similar kinds of effects on the core support materials. That's another one that was a COL information item we chose to do.

CHAIR RAY: What was that - sorry to back you up again - but completed action item for COL item on reactor internals vibration assessment and predicted response. What did that entail?

MR. LINDGREN: Vibration analysis.

CHAIR RAY: Just analysis?

MR. LINDGREN: Analysis, it predicts a response - there still is an ITAAC for the first plant to do a vibration test.

CHAIR RAY: There will be special instrumentation?

MR. LINDGREN: There is special instrumentation; they're defined in the DCD. The first unit test. And one of the requirements of the guidance on this is that you make a prediction first as to what you are going to see, and then you run the test and see how accurate your prediction is.

That development of that prediction was - and the certified design was left as a COL information item, and we have completed it during our amendment.

MEMBER ARMIJO: I had a question on your core support void swelling issue. With the original DCD. I'm trying to figure out if there is something that has changed in the design that required additional analysis?

MR. LINDGREN: We did not complete that analysis in the original certification; it was left as a COL information item.

MEMBER ARMIJO: And now you have completed that?

MR. LINDGREN: We have completed that.

MEMBER ARMIJO: What was your finding?

MR. WISEMAN: This is Dale Wiseman from Westinghouse. Basically using screening criteria developed through the EPRI programs. In the void swelling area the screening criteria is basically on

temperature and fluids, and none of our core support structures were outside the screening criteria.

MEMBER ARMIJO: What fluence level do you use as a cutoff point below which you are not concerned?

MR. LINDGREN: It's a combination of temperature over 608 degrees Fahrenheit I believe, a little over 600, and 20 dpa for the fluence.

MEMBER ARMIJO: Okay, not much happens there.

MR. LINDGREN: As a result of providing the first item to the staff for review, we revised some of the discussion about the modeling for the internal discussion. We added a discussion about the GAPs in the internals, and pulses from the reactor coolant pumps, and could finally - those are as a result of interactions that the staff - and then we also revised the locations for the vibration measurement transducers from what we had in the - by design.

MEMBER ARMIJO: This bullet here for example, it says revised reactor vessel internals modeling discussion illustrates the difficulty we have. There is no way of knowing what does that mean without asking at least one or two questions. You

need to pull the microphone toward you I think.

MR. WISEMAN: This is Dale Wiseman from Westinghouse. Basically the changes here were trying to enhance the model that we had used previously, and this is a model integrated model that has four major component submodels of the vessel, and then you get into the core barrel, and the core shroud is another model, and then there is a simplified fuel assembly model.

So the initial analysis that was done only had three of these models. It was deemed to get a better response that we needed to add more detail to the model.

Then there was also inclusion in this model of GAP elements. So this whole system model, which is what it became known as, the reactor systems model, was used in the seismic analysis then to produce loads for all the components in the vessel and the internals.

So these changes are enhancements of the model in more detail, more rigorous modeling of the gaps of the various components of the internals.

We added neutron panels to the reactor internals to reduce the fluence on the reactor vessel. In conjunction with that we also increased the

diameter of the reactor vessel, it was two inches on the diameter, one inch on the radius. Also helped to reduce the fluence on the reactor vessel. This is obviously part of our design finalization effort.

And we also added the flow skirt that you heard about yesterday to the lower portion of the reactor vessel to include the distribution of flow into the fuel assemblies. As you know this is supported by testing.

MEMBER SHACK: The neutron panel, is that what we used to call a baffle plate?

MR. LINDGREN: No, that's different. Neutron panels are on the axes here. They are sort of - you can sort of see them here, sort of a crescent shape of just extra metal to slow down and grab neutrons. This design has a core shroud around it, rather than - well, that is inside the barrel, and then the neutron panels are attached to the barrel on the outside of the barrel, in the downcomer between the barrel and the reactor vessel.

A couple of other minor changes was the - we changed the configuration of the specimen baskets and then down here the way the lower core plate is keyed into the reactor vessel change, and then the - these are the internals, and the flowskirt that ends

up fitting about here, but it is attached to the reactor vessel.

MEMBER ARMIJO: What drove the increase in the diameter of the pressure vessel?

MR. LINDGREN: It was primarily to get a little more water between the core and the vessel.

MEMBER ARMIJO: Just for vessel life?

MR. LINDGREN: For the fluence, yes, sir. It also has the advantage of, it compensated for the area taken up by the neutron panels, so there was no question about increasing velocity.

MEMBER ARMIJO: The burn panel is just a piece of steel, just a shield? Or is there anything special about it?

MR. WISEMAN: This is Dale Wiseman from Westinghouse. The neutron panels are essentially additional metal added to the core barrel. And as Don was pointing out they are located where the fuel assemblies are on the periphery, so that's where you get the highest fluence. So they are limited to those areas where the fuel assemblies - periphery.

CHAIR RAY: We've got to go back to - I guess I wanted to ask Sanjoy if this is the point at which - I'm looking here at this flowskirt, and the next - is this where we are going to get the thermal

hydraulics issues addressed that you are interested in?

MEMBER BANERJEE: Well, I think that it's up to them. But probably the effect has to be discussed on the - whenever they discuss accident analysis.

MR. LINDGREN: You are interested in the accident analysis?

MEMBER BANERJEE: Yes.

CHAIR RAY: Not in the mechanical --

MEMBER BANERJEE: Well, you know the flow distribution and the effect on the fuel and so on I see as more of an operational problem. It's very important, but it's not really that to us. It's up to you guys.

MR. LINDGREN: That section will be included when we discussion Chapter 15.

MEMBER BANERJEE: In some way though of course I'd be interested in effects on DNB and full distribution. But I'm pretty sure that you are not close to any margins there, because you include in the full distribution. So you should actually gain margin on that.

MEMBER ARMIJO: I am not familiar with PWR vessel flowskirt designs. So my question is

pretty simple: is this pretty standard only larger?

MR. LINDGREN: It is typical of the CE fleet.

MEMBER ARMIJO: So you've incorporated that into --

MR. LINDGREN: And our internals is a hybrid of Westinghouse and CE designs. The core shroud is also typical of the CE.

MEMBER BLEY: Just eyeballing it, those are pretty big holes in that, the holes in the skirt.

MR. WISEMAN: This is Dale Wiseman. The flood holes are about two inches.

MEMBER BANERJEE: And typically how many velocity heads are you losing in terms of head - just give us a feel for it.

MR. MEYER: This is Greg Meyer from Westinghouse. Just in terms of pressure.

MEMBER BANERJEE: Just velocity, just give it to me in that, I understand that.

MR. MEYER: We usually use a coefficient, conservatively about 1.2. So and that is considered fairly conservative.

MEMBER BANERJEE: Same both ways?

MR. MEYER: It's slightly different in either direction, reason being is the front end is

champfered, the upstream side. The back end is not champfered. So there is a slight difference because of that, but it is not large.

MEMBER BANERJEE: And all the flow goes through this?

MR. MEYER: There are gaps at the top and there is a gap at the bottom just for heat, for expansion that exist. But the flow area there, with respect to the holes themselves, is very, very small.

MEMBER BANERJEE: And these numbers that you are quoting for the loss factors, is that sort of consistent with what is found in the CE plants? I guess people have assessed it since they are being used.

MR. MEYER: It is similar. The CE, though in philosophy the design is similar, the size is very different, and some of the design features are slightly different. But in terms of, we will have test data that also helps us determine that pressure loss along with correlation with CFD models as part of our validation of CMP. So we tell a story if you will between all three, and it has been consistent.

MEMBER BANERJEE: If you get a situation where you get two-phased flows for this, do you still keep the same loss factor?

MR. MEYER: I don't want to speak to that, because I want to say, that is my understanding. I know in some analyses they will do that. But in terms of a final analysis, I do not know.

MEMBER BANERJEE: Would that be part of your safety analysis?

MR. MEYER: That's part of your question that will be answered.

MEMBER BANERJEE: Okay, thank you.

MEMBER BLEY: I am just curious, and maybe this is proprietary stuff you don't want to get into, but how effective is this flowskirt design in equalizing the flows and balancing? Is it a big difference?

MR. MEYER: Greg Meyer from Westinghouse. It turns out to be, from testing and CFD it turns out to be very effective.

MR. LINDGREN: Good enough.

MEMBER BLEY: Almost good enough.

MEMBER BANERJEE: Now of course you can ask questions about fretting of the fuel.

(Laughter.)

CHAIR RAY: Proceed.

MR. LINDGREN: Okay. That's all I have to talk about the internals right now.

3.9.3 talks about ASME code components, and so some of the piping comes in right here. Here's your subject: we revised the list of piping lines that we found to be susceptible to thermal stratification cycling and striping. These lines are listed in the DCD, and identified with additional analysis.

MEMBER BANERJEE: What is the table number? Somebody can give it to me later.

MR. SISK: I believe 3.9-1.

MEMBER BANERJEE: 3.9 dash 1?

MR. SISK: 3.9- 1. Let me confirm that.

MR. LINDGREN: I have it, but I don't know if you want me to read off the list.

We added a table of critical piping design analysis method and criteria for ASME code piping to capture information that was previously in the piping DAC. The piping DAC that was certified was a table of criteria and methods in the introduction to the DCD.

When we proposed to get rid of that, one of the comments we had from the staff was, that was a very nice list to have, and that we should try to keep it somehow, so we added it to 3.9.3.

We added a requirement for snubber inspection testing on the replacement program. That is new - it's new to be explicit, as it is. It was

implied before. And that is part of our working on in-service testing.

We had a COL information item that said, design specs and design reports will be available for review by the staff, that COL applicants will have those available by review.

We have completed those and the staff gave an audit of that material. So we have completed that information item.

Okay. What we provided for staff review were the design specs, and the design reports for the major components that are specifically designed for the AP1000 such as the reactor vessels, the generator and items of those magnitudes. For the components such as valves and auxiliary equipment that are more catalogue items we get from vendors, we have completed the design specifications.

There are ITAAC that require design reports for all the ASME code as built ITAAC stuff, design reports for all the ASME code versions.

So we got rid of that COL information item. We revised - there was COL information on benchmarking the piping programs that basically said if you use piping program that isn't listed in the DCD you have to undergo a benchmark program. Since we

were doing piping design, and used the ones we said - we talked about in the DCD, we did not have to do those benchmark programs. We revised that COL information.

MEMBER BANERJEE: 3.9-1 is not the right table.

MR. SISK: I'm checking it now.

MR. LINDGREN: It's not really a table. It's text in the DCD.

MEMBER BANERJEE: It's a list?

MR. LINDGREN: It's a list in the DCD.

MEMBER BANERJEE: You can do it offline.

MR. LINDGREN: Sorry. The open items in this as part of the review of the specifications and design reports, the staff had comments about the way we evaluated the J-groove weld. There was a disagreement between the staff and Westinghouse on how we applied certain ASME code reviews.

We have decided to follow the NRC staff's interpretation using the plastic analysis on that weld, and sent in a revised RAI response and the analysis is available for review by the NRC.

MEMBER ARMIJO: Now was that an analysis that had not been completed in the initial DCD in the certified design?

MR. LINDGREN: We had not done it.

MEMBER ARMIJO: You had not done it?

MR. LINDGREN: We had not done a detailed stress report of the - it turns out this is the attachment of the CRM nozzles to the head.

MEMBER ARMIJO: Right. It didn't change the design at all, right?

MR. LINDGREN: We get a little higher stress in this one?

MEMBER ARMIJO: I was just curious to find out. When does the DCD, the certified design, when does it get opened up? If the design hasn't changed, and you already did this analysis, why would you have to do it again?

MR. LINDGREN: We are in fact not changing anything in the DCD for this. This was as a result of our effort to close the COL information items that provide the reports for our review. When they review one of the reports they found this the way we had done - did not agree with the way we had done the J-groove weld.

MEMBER ARMIJO: So is this a COL open item or a DCD --

MR. LINDGREN: Well, no since we chose to close that COL information item, it became our open

item. We believe we have now responded to it in a way that will close it.

MS. McKENNA: Mr. Lindgren, I think at the time of Rev 15 it was not finished as a part of design certification, because it was a COL information item instead of design specification reports. Now that work has been done; those reports have been developed in order to resolve this information item in the certification, and that is how we have this opportunity if you will for the staff to review these reports which didn't exist at the time of Rev. 15.

MR. LINDGREN: Second open item --

CHAIR RAY: Sanjoy, do you want to take note of this open item here he is about to describe?

MEMBER BANERJEE: Yes, yes, but we are going to deal with it in a different meeting, right?

MR. LINDGREN: Well, this open item focuses particularly on the component designs of the screens if you will. The design specifications, seismic qualifications. They are --

CHAIR RAY: Well it's debris-loading stresses too, isn't it?

MR. LINDGREN: What's that?

CHAIR RAY: Debris-loading stresses too, isn't it?

MR. LINDGREN: Stresses on the screens. From any source. So this is focused on the screens as a component, not how they work in the system, but are the screens strong enough to handle the differential pressure and seismic loads and that type of thing.

MEMBER BANERJEE: What type of screens are these?

MR. LINDGREN: They are pockets.

MEMBER BANERJEE: Pocket screens?

MR. LINDGREN: They are basically pockets with screen material on all five sides.

MEMBER BANERJEE: If you just tell me they had the standard pockets - is this CCI or who does that?

MR. LINDGREN: Yes.

MEMBER BANERJEE: CCI, right?

MR. LINDGREN: That is correct. They are our vendor on this.

So the staff did a review of the design spec. Did a review and had some questions and were looking for some more information. We are pulling that information together.

MEMBER BANERJEE: Does the plant have any fiber?

MR. LINDGREN: That's really --

MEMBER SHACK: You said no before.

MR. LINDGREN: I said we had no fibrous insulation. That's really a Chapter 6 question.

MR. CUMMINS: The fiber that we have is from residual debris, dirt. So we have the inlets for that.

MEMBER BANERJEE: This should be a super clean plant, right?

MR. CUMMINS: Yes, it is going to be a super clean plant.

MR. LINDGREN: We have some drawings and documents that we are preparing. What we do is, we place them in our Rockville office and so the staff can review them there, and not have to travel to Pittsburgh to look at them.

MEMBER BANERJEE: But to answer Harold's sort of issue that the loading due to the debris could form a fiber mat, would be quite high in terms of the pressure losses; otherwise it may not. We will revisit that.

CHAIR RAY: Yes, I think the point would be, in my mind anyway, are they effective in performing their function of capturing the debris and not having it break through and go on into the recirculating stream.

MR. LINDGREN: That is really a Chapter 6 question, the performance of the streams. This particular review looked at the control and mechanical capability.

MEMBER BANERJEE: Well, the stream is placed at the periphery of the containment, a little like in Salem, or how is it?

MR. LINDGREN: It's basically a structure that is vertical near the bottom of the containment, and the pipes that allow recirculation are open on the other side. This is really a Chapter 6.

CHAIR RAY: Yes, I would prefer we have the right people here for the Chapter 6.

MEMBER BANERJEE: Do you have a schedule for that?

MR. CUMMINS: This is Ed Cummins. On the GSI-191, the special list will include it in November.

MR. SISK: There is plan to have a discussion in November.

MR. CUMMINS: But what he is after, what he wants to hear, is going to be scheduled in November.

MS. McKENNA: Yes, I think the idea is that we have proposed that Westinghouse would present to the committee in November what they have done to

address GSI-191 in terms of screens, testing, analysis, that kind of thing. The staff at that point will not have finished its review, because some of that work is things that are still coming to us. So the staff would be presenting its conclusions at a later ACRS meeting, but this would give you an opportunity to get some answers to some of the questions that you are asking.

MEMBER BANERJEE: We understand that there would be like in GSI-191 likely to be some issues with downstream effects. For example, not really going to be closed out until we actually review the downstream effects program.

MR. SISK: The plan, as I think Eileen and Ed were referring to is that we would come in at the next ACRS meeting in November and talk about the GSI, both from the sump screen aspects and the downstream effects, basically how AP1000 or how Westinghouse is resolving the issue of GSI-191, sump screen downstream effects for AP1000 in the November timeframe.

Then I think the schedule of that in January, there is a follow on staff would have a discussion for the SER Chapter 6. But we are looking forward to our discussion and answering many of your

questions I hope.

MEMBER BANERJEE: And you will not be able to close this until - I don't know, but as you know there is a lot of work going on on downstream effects by the industry group. And we are expecting to see resolution of that maybe mid-year about next year. So I'm not sure that the item can be closed out until we have all this data looked at. Because a lot of the plants are going to do this by reference. So if you look at the concept of putting new screens, they will simply do it by reference to the industry group that is approved.

MR. SISK: Yes, and Westinghouse is following the industry programs. Westinghouse is also working with the owners group on the operational side of the resolution to GSI-191. And we are looking at what they are doing and what we are doing and how the industry would --

MEMBER BANERJEE: For the existing plants there is a clear procedure for closing out each, right? I mean we have the IRT going on. We've got a representative - an expert sitting back there. So is it that the staff are actually going to close it out in the same way for the new reactor? How are you going to close it out? Are you going to have an IRT

sort of resolution of this? What is the - that's an integrated review team.

MR. LU: This is Shanlai Lu from the staff. I don't think I'm going to address the GSI-191 downstream effects. That's for the reactor system review. I just switched to the division of engineering at the active branch chief on the AP1000 on structure side, so I am not ready to address your comments or questions.

MEMBER BANERJEE: But you will do something about it, right?

MR. LU: Yes, definitely if there is a desire. MEMBER BANERJEE: But I am really asking about the procedure. Because on the operating reactor side there is a clear procedure to close out each plant, which ends up as an integrated review team and looks at all the things, and takes account of this. Each plant is closed out.

Now with this design certification process is there something similar going to occur with this or not?

MS. McKENNA: I don't know if there is such as thing as an IRT. I think we have a number of technical staff who are responsible for various aspects of the sump review, for example, how does the

debris move through the containment, what happens to the screens, what happens to the fuel. And we have representatives from each of those that are working together as a team, and the goal is to write a safety evaluation which discusses how the AP1000 design deals with this issue. And hopefully we will come to the conclusion that they've demonstrated that the core's long-term cooling is satisfied. So I think that is the approach.

MEMBER BANERJEE: But this is really just a side conversation that we want to maybe resolve at the next meeting or the meeting after. But do you really expect that you will be able to close out the issue until we have the industry work on downstream effects completed, reviewed and approved? Hopefully it'll be approved, because at that point it will be used by reference by most of the existing plants. So how are you expecting to close it out in January, when we don't expect it for the existing plants to be closed out before late next year?

MS. DIXON-HERRITY: My name is Jennifer Dixon-Herrity. I'm the chief of the engineering mechanics branch two. I've been involved with this review. Our group looks at generically across the board the way that the components are designed. We

would go through and review the design specs and design reports for these screens, and if they are designed in accordance with the regs, and in accordance with the code that they've signed up to meet, and in accordance with the DCD, then we could close this item out.

However, later on in the process, we have ITAAC in place that would look at as-built reconciliation. So anything that is changed in the design would have to be changed in the design report later; they will have to reconcile it. We would have the opportunity to look at that later as part of the inspection process.

MEMBER BANERJEE: The thing that's concerning me is that I'm sure that structurally and so on this is okay. The job - whether it really does its job or not is what is in question: function. In this case the function is to take out the debris and make sure you don't clog the core. How are you going to assure yourself that that function is taken care of?

MS. DIXON-HERRITY: I think that that is the Chapter 6 review that Shanlai was talking about.

MEMBER BANERJEE: So that's the crux of the matter.

MS. McKENNA: Certainly. Our staff is working very closely with the NRR staff to understand where they are in the review. There are some differences in the design, flows and things like that, which may lead us to parallel but on a different timetable for conclusion. But obviously we are aware of what's going on on the owners' group side and what that means for the AP1000.

MEMBER BANERJEE: I'm just skeptical that you can close it out from a functional point of view until the downstream effects are resolved for the existing plants. At that point, of course, you can. But I think it will be later in the year. So to be realistic, it may remain an open item.

MS. McKENNA: It could. I mean I'm certainly not going to prejudge, the staff hasn't finished its review.

MEMBER BANERJEE: All right, okay.

CHAIR RAY: Do we need to pursue this any further right now?

MEMBER BANERJEE: No.

CHAIR RAY: There is an open item on the structural thing. I'm not concerned about the downstream, and I'm less sanguine about the structural adequacy until I know more about the open items. So

when the staff comes up, can you discuss a little more what the heck the issues are that are at play that give rise to this open item?

MS. McKENNA: Yes.

CHAIR RAY: Thank you.

MR. LINDGREN: Let me just complete the mechanical portion of this, these screen pockets are combined into modules that are oriented horizontally and they are put into a frame. That's what this open item addresses. It's drawing that show that, and documents that show the loads on those.

Now we are preparing those documents to be available for the staff to review, with the caveat that the ongoing testing if there is some - if there becomes a difference in the pressure loss to the screens, this information will change. But it's the best we have available right now.

CHAIR RAY: So the issues have to do with the completion of these remaining details?

MR. LINDGREN: Right.

CHAIR RAY: There's been some controversy.

MR. SISK: And it's just we did not have the drawings. We gave them to a vendor, and we have them now.

CHAIR RAY: We're going to show the J-groove slide, and then we are going to stop and have a break; it's now a half-hour late. So proceed.

MR. LINDGREN: This is the J-groove weld, just so you know what we're talking about. That is the pipe that is the nozzle that goes to the reactor vessel head, attached to the CREMs. So that the - what you see at the bottom of the screen, at the bottom of the picture is the cladding of the reactor vessel head, and then there is this vaguely J-shaped weld that attaches this nozzle into the reactor vessel head.

And there was - I'm not even going to try to describe it - a difference of opinion. I'd just note that to resolve it we are doing a plastic analysis that satisfied the requirements.

MEMBER ARMIJO: Was this an old requirement or a new requirement?

MR. WISEMAN: This is Dale Wiseman from Westinghouse. The requirement has always been to meet the code. And the analysis in the interpretation of the code that Westinghouse used to show that it met the code, the staff did not agree with that interpretation of the code.

MEMBER ARMIJO: Wasn't that resolved in

the initial certified design of the AP1000?

MR. LINDGREN: We had not completed the design.

MEMBER ARMIJO: It wasn't completed, so it was an open issue for the amendment.

MR. WISEMAN: This was part of the COL item that we were talking about producing the design reports for the major components. So this was - so this analysis was part of trying to close that COL item.

CHAIR RAY: Okay. We'll pick up with the Westinghouse presentation --

MR. SISK: If I may, sir?

CHAIR RAY: Yes.

MR. SISK: I just wanted to get back to while we were on the record, I would like to correct my statement about the Table 3.9.1 You may want to check the list that is provided on 3.9-50, and also look at the table that is 3.9-19. Between the two of those, if they do not answer your question please let me know.

CHAIR RAY: All right, so we will pick up with 3.9.4 at 20 minutes to 11:00. It's 14 minutes by my calculations, which I think we need to trim the 15 by at least one.

(Whereupon, the above-entitled matter went off the record at 10:25 a.m. and resumed at 10:38 a.m.)

CHAIR RAY: Okay, picking up again with Section 3.9.4.

MR. LINDGREN: Okay, 3.9.4 there are some fairly minor changes - we changed the material of the gray rod assemblies. We did have a design that included 24 steel rodlets. We now include 12 silver-indium-cadmium rodlets and 12 stainless steel rodlets in a cluster, with reduced diameter compared to a regular control rod. The gray rods are the rods we use to affect changes, small changes, to compensate, to burn up without greatly cycling the boron concentration.

CHAIR RAY: They're also used for load tolerance, aren't they?

MR. LINDGREN: They can be used for load tolerance, yes.

MEMBER ARMIJO: Now why did you do that? Is there something different in the core that drove you to go to the silver indium?

MR. SISK: No, we did have the silver-indium-cadmium in Rev 15, and we used the silver-indium-cadmium obviously in 16 and 17. What they did

was just used it a little broader. In the original the silver-indium-cadmium was in four rodlets. We now put it in 12 rodlets. What that does is distribute the absorbent more evenly around the core and gives you a flatter flux.

MEMBER ARMIJO: This is just a refinement?

MR. SISK: That's all it is.

MEMBER ARMIJO: Okay, so it was nothing that - no fundamental change in the core that drove this change?

MR. SISK: Nothing fundamental. The other thing we are really looking at here was the use of the gray rods. These were not changing the black rod RCCA type - what we call the gray rod, which are used a little bit for the reactivity control, flux control, throughout the reactor. But that gets into current design, and it's just a matter of trying to have it a little bit smoother distribution across the board.

MEMBER ARMIJO: Okay, thank you.

MR. LINDGREN: We made a small revision in the description of how we would draw and insert the control rod to reflect that we have two coils holding it in place. And then we revised the cycling support

for the CRDM rod drive mechanism when we changed the integrated head package. Previously we had a plate at the top that - at the top of the rod travel housing. When we changed this, the integrated head package design, we changed the design with a bumper that flipped over the rod travel housing similar to what we have in many operating plants.

That's really all I have on the control rod drive.

CHAIR RAY: Okay, proceed.

MR. LINDGREN: We have no open items.

We had a fairly significant change in the integrated head package. Integrated head package is a design that decreases the time to prepare for refueling. It allows you to take pretty much everything that is attached to the head, reactor vessel head, off at one time. We redesigned the in-core instrumentation support system. We had a design where everything was drawn up into the - above the reactor vessel head. We - that resulted in putting a large radiation source in the head when we were moving it, and when we get to the final location, you push them back down into the tank water.

We put in the design that is similar to some that are included in the CE fleet that we used to

call a Quick Loc design so that the instrumentation is only drawn up into the top of the upper terminals, they're not brought up all the way out of the reactor vessel. The Quick Loc design is a design that has been used before. We reduced the radiation exposure. The highly irradiated instrumentation remains under water, so you observe great improvement to the people worried about exposure to the people in the containment.

The cooling fans are - this allowed us to reduce the weight of the shroud, since the shroud was providing shield. We reduced the weight of the shroud; that allowed us to put the cooling fans on the integrated head package, and still be under the weight of the floor crane lift limits.

We revised the seismic support of the CRDM rod drive housing, and we included a cable bridge that supports powering instruments.

MEMBER ARMIJO: This is really a brand new design, then, that picked up some features.

MR. LINDGREN: It is considerably different than what we had before. It does still have many of the features. It still has a shroud, and the shroud has openings near the bottom so you can do inspections at the top of the reactor vessel head.

MR. WISEMAN: This is Dale Wiseman from Westinghouse. The integrated head package design as it now exists is very similar to ones that we have placed in operating plants as replacement head simplifications.

MEMBER ARMIJO: Oh, okay.

MR. LINDGREN: We have a picture of the piping here. You see the fans are attached to it. There is a cable bridge that brings the cables over to a connector plate to increase how fast one can disconnect. One difference from Westinghouse fleet of operating clinics is that the instrumentation does come out of the top of the head on this system.

So this is a change from Revision 15. The overall height was also reduced. We don't have to have the height reduced the full length of the instrumentation.

Okay, 3.10 which is seismic and dynamic qualification, we added some additional information to show the - to explain what we meant by qualification by analysis. We deleted the option of qualification by experience . That was -- and therefore we eliminated a COL information item on qualification by experience.

The reason we made these changes -

qualification by experienced approved in DCD Rev 15, but it was approved on a level that I'd call theoretical. The COL information item said, tell us how you are going to do this. In attempting to tell the staff - this was yet another COL information item we wanted to close in design certification, and we discovered that when we wanted to show how this works in practice, that it's not as capable as it was in theory. The staff had problems with what we suggested we were going to do to implement the qualification by experience. We made the determination that it probably was not a large benefit and decided to eliminate that option.

MEMBER BLEY: Was this for structures?

MR. LINDGREN: No, it's mostly the pipe, the valve operators.

MEMBER BLEY: And so you are qualifying by design and not be test.

MR. LINDGREN: Qualifying by analysis is large mechanical - like steam generators and reactor vessels.

MEMBER BLEY: Right, that's why I'm a little confused.

MR. LINDGREN: We had a description by analysis that was sketchy I would guess. And we've

added information to clearly define when we use it and how we use it.

The qualification by experience, we were not attempting to use earthquake experience but rather testing experience in similar designs. And ultimately we could not come to an acceptable definition of what a similar design means or a similar test. So we are qualifying - these are things like valve operators, electronics, those are the ones that are typically qualified by testing, and they will continue to be qualified by testing. As I said we eliminated the qualification by experience.

MR. CHEN: This is Pei-ying Chen, NRC. I guess basically qualification by experience, they are following that you assign A46 concept trying to use the testing experience and then qualify. But Westinghouse produced a topical report, TR-16, initial report, staff review. However, after we raised a dozen questions, Westinghouse decided to withdraw that topical report, and therefore they tried not to use the experience.

MEMBER BLEY: And you are happy with what they did?

MR. CHEN: No, I said they withdraw the topical - oh they are using the other method, which

you know is credible through IEEE's report.

MR. LINDGREN: And then finally we identified additional information to address screening and qualification of equipment for high frequency motions. High frequency seismic motions is something we're not really talking about much in this session. It shows up in 3.7 and 3.8, but we have to address the seismic dynamic qualification for sites that have high frequency motions. And it is consistent with the screening and qualification guidelines in the Interim Staff Guidance, ISG-01.

MEMBER BLEY: Since you brought up seismic --

MR. LINDGREN: Go to the next one.

(Laughter.)

MEMBER BLEY: I want to slip in a question I didn't ask this morning earlier when you talked about seismic. Some of the changes you've made in seismic design, you mentioned in the turbine building now in seismic two you worried about the proximity of non-seismic and seismic, two things to the seismic one. And I just went back and looked through a description of the PRA in Chapter 19, and the seismic margins analysis there, and the only place I see any mention of worrying about the category two

or non-seismic category one is in the description of the turbine building, and of course that's changed.

MR. LINDGREN: It says it's not seismic, doesn't it?

MEMBER BLEY: Yes, it does. Now you haven't updated the PRA to account for these changes, and I'm a little curious about why that is. Then you replace these intentionally blank sections in that document - this might not be the right time to ask about this - it says, the design certification of the AP1000 included consideration by the NRC of the topic referred to in this empty section. That seemed a little weird to me. But the PRA was not updated to account for the changes in seismic design it appears. There is no mention of any changes.

MR. CUMMINS: This is Ed Cummins. We have an RAI on seismic margins. It's a little broader than just your comment, and we have a plan schedule for submitting updated information on seismic margins for I think December, although I'm not sure of the schedule.

MEMBER BLEY: We'll wait for that. I didn't see any thing in the old margins analysis that talked about the possible impact of non-seismic and category two things on seismic category one which

would have been analyzed in the margins analysis. So we'll ask about that when you come back on that one.

MR. LINDGREN: We are done with 19, but we are coming back with seismic.

CHAIR RAY: Done is not the right word in this context. But we have gone through 19.

MS. McKENNA: Recall that second question about the intentionally blank pages.

MEMBER BLEY: Yes.

MS. McKENNA: That was really a reflection of some changes that occurred that at the time of the initial certification the PRA was submitted as a stand-alone document to go along with the design certification. Subsequently there was a change to Part 52 that says you don't submit the PRA; you include the results, and information about the PRA, in the design certification documents.

This was an attempt to kind of bridge that. Things were not put in the DCD because they were over in the PRA, but now we don't have the PRA as part of the package, so we needed to have something in the DCD to reflect what that information was. So it's a little bit perhaps muddy, ambiguous wording, but that was the purpose.

MEMBER BLEY: You looked at what it

really was.

MS. McKENNA: Yes, that's right, that subject matter was looked at as part of the PRA, so it was an attempt to deal with a change in that requirement.

MR. LINDGREN: Okay, this slide here shows in blue - on your paper it's black on black, on this screen I think it's blue. It's generally the one that's lower. We referred to that as our hard rock high frequency specter. It bounds three of the COLA applicants for AP1000 sites. It - we are the beneficiary of a lot of work done by the Seismic Issues Task Team run through NEI to address these high frequency seismic motions.

The general consensus is that these high frequency motions don't put much energy into structures, equipment and systems, and that if you are designed for the more traditional frequency spectrums then you can handle these larger - these higher frequency motions.

In 3.10, which is the seismic qualification, it's basically a screening test, so screening is a two-part title. I mean we look at - we determine equipment that is potentially sensitive to high frequency motions. The classic example is

relays, which may be subject to chatter. But there are others that may be sensitive. They tend to be electronic devices. And any that we think are potentially high frequency sensitive, as part of our standard seismic qualification, we will do a screening test with high frequency motions to verify that they are not high frequency motions.

Our position is that we will not have any equipment that is susceptible to high frequency excitation, that if the screening test finds something that is, we will select different equipment, redesign it, or redesign the supports; but we will not have equipment that is susceptible to high frequency motion. That is a topic that was of considerable interest in the past couple of years.

We are now done with the V&V portion.

CHAIR RAY: On our list it had indicated you would do 3.12.

MR. LINDGREN: 3.12 was buried in the piping. I put it out of order.

CHAIR RAY: That's all right. So in accordance with the plan we're running about an hour late but otherwise fine. The - we will now revisit the topics you've covered with the staff. I want to give everybody a head's up to one other thing that we

will be doing today that is not on the agenda, and I'm not sure where to fit it in, but I'm not going to do it right now because of the desirability of getting on to the staff, but we received some input on Chapter 8 from one of our colleagues who wasn't able to be here yesterday or today, and I'm grateful to Member Bley for having looked at that quickly this morning. We want to note a few items just for the record. I understand we wouldn't have the right people here to respond, but as long as you are up this afternoon we will take note of a few items. But Dennis has identified in this input that we received.

MS. McKENNA: Excuse me, Mr. Ray, later in the day when we were talking about the last item, 3.6, 3.9 and 3.11 we didn't think our engineering people were going to be there to support that portion of the discussion today, so we would have staff available at that point in time. So that might be a better opportunity.

CHAIR RAY: And that is precisely when, Eileen?

MS. McKENNA: The session that is 3.6, 3.9, and 3.11.

CHAIR RAY: Item seven on this agenda.

MS. McKENNA: That's correct.

CHAIR RAY: We covered a lot of the things John raised yesterday, but there are a few.

MS. McKENNA: Okay, that way you could have the staff in the room and could hear it directly.

CHAIR RAY: Very good. So we will do it by that time.

(Off the record comment.)

CHAIR RAY: All right, with that anyway we will move directly and ask the staff to take the table for the purpose of their presentation.

MS. McKENNA: There are a number of staff we thought we might bring up, the people doing 3.2 and 3.6, to the table, cover their topics, and then they can finish with 3.9. And that also might be, depending on the questions, might be a good point for lunch as well after 3.2 and 3.6.

CHAIR RAY: Well, we'll definitely do that, whether they're done. If they are not done we'll stop and take a break for lunch. But we will see how it goes.

NRC CHAPTER 3 DSER/Ols - Sections 3.2, 3.6, 3.9.1-3.9.5, 3.10, 3.12

MR. McNALLY: Okay, I'm Richard McNally. I'm from EMB, Engineering Mechanics Branch, and I'm here to talk about 3.2, the equipment, classification,

and quality group classification. This covers both seismic and quality group.

And first of all I'd like to say why this is so important. The seismic and quality group classifications determine the level of design detail and basic design requirements that are going to be imposed during the detailed design. I would really characterize our review as fairly comprehensive. We not only looked at the changes that were proposed by Westinghouse in amendments 16 and 17, but we also looked for things that we expected to be there that were concerns or omissions.

We also performed an on-site review of Westinghouse detail design documents that were not included on the docket, in order to take a look at the level of detail that we thought was appropriate. And I'd also like to say that I would really characterize this not so much as a counterpoint to Westinghouse's presentation as looking at the issues at a level of detail presented in the application as well as a level of design completion that we would be expected to review during the detailed design.

These are really the five areas that we tended to gravitate toward, which are really represented by open items in the current safety

evaluation. The first issue that deals with augmented seismic requirements for the regulatory treatment of non-safety systems, which we refer to as RTNSS and those SSCs.

And the basic GDC-2 is what establishes the criteria for important safety and SSCs that shall be designed to withstand earthquakes. To the extent that non-safety related SSCs are seismically qualified as defined by the RTNSS as described in the PRA Chapter 19 is evaluated in Chapter 22, and - but there is really no dynamic qualification of active equipment is considered necessary for RTNSS SSCs; that was established by commission decision.

In response to RAIs, the RTNSS ancillary diesel generators, as Westinghouse mentioned, are now included in the amendment, and are located in a seismic category two building with seismic category two anchorage, which is acceptable on the basis of that commission paper.

CHAIR RAY: Now is that something that happens after the certification of the Rev 15?

MR. McNALLY: That happened back in the `80s. That had always existed. The issue as we talked about before was that these were not classified as anything in the application. The ancillary diesels

were always there in the design, but there was no classification assigned to them.

CHAIR RAY: Was that an oversight in the certification?

MR. McNALLY: Yes.

CHAIR RAY: Okay.

MR. McNALLY: The applicant considers seismic classification of SSCs to be complete, but if design finalization identifies change, the design change process should identify changes that would impact the detailed application in regard to classifications. That shows that the design is still evolving.

Seismic requirements if needed to support functionality are to be better defined for RTNSS SSCs. Right now the focus for seismic consideration for RTNSS-type components is with the Criterion B, post-72 hour functions, and the emergency diesels - I mean the ancillary diesels, would be ones that are included in that definition. Right now the only seismic requirement that pertains to that is anchorage and seismic category two definitions. Seismic Category II by itself does not ensure functionality, so if these diesels are needed after a seismic event to be functional, then they should have augmented

requirements that apply to them. You may not need a dynamic qualification but you could require a more detailed dynamic analysis.

Another approach would be to replace the diesels if they would be damaged in a seismic event. So we are trying to work out the details of the seismic requirements with Westinghouse. Some of these may be ironed out in the detailed design documents. Some of the RTNSS requirement documents, or possibly the design reliability assurance program. This may result in a feature change to the DCD in order to make it more clear what the exact seismic requirements are for diesels and other RTNSS equipment.

Another open item that we identified was related to the first item concerned the scope of the SSCs that were included in the classification tables. During Amendment 16 we selectively included items that we expected to be on the list. As we identified the ancillary diesels were an example of something that was not there. Fire protection classifications were not there. RPV insulation was not classified as well as electrical instrumentation type components were not included in the tape.

These are somewhat contained in Section 3.11 for environmental qualification, but no seismic

designation is really assigned to those components in 3.2. So that is a thing that we'll have to work out with Westinghouse.

And then in Amendment 17 we did add the ancillary diesels but not the other components, RPM insulation, the circulating water system, which may be considered site specific. But none of these components are really classified in the DCD rather than in the COL applications.

So again this is a situation where staff is going to work out the detailed requirements with Westinghouse when we do reviews of their non-docketed type information. Some of the information that we have looked at already is really in topical reports, but we haven't totally endorsed those topicals at this point.

Another thing we looked at that we felt was not sufficiently addressed was augmented QA requirements for Seismic Category II SSCs. This is something that is in Reg. Guide 1.29. It's a regulatory position that the applicant has said they conform to, but when you look at the classification tables, there is really no augmented requirements to distinguish Seismic II SSC quality requirements from other normal non-important to safety equipment. So we

felt that there should be augmented requirements imposed on that. And this is something we would look at doing onsite reviews of design specifications and other topical type reports.

Another item that we focused on is the list of SSCs needed for continued operation following an DBE. This is something that's in the Standard Review Plan, 3.2.1. It's something that Westinghouse felt they did not need to address initially because it was not included in the version of the SRP that they used for preparing the design control document. But they agreed in an audit that this is something they would respond to. So we did issue an RAI. We are still waiting for the RAI response, and the list of these components is really needed more for pre-earthquake planning than it is for design purposes, but that list is something that the SRP infers we need, so hopefully that will be resolved with the RAI response.

The last item that we identified that we felt was not adequately addressed in the DCD was supplemental requirements for non-safety related passive type SSCs important to safety. We found that most of the components that were listed in the design reliability assurance program were active-type

components, and as you would expect those are the components that you would most be interested in when it comes to reliability. On the other hand we felt that passive components do and can play an important role in ensuring that these systems function. An example would be service water piping. Non-metallic piping had been proposed for that ground application, and we felt that it would be appropriate to include augmented requirements for risk-significant systems such as service water, which are identified as being risk-significant. And Westinghouse has clarified that they are using this for very limited applications in service water, and possibly component cooling water, and so we are trying to work out the details of what by doing our own site reviews.

Another example could be metallic piping in buried applications. We would want augmented requirements to make sure that that piping would not corrode excessively, with the appropriate coatings - cathodic protection and other measures - to ensure its integrity.

So this is another example where we are trying to look at the detailed design documents to ensure that proper supplemental requirements have been imposed in order to comply with the intent of GDC-1

and GDC-2.

So are there any questions?

CHAIR RAY: Well, no, I just think as an observation all of the things you describe makes one wonder how the original certification stood in terms of addressing these issues. We've heard often that well, they were COL information items. They would have had to have been addressed by the COL applicant for example. Or there is DAC that has provided some measure of criteria of what was expected.

What you are describing here is, now we have taken this additional step, the applicant has, filled in a lot of this information, that's good, we review it and decide if it's okay. But supposing we hadn't? That's not a question for you. I'm just telling you, that's one of the things that we have to think about.

MR. McNALLY: My only explanation is that this is really related to the design acceptance criteria, and I think it was recognized that the detailed design was going to be progressing, and that some of these design details would be available later on in the design. And it's also with the understanding that staff doesn't do a detailed review of every individual component in the plant. We really

tend to focus on the criteria, and then selectively see how that criteria is applied. We don't perform really a quality control check. We expect the applicant to do that. So hopefully during the detailed design, during future engineering design verification inspections, these types of discrepancies would be identified and corrected.

CHAIR RAY: I don't know whether we want to call them discrepancies or not. The real question is again is - are the design acceptance criteria sufficient, and now we are simply replacing them with the details? Or were they not sufficient in the first place? Again, that's a rhetorical question. Don't try to answer it. I'm not asking for an answer. But that is nevertheless an issue that we are trying to get some understanding. I mean it's fine if now you know the answer to the design acceptance criteria questions. Amend the certification and put it in. That has all the benefits of standardization and reduced uncertainty and so on and so forth.

The real question is, were the design acceptance criteria originally sufficient? Okay? All right, go ahead.

MR. McNALLY: We still seem to be working through exactly what requirements we should place on

RTNSS components. That's an open question we keep coming back to, and yet I'm not sure we have a completely satisfactory answer except to sort of wrestle it out case by case.

CHAIR RAY: Well, it is an open item in this case, isn't it?

MR. McNALLY: Yes, exactly what requirements should be met.

MR. CUMMINS: Ed Cummins. We believe that the certified design established the requirements for RTNSS, and that the staff is taking a different view of that. So we are not in agreement with this reclassification of equipment to higher standards than were already recorded in the DCD.

MR. McNALLY: I believe our position is that it is up to Westinghouse to dictate what the augmented requirements should be in order to ensure the reliability and functionality of RTNSS-type equipment, and that should be identified in their PRA and the whole RTNSS process. So if Westinghouse can justify that the equipment need not be functional after a seismic event, that they don't credit it, and there is a good basis that is documented for that, then staff would concur with that approach.

CHAIR RAY: These are simply examples at

least in my mind that are food for thought as we consider this process that we are all engaged in here and see what we can learn from it. Okay, questions?

MS. LI: I am Renee Li from engineering mechanics branch two. The topic I am going to discuss is completion of design pipe rack hazard analysis report, which is within the scope of SRP 3.6.1 and 3.6.2.

The regulatory spaces for these topics --

CHAIR RAY: Good heavens. That's awfully wordy slides.

MS. LI: -- which requires the SSCs important safety design to accommodate the dynamic and environmental effects resulting from postulated pipe failures. Before my discussion I would like to make a note that there are two aspects involved in the pipe rack hazard analysis, the design aspect, and the as-built reconsideration of the construction.

The staff's review for the design aspect includes reviewing the applicant's methodology and the criteria for evaluating the effects of postulated pipe failure. The staff also needs to verify that the pipe rack analysis report, completed by the applicant, is done in accordance with the criteria and methodology described in DCD and in applicable regulation.

And then the as-built reconsideration is to ensure that the plant is built in accordance with the design and meets applicable regulation. Based on this review, the staff found in NUREG-1793 that the applicant's criteria and methodology as described in DCD is acceptable. The staff also found the as-built reconsideration does include in PO1 ITAAC is acceptable.

As I said earlier, so today I am going to discuss the completion of the design, pipe rack hazard analysis report. Let's go to the slides. In AP1000 DCD Rev 17 and two subsequent letters, dated June 30 and July 22nd, 2009, Westinghouse proposed changes to DCD subsection 3.6.4.1, which is COL information item, and 6-1.

It is pertaining to the completion of the design pipe rack analysis report. The analysis was to be completed prior to the approval of the amendment, and the COL item was removed. In those subsequent letters I mentioned before, Westinghouse stated that it will complete the design hyper-analysis report, which the exception of some pipe whip restraint, and jet shield design by December 31st, 2009, and the completion of the remaining pipe hood restraint and jet shield design will require and modify a COL

information item to be addressed in a COL Application.

And this is what our plan is, upon the completion of that report by Westinghouse, the staff will perform an audit which is expected in early 2010, to ensure the analysis is indeed performed in accordance with the criteria outlined in DCD Sections 3.6.1.3.2, and 3.6.2.5. For all the piping system within the scope of SRP 3.6.1 and 3.6.2, and meets the regulations.

So pending a satisfactory audit of the design pipe rack hyper-analysis report, and modify the COL information item, or an ITAAC item that requires COL Applicant to complete the remaining pipe whip and jet shield design, the design pipe rack analysis is still considered as an open item.

And that concludes my presentation.

CHAIR RAY: Thank you, Renee. Any questions?

MEMBER ARMIJO: When that final pipe whip and jet shield design is completed, does it ever get into the DCD in any form?

MS. LI: The DCD describes the criteria and methodology for those design, and so as I said when I audit the pipe hyper-analysis report, I will verify the methodology in the report if indeed it is

consistent with the criteria that are in the DCD.

MEMBER ARMIJO: It doesn't have to? I guess my question is more toward Westinghouse. Once you have completed all this work you have all that design detail, that information into a DCD in some form so it isn't sitting out there in space, in COL land or something.

MR. LINDGREN: This is Don Lindgren with Westinghouse. We have currently conceptual designs of a couple of restraint designs in the DCD. If we do not - if the current plan does not complete whip restraint designs as part of the review of the amendment, there is really no mechanism to get them into the DCD after that. It becomes a COL Applicant responsibility. This is really a level of detail that typically is not included in the DCD anyway.

MR. SISK: This is Rob Sisk, Westinghouse. As I think Renee correctly indicated, the criteria and the process for what needs to be done is in the DCD. What we're really talking about here is the actual review of the calculations and the work that will have to be reviewed by audit. That kind of information is not normally maintained at the DCD level, but the criteria and the process and requirements are what would be helpful. So I think

the answer to your question is, we would not come back for this purpose to put these calcs or these work restraints into the DCD. The procedure, the criteria, didn't change; it just needs to be completed.

MS. LI: Yes, to supplement that, after I complete the audit, I would refer to the Westinghouse report, technical report or whatever they call it, which will be in SER supplement. And then that would be on the docket. So I think - but the detail would not be in the DCD.

MEMBER ARMIJO: Thank you.

CHAIR RAY: Okay, next.

MS. McKENNA: Okay, we can bring up the next couple of staff, or we could break it, it's your decision.

CHAIR RAY: Well, I don't think it's time for us to take a break.

MS. McKENNA: Okay, then we will see how far we get.

MR. WU: My name is Cheng Wu. Actually I'm known as John, John Wu, that is my name. So today I am going to talk about the Section 3.9.1, special topics for mechanical components. And in this section we covered two parts, changes, one is design transients. Three items related to design transients,

and one related to fatigue analysis program called WESTEMS.

The design transients, we also looked at design transients. We have - I think Westinghouse covered this very well on these design transients. Then plant unit loading and unloading transients, which used to be 19,000, but now reduced to 2,000 based on Westinghouse - actually loading and unloading is split into two parts. I think Westinghouse mentioned this earlier, two parts, one is loading, and unloading transients and the other one it is the load follow op. transients. And actually this transient normally assumes one occurrence per day, or reserve, these two combine, one occurrence per day. So one occurrence per day, so you operate for 60 years, so approximately - about 22,000. And 22,000 you estimate about 90 percent operation time, you got about 19,000 estimate. So this is broken up into two - also there is a reason involved. Because once you have loading and unloading, they are not occurring simultaneously. So once you have loading and unloading, it splits into that 2,000 and 17,000.

MEMBER BLEY: When you think about that, one per day is a real over-estimate for a new plant in most applications. For a 40 or 50-year-old plant in

other applications I don't know, have you thought about that? This is for the whole 60 years, right?

MEMBER ARMIJO: I guess these were - loading and unloading, is that equivalent to pump startup and shut down?

MR. WU: Pump startup and shutdown, that's a difference.

MEMBER ARMIJO: I wanted to get clear on that.

MR. WU: Pump startup and shutdown, I think that they originally did have different definitions. Now, to separate it to become startup and shutdown, okay, two conditions. So two conditions is startup, that it probably has half position, you know, startup, you know, the critical, something like that, like half position you start, one pump's already idle, something like that. And the shutdown it also have a similar case, like three already shut down once they're operating; these are similar, these two. So they actually and this is a new definition, it combined become one transient. So ordinarily it's at 1,100 separate now it's 2,200. So those are the three transients we cover. I look at the history, background involved. They are acceptable. Leave no question, no open item on that.

Number four, the fourth item is related to -- is something to do with FatiguePro, because FatiguePro is --

MEMBER SHACK: But that's what I'm curious - this is now they're doing the whole piping design, so they have to do an ASME code fatigue analysis.

MR. WU: Exactly right.

MEMBER SHACK: Are they proposing to do that with WESTEMS?

MR. WU: They have been using WESTEMS. That's why we know, I would think that now a lot of new plants, and a lot of operating plants, you can choose WESTEMS or like fatigue analysis. Consider those as the post-process of ANSYS. Sometimes ANSYS can do fatigue by itself, and sometimes not. And sometimes you say, this is only the post processor or pre-processor. So post-processing and pre-process sometime, you don't have to list for review. So that is sometimes --

MEMBER SHACK: They don't want to live with a conservative code piping design rules. They want to do finite element analysis for the fatigue.

MR. WU: They were two type of the criteria. One is based on the finite element

analysis. Also, NB-32 analysis. And the joints, piping, 3600, NB-3600.

Now I think this is a fatigue, this is a WESTEMS that contains two, 3,200 rating is suitable, and it's good for a component, fatigue analysis, because of finite elements. And 36 is good for piping. And because we are aware there is - and I think Robert Hsu is an authority when he did the review, the audit, and he finds basing it in the calculation WESTEMS was mentioned in the calculation for fatigue analysis, and how come we don't have those, we never know. So now we - because that is a FatiguePro issue before, so we start have an RAI here. The thing with RAI there is that because of a lot of information is proprietary. So we cannot get it. So we go to the audit. In Westinghouse audit in Westinghouse, and because it is WESTEMS for the fatigue analyzers, this now is Version 4.5, so it's evolved quite awhile, maybe last 10 years, something like that. So there are a lot of documents.

So in that valid documents -- mostly are in their electronic system, I would say in their NRC EDMS system, something like that, EDMS, you know, everything is stored in there.

So therefore not old hard copy are

available for reading. So now we review portions and we ask them for some portion -- which WESTEMS provided to do their analysis, or to do their -- documents, you know, the result in the documents. Then after the audits we continue the follow up audits in here, in Westinghouse Rockville office. So that is what come true because the first open item we say, complete -- documents make available for our review. So because we have all the documents in Westinghouse Rockville office we continue with a follow up review. So that first open item is closed.

The second open item is related to really to our - actually related to their methodology. Their methodology is WESTEMS. WESTEMS is, first of all, they use one degree of increased interval, like you increase one degree, and which is used as the database. If they have a different temperature, they go through integration, then we find out the final results, and this one degree they use - sometimes they use a Westinghouse program, WESTEMS, sometimes they use ANSYS to do this. And we were saying, well, because of the material property, the material property is the function of temperature, like high temperature, you got 27.7 or something at high temperature, but the low temperature probably has 30

10 to the sixth psi. So in each case, how you justify, you use the right one, how you do it, okay. That is the second question. So you may end up with a very different results if you use one degree.

So now this is a question that we've got to answer so they give us response, and also mention one of the Westinghouse guidelines. And Westinghouse guidelines, which we - the very late stages about the end of September we got that document. And we look at that document. And the guideline, it is also - I don't know if they are proprietary or not - but they have some kind of temperature. Overall if they select a raw E or raw Alpha as the material property, then the probable discrepancy may be only as much as 15 percent. So 15 percent actually is not too bad. So therefore they have a suggestion - they use it. They either use the average one so you cut 15 percent in half, or you use like a very typical, very representative one to do it.

So and there are also - once they do it, they also compare it to do some kind of benchmark finite element measure to compare how good it is. And once it's good then they do the analysis, use those parameters to select it, to do the analysis.

And I think we can assure this way to do

you know, to do that integration, to do the final stage result, over wide range of temperature, will be - it is appropriate and maybe conservative, they make sure it's conservative.

So but we will - we accept these guidelines. Only thing the guidelines are old, but old as users. The guidelines is a separate document, it's not in the users manual. So that the user has to avail these guidelines, how to avail these guidelines. That is Westinghouse probably in the future.

But the methodology of the guideline, we accept that we're their guaranteed to get a good result. Therefore we say this issue will be closed.

MEMBER ARMIJO: But the WESTEMS code has not been submitted for review and approval to the staff. You are doing it - they are telling you they're using it; it's proprietary. You go to their site and you audit it and you say, well, we think the approach is okay, but we've got some technical issues, you are still working on that.

But the problem I have is, what if it changes? And the methodology changes, or input, or data or something.

MR. WU: That's right, that is the last one. They want to accept we close it as the number

two open item.

MEMBER ARMIJO: How does the staff independently check fatigue analysis done by WESTEMS? Do you have your own code that you use to just do a sanity check at least on the results?

MR. WU: We don't - we have the code, but we don't check it. Right now we don't check it. We haven't checked it. It is an ongoing review of the Westinghouse, still ongoing review.

MEMBER SHACK: They are checking against benchmarks.

CHAIR RAY: Westinghouse is checking?

MR. WU: Westinghouse is checking, it's always reviewed, they are checking with benchmark problems such as like ANSYS they have temperature distribution from beginning to the end. So if they check that, WESTEMS, they can verify - validate with those results. We think that they probably --

MEMBER SHACK: I am still a little surprised they want to take the conservatism of sort of using this code and then picking a conservative benchmark. When you are using this as a fatigue-monitoring program it's one thing, because every transient is different, and you don't want to have to do a calculation for every transient. They have a

couple of stylized transients here. I mean I'd just do the analysis for those transients, and I multiply by the numbers, and I'm done. Here they are going to go through this thing, and take a conservative penalty. It's their call, but it does seem a little strange.

MR. WU: Right, but it's our review, so we take it conservative, at least - we accept that.

MEMBER SHACK: Now this takes care of the kind of classic fatigue stuff. Sanjoy of course has left. We won't even get into his vortex syndrome. But how about all the criteria that they are using for things like - when they are really looking at things like from the striper. Are those reviewed by the staff and accepted as reasonable criteria for determining likelihood for striping?

MR. WU: The striping which is not - it's not included in their - not done by the WESTEMS.

MEMBER SHACK: But do you agree with their criteria? Or is that reviewed in some way?

MR. WU: Yes, the criteria, we look at the criteria as actually a part of the methodology, the criterion, 3200, you satisfy the codes.

MEMBER SHACK: No, no, I meant these criteria for when you have to consider thermal cycling

or thermal striping, for example, or stratification. You know sections of piping system that have a slope greater than 45 degrees from the horizontal plane are not subject to thermal stratification cycling and striping thermal loads. Is that --

MR. WU: I think I would let the piping -

MR. HSU: Okay, basically, WESTEMS, this is Robert Hsu, okay.

REPORTER: Could you back away from the mike?

MR. HSU: Basically, the WESTEMS is a computer code, which is just take advantage of the computer, use the transfer function method, okay, to determine the stress. As far as you talking about the thermal cycling and striping, and stratifications, all those cases, that is your input, based on your input. You got to input a cycle number, and then you input it, temperature and pressure. They automatically calculate the stress for you. And then you have all those different transients combined. Maybe you have 40 or 50 transients, and each transient with a defined number of cycles and the temperature and the pressure and the computer code automatically calculate the stress, automatically select the max, peak and the body and calculate for you. So all this, whatever

cases we are talking about thermal stratification, all those cases, is just based on your input.

MEMBER SHACK: But at the moment they are coming in with an analysis that counts up those cycles we have been talking about before, and they are not really bringing in I don't think a thermal striping analysis of any particular component. Yet somehow they are assuming they are designing those away.

MR. HSU: Right now whatever they did is for example, the cycle for thermal stratification at this stage based on their best estimates they assume, and if they have the COL item, which is the surge line thermal stratification monitoring program, with this thermal stratification monitoring program they are going to verify whatever their input, whatever they assume, their best estimate, of the thermal cycle will still be valid. This monitoring program is including the hot functional and the force fuel cycle, and after this they were re-verify, or you could say they were evaluated. All the data they collect, and then compile that data and determine is there analysis where the envelope by the --

CONSULTANT KRESS: But I don't think the plants are like that, are they? That program is not looking for thermal stratification I don't think.

MR. HSU: The code is just performing analysis.

CONSULTANT KRESS: I understand that. But the assurance that you don't have thermal striping in various components it's not looked for in this initial test program.

MR. WU: This is Westinghouse. They use the MV 3200 and MV 3600. Thermal striping and thermal stratification which is non-uniform coverage, and that is actually not in the regular piping codes, it doesn't cover that. Westinghouse is developing the code to cover this certification, but they have now - it's still under review right now.

So in other word the code, the ASME code, we assume circumferentially uniform piping, the temperature is uniform. So that's what Westinghouse is using now, equation 10, 11, and 14 to cover that. So this is - I don't think WESTEMS is proper to be used for those cases.

MEMBER SHACK: That's an interesting comment. There is at least one location where you think stratification might be a problem, there is a COL action item to go out and monitor that.

MR. HSU: The problem is because of - they cannot determine the stratification profile, and

stratification cycle. They can use their best estimate at this stage, but they have to verify it later.

MEMBER SHACK: Are there any other cases like that?

MR. HSU: Any other cases - you talking about thermal stratification or what?

MEMBER ARMIJO: Yes, any kind of thermal fatigue, any kind of thermal fatigue, that says, okay, these are the suspect areas. We think we have designed the problem away but we are not sure, so we are going to monitor that.

MR. KOTWICKI: Phil Kotwicki from Westinghouse. We got into this a little bit a little earlier. There was an initial screening criteria that identified locations where you could have the potential for several of these issues.

MEMBER SHACK: But assuming that changed the design.

MR. KOTWICKI: But you could analyze for them with something like CFD, to see whether or not what you thought was true or not, and sometimes it is and sometimes it isn't. And if it is, you can either design for it, or you can try to change your layout or try to accommodate it.

Certainly WESTEMS doesn't tell you whether or not you have it. It's something else that tells you whether you have it, and then you can idealize it so that WESTEMS can evaluate it. So that is what they are looking at here.

MEMBER SHACK: But I mean that is not part of the ASME code analysis?

MR. KOTWICKI: It's required as part of the ASME fatigue evaluation. So if you have a transient that acts on a component, and you have a component that is in a regime where you've got some kind of thermal cross-section that isn't uniform, then you need to account for it somehow. So the stratification, the piping, the turbulent penetration, all of these things can be idealized with code like CFD and/or ANSYS, and if you've got a very detailed component that you need to look at, you can do a detailed finite element analysis and get temperature distributions that can then be fed into a code like WESTEMS that is going to give you what the ASME code is asking you to evaluate as far as ultimately stresses and allowable cycles.

MEMBER SHACK: Okay, but then these criteria sort of set up where you start to go look for these sorts of things?

MR. KOTWICKI: These criteria being?

MEMBER SHACK: The things on page 3950, which identify where I might get stratification.

MR. KOTWICKI: Like we had mentioned in the MRP or EPRI defining locations where these kinds of things have been identified before. So if you've got layouts, or you've got changes in elevation where stratification could potentially occur, or you've got turbulent penetration, or you've got all of the things that they list, there are at least to the best of their knowledge available ways to go through and screen for those. And you take the next step after the screening to see whether or not it pans out as a problem or not. Not necessarily a problem, something that you need to take another step. Either it will go away - well, I thought it was but it really isn't. Or I thought it was, and yes it is indeed, and I need to evaluate it.

What they tried to do obviously - not obviously - but what they tried to do is address it as conservatively as they can originally, and if that gets them through all the better.

MEMBER SHACK: You could say there that the screening criteria might have missed some, and once you get the plant built - you won't be able to

find those because it's all insulated and not instrumented for?

MR. KOTWICKI: You always have surprises. There will be cracks. It sounds like a good process to me.

CHAIR RAY: Okay, let's pick up and see if we can move forward.

MR. WU: Okay, so that is polar obstructing the non-uniform casing. That concluded first open item. Second open item we accept. The third open item is related to WESTEMS. In the WESTEMS they have the option to use - they use the summation of moments in three algebraic sums of the moment in three directions to determine the peak and valley type points and then to do the - from there evaluate the strengths before they can analyze this. This - we have - we still have the problem dealing with the issues of algebraic sum of moment in three directions which particularly doesn't mean anything and also can be something else. But this Westinghouse now still has the responses to -- they use that to determine the peak and valley type points only and not to evaluate the moment based on the ASME codes. The moment you have has to be obtained using that three equations. So this is - we are still not - Westinghouse in their

response they give what they use for this, this kind of result of the moment, they give the reason they use that. But it's a critical reason, it's in the technical basis. It's not clear. So this is - also we can still not accept this adequate sample.

So this is still remaining, we still need to have a discussion with Westinghouse on this. So this is number three of the open items, still open. And we have to follow up with Westinghouse.

Number four is because of doing the audits we find sometimes benchmark problem has a different input as the WESTEMS run, WESTEMS computer run. So given this - because of that, the comparison were meaningless. Because you got - so with what in Westinghouse the response was, they were - we do this, and use the same input consistently. And the result, the benchmark problem results will be available in December of this year. So we wait until December of this year for this. We will see what we will get.

Number five, open item. We asked Westinghouse, they showed they have an interactive option, they can do that from the PC interactively and run the WESTEMS. And this interactive WESTEMS, and you also can revise, like revise, if you have a lot of different transients, some transients that is not

proper for WESTEMS, they can revise it manually. So they can revise the input manually, then after that then they will - after that they revised the input put in the WESTEMS, and get it out. Put it in the WESTEMS, and they are documented.

Then after that document, so they know this is revised so many times you input, you can input material property or the loading, the loading configuration. So we think that this is manually multiply the inputs without some certain configuration control. First of all you can conglomerate controls. You got to document the records to see why you needed to revise the input, what the reason and et cetera.

So they don't have those amalgamation of controls. So we still need to discuss this with Westinghouse. So this still remains open and needs to be discussed. So we already sent number three and number four followup RAIs to Westinghouse for their response, and number four will wait until December to see what we can. That conclude my --

CHAIR RAY: Any questions for John?

All right, hearing none we will resume at 1:00 o'clock.

(Whereupon, the above-entitled matter went off the record at 12:04 p.m. and resumed at 1:00 p.m.)

CHAIR RAY: Okay, let me get us on the record here.

The next topic we have is 3.9.2. If our resumer doesn't show up we will skip over to 3.9.3.

MS. McKENNA: Same presenter. I'm sorry.

CHAIR RAY: Let me just say that at this point in time, for those who have commitments at the end of the day, we are running behind, as everybody knows. I can't estimate exactly how much at this point, but an hour or so. I hope we will catch up some this afternoon. But we do have one added item that I mentioned earlier that we will be dealing with as part of the NRC final presentation, item seven on the agenda.

So my expectation is that we will run beyond the advertised time, but we will try and keep it as little as possible. Gathering together like this is hard enough; we don't want to do anything to not get everything out of that we should while we are here. So we will run over some if that is necessary.

That having been said, where are we, Eileen? Are we ready? Ready to go, so let's resume, I should say.

MS. SPICHER: Hi, my name is Terry Spicher, and I work at engineering mechanics branch

one. In SRP Section 3.9.2 is dynamic testing and analysis of system structures and components. And in this SRP section we address the criteria, testing procedures, and dynamic analysis employed to ensure the structural and functional integrity of reactor internals under vibratory loads.

This Rev 15 of AP1000 the staff approved this section, and it was certified. In Rev 17 they had a few changes that were discussed earlier today. And one area I was going to talk about, and that was the flowskirt.

We did have an open item, it was OI-SRP-3.9.2-EMP 1-07, and that open item was related to the flowskirt. The flowskirt we know creates a more uniform - in the flow distribution to the fuel bundle. After we reviewed the information in Rev 17 we were a little concerned and requested the applicant to discuss a potential for the generation of vertices in the region of flowskirt, and if it had any type of potential adverse effect on the response of other internals.

Westinghouse did provide us with analysis information that explained the diminished likelihood of large vertex formation in the lower plenum was unlikely. They also discussed with us the lower

vibration - I mean, excuse me, lower velocity gradients from the greater flow uniformity, and it diminished the large vortex formation. As well the flowskirts are used in System 80 plants, and we are able to review reports from these System 80 plants, which also show that the vibration was lower. So open item OI-SRP-3.9.2 EMB 1-07 has been resolved.

CHAIR RAY: Very good.

MS. McKENNA: Okay, now we are going to proceed. Is Tuan Le here?

CHAIR RAY: Right.

MR. LE: Hello. My name is Tuan Le. I did technical review for 3.9.3.540. The SME has one, two, three components, and components four support structure. In the review the DCD amendments, the COL items, one COL item, this item is allowed staff audit design specification and report was deleted, as a result of this, because we established the audit for the design specification reports, those were provided by the Westinghouse. And staff considered this change acceptable with the exception of the piping review which is addressed in Section 3.12. During the 2008 staff conducted an audit for AP1000 for specification and reports. Staff identified two open items, one is the reactor vessel J-groove weld did not meet the ASME

report.

MEMBER SHACK: In what respect?

MR. LE: In respect of the - staff reviewed the design report indicating the stress on the welds were exceeded with respect to the code and the plastic analysis did - was performed in this area, demonstrates the desire to meet the requirements of the code.

The second item --

CHAIR RAY: Did that answer your question, Bill?

MEMBER SHACK: Yes.

MR. LE: The second item is regarding the containment surface and screen designs. We asked Westinghouse to provide details in drawings, design loads, load combinations basic for pressure loading on the screens so the staff can do additional review of that.

So there are two items. As now, the first item, I believe, is response from the Westinghouse indicating they had completed the plastic analysis and start enforcers scheduling to do additional review on that as the confirmation items. The standard review, their plastic analysis, and also the previous assumption that they had in the integrating package

that the do particular analysis for J-groove weld, make a determination, the second determination for the weld joints. So that's own the road.

The second item, they had a containment on the surface screen, that is still waiting for the small details, just now we provide to the staff for review such as drawing has not provided to the staff, to take a look at it.

That is our only two items that is for 3.9.3 open. Is there any question, discussion?

CHAIR RAY: Well, in the case of the screens, what existed as a requirement in the existing certified design?

MR. LE: The existing requirement for the design is considered as the latest Westinghouse product for the screen was the safety-related component. The design criteria conformed to the GSI-191 which relates to the Chapter 3.6. With 3.9.3, we look at the loading combination on the screen and the related debris that are blocking the screen, how is the integrity of the component stands in the load of the debris, of the mass of debris. And also the difference of pressure above the screen.

CHAIR RAY: What is the certified requirement? Can you say that in a simple way? What

is the certified design requirement with regard to this issue?

MR. CUMMINS: This is Ed Cummins. There is a COL item in DCD, Rev 15, related to screens, because the GSI-191 was still going back then, and there wasn't really an approved methodology to analyze what was needed, and so we agreed with the staff that we would have a COL item on the design of the screens. Now that might not answer his question directly, but certainly there was an opening for additional review.

CHAIR RAY: That's fine, Ed, and I think answers the question. This is intended when this open item is closed to replace that COL information item. Okay. That's the simple answer I want.

MS. McKENNA: But the COL item is actually broader than just the structural analysis of the screen.

CHAIR RAY: I'm sure it is, Eileen, but I'm just looking at this narrow question.

MS. McKENNA: I understand.

CHAIR RAY: This issue is being questioned today because the COL information item is intended to be replaced by this and other things that will address the issue. Thank you.

MS. LI: Any other questions?

MEMBER BANERJEE: What is the buffer?

MR. CUMMINS: Ed Cummins. The buffer is trisodium phosphate.

CHAIR RAY: Okay, 3.10.

MR. CHEN: Section 3.10, seismic dynamics. My name is Pei-ying Chen from engineering mechanics two.

The change - significant changes from Revision 15 to 17 are basically two areas. One, Westinghouse decided not to use the experience-based approach for seismic qualifications, and therefore, those area of DCD has been removed.

The second area is that basically it's a spectrum exceedance in the high frequency area. Recent seismic header analysis indicates that for certain Eastern sites, they are basically rock site, hard rock site, and therefore there will be a high frequency effect on the equipment performance.

So the second area actually was addressed initially in a Westinghouse Topical Report 115, and I reviewed that, and we had about 10 RAIs for that particular topical. However, in Revision 17, they took basically the TR-115 information, and incorporated that into one of the appendixes in Revision 17 of DCD, which is basically Appendix 3I.

The exceedance is basically the ground motion response spectra exceeded the 35 design response spectra, or CSDRS. And we reviewed that particular issue according to SRP 3.10, and then we have a staff guidance ISG-1, and then we also review that document, safety paper 93 0A7 related to seismic qualification of equipment.

The resolution of those 10 RAIs have been completed, and the SER written - SER for the Revision 17. One of the significant issues I thought I would bring up here is that for high frequency exceedance area where Westinghouse basically performed a so-called screening test for SSE, Safe Shutdown Earthquake, and when we are reviewing it, we thought well in order to satisfy the regulations, equipment complication normally is performed for 5 OBE and followed by one SSE. Well, in the high frequency area Westinghouse only testing SSE. So RAI says, how come you are not considering 5 OBE for high frequency.

Then after a couple of iterations, Westinghouse said that their CSDRS testing, the standard design testing, can be considered as 5 OBE for high frequency fatigue effect. And then I thought, okay, if that is the case, I need Westinghouse to perform some calculations saying that

the CSDRS 5 OBE 1 SSE to the 35 design spectra is equivalent or greater than 5 OBE for the high frequency. If they did, and look at it, and looks acceptable, and therefore that issue has been resolved, and there is no open issue for this particular section 3.10.

CHAIR RAY: Well done. Any questions? Thank you.

MR. HSU: Okay, this is Robert Hsu. We are going to discuss Section 3.12. I'm in engineering, mechanics branch. And basically what we did is, the major change for this DCD Revision 17 is the Westinghouse proposed removal of the piping deck to the conclusion of the risk-significant piping design report. So this COI for the design spec and the report will be moot. So Westinghouse took all responsibility for the complete design and complete design spec. So during the COL time period, the COL will now be bothered with this, COL only have to address the as-built reconciliation and ITAAC. So staff performed piping design completion review, activity review, during the audit, August 30 to the September 18. And the staff identified a lot of the issues related with the packaging, which is not completed. Because they finished their analysis, but

they leave a lot of space or some kind of fluid dynamics condition, they haven't analyzed, and they leave a lot of open item in there, and so basically which is not meet the regulations, and this for 10 CFR 50.55(a).

So we need additional work to close this DAC. And a lot of major issue is that - high frequency, seismic input. I think that a lot of people already discussed. And in the TR 115, the piping stress and their result which demonstrate a comparison. They used a Standard AP1000 CSDIS and compare with the high frequency GMRS, Ground Motion Response Spectra, seismic input, which is identified in some specific response spectra for the hard rock high frequency ground motion response spectra. And then the result which demonstrated the CSPRS which is - can be used, as I represented, as a HRHF seismic input.

And HRHF Ground Motion Response Spectra exceed the spectra, identify the current in the DCD. They have to demonstrate, following the methodology and the strength criteria they provided in the DCD. Those are the two major changes.

CHAIR RAY: Okay, understood. Any questions?

MEMBER BLEY: They may not have aligned things properly. I thought on 3.12 Westinghouse told us they thought they had submitted what they needed to close the open items. Did I misinterpret what I heard?

MR. LINDGREN: No.

MEMBER BLEY: No? Okay.

MR. LINDGREN: No, not on 3.12.

MEMBER BLEY: Okay, I'm fine.

CHAIR RAY: Anything else?

Thank you.

Okay, so we are precisely 40 minutes behind schedule, not as bad as I thought. And we are ready for the afternoon discussion, which means, Rob, you are up.

MEMBER ARMIJO: Mr. Chairman?

CHAIR RAY: Yes.

MEMBER ARMIJO: I'm sorry I was tied up in another meeting, and if I missed it. A question I wanted to ask - oh, that's me.

Maybe Bill already asked this, it's on 3.9.3 presentation, and that statement is made by the staff, reactor vessel J-groove weld does not meet the ASME code. This is a pretty standard weld. I wanted to know is this that the analysis hasn't demonstrated

that it meets the code, or is the staff saying that the design --

CHAIR RAY: Bill did ask the question.

MEMBER ARMIJO: So just give me the answer and I'll be quick.

MR. SUBUDHI: I can. Mano Subudhi from Brookhaven National Lab. I audited the design report. What they did is they used by analysis, when they took two transients to calculate equation 10, primary plus secondary stress, they didn't meet the 3SM requirement. Then they took out the thermal separately because code allows it, still they couldn't meet the 3SM requirement. So the question comes, does the plastic shakedown occurs or not. And that is a question I asked, have you done a plastic analysis, since it has gone for the plastic range, it is normally in elastic range. And they didn't do it. What they did is, these stresses are calculated as stress intensity range. They have the big stresses, maximum shear stresses, so they are not calculating - they broke the stress into sigma x, sigma y, sigma z, and each component they are satisfied. I said code doesn't allow that. Code is always stress range and it is the stress intensive. If you are going to use the code you cannot use both ways. And they keep on

fighting, no, we can use it. I did not accept it. I caused them code if you don't satisfy then go to the plastic analysis, make sure it's set down does occur. If set down doesn't occur then you have to go back and redesign the whole thing.

And they said that that's what they did, and I have not reviewed it.

CHAIR RAY: That's where it stands right now? Okay, thank you.

All right, proceed.

DCDA CHAPTER 3 Sections 3.3, 3.5.3

MR. LINDGREN: Okay, a couple of housekeeping things first. Previously Phil Kotwicki used the example of the pipe - the pump heat exchanger pipe as an example where we had made a change to the DCD. He is in fact too current. It's not that had been added, strictly speaking. And we are going to let our piping and component people now. We think we are done talking about piping as a component. If anyone else has a disagreement with that let us know.

CHAIR RAY: Just for today.

MR. LINDGREN: Just for today, yes.

3.3 is the wind and tornado. We are talking - this section talks about wind, tornado loadings and missiles. It's 3.3 and 3.5. 3.3 the

changes we included we reduced the height of the shield building because the enhanced shield building has a slightly reduced height which of course reduces the wind loadings and the tornado loadings.

We revised the COL information item providing additional information - provided additional information support to the design certification.

We updated - the COL requires that you address the interface criteria for programs. We made it more specific about what exactly needs to be done, what information needs to be provided to do that, rather than just saying wind and tornado in your area.

The site parameters for the wind speed and the tornado speed were not changed.

MEMBER BANERJEE: Remind us what were these site parameters particularly?

MR. LINDGREN: It's 145 mile per hour wind, and there's three-second gusts with an importance factor of 1.5 for safety ratings. And a tornado is 300 miles per hour.

MEMBER BANERJEE: The average wind speed was 145, or the gusts?

MR. LINDGREN: The gusts.

MEMBER BANERJEE: The gusts were 145. And what was the average wind speed?

MR. LINDGREN: We design for that level.

MEMBER BANERJEE: That's controlling -

MR. CHUANG: According to AIC Rev 7 following the so-called exposure, 33 feet above the ground in open air.

MEMBER BANERJEE: So the three-second gust is - provides sufficient load as a determining load.

So how often do these three-second gusts come? I mean this is a turbulent flow, right? And so therefore you have a frequency of oscillation. And if you have a three-second gust, it has to recur. What is the recurrence frequency in the turbulence?

MR. CHUANG: I think ten to the minus four.

MR. LINDGREN: This is designed on a steady state basis.

MEMBER BANERJEE: Oh, there is no buffeting, okay. So buffeting does not become the determining factor here? It's just a steady load. And that actually is the limiting load, rather than buffeting? That is the design basis?

MR. CHUANG: I think so.

MEMBER BANERJEE: So it's determined by the tornado basically.

MR. LINDGREN: We have a couple of open items that are really more missile open items There was a question about the turbine building is a building that uses steel siding and they asked us to evaluate the impact of the steel siding from the turbine building on the modular wall on the strength of the enhanced shield building. I can now change that status to response is in review. So it will be to the staff in another week or so.

It's not a challenge to the building at all.

And the second ones ask about the impact of the three radwaste tanks we added as missiles on the collapse of the radwaste building and their effect on the aux building. That response is being prepared, so in another two or three weeks we will be turning that one in. It's also once again not a challenge to the aux building.

3.5 is missile protection. The changes we made were, we made specific requirements for the wind interface requirements. Once again there was a COL information item that said, address the site interface requirements, which is a fairly vague requirement. So we changed the - did some analysis and changed the COL information item to provide information that is more

specific.

So as far as the tornado missiles are concerned the applicant has to verify the building construction and location is basically the same as we assumed in our analysis, that there are not other buildings close enough to the site to represent a new missile - tornado missile threat.

Also they have to show that other site missile sources are bounded by tornadoes. As I said, we made that COL information item more specific.

There are some conforming changes, or changes in other sections, including the changes to the shield building. The missile spectrum is not changed. And we have the same open items that are listed in 3.3 as 3.5 open items.

There are a couple of issues that are really COL issues, but we have addressed them generically. The NRC guidance on evaluation of tornado-driven missiles says you need to look at automobiles above ground level, because ground level is where it's parked. And we have a couple of sites where the parking lot is elevated above the grade, right around the plant. So we have looked at elevations above 130 feet, and basically at all elevations the aux building including the roof and

shield building up to the roof, which should cover all of the sites we have, and the building of course would withstand the attack.

MEMBER ARMIJO: What size of automobile do you pick?

MR. LINDGREN: I believe the reg guide says a 3,000 pound automobile. Not a Hummer.

MR. SISK: Four thousand pounds.

MR. LINDGREN: It's the reg guide automobile.

Okay, and it's within - it's automobiles within half a mile. Okay, so the next one. The other items that comes under missile protection is the impact of a neighboring unit turbine missile. The AP1000 design certification just for a certified unit what all of our applicants have dual unit - expectations to put in dual units, and they are either side by side or close to side by side. So we have once again addressed this on a generic basis basically relying on guidance in the regulatory guide. We have determined that the probability of destructive overspeeds and missile generation from the turbines is less than 10 ^ -5 per year. That criteria, that probability, satisfies the criteria in the Reg Guide for an unfavorably oriented turbine - an unfavorably

oriented turbine is basically the configuration with the turbine oriented close to the reactor vessel with - in such a way that missiles coming out perpendicular form the turbine would strike the containment or safety related equipment.

AP1000 units located side by side are in an orientation no worse than an unfavorable orientation, and they are separated by 800 feet, at least 800 feet, so we believe that satisfies the concern.

And that's where we are.

CHAIR RAY: Related to this I'll note we discussed yesterday was the reduction in intercept valve testing frequency, which I assume is factored into this one time 10^-5 per year?

MR. LINDGREN: Yes.

CHAIR RAY: I'd still like to see us look at that as we discussed yesterday.

Staff's turn now.

NRC CHAPTER 3 DSER/Ols - Sections 3.3, 3.5.3

MR. CHUANG: My name is Jerry Chuang, from structural engineering. I will present a review of SRP 3.3 as well as 3.5, varian designs against missile attack.

The area, 3.3 we don't have any organizing

for 3.3.1. We do have two open items, as already discussed by Westinghouse, in 3.3.2. This is according to ASCE 7 standard, Section 6.

In the case of 3.3.2 transitional and rotational, it handles the wind speed. This is including translational and rotational speed I'll note pressure drop, and the spectrum of missiles. This is according to again ASCE 7, Section 6, as well as Reg Guide 1.76 on Design Basis Tornado, and the tornado research for nuclear power plants.

Essentially wind readings are defined by AP1000 as the basic wind speed, 145 miles per hour. This is also described by Westinghouse. And in case of tornado loading it says, wind speeds, 300 miles, but we include 240 mph, translation for us, 60 miles per hour for the location. And in the design -- pressure drop is two psi, and rate of pressure change is 1.2 psi per second. The radius of the dome from maximum rotational wind from the center is 150 feet.

CHAIR RAY: Excuse me.

(Off the record comment.)

MR. CHUANG: Then by Westinghouse with regard to the COPD. They reduced the rise from 25-1/2 feet down to 20-1/2 feet with respect to the wind load. The staff calculated the reduction is about 100

percent. Therefore it is acceptable. This reduction also have some side effect, in other words, additional benefit, could reduce the risk of being hit by a falling object. Such as aircraft.

Second change is the topical report five, which is 3.5-1. This TR 05 is covered in Revision 17 of DCD in the FSAR 3.3.3, in the section on Combined License Information. So one major open item is related to the site which could be destroyed in the tornado event which could become wind-borne missile and potentially damage the structure.

So this is a very challenging technical issue as it relates to penetration mechanics. The -- it's known that the geometry shape of the siding does not fit the spectrum as dictated in Reg Guide 1.76. The COL Applicant should verify the site conditions upon the barriers analysis.

Second open items related to the Topical Report 116 on the addition of three heavy water tanks as indicated in this slide. On the addition of the heavy water tank would become a missile, a high energy missile, and its dynamic effect impact on the seismic containment structure.

So, in summary the safety concern is that because the non-seismic reading is allowed to

collapse, and the consequence of collapse could generate inbound missiles from sidings and from water tank and those should be analyzed.

Okay, so let's moves to Chapter 3.5.3 on barrier design against missile attack. We do have one open item which is also related to missile. The SRP 3.5.3 shows the prediction of local as well as global damage response of seal and the concrete barriers, due to missile attack, either internally or externally.

And also maybe secondary missile from scattering of the concrete. In this area there are no changes for the DCD as approved in the NUREG-1793, which is Revision 15 of AP1000.

So the open item relates to the analysis concerning the impact of this high energy metallic wind-borne siding missile. And the concern is it could compromise the safety of the nuclear structure. And Westinghouse should provide analysis and the COL Applicant should notify the site conditions found by this analysis.

So in conclusion the DCD Section 3.3 and 3.5.3 are acceptable pending resolution of these open items. while 3.3.2 has two open items and 3.5.3 has one open item. Thank you.

CHAIR RAY: Thank you. Any questions for

Jerry?

All right, we are now magically 10 minutes ahead of time. So all it took was perseverance.

MEMBER ARMIJO: I could ask a question to slow it down. Just a curiosity on my part.

CHAIR RAY: A question.

MEMBER ARMIJO: Yes, just a question for the staff. This issue of tornadoes and high winds, where are structures like the switch yard and above-ground electrical facilities, how are those handled in your analysis, in your review?

MR. CHUANG: Basically, the impact of this collapse -- this so-called one seismic category building, this annex building, they are allowed to collapse.

MEMBER ARMIJO: You just write it off?

MR. CHUANG: Right, so we will contain the impact of those high energy missiles from the --

MEMBER ARMIJO: From the building. Thank you, Mr. Chairman.

CHAIR RAY: All right, thank you.

We'll now proceed with Westinghouse once again beginning I believe with 3.6.3.

DCDA CHAPTER 3, SECTION 3.6.3, 3.9.6, 3.11

MR. LINDGREN: Well, actually I covered

3.6.3 when I covered piping.

CHAIR RAY: All right. I'm just following the script here. I don't memorize this stuff.

MR. LINDGREN: I know, I pulled a fast one on your there.

CHAIR RAY: Where would you like to begin?

MR. LINDGREN: We are going to go with 3.9.6. These are all related to the Component Integrity Branch.

3.9.6 is a subsection that talks about in-service testing. Since we have no safety-related topics it's all about in-service testing of valves. We added a description of the valve operability testing to be consistent with the Joint Owners Group valve program. There is a lot of activity in the operating fleet on in-service testing and the like, and we were - we - our major test changes are true-ing our programs and information up with that.

We updated the description of the valve in-service testing program once again to true ourselves up with current industry practice after NRC review and RAIs and the like. We revised and updated the table of valve in-service testing requirements.

In some cases these are results of design finalizations. We add a few valves; we remove a few valves, is primarily what happens, as the designs of the various systems are optimized.

And in some cases there are some RAI responses.

This table is very important because it really defines the in-service testing program for the COL applicants. As part of that we updated the list of active valves, and we revised the COL information item for in-service valve testing to accurately reflect that most of the requirements are in fact in the table.

As part of the review of - and in conjunction with the review of the design specs and design reports, there was an audit of information on valid in-service testing, and there are some open items as a result of that audit that have recently been included in the SER.

CHAIR RAY: You are referring to the first open item listed here?

MR. LINDGREN: Well, they are all really kind of a result of that. Some are more specific than others. Just a general one that talks about resolving the issues from the audit, and as is always the case

the NRC doesn't have the time or the charge to do a detailed resolution - review of the tables, so we are doing an extended conditions exercise to see if what they found is anywhere - exists anywhere else.

Then two is reference to static testing needs to be consistent with the JOG MOV program. We are preparing a response with that. We need to - third one, we need to clean up our citation of the ASME QME-1. We are preparing a response for that.

Four is, we have to describe how we are applying application of Code Case OM-1 in the ASME OM Code. And our response for that.

MEMBER SHACK: And what does that code case cover?

MR. LINDGREN: It's details of how you do an ISD program as I remember. I think there is only one code case for the OM Code, and that's it. And it's been around for awhile. Mostly we need to clean up how we cited it.

Mr. Scarbrough, who just walked in, can probably tell you.

We have to revise the tech specs and tech spec cases to be consistent with the OM Code. This is an historical thing. The ASME used to be everybody referred to Section 11 of the ASME code, which they

referred to the OM Code. Now we refer directly to the OM Code.

And the tech specs haven't caught up with that. We need an acceptance criteria for check valves and clarify our response to an RAI response . We have to clarify a note in our ISD table about the use of the JOB MOV program, periodic verification.

We have to clarify a reference to the OM Code. You can see that some of these are fairly detailed.

MEMBER BLEY: Yes, right in that area, in the text that talked about the JOB and the PORV section, it mentioned doing - calculating risk importances. It doesn't quite say how to do that. Because there are various ways to do it. But it also - I didn't see that it said what to do with it after you audit it.

MR. LINDGREN: Well, we think - we define the frequency, and in some cases if you get experience you can reduce those frequencies.

MEMBER BLEY: Oh, that's what that was about.

MR. LINDGREN: And that's what that's about. We do rely on the JOB MOV program. Our program. As I said much of the changes have been

true-ing our information up with the programs. And the we did need to address an issue about testing for the CVS valves.

We believe on all of these this is an area where we have found that the best way to resolve them is to sit across the table from the NRC, unless we have come up with some suggested responses and the like, we will be scheduling a meeting with them to discuss these.

I believe we are done with 3.9.6.ileen, what is the status of the SER for this section? This is a lot of open IEs.

MS. McKENNA: Well, the status is an SER with open items that we are awaiting responses to the particular items that were mentioned, and then staff will review those responses and hopefully produce an SER with no open items. I'm not sure exactly where you were going with your questions.

CHAIR RAY: Yes, my question was whether the SER was issued - it looks like there are nine by your count, I think we'll get to that later. But I guess I'm just kind of puzzled by such a long list of open items that you go ahead and issue the SER.

MS. McKENNA: It's a judgment of what's too many or too large, in order to support issuing it.

I think we felt, yes, maybe the number was a little large. But I think they are fairly well defined of what is necessary to resolve them, so that was our rationale.

MR. LINDGREN: We don't believe there's any real difficult show stoppers.

CHAIR RAY: Yes, it's just hard for us to tell.

MR. LINDGREN: Okay, 3.11, environmental qualification changes. The changes we made in 3.11 was to clarify that Westinghouse is the organization that is responsible for most of the equipment qualification, and have revised the COL information item to that effect.

We've also updated Table 3.11-1, a very large many-page table, for design finalization efforts, to include valves and equipment that are added and revised.

There is one open item, that came out of the - once again came out of the audit on design specs, and design reports. And they looked at this at the same area and the same time. And asked us to revise design permit specs to address their comments on equipment qualification. Again, we will be coming up with a suggestion on how to resolve this, and

seeking to schedule a meeting with the NRC.

And I believe we are done.

CHAIR RAY: We are done presenting. I think if it's all right with you guys, we will take up these Chapter 8 things that I mentioned at the end of the staff's discussion, and then your still available to at least hear them to respond if you wish.

We will proceed now with the staff. We are going to take advantage of the fact that we are ahead of schedule here. If we can do that.

MS. McKENNA: I think we are ready for the technical staff for the 3.6.3, 3.9.6 and 3.11 too.

CHAIR RAY: Proceed when you are ready.

NRC CHAPTER 3 SECTIONS 3.6.3, 3.9.6, 3.11

MR. SCARBROUGH: Good afternoon. My name is Tom Scarbrough. I'm in the component integrity branch of the division of engineering for NRO, and I'll be presenting several sections.

The first section is one that I'm seeing here. I didn't work on it directly, but I was going to walk you through what we did, and if staff, in case you have any detailed questions. It involves around Section 3.6 of section, dynamic effects associated with the postulated rupture of piping, the leak-before-break issue.

In Revision 16 the documentation is revised to eliminate the need for COL information items 3.6-2 and 3.6-3, which address the as-designed and as-built leak-before-break analysis. Westinghouse went ahead and did that analysis, and provided in Technical Reports that the staff reviewed.

The staff performed an audit of those analyses and found the methodology and calculations to be adequate, and that the as-built results would be confirmed through ITAAC inspections.

The Revision 17 changes the main steam line, the fuel rods, from SA-333 to SA-335, which included chromium for these erosion/corrosion resistance.

And the leak-before-break analysis for this material remains bounding for the AP-1000 DCD, and we had no open items on this issue.

MEMBER SHACK: Do you have to heat-treat the welds in 335?

MR. SCARBROUGH: That's out of my area.

MR. REICHELT: Yes?

MEMBER SHACK: You have to heat treat welds in 3.35.

MR. REICHELT: Yes, you do.

MEMBER SHACK: You do?

MR. REICHELT: I'm sorry, my name is Eric Reichelt. I'm a materials engineer for the division of engineering and component integrity branch one.

MEMBER ARMIJO: Okay, good information. Also on that point the 335 it's a big improvement for low accelerated corrosion, no doubt about that. But is there any change in the mechanical properties, the ductility, fracture duct, things like that, that reduce your margin on leak-before-break?

MR. REICHELT: The mechanical properties were the same. The UTS was 16, the yield was 40, the same as the 333.

MEMBER ARMIJO: Okay, good.

MR. SCARBROUGH: We will move on to 3.9.6. And this is the functional design qualification and in-service testing programs for pumps, valves and then for screens.

And the next slide there shows the project manager and technical staff involved in this review. And then the next slide is part of an overview of what 3.9.6, what the review is about. It's rather convoluted because of the fact that you are merging together a design certification application and COL application, because this program is an operational program, and really it's the responsible of the COL

applicant to fully describe it. But in this case we will talk about why we do a review of the Westinghouse VCV as well. The VCV itself includes provisions for functional design qualification of in-service testing of the pumps, valves and restraints. And in NUREG-1793 the staff included that the AP1000 DCD was acceptable for design certification.

And that review revolved around design aspects, not really the operational aspects, but making sure that there was adequate availability and accessibility to do the testing and such. And a high level overview at the program. And that was fully acceptable under NUREG-1793.

Now the Bellefonte FSAR or any lead FSAR with the COL application incorporates by reference the AP1000 DCD for the full description and I'll talk a little bit more about that later. The full description of the IST operational program. And based on interactions, Westinghouse is revising the DCD to address IST issues that are common to all the COL applicants. We make it just simpler for the reviews for all of them.

And the NRC, we conducted an audit of Westinghouse of the design of procurement specifications in October of last year to review the

implementation of that program. And that is part of the Part 52 requirements of the implementation of some of these programs.

And as a result we have nine open items, and we'll go through those and I'll tell you what they are when we get to them. So that is a real high level. But basically as an introduction the AP1000 DCD includes the provisions that we just talked about for pumps and valves and restraints, and the DCD specifies COL information items for applicants developed IST program per Section 3.9.6, and the snubber operability program per Section 3.9.3. And what the Bellefonte application does it incorporates by reference the provisions of the DCD to help fully describe this program through a combination of the DCD provisions and FSAR provisions. So they merge together.

So our review, back when we did NUREG-1793, we found that the provisions were acceptable for the AP1000 design certification. It fully satisfied that high level description at that time.

We met with Westinghouse and with TVA back in March of '08 and talked about the need for the applicant, the COL applicant, to be able to fully describe the program per the commission guidance. And

Westinghouse decided that they would revise the DCD to address these IST issues that are common to all applicants.

So we are currently reviewing the AP1000 DCD, and this is Rev 17, for all those provisions that help support the COL applications.

So we break up the review into sort of two main areas: one is functional design qualifications; and one is IST. But what we found through our history of the motor-operated valve problems over the years is the foundation of functional design is critical to make sure these valves can actually be verified during plant operation. So we do look more closely at functional design than we ever did before.

So the AP1000 provides high level provisions for functional design qualifications. And it is noted that there are no safety-related pumps in the AP1000 design.

But they are high level, they talk about factory tests and things of that nature. But at the time for design certification it was acceptable.

In October of last year we performed an onsite review to review the design and procurement specifications, to evaluate how those high level provisions of the DCD were translated into the specs.

And we - and the memorandum which we issued in November of '08 we summarized onsite review, and I'll mention some of the open items we had from that.

But that was what we did for functional design qualifications. Now for the IC program itself, as we went through and review the Westinghouse AP1000 DCD we had to look and see how the language related to a full description of the IST program. For example a DCD might say that we consider - the applicant will consider this aspect, like a generic letter or such. But that needs to be fleshed out more for a description. That's maybe adequate for design certification, but if you are going to reference in the DCD FSAR or COL application it has to be more clear.

So some of the places we asked questions about was to clarify some of the language that was in there, that Bellefonte was going to be incorporated by reference. So in response to those RAIs, and there were a large number of them, Westinghouse modified the DCD, Rev 17, to include several additional IST provisions. So through the combination of the Bellefonte FSAR and AP1000 DCD all those provisions together are intended to fully describe the IST operational program per Commission paper SECY-05-0197.

So next, this is just a brief summary of some of the changes that appeared in the DCD, and this resulted from the interaction that we had in terms of coming up with a full description of the IST program, first as they moved from the former pressure vessel code, which was the code of record at the time that the design certification was prepared, into the ASME OM Code, which is now the new operating code for pumps and valves and dynamic restraints. So the IST program description has been transferred over to reference the more recent code.

Next is the testing provisions for the power up valves, which include motor-operated valves, has been revised to reference to an Owners Group JOG program on motor-operated valve periodic verification. And there was a comment about the functional design qualification, and where that comes into play in the JOG program is, our program sets up a table based on level of safety and significance, and functional margin. And if you have a high safety and significance, and you have a low margin, you are up in the category of testing at every outage, and you do diagnostics. You test the valves with diagnostics, statically but with diagnostics.

And then as you move across the table,

based on your margin or your safety significant risk ranking, you can extend that out to a maximum of 10 years. For diagnostic testing. You still have to do your exercise stroking every outage at least, and maybe even more frequently if it's a high risk valve. But that allows you to extend that interval out.

So that is what the Joint industry program does, and there is also provisions in there for possible dynamic testing, if you cannot satisfy the Joint Owners Group program for the historical testing that was done at all the operating plants for the Joint Owners Group program, you may be doing dynamic testing. So there is a provision there for dynamic testing.

So the AP1000 DCD was revised to incorporate this reference for the use of COL applicants. And also we'd be happy to have discussions too because there are other types of valves, power up valves, other than motor-driven valves, and there is not a joint industry program for POVs; there's one for AOVs, which is part of the discussion, but you need to be able to address those other type valves as well.

Also the provisions for check valves were expanded to be more descriptive of what's in the ASME

OM code, and that was expanded. It used to be a very simple reference to the OM Code, but now it's a more descriptive discussion of that.

The IST table, 3.9-16, and all applicable notes, were updated, because the table was developed many years ago, and now the changes in some of the valves and such, and some of the references. So that has been updated as appropriate.

And also there is a new section, 3.9.3.4.4, which addresses snubbers, and the IST for snubbers according to the new OM Code, subsection ISTV, which is the latest in that hearing.

So those are high level changes that were made to the DCD.

Now the open items, there's a large number here, but part of the reasoning was that as we went through we came up with these open items. We knew we had an audit that we were planning, and we would proceed with that. Then after that we have been in the process of processing this. We don't think any of these are show stoppers; we think we can work our way through these. But there are a large number of them.

First is the resolution of audit followup items, and one of them was the references to QME-1-2007. That's the latest standard in terms of

qualification of equipment, mechanical equipment, that the staff and industry has worked on for over 20 years to incorporate all these lessons learned from the Generic Letter 89-10 program. And that is addressed in the performance specs we found when we did the audit, but it's not clearly specified in the DCD itself, so we are working with that, with Westinghouse on that.

Another area is the valve factor for the motor-operated valves, the frictional requirements in terms of designing the valves. Some of that was referenced, and the bases for that needs to be discussed further.

Also the use of QME-1 by vendors that supply valves to Westinghouse, to the COL applicants, that discussion too is another area that we do need to follow up on. So those are the audit items.

In terms of the second item there, it's consistency with appeal would be periodic testing with the JOB program. There was language in the DCD which talked about static testing. And one of the areas is we need to make sure that the potential for dynamic testing is recognized, because the job program does have that provision in it if you don't satisfy the provisions in the program. And we wanted to make sure

that was very clear, because the DCD is going to be read and used by people many years in the future. We want to make sure it's very clear as to that relationship between static and dynamic testing.

So we need to make sure that is clear before we go forward.

The next is - this came through the RAI, but it's the same issue in terms of QME-1-2007 reference in Section 3.9.2.9. It's actually referenced in the latest version of the DCD back in like Chapter 5, for system components, but we think it would be important to reference it up in 3.9 as well.

Next is the use of ASME OM Code Case OMN - 1, and that code case was the result of the determination that the stroke time testing in the ASME code was inadequate to demonstrate the design capability or the operational readiness of motor-operated valves. And through working through ASME, this code case allows the replacement of the stroke time testing, or quarterly stroke time testing, with a longer interval testing of the motor-operated valves with diagnostics based on the margins that they have. And the NRC has endorsed and accepted the Revision 0 of the OMN-1 code case in Reg Guide 1.1.9.2. There is a new version which I think is a better version of

OMN-1 Rev 1, but we haven't worked our way through the process to endorse it yet in Reg Guide 1.2.9.2, bu9t we think that is soon to come up. We need to make sure that this reference -- the reference that is already approved in Reg Guide 1.9.2, or that there is an alternative submitted. Because you can't use a code case that is not already approved unless you provide an alternative. So that is open item number two - open item four.

Open item number five is consistency with the tech specs, and when the tech specs were updated to OM Code, most of the places properly translated the boiler and pressure vessel code reference to the OM Code reference, but there were a few scattered places where it didn't get picked up. It was like in notes or references, that sort of thing. So that is a little bit of clean up area that we noted and that needs to be done.

Open item six is the check valve test acceptance criteria. We asked about this in the RAI. And the RAI response talked a little bit about ensuring that the test checked out test acceptance criteria with fully demonstrated opening, have proper pump indication of flow, the way good acceptance criteria, but we thought that needed to be more

clearly specified in the DCD, but in an RAI response we can't really rely on it in the SER. We can only use it to clarify information that is already in the DCD. And we need to work with them on that to see where the DCD itself can be strengthened so we can rely on that.

Next is open item seven, and this has to do with the power-operated valves I talked about. We issued Regulatory Issue Summary 2000-03, which talked about all those power-operated valves that are other than motor-operated valves. And in there we incorporated a list of attributes which we considered to reflect the lessons learns of all the motor-operated valve programs. And what we would like to talk to Westinghouse about is they can - some of that information, some of those lessons learned, more clearly indicated in the DCD. So we will be working with them on that.

Open item eight is a clarification of the OM Code for exercise testing. An RAI response indicated that the remote position indication in ISPC 3700, which is one section of the OM Code, will be used to verify the fail safe operation, and we just need to make sure that's clearly indicated in the DCD. So we'll be doing that.

And then there's item nine is sort of cats and dogs. There were long lists of tables. Because it's such a long table for ISD, so many valves in there, and there's been so many notes that have to be addressed to all those valves. There were a few places that needed to be clarified. There was a reference to Appendix J testing, and we talked about that, about the safety functions, and how you rely on Appendix J for safety functions. Plans for a particular certification of a note on PRA, and a reference to some valve categorization. Some minor issues in there to deal with that we have to resolve.

So those are the open items. So where do we go from here? What do we have left? The remaining review items are, we have to address the audit follow up items. That was something that when we left the audit, that was something that we agreed that, that we would go back and think about those items, and we would meet in the future and resolve those. So we need to close out those audit items. We need to do a follow up audit to see how those were addressed. But we'll talk about that. We'll resolve those open items; there's nine items, and we think, as was mentioned, this takes I think just sitting down face to face and working our way through those. And then

finally to confirm that the DCD and the Bellefonte FSAR consistent to provide that full description of function, design and qualification of these programs in support of the COL application.

So that's where we go from 3.9.6. So any questions on 3.9.6 before we move on?

CHAIR RAY: Hearing none.

MR. SCARBROUGH: So 3.11 is EQ, and the next slide. 3.11 I focus mostly on the mechanical side of EQ, but once again here's the overview. The DCD includes provisions for environmental qualification, EA, of mechanical and electrical equipment. NUREG-1793 concluded that the DCD was acceptable for design certification. The Bellefonte FSAR incorporates by reference the AP1000 DCD for a full description of each operational program. Once again this is another operational program. And the Westinghouse changes to the DCD in the EQ area do not impact NUREG-1793 approval, and I'll relate some of those in just a minute. And the audit we did conduct in October of last year also covered the EQ aspects; we looked for the EQ aspects as well while we were there. We ended up with one open item.

Okay, so once again, the introduction to AP1000 DCD includes the provision for EQ, the DCD does

specify that the COL information item for equipment qualification file - and I'll talk more about that in a minute - then the COL application incorporated by reference the DCD, don't fully describe the EQ operational program.

So the NRC review - the NRC found DCD provisions for EQ mechanical and electrical equipment to be acceptable, and we are reviewing the DCD provisions to help support the description for the COL applications. And in October of last year review audit onsite review also covered the 3.11 areas, and will be resolved as part of the whole 3.9.6 review.

Now here is the summary of the AP1000 DCD. I found going through that Section 3.11.5 was revised to specify that Westinghouse will act as the agent during EQ phases with the COL holder defining the process or procedure for EQ files. So here is a change where Westinghouse is acting more as an agent to hold those aspects, and that was part of the process for the valves as well, painting the valves, qualifying the valves, acting as an agent, and that is spelled out in this section, 3.11.5. The EQ table --

CHAIR RAY: That is an odd thing. I mean the agency is a commercial relationship. Why is it in here? Maybe there is a good reason for it when I

think about it. But supposing they decided to have somebody else do it?

MR. CUMMINS: This is Ed Cummins. I think the SU really was, used to say that the COL holder would be responsible for everything. They didn't want to be.

CHAIR RAY: That's fine, but why does it have to be in the DCD? That's the business between you and your customer.

MR. SISK: I think part of that answer would also fall into the ITAAC. You are completing some of the ITAAC, the EQ ITAAC as part of a qualification program, one time up front, as we do this. So they looked at the audit last year in procurement space, each customer would not go back and do a new EQ program for valves and equipment that have been qualified at one point in time.

CHAIR RAY: Well, that's not what this says, but it may be why you did it. I think it is not something we should spend our time on. It just seems a very odd thing to have the NRC build into the DCD something that is basically a commercial relationship between the COL holder and whatever he wants to use. Anyway, go ahead.

MR. SCARBROUGH: As I mentioned, the HQ

table was expanded or updated. The EQ scope itself was expanded in Section 3.V, which is sort of this methodology for EQ, to include the seismic category two equipment.

The Reg Guide 1.9.7 was referenced as updating another Reg Guide for plant instrumentation. Section 3(b).6.3 was revised to specify that the operating experience is not employed as part of the EQ program, for qualification. And a section 3(b).5.5.1 was revised to address NUREG-1465 and Reg Guide 1.1.8.3 on accident source terms.

So those were the changes, and so there is not a significant amount of changes from our perspective, from our review. And so the remaining items we have, the changes to the DCD do not impact our NUREG-1793 review. We need to address the audit follow up items, and part of that is confirming the operational aspects as the initial EQ is transferred over o the applicant. We need to make sure that transition is a transition phase there, and that's clear, and make sure that EQ specs are allocated, as I mentioned about the vendor for QME-1. And then confirm that the DCD is consistent with the Bellefonte FSAR to help support the full description of EQ programs. So that's where we are with 3.11.

CHAIR RAY: Any questions?

Okay, that concludes the set agenda.

SUBCOMMITTEE DISCUSSION

CHAIR RAY: As I mentioned, we have a need to talk about Chapter 8 that was discussed yesterday, and then we have discussion among committee members before we conclude the day.

I perceive that we would be better served to take our break now and come back and do that. Since we are ahead of time, we will resume at 2:45.

(Whereupon, the above-entitled matter went off the record at 2:30 p.m. and resumed at 2:43 p.m.)

CHAIR RAY: We are going to now again I want to express my gratitude to my colleague here while I was trying to keep this hearing on time, he was able to go through information sent by our fellow member concerning Chapter 8, and we think it's important to make note of a few items, many of his comments to us were covered during the discussion; a few were not. And we'd like to make note of them. Either applicant or staff can respond. At least we have the time to receive the response, but there is no expectation or obligation to do so.

And they will then be carried over as appropriate if need so. So I'd like to turn it over

to Dennis now to let us know what it was that needs further response to what we've gotten from our colleague here on Chapter 8.

MR. SISK: Mr. Chairman, if I may, is Westinghouse on the line?

Is Mark Demaglio on the line please?

MEMBER BLEY: They might be muted in here.

MS. LI: He is there.

(Off the record comment.)

CHAIR RAY: These are just comments that we have extracted from input aids provided originally to me, and then I asked Dennis to take a look at it, and he will pass along what he thinks is still in need of some response.

(Off the record comment.)

MEMBER BLEY: We can take just a minute.

MR. LI: We are ahead of schedule.

(Off the record comment.)

MEMBER BLEY: Well, let me just introduce this until they show up. John wrote a number of detailed comments as he reviewed Chapter 8. And most of them were addressed yesterday in the presentation and discussions.

Is somebody on the line?

(Off the record comment.)

MEMBER BLEY: Is this Mark from Westinghouse?

All right, we got some feedback, Mark. It's echoing.

(Off the record comment.)

MR. SISK: Mark, could you identify yourself for the record, please?

(Off the record comment.)

MR. SISK: Mark, continue to listen in and we will continue on.

MEMBER BLEY: Here are two questions that were not addressed. He raised some questions about the batteries and the chargers, and noticed that with the change to the 250-volt where you put two 125-volt batteries in series, that led to some complications in switching and arranging, and he raised some questions with respect to the spares. And let me read what he said.

Section 8.3.2.1.2 confirms that the Class I E spare battery series disconnect switch is opened when the battery is connected to a non-class 1E bus. Please explain how the spare battery and a battery charger are connected to a Class 1E bus and to a non-class 1E bus. Also, what design features, interlocks

or other practices preclude switching errors on this connection.

So I don't know whether you want to address that one now or later?

MR. CUMMINS: I think we can address it now. This is Ed Cummins. The concept of the spare battery was - it could be used to replace any of the batteries in the plant one at a time. And so if you think about this it could be quite complicated by train separation, because whenever it's a division of safety-related, INC-related, because whenever it's hooked up it's the division that it's hooked up. So sometimes it's A, sometimes it's B, sometimes it's C, sometimes it's D, and then sometimes it's the non-safety.

So we have let's say a spare battery control room where wires have been - or cables have been pulled from the A, B, C and D and the non-safety batteries. And they are disconnected. So nothing is connected normally, except the charger to the batteries. So if you want to connect it you can only connect, you can have interlocks, so that you can only connect one source.

MEMBER BLEY: So that is a physical interlock?

MR. CUMMINS: Yes.

(Off-mic comment.)

MR. SISK: Mark, can you call in on another line?

MR. DEMAGLIO: I can try.

MR. SISK: This is breaking up badly.

MEMBER BLEY: We don't have a figure either.

CHAIR RAY: By the way, before we resume, you used the word, you can have interlocks. And Dennis I think then asked a question that sounded like you did have interlocks. What is the status of the design?

MR. CUMMINS: Well, Mark is the right one to answer. But I believe that the way you do the physical interlock is the actual detailed design of this battery intake valve is conceptual. So it's functional. But typically the interlocks in electrical are I'll call them kirk-key interlocks is what I know, and you can only have one key connected to one thing.

MR. DEMAGLIO: Hello.

MEMBER BLEY: Try to say a few words, Mark, it didn't sound much better.

MR. DEMAGLIO: Okay.

MEMBER BLEY: I don't think it'll work. I think we'll have to hear back from you.

CHAIR RAY: It may be a problem on our end.

MR. CUMMINS: Stay on the line, Mark, because it is important that you hear this anyway.

MEMBER SHACK: Squawk if you're really unhappy.

MR. CUMMINS: So the spare battery is - all of the batteries have two banks of batteries that supply 125 volts, and sometimes you connect them in parallel and sometimes you connect them in series, and if you connect them in series that provides a battery with 250 volts. So if you wanted to have a spare - if you wanted to make the spare battery substitute for one of the 125-volt non-safety batteries, then you would want to connect it in parallel instead of in series, so you would have to have some sort of switch.

(Off mic-comment.)

MEMBER BLEY: We can't understand you. I'm sorry, you are just going to have to keep notes.

(Off-mic comment.)

MEMBER BLEY: I think we are going to have to ask you not to talk, because it is unintelligible. But go ahead.

MR. CUMMINS: I think he is saying there is some description of this in the DCD, in Chapter 8 of the DCD.

MEMBER BLEY: I think our point was, it appeared to be conceptual, and what we'd like to eventually see and we hope staff will keep as some kind of an open item until it's finished is the details such that we can know if it's physically impossible to do this in wrong way, like hook up two at the same time, or if it's procedurally done, so it's the detail there that matters.

MR. CUMMINS: The details of the battery, the spare battery interlock system, is what you are asking for?

MEMBER BLEY: Yes, and how that ensures that you won't --

CHAIR RAY: Well, either that, or in the absence of details, something that would serve in place of the details, like we sometimes do.

MEMBER BLEY: Which could be an ITAAC.

CHAIR RAY: Right.

Does the staff have any comments on this point?

MR. CHOPRA: Om Chopra from the electrical engineering branch. I really don't have

the drawings. But yes, I did not --

CHAIR RAY: You don't need to make a comment if you don't feel like you are ready.

MR. CHOPRA: But all I know is that the interlocks are provided, so that the spare battery will be connected to the inoperable battery and nothing else.

MEMBER BLEY: Okay, so it's been thought about, but we don't know what the details are.

MR. CHOPRA: Yes.

MEMBER BLEY: Our concern is that we understand conceptually that's what's there. Until it is actually realized in hardware it's possible it won't do what the claim is.

The next one he raised a question on had to do with --

MR. CUMMINS: Can I - we are reading - where are we? 8.3? It says a single battery bank with a spare battery charger is provided for Class 1E, B, C, and UPS system. In case of failure or unavailability of normal battery bank, when the battery charges, permanently installed cable connections allow the spare to be connected to the effective bus by a plug in locking type disconnect along with a kirk key interlock switches. Plug-in

locking type disconnect, and kirk-key interlock switches permit the action of only one battery or battery bank and charger at the time, so the independence of each battery division is preserved. The spare battery and the battery charger can also be utilized as a substitute when offline testing, maintenance and equalization of operational battery pack is desired.

MEMBER BLEY: Okay, thank you. I think that takes care of it. John hadn't found it, and I didn't spot it.

The next one has to do with the aux boiler. You talked about that a bit yesterday, but the question John raises is more an operational one. Why is the aux boiler, the electric aux boiler, supplied through a separate unit auxiliary transformer, and a bus that cannot be connected to the reserve aux transformer? How does this design affect auxiliary steam supply to plant loads if the unit shutdown and maintenance is required on the main transformer, the isolated bus or the switch section hooked to the main transformer.

MR. CUMMINS: Ed Cummins again. Why is it a separate winding? I believe it's a separate winding because it's voltage and its capacity is more

than what could be accommodated by the normal division - but how do you work it when the plant is offline? Well, normally, when the plant is offline, the unit auxiliary transformers are supplied from offsite, power, and it steps it down to the isophase bus volt is 22kV, whatever it is. And all the loads are supplied from unit aux transform. So normally when the unit is shutdown you have complete capability from this other transformer to supply the aux boiler .

Now what I suppose part of the question seems to be why didn't you think you needed to have another reserve source for that.

MEMBER BLEY: In case you are doing maintenance on that particular transformer.

MR. CUMMINS: I think the answer there is that one of the utilities comments we had was that maybe we could get rid of this. I mean this is not a device which is often used, and so we decided not to get rid of it, to supply it, but to supply it - it doesn't need to be supplied in a way that it is super-reliable, because the only time you would use it is when you shut down and don't have any steam, and need heating of the building.

MEMBER BLEY: Okay, thank you.

The next one is kind of two of his put

together, but he built a couple of tables from DCD Rev. 15 and 17, looking at power ratings for certain components, and they include service water pump, component cooling water pump, normal RHR pump, containment recirc fan, and the CRDM fan, and the DC division to supply motor-operated valves, and these ratings, some he couldn't find ratings originally, but some of the ratings on the pumps and fans changed by about 20 - 25 percent, and some of the ratings on the motor-operated valve divisions changed by a factor of two, and he was just wondering why did these change so much? Have you added a lot more loads somehow? Or changed the motors? How come they changed so much, or is it just one of those design finalization things we've been hearing about?

MR. CUMMINS: Well, Ed Cummins again. Let's take the motor-operated valves first. We were talking about this subject earlier today when we talked about all these joint owner group studies at EPRI and NRC too studies on valve operability. And the net effect of all those on the operating class was they had to go take their valve operators and put bigger motors on them because there was not enough margin, and there were issues of torque switches and other things that didn't assure performance under the

worst conditions.

So as we finalize the design we actually go through the - I think it's actually an EPRI methodology to size the motors in accordance with the rules that came out of this motor study. And it's not surprising to me that some motors doubled in size because they probably would have operated with the first size, but if you have all the things go wrong, you need twice the size.

MEMBER BLEY: Getting past the torque switches and the like? Okay, thank you. So it really is a calculational improvement?

MR. CUMMINS: It is.

MEMBER BLEY: And a low margin thrown in.

MR. CUMMINS: And I would say on the other ones, that is design. Twenty percent doesn't sound too bad to me in terms of design finalization, sizing differences. And we get some even without them, because we are not sure.

MEMBER BLEY: He didn't find that. And he is usually pretty thorough when he chases something like that.

Okay, there's only a couple of more of these. When you talk about the standby diesel

generator, you talk about that it is tested to verify its capability to provide 4,000 kW. Duration will be the time required to reach equilibrium plus 2-1/2 hours. And John asked, why don't you need a 24-hour full load test to demonstrate capacity?

MR. CUMMINS: Ed Cummins. I don't know the answer to that.

MEMBER BLEY: I don't know if there is a usual requirement. Maybe staff has a comment on this one.

MR. CHOPRA; Om Chopra from electrical engineering branch.

In the current design the diesel generators are an emergency power source. So we do require that they should be endurance test, so we require a 24-hour test for those diesel generators currently in operating plants.

But for passive design there are no tech specs really for these diesels.

MEMBER BLEY: So you're happy with the 2-1/2 hour?

MR. CHOPRA: Pardon me?

MEMBER BLEY: You are happy with a 2-1/2 hour at equilibrium.

MR. CHOPRA: Like I said, they don't have

any tech specs that we can look at, and we can make them do anything, because these tech specs they have are really not related to safety-related equipment.

MEMBER BLEY: The RTNSS things?

MR. CHOPRA: The RTNESS, yes.

MEMBER BLEY: Does that come under the RTNSS discussions you still have going on?

MR. CUMMINS: Yes.

MEMBER BLEY: Here is one more thing to think about.

MR. CUMMINS: Ed Cummins, I have a comment on that. We specify tests of all things in Chapter 14, and so if we wanted - if we needed, if we felt we needed a longer test, you don't need it to be in tech specs, and we don't want it in tech specs, because it is not essential to the safety of the plant. But if you wanted a 24-hour test or needed a 24-hour test, in order to feel confident of the performance.

MEMBER BLEY: That's the end of the questions. There were a couple of others, but we resolved those. One of them is going to come up under one of the other chapters, Chapter 7 we'll get to.

CHAIR RAY: Thank you very much, Dennis, I truly appreciate it.

Okay, now we still don't have the applicant at the table, and we have the staff here. Is there is any thing that a member has just thought of that needs to be directed to either party, speak up, otherwise I will go around the table, and we will have a discussion among the members.

MEMBER BLEY: One thing came to mind during the last set of staff presentations. It sounds as if there is going to be a need for a Rev 18 to fix the DCD with respect to the agreements that have been made between the applicant and staff, and I'm just wondering, have you got any assurances that there aren't going to be another set of wholesale changes because of other things, or - requests from the customers?

MR. CUMMINS: This is Ed Cummins. First, my helpers have shown me where we do have a 24-hour test. In Chapter 16.3, 16.3 is kind of an availability requirement for RTNSS components in certain configurations like in the MISP that requires certain of the equipment to be operable when you are in certain situations. And one of them is the diesel generator, and this says, they are written kind of like tech specs, but the consequence says notify the chief nuclear officer rather than shut down. So it's

a little bit less consequence.

But in SR 3.1.4 it says, verify that each standby diesel starts and operates - this is a 10-year repeatable test - operates at 4,000 kWs for greater than 24 hours. This test may be utilized in diesel engines prior to starting. They warm up-period prior to load both diesels, will be operated at the same time during this testing.

MEMBER BLEY: Fair enough. Thank you.

(Simultaneous speakers.)

CHAIR RAY: How the things, since the issuance of 17, are going to be documented.

MR. CUMMINS: So fortunately we recognized this awhile back, that we had some comments from the staff that if you continue to change the design continuously how could we ever evaluate it. And we thought about that, and we said, well, we have to fix that. And it's a licensee responsibility to fix that. And so we established a design freeze for licensing purposes, in August of 2009. And then we submitted Rev 17 in September. So we took all the changes we knew about that were approved before that, put them in and said okay, all - from there on --

CHAIR RAY: Did you mean 2009?

MR. CUMMINS: 2008, I'm sorry.

CHAIR RAY: I was going to say.

MR. CUMMINS: So what does that mean? What it means in our kind of agreement with the staff is that they will not see changes in the design that they haven't already seen in an RAI response or in some other kind of communication. So if there are other changes to the design that are not already communicated to them in the context of an RAI response, then those changes will be implemented into the licensing with what we call departure. And so they all will be in the certified AP1000 design. They will be in either the CMO designs or if the COLs provide, they could be say 50.59 type changes that occur after the COLs.

But so --

CHAIR RAY: Well, how does the DCD get conformed to the 17-plus RAI responses? What is just the administrative mechanism?

MR. CUMMINS: So that becomes you have 18, obviously. And you have 18 - conceptually it's coming in the near term. Many of the RAI response - requests have nothing to do with design change, but say, I want you to write in the DCD something that assures the staff that this is true. And in some sentences to write there, or need some concept of

sentences to write there. So there are many changes that we have agreed upon with the staff not related to changes but related to staff needs for confirmation of commitments in the DCD.

So what we do when we write the RAI is we draft the change to the DCD as part of the RAI response, and we send it to the staff, and if they don't like it we have further dialogue, and if they like it they are fine. So we have a whole pile of these changes that have nothing to do with design changes, they have to do with licensing changes as a result of our process with the staff. And sometimes if we could conclude on those a related design change that made sense, we did, and if the staff didn't like it they would communicate back to us, which hasn't occurred to my knowledge.

But if we didn't have an RAI interaction, then we took this departure process. So we have I'll say 50 - but I could be off by plus or minus 15.

MR. SISK: Ed, just additional clarification on that if I can. As indicated - Rob Sisk, Westinghouse - as Ed indicated from the freeze date if you will of Au gust, 2008, we have at least been following along a process with the staff of basically looking at conforming items. We haven't

talked about confirmatory items. Many of the confirmatory items that the staff has identified requires us to incorporate changes to the DCD test. The one item I want to add for clarification, as we go through each change, or as we look at evaluating potential changes, we work with the staff, obviously with the RAIs, and make sure that those changes are responsive to the staff needs.

But if we have anything that falls outside the RAI, we also look at ISG-11, the Interim Staff guidance, 11, which is on the guidance, and that sets up about a five-step screening process which says, these are things you must tell us about, these are things that can be potentially deferred to a later date at the option of the COLs and at the option of time going forward.

So there is a process in place that the staff has established with ISG-11 that we are using as a framework on which to evaluate changes as we go forward. Right now the purpose of Rev 18 is a conforming document to address staff needs.

MEMBER BLEY: All right, one last question in this line. Is this design finalization process far enough along that you are reasonably comfortable you won't be seeing a lot more things

popping up?

MR. CUMMINS: Well --

MEMBER BLEY: You've looked at most systems now?

MR. CUMMINS: Well, the design, I don't know what to say. The design finalization I'd say we are between 70 and 80 percent complete with the design. But we have proposals for design changes that we disposition weekly. And so we are - we have candidates for departures that we look at and evaluate weekly, and we do that in conjunction with our customers. But everybody thinks about this together as something that we need. So we are still changing the designs, but we are not changing the license, and there is a process to change, to make it conforming ultimately, as a COL responsibility.

I would say, talking about Rev 18, the time you want to issue it to the staff is sort of at the point where you don't have any significant interaction with them in RAIs, because the real drivers for the changes that they want to see us make are the RAIs, and if the RAI comes the day after you submit the Rev 18, then it's the reason for Rev 19.

MEMBER BLEY: We understand that.

MR. CUMMINS: Yes, so we are talking not

too far from now, early next year or late this year, to Rev 18, somewhere in there, and Rob and I don't even agree, but we have to talk to all of our constituents, our customers, and the staff, and we have to come up with a common view of when it's appropriate.

CHAIR RAY: Okay, well, trust me when I tell you that the very last thing we want to see is Rev 18. Aside from that at least it's legitimate to think about this thing called Rev 18, which I would think of as a conforming change that doesn't have any new information in it that hasn't been previously vetted with the staff.

The two of you used change in at least three different ways: one, design change; one change in the text; and the third one I heard was change in the license. One of the problems we are having, and why Sanjoy is holding his head right now, is that we are trying to figure out how we can focus on design changes, and not be bogged down in text changes and license changes, and we haven't figured that out yet.

And Ed, I promised you I would invite you to tell us if you have a way to do that. But what we crave is the ability to recognize changes in the design that can be aggregated into topical areas, for

review. The process that we deal with isn't directly with you, it's really a function of how staff does their work. But nevertheless that is the dream that we have is that we can somehow focus on design changes, and pay attention to those, at least as our first priority.

Do you have any thing you want to offer?

MR. CUMMINS: This is Ed Cummins. I think we have to feel this out a little bit. But we know what our design changes are. We have a very --

CHAIR RAY: I'm sure you do. Unfortunately, we're in the other direction. We are trying to figure out the design change from the text change.

MR. CUMMINS: So the question to us is, is there a way that we can reasonably communicate what we know to you to be helpful without being I don't know - and still be in the proper regulatory framework, working with the staff and you. And I think that we have to talk to the staff and you, but we wouldn't mind making it, as we submit each chapter to the ACRS for full review, making a one-page summary of the design changes that we think apply to that chapter that are impacting the chapter or in a sentence about why we made the change.

CHAIR RAY: Well, to some extent the change matrix that we had did that, but it was at the wrong level, the wrong altitude. And so without asking to solve the problem here, I just want you to know that - I'm sure you not only know what your design changes are, you've got them numbered, and you know which design change has got which number to it, and which revision of that design change you are talking about at any time. I'm sure you've got those books. Unfortunately they are not transparent to us, and that's because we are driven by the consequences of the design change in terms of the text and the fact that the way the staff approaches the DCD is based on chapters, and the text and the chapters.

So you lead to that - I mean you wind up with something like that matrix, which you know is a valiant effort to try and get some clarity, but it just became something we couldn't process effectively. But we are struggling, so now maybe you will hear some more or that here, just be patient with us. We will go around and get any further comments members have. I'll ask Mike to take notes so we can recreate this.

MR. CUMMINS: We are willing to do some incremental value added thing as long as it's proper.

CHAIR RAY: We appreciate that, and I trust you understand it would be in your interest as well as ours if we can somehow live with this more functionally and less text driven than we do.

Okay, with that, Sam didn't have a chance to comment yesterday. Others of us did. Bill, do you have anything you want to say further?

MEMBER SHACK: No, it just seems to me that most of what we've seen today seems to be in process of getting done. And this is going along - I don't see any show stoppers here. The one that is a little surprising is the difficulty in still working out what the proper requirements are for RTNSS components. Maybe this is when the rubber is meeting the road on RTNSS, and it just has to be worked through.

CHAIR RAY: Is there a topic that we should try and address in any generic way internally between us and the staff? I'm just getting up to speed on it. I basically understand the principle, but I can't be an authority on it.

MEMBER SHACK: The staff and the licensee can work that out. But it seems to me that is going to be a problem sort of over and over again until we get a better process. It seems to me conceptually

when RTNSS was invented it was going to work all right. You'd look at the PRA, you'd see what functions were really important, and then you'd go and you'd test or you'd verify those functions.

Now that doesn't seem to work out as easily in practice as it did in 1994, so when the concept was invented but I don't know that we have anything to add to the conceptual stage, and we'll just sort of have to see how it works out as we go along.

CHAIR RAY: Well, your judgment would be far better than mine. It's just that it would seem like it might merit, given the time that has passed, revisiting what were we thinking of, and how is it seemed to be working, and is there any input that we have on the subject. Just a thought.

Sanjoy?

MEMBER BANERJEE: I think you spoke of something which is how to aggregate things which are the consequences of these design changes into areas which are let's say a little bit more disciplinary and aligned with the actual committee-subcommittee structure that we have in the ACRS. And I'm struggling with this, but I'm hoping Weidong will help me. I think we need to see what - at least in the

area that I'm interested in - how to look at what has happened and abstract from that the issues, and then perhaps organize ourselves so that we can deal with these in one meeting or two meetings or whatever, on certain days, and then make sure the right people are here to deal with them. And that we go into sufficient depth.

Because that is an internal organizational matter, but I think with the help of our own staff as well as the staff we have on the NRC side, any help that Westinghouse can give us, we should try to arrive at this thing rapidly. Time is moving on, and we are being torn between four concepts that are all asking us to spend time on their - now if you look at Mike Corradini, he is happy with what is done, exactly what you are saying. Now maybe he is dealing with the new concept, so he can do it. But - or at least one that we are certifying - but he's moved in that direction. So he's saying, you come to this meeting, you come to this meeting, you bring these people, make sure you look into this in detail.

CHAIR RAY: I think we are both text-driven, chapters and sub-chapters, sections, and we are also driven in a order which is simply the sequence with which those particular chapters emerged

from the staff. It becomes next to impossible. So I think we need a different platform to do what you say, which is the logical thing that we should try and do.

MEMBER BANERJEE: But that is the thing, when you are dealing with say fluid dynamic issues they are cross-cutting. They are going to arise with the piping, they are going to arise with your blind ends, they are going to arise with your LOCA analysis, they are going to arise - but to get the right people who know how to do CFD or whatever it is, at this meeting, which is within the expertise of the ACRS certainly, we need to aggregate them.

CHAIR RAY: No, I do understand that. Again, all I'm observing is, we need a different platform.

MEMBER BANERJEE: It's the same with all the other reactors, and they are able to do it.

CHAIR RAY: Nobody has yet done what we are attempting to do here. That is the difference. The problem here is, we are not doing the whole chapter; we are doing a bunch of little pieces. Because they change - instead of the whole thing. So we don't have as much meat within it. We are trying to compensate by throwing three chapters together instead of one, and it isn't quite as smooth for

Corradini as it sounded. Until you turn around quit a good deal.

Any other comment? Because we will be coming back to this later. Sam?

MEMBER ARMIJO: Yes, I endorse your recommendation to - for us to add value we need to work on functional things rather than regulatory language and things like that. For example, and if we could go chapter by chapter in the areas of more core changes, or thermal hydraulics, focus on our disciplines, that I think would help a lot.

To me I'm still not quite sure why the vessel diameters increased by two inches. To me that's a big deal; I still don't understand why one would do it. But we were told today that it's just to give it - put more water between the core.

MEMBER SHACK: Bigger is better, Sam.

MEMBER ARMIJO: Well, maybe so. Is the core diameter bigger? I don't know, and I probably should know.

MEMBER SHACK: The BWR guy knows that water is what you want.

MEMBER ARMIJO: I love water; no problem there. I just don't know why that vessel diameter is so much bigger than the original certified design

unless the power is being upgraded, or some other good reason.

But basically that would help a lot, because I never know when to come to this meeting when I can do some good unless - we talk a lot to try to get the right people here.

On the open items, I think what we covered today clarified a lot of things for me, particularly the materials change, on the main steam line, was very clear.

As far as follow up, I really would like to learn more about the resolution of that J-groove weld issue, whether that ultimately is solved by an analysis or actually requires a design change. I would be stunned if it would require a design change after all the years we have been putting J-groove welds into PWRs. Anyway I'd sure like to make sure that doesn't just get - that we take a look at it again when the staff is ready. And with that --

CHAIR RAY: Okay, well, that reminds me of something I've said to others, talked to Sanjoy today, and also, I do believe that the progress we are engaged in here, the only way we can really cope with it is to view it as screening a whole lot of stuff, and listing things that have to be revisited.

Now if we can come up with a different process, and God knows I've invited anybody to tell me how to do that who's got an idea, fine. But right now we are going to have to -- and as part of this wrap up I want to ask each of you - Sanjoy has already said he would - provide us input about - more than what you were able to do right at the moment, which Mike has taken down. But give us something that perhaps would provide better direction to the staff as something that we would need to revisit at a future meeting, and we will simply have to schedule it and do it.

Now that is going to be difficult for others, but we've - there is just no way around it that I can see.

So do indicate to me or to my - this is something that needs to be further discussed in subcommittee before we get to the full committee; otherwise the full committee will just disintegrate if we don't do that.

We are meeting on the 19th and 20th, right?

MEMBER BANERJEE: There is a conflict with ESBWR, which is 20th and 21st.

CHAIR RAY: And there is an EPR meeting that is scheduled, that was on the 18th and is now moved to the 19th. But scheduling is like tomorrow's

task, and we don't have to fight over that subject. I know there conflicts, but I just have to do what I have to do.

MEMBER BLEY; Actually the last version of the schedule I saw, the conflict between ESBWR and AP1000 disappeared. That's 17 /18 for ESBWR and 19 -

(Simultaneous speakers.)

CHAIR RAY: I just want to make the point that there is an agenda to be set for the 19th and 20th that isn't set yet, and the way we've set them for the first two pairs of meetings is, we can't do much more than decide what we need to come back and look at later. And maybe we can do a better job, like Sanjoy is suggesting, on the meetings on the 19th and 20th.

Okay, Dennis.

MEMBER BLEY: I was just surprised by those dates. I didn't see them --

CHAIR RAY: Well, they have been on Sherry's list for some time. They've been on my calendar since July.

MEMBER BLEY: She sent out a new one this week.

CHAIR RAY: They have been on there since August 31st.

MR. LEE: The AP1000 dates have been set

for a couple of months. Because we were asked to get in the queue as quickly as we could by the staff. And NRO - as Harold said, later - but NRO has already told us what our priorities are, or has suggested what our priorities should be.

CHAIR RAY: We are having trouble with that process as you heard. So we will deal with that later.

Dennis?

MEMBER BLEY: Just a couple of things. I hit on these yesterday. But as to your last point, things that we either need to revisit or need, we need to identify and obtain the WCAPS, topicals, technical reports, whatever they are called. The ones I've flagged are the ones for Chapter 18 and Chapter 7, and we talked yesterday about seeing some detail on the open things about the PRA or PRA guys weren't here for the first meeting, so we do have a couple of issues there.

CHAIR RAY: Yes, that's exactly right. I want to underscore that the PRA got not even a good screening review in the July meeting.

MEMBER BLEY: But there are a number of things there that we need to ask about. I can drop you a note about what the key issues are.

CHAIR RAY: Yes, would you?

MEMBER BLEY: And maybe if a few of us just got together and brainstormed on a board we could figure out a way to reorganize a little bit how these meetings come.

CHAIR RAY: It'd be easy to do.

MEMBER BLEY: It might not work for staff.

CHAIR RAY: That's the problem. We are driven by the staff right now.

MEMBER BLEY: But if we are not getting to things because of the way it's organized, it's going to slow them down in the long run.

CHAIR RAY: I think so.

MEMBER BANERJEE: You know we are going to continue until we are satisfied. So ultimately we will just keep revisiting stuff until we --

CHAIR RAY: Nobody has been more outspoken than I have.

MEMBER BONACA: It's a general issue for everybody who is doing these reviews. And that's why we talk about this being critical to organize for the next meeting to discuss this very issue, how do we do it, or should we improve?

I must say that when I look at this

presentation here this morning, I am not suggesting that -- this provided a lot of help as a guide to what we are reviewing. If I had this together with the material that was given to us before, it would have been very helpful. So there is a little example of how - I'm not saying in a formal overhead, but certainly a few bullets, a few words, it provides a guide that helps us.

What's the value added by the ACRS to perform the review? Are we doing just what the staff has already done, and they find whether that is correct? If that is the case I don't think they add another value, because they have been spending hundreds of hours, and we spend a few tens of hours, so again when we do this, discuss these issues, what is the best use of our time.

In general regarding what I saw today and yesterday, and I apologize for the time I was out because I had a meeting with Yatsco and other people, I feel that the presentations were clear, information was good, and I think the SER was on target. I think that - it seems to me that the staff is raising the right issues in the SERs. That is a feeling. Right now it's more than - I don't have a sense of completeness or whatever. It's simply that the

questions that have been raised were appropriate, and that's pretty much that.

CHAIR RAY: Okay, Mike.

MEMBER RYAN: Thanks. I second all the comments that have come before me, but I would add a little bit of time, maybe it's 40 minutes or 45 minutes at the end of a day, or maybe each half day, and really go through the list of commitments that have been created there in that session. Who is going to input somebody something? A is going to give this to B, and just write out all our plans so that when we walk around after two full days we've got a list of things we know are going to be transmitted from one party to the next, whether that's the applicant or the staff or the ACRS or the NRO. Or NRO is going to provide something to the committee. So that we are real clear what commitments or what information has been made, so we can all feel like we didn't miss anything, and we don't have to doublecheck our list and make extra phone calls to make sure we touch all the bases, or ask for it again, or whatever it might be.

So I just offer that there ought to be a formal half hour or so, maybe once in the morning, once in the afternoon, maybe it doesn't need to be

that - maybe we'll get good at it.

CHAIR RAY: I think some of the session ought to be kind of described, and maybe it's Mike or somebody helping Mike, to track all those as we go through the day.

MEMBER RYAN: Probably what would help to do that is to make more specific the identification of a future action item at any time. So rather than, did you get that note or write that down, you just stop and say, well, that should become an action item. The next one is number six, and --

CHAIR RAY: That is exactly what I'm saying.

MEMBER RYAN: -- you know what it is. Because after two days or even one day, it's hard to remember, and everybody has got other things they want to do. And if we had created something as we went along, we could just validate it.

And I'll be happy to volunteer to help you do that.

CHAIR RAY: Well, you volunteer for a lot of things. I think it's a good point.

MEMBER RYAN: Somehow we ought to make sure we don't leave the room thinking one thing, and then having something that doesn't line up.

CHAIR RAY: Tom.

CONSULTANT KRESS: I think I agree with Bill Shack that the RTNSS seems to be the issue. In my view, the safety status of any design plan has two points. One is how well does it meet the Design Basis Accidents and defense in depth. And how well does it meet its risk goals.

Now if you have a component that is - meets all the Design Basis Accident requirements, and still is risk-significant, that ought to be a risk-significant component, and ought to have RTNSS applied to it. Just as if it were a safety component.

So I think - I kind of agree with the staff, there may be a need for more requirements for some of this risk-significant systems.

CHAIR RAY: Let me interrupt you for a second and ask, do you think we are at a point where we could draw some conclusions from our experience that would be generic?

CONSULTANT KRESS: I don't think so, because this design was just too different. When I'm talking about risk significance, I'm talking about - the CDF is so low for this plant it's hard for me to come up with anything that would be very risk

significant. But there might be some things that would impact the LRF of say ten to the minus six per year. If it impacted that significantly, I would think it would be risk significant.

Anyway I think that is still an issue and ought to be looked at.

With respect to GSI-191, I think the issue is going to come down to the downstream effects, and I think the resolution of whether or not we meet some sort of downstream effects criteria will have to wait for the COL. I'm not sure you can do it at the design stage. Because in my mind it'll involve what might be an acceptable level of fibrous debris, and that is going to be caught mostly - and I don't know how you do that in the design stage.

And anyway, and that will probably have to wait until the middle of next year until the overall GSI-191 has been resolved.

MEMBER BANERJEE: It may not be resolved on that timescale either. But Tom what do you think, it can be that this plant will have very different debris than - obviously they would try not to have the issues that we've had with the other plants. And it might be possible to deal with it in a special way as to downstream effects. I have to look at the whole

thing and see if there is a way out. If there is a way out what is it? It would be nice.

CONSULTANT KRESS: I think clearly the downstream effects, if you have got reflected insulation, I don't think they get into downstream effects. So it has to be fibrous debris, and it has to be issues of -- I think you can deal with it in particular for this - I think you have a good suggestion there, and it might be - I think it's well worth pursuing.

MEMBER BANERJEE: The devil is in the details.

MR. CUMMINS: At some point when you are done maybe I could make a point.

CHAIR RAY: When we are done.

CONSULTANT KRESS: I think the ACRS needs to - we have a pretty good review of the WESTEMS. It seemed to me there were substantial open items, very substantial. And I think you need to get involved in the review of it, WESTEMS, and this would be particularly thermal hydraulics people and structural mechanics people I think.

I didn't think we got a real satisfactory - at least I didn't - resolution of the striping issues. I think we need to review the scaling

criteria to see how it was applied and whether or not we think something might be missed there, and how to determine whether we missed something when you get to the actual COL stage.

Another item, I was surprised at the hard rock spectrum. I was expecting that to have some influence on particularly some electronic components and electric components. And I'm surprised we haven't seen some -- when the high frequency has more impact on those things than the low frequencies do, because it depends on mass, and how they are logged in. So I'm not sure the item is resolved yet. I think you need to look at it again and see if there is not some vulnerable small electronic components, electric components, to the hard rock spectrum.

Finally just some minor typographical errors I thought I'd bring to your attention. You might want to change them in the DCD. One of my interests is in accelerated aging, so I looked at Appendix D to see what was going on there. And on pages 3D.99 and 100 there is two equations, it's an input to this aging equation. And 3D.99, it's the second equation under the word, therefore. What you have is a plus sign actually with 25 degrees. It should be an equal sign. And the same typographical

error occurs on the next page on the same equation. The plus sign, actually 25, should be an equal. That's just a minor change, but since you're in the DCD, you might want to correct it. I don't know if you have found it or not.

MR. SISK: Thank you. We'll check the matrix. We are trying to correct those types of things. Thank you.

CONSULTANT KRESS: It's a minor thing. It doesn't impact anything, because it did arise. That's all.

CHAIR RAY: All right, Tom, as always, thank you very much.

Ed, keep it short.

MR. CUMMINS: Yes, two comments. The hard rock spectrum, for electronic - for the hard rock spectrum for electronic components are deemed to be, or screened to be sensitive to high frequency, they are actually tested to the hard rock. So I hope that we can convince you that where you have a concern we actually do testing.

With GSI-191 the downstream effects will be even more important than you think, because AP1000 kind of uniquely floods up, in many instances, above the break, and the water flows in the break at some

point in the transients, and never goes through screens. So we have un-screened, and so we will talk about that next meeting, but it's even more important than maybe you would have perceived.

And the staff obviously knows this, and we are working on this, and so the second comment is, the cleanliness program is a program done by the COL Applicants, and you have to have some consistency if all your fiber comes from dirt, and you have to have some consistency between what we commit and what they commit. And the staff and we have recognized that, and while I think that we are in - we have some tension in the COL Applicants would like higher limits, but I think we are going to present limits that they will accept in their cleanliness program, and say that those are acceptable to us.

And then we are going to work on ways we can analyze perhaps fiber is usually our problem, higher fiber in the future. We plan on doing better testing, or different testing; we are looking at those kinds of things.

And I would say - there was a little discussion this afternoon about we can't resolve this until we resolve GSI-191. And I don't pretend to be an expert on GSI-191, but I would say that we have

probably done more testing than they have on GSI-191, probably because we have this particular issue with downstream effects.

More obviously, it needed to be addressed by us as a safety issue.

CHAIR RAY: Okay, well taken. Anybody else have anything? Do we have any members of the public that seek to speak?

All right, then, with that we stand adjourned as a subcommittee until next month.

(Whereupon at 3:47 p.m. the proceeding in the above-entitled matter was adjourned)