Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
ABWR Subcommittee on the STP COLA

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Wednesday, June 23, 2010

Work Order No.: NRC-314 Pages 1-142

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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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ABWR SUBCOMMITTEE ON THE STP COLA

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WEDNESDAY

JUNE 23, 2010

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ROCKVILLE, MARYLAND

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The Subcommittee convened at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 1:30 p.m., Dr. Said Abdel-Khalik, Chair, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

SAID ABDEL-KHALIK, Chair

J. SAM ARMIJO

DENNIS C. BLEY

CHARLES H. BROWN, JR.

MICHAEL CORRADINI

HAROLD B. RAY

JOHN D. SIEBER

SUBCOMMITTEE MEMBERS PRESENT (Cont'd):

WILLIAM J. SHACK

JOHN W. STETKAR

NRC STAFF PRESENT:

MAITRI BANERJEE, Cognizant Staff Engineer

MARK TONACCI

GEORGE WUNDER

JIM TATUM

TOM TAI

GREG MAKAR

DEVENDER REDDY

ANGELO STUBBS

ROBERT MOODY

ROCKY FOSTER

JAMES KELLUM

ALSO PRESENT:

SCOTT HEAD

COLEY CHAPPELL

TOM DALEY

JAY PHELPS

FRED PULEO

GLENN MacDONALD

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

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

1:27 p.m.

CHAIR ABDEL-KHALIK: The meeting will now come to order. This is a meeting of the ABWR Subcommittee of the Advisory Committee on Reactor Safeguards. I'm Said Abdel-Khalik, Chairman of the Subcommittee.

ACRS members in attendance today are Jack Sieber, Harold Ray, Dennis Bley, Sam Armijo, Michael Corradini, John Stetkar, Charles Brown and Bill Shack. Ms. Maitri Banerjee is the Designated Federal Official for this meeting.

The NRC Staff review of the STP (South Texas Project) Combined License Application is generating safety evaluation reports (SER) with Open Items by chapters. In our last meetings of March 2 and 18, May 20 and June 8, we discussed the COLA (Combined License Application) FSAR (Final Safety Analysis Report) and the corresponding SER with Open Items for Chapters 1, 4, 5, 7, 8, 11, 12, 14, 15, 16, 17, 18 and 19. In today's meeting, we are scheduled to discussion Chapters 10 and 13. Today we will discuss Chapter 6 and the status of several follow-up items from the last four meetings.

This meeting will be followed by a meeting of the Full Committee in July. I expect today's discussion to be issue-centered related to the technical issues in the COLA and the SER.

The rules for participation in today's meeting were announced in the *Federal Register* on June 7, 2010 for open/closed meeting. Parts of this meeting may need to be closed to the public to protect information proprietary to Toshiba or other parties. I'm asking the NRC Staff and the Applicant to identify the need for closing the meeting before we enter in such discussions and to verify that only people with the required clearance and need to know are present.

We have a telephone bridge line for the public and stakeholders to hear the deliberations. This line will not carry any signal from this end during the closed portion of the meeting. Also, to minimize disturbance, the line will kept muted until the last 15 minutes of the meeting. At that time, we will provide an opportunity for any member of the public attending in this meeting, either in this room or through the bridge line, to make a statement or provide comments.

As the meeting is being transcribed, I request that participants in this meeting use the microphones located throughout the room when addressing the Subcommittee. Participants should first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We will now proceed with the meeting. And I call Mr. Mark Tonacci of NRO to begin the presentations.

MR. TONACCI: Good morning or actually good afternoon. Thank you for the opportunity to talk with you again today about these chapters. I really don't have any earth-shattering opening comment. I'll turn it over to George here, the lead project manager for STP, for introductions.

MR. WUNDER: Thank you. Thank you, Mr. Chairman and gentlemen, Maitri. I'd just like to introduce the NRC participants for today's meeting. For Chapter 10 DNRL will be represented by Senior Project Manager Tom Tai and the presenters for the Staff will be Devender Reddy, Angelo Stubbs and Greg Makar. For Chapter 13, DNRL will be represented by Project Manager Rocky Foster and the presentation for the Staff will be made by James Kellum and Robert Moody.

That's it.

CHAIR ABDEL-KHALIK: With that, we'll

proceed with STP's presentation.

MR. HEAD: Thank you, Mr. Chairman. My name is Scott Head and we appreciate the opportunity to brief the ACRS today on Chapters 10 and 13 and as you said tomorrow on Chapter 6. I'm not aware of anything proprietary at this point in our presentation today. There will be some proprietary information tomorrow. So we'll plan accordingly for that.

Our standard agenda for each of the chapters we will introduction, summary, the contents aspects of it, with some discussion as we go through that and discussion on ITAAC (inspection, testing and acceptance criteria) and then the conclusions with respect to that.

Helping us today we have myself, Tom Daley, our mechanical systems supervisor who briefed you before I believe on Chapter 5, Coley and Jim Agles. We also have other members from Toshiba here to help us if we have any specific questions.

And with that, I'm going to turn it over to Coley.

MR. CHAPPELL: My name is Coley Chappell. I appreciate the opportunity to be here to speak to you today. I'll do a brief outline of Chapter 10 and hit some of our departures and site-specific supplements. Chapter 10's summary includes a discussion of the main steam supply to the main turbine. It also talks about the major valves, major components, the turbines, the high pressure and low pressure turbines. And it talks about the turbine alarm and trip systems.

Other principal features that are discussed in Chapter 10 include turbine bypass system, the main condenser and evacuation system. It also talks about condensate feedwater and condensate verification and gland sealed system and off-gas system. And there are safety-related instrumentation associated with RPS, specific inputs to RPS and there is a safety-related condensate pump trip. So the breakers for that function are included for consistency in Chapter 10. But I believe the discussion will be depth for today with Chapter 6 discussion.

Contents are as you see on the screen. There are four main sections that I just outlined. Departures are included in Chapter 10. There are two Tier 1 Departures. The Tier 1.341 Departure is INC departure and this is nomenclature consistency changes with this chapter. And the Tier 1.242 is that I just mentioned about the condensate pump trip.

Other departures that impact this section due to changes in the turbine building designs, this includes adding some features such as siphon break valves and circ water lines. We also changed the plume water supply to off-gas condensers from condensate to turbulent cooling water system and that's for vendor design.

We have some changes to figures in Chapter 10. The overall figure 10.1-1 that shows the outline of the condensate feedwater system to the reactor and then back to the turbine, all those components have been evaluated and in some cases we've added some pumps. We've added a number for redundancy for purposes of reliability and efficiency. And this is reflected in a couple of the heat balance figures in Chapter 10 that show these changes in heat balance associated with the specific information for the vendor.

Some of the departures that are related to the turbine design impacted Section 10.2, some of the fabrication techniques. So it's fairly standard I think to go now with a monoblock design that improves the performance in a number of areas with the new turbine. Of course, we take advantage of that change in technology. And that includes the low pressure turbines and integral rotors.

MEMBER SHACK: Just a question on that.

MR. CHAPPELL: Sure.

MEMBER SHACK: I was reading the audit report and it points out that essentially your transition temperature or your fractured appearance transition temperature doesn't seem to meet the SRP. You're using higher stresses than are allowed by the SRP. And it says you've misinterpreted the requirement in the SRP on the relationship between the tangential stress and the essentially critical fracture toughness. So why is it all okay?

MR. CHAPPELL: Right. I know we've tried to -- We've had some responses on RAIs with that in that area. We know about the audit.

MEMBER SHACK: Well, it's obviously a question for the Staff because they read the audit report and then SER says everything's fine and dandy. But I wondered why you thought it was fine and dandy.

MR. CHAPPELL: I think we'll have to get some more information on that particular point.

MR. HEAD: Can you explain on that any at all?

MR. CHAPPELL: It's material properties.

MR. HEAD: Yeah. I don't believe we can

detail that, give you a whole lot of detail with who we have here today on that question. But it has been something that as a result of the audit we did answer some RAIs and had quite a bit of dialogue on. Just to give you a good answer right now --

MEMBER SHACK: Thank you.

CHAIR ABDEL-KHALIK: So are we going to hear about this sometime later today?

MR. HEAD: If not today, then we will carry it as an open item and certainly get back to you depending on the staff's response is.

MR. TONACCI: I think you promised to ask the Staff the same questions.

MEMBER SHACK: Yes.

MR. TONACCI: We'll take a shot at it, too, when it's our turn.

MEMBER SHACK: Okay. Thank you.

MEMBER SIEBER: It's more brittle at a higher temperature the way it is now, right?

MEMBER SHACK: Yes, the transition temperature is higher. I mean I'm a man that likes toughness.

MEMBER SIEBER: The original one was zero degrees I think.

MEMBER SHACK: Yeah.

JUDGE STEIN: Which was sort of unrealistic don't you think? Unless it's not steel.

CHAIR ABDEL-KHALIK: Please proceed.

MR. HEAD: Okay.

MR. CHAPPELL: Other changes of note to the main turbine design include the overspeed trip system. So the primary mechanical overspeed trip is being replaced by redundant, diverse digital system or an electrical system that also provides overspeed protection. So these are diverse sensors and diverse inputs into the trip system for the main turbine.

MEMBER BROWN: There's no communication between those two systems. I mean when you say redundant.

MR. CHAPPELL: Yes.

MEMBER BROWN: And I take it they're totally independent.

MR. CHAPPELL: We have separate type sensors and they have separate cabinets.

MEMBER BROWN: Separate power supplies.

MR. CHAPPELL: And separate power supplies.

MR. CHAPPELL: And separate power supplies that feed --

MEMBER BROWN: They don't communicate

between each other. In other words, both of them can trip.

MR. CHAPPELL: Correct.

MEMBER BROWN: Okay.

MR. HEAD: Tom, is there anything to add on?

MR. DALEY: That's it in essence.

MR. HEAD: All right. I just wanted to make full well between it nothing crosses the boundaries.

MR. DALEY: Right.

MR. CHAPPELL: The trip systems they both independently go to the front standard to perform the trip function.

MEMBER STETKAR: Coley, I tried to look ahead in your presentation here and I didn't see it but it might be in there somewhere. Somewhere I thought I read that your going to perform the turbine overspeed of the turbine missile analysis. I quoted something out of the SER and it might have paraphrased things differently. But I wanted to understand the timing.

It says, "Within three years of obtaining an operating license the licensee will submit to the NRC a turbine system maintenance program...include probability calculations for turbine missile generation." Does that mean three years after you obtain the COL?

I mean what's the term -- A better question is when do you plan to submit the turbine missile analysis.

MR. CHAPPELL: I believe that the discussion in this chapter points to Chapter 3 and I'd have to look at that.

MEMBER STETKAR: It does point to Chapter 3.

MR. CHAPPELL: I'm not familiar with what the specific wording in that is.

MEMBER STETKAR: Well, I've paraphrased something out of the SER and I didn't have time to look it up. So I thought you might know when you're going to submit it.

MR. HEAD: We'll look that up.

MEMBER STETKAR: Okay. I appreciate that because --

MR. HEAD: Between this one or maybe when we start Chapter 13 we'll be able to tell the answer. I think it's our intent clearly to give you that, give it to the staff, before we start up. The three years is --

MEMBER STETKAR: Yes. As I said, this is paraphrased from the SER. And it references Section 3.5.1.3 of your FSAR and I just didn't have time to look it up last night. But the paraphrase is "within three years of obtaining an operating license." And I don't know what is within three years of obtaining it. It could be construed before.

MR. HEAD: No.

MEMBER STETKAR: But it means you probably would have submitted it by now which leads one to believe that it would be three years after the COL was construed.

MR. HEAD: Yes sir. If that's your question, I can tell you the intent was after.

MEMBER STETKAR: The intent is after the COL is issued.

MR. HEAD: Yes sir.

MEMBER STETKAR: So the licensing decision will be made before that's submitted.

MR. HEAD: Yes.

MEMBER STETKAR: And we won't have an opportunity to see that analysis.

CHAIR ABDEL-KHALIK: That's a question.

MEMBER STETKAR: Okay. Thank you.

MR. CHAPPELL: Does that answer the --

MEMBER STETKAR: Yes. I just wanted to make sure that I understood that it was after the COL was issued.

CHAIR ABDEL-KHALIK: We'll need to confirm with the Staff when they are up here as to the timing of this analysis.

MEMBER STETKAR: Yes.

CHAIR ABDEL-KHALIK: And whether or not we'll have the opportunity to look at it.

Please proceed.

MR. CHAPPELL: Okay. The last departure on here we just made clarifications to the storage location for bulk hydrogen to move it a certain distance away from the power block for safety and protection.

The only real departure that originates in Chapter 10 Section 3 discusses the steam line drains and it adds some clarification about how the drain lines run and adds some further description of the function as the steam leak path.

And in Section 10.4 we have combined a number of changes into several departures. We've added a clean source of steel and steam with the gland sealing evaporators. So instead of using a potentially contaminated source such as main steam directly for gland seal, this is an improvement to the radiological controls.

Site specific information for the main condenser design. So instead of DCD multi-pressure three condensers, we have a single pressure main condenser. We also have parallel flow in those condensers and four circulating water pumps.

We've added a second redundant mechanical vacuum pump for flexibility and enhanced start-up capability and modified the source steam to steam jet air ejectors with the main steam still using an extraction steam line with the main steam as backup.

Departure 10.4.5 reflects a number of the same changes that are described in other departures. But this particular one references a change to the tech spec bases for the feedwater pump adjustable speed drives which simply referenced a number of these. And so because they were changed to four feedwater pumps we had to make the company change the tech specs.

The departure 10.4.6 discusses the bypass valve capability. This is unchanged from the DCD, but this clarifies that it's 33 percent for the bypass valve capability for the main turbine.

MEMBER STETKAR: That is changed from the

DCD, isn't it? It was 40 percent.

MR. CHAPPELL: The 40 percent referred to a number of factors. But the bypass valves themselves, the capacity of the bypass valves, is not changed. It is 33 percent.

And the last departure is just a small change to the figure in Part 10 or Chapter 10 to be consistent with some text descriptions in Chapter 7.

MEMBER STETKAR: I was writing notes. Back up to the -- This is just a point of information because I like feedwater systems. For the changes, at least, the words I read was that you added a low-flow feedwater water control valve in the system and the description says it's on the discharge header from the feedwater pumps where I guess I would think it would be.

When I looked at the figure, I couldn't find the valve on the figure, Figure 10. whatever it is. I can't read my own writing here, 10.4.6. in the FSAR.

I see bypass lines around -- There's a motor-operated bypass valve around the heaters. But that's I think the typical bypass valve. I was just curious if -- I originally was going to ask why only one valve. But that's a PRA question. But I wanted to make sure that indeed it was only one valve and I couldn't find it.

And I assume they're operated bypass valve around the feedwater pumps that you can get condensate in there I guess.

MR. CHAPPELL: Right.

MEMBER STETKAR: Is that the valve?

MR. CHAPPELL: My recollection is a little different. I thought it was on one of the main feedwater pumps.

MEMBER STETKAR: Oh yes.

MR. CHAPPELL: On the main feedwater pumps, not on the header.

MEMBER STETKAR: Not on the -- Okay.

MR. DALEY: We have a startup pump and the startup pump has a motor-operated control valve.

MEMBER STETKAR: And it's a motor-operated valve.

MR. DALEY: Yes.

MEMBER STETKAR: Okay. You know I was reading from the departure and it says one low-flow control valve in the feedwater pump discharge header for startup. So I was looking at the discharge header.

MR. PHELPS: This is Jay Phelps. There is a -- I believe you're correct, John. There is a power that you can use with the condensate pumps that's a level control valve. For load power there are a one level control valve off of the Alpha main feedwater pump and a level control valve off the Bravo feedwater pump that can be utilized for low power conditions prior to running a minimum speed on the feed pumps.

MR. HEAD: The question is you don't see them on our drawing. Is that --

MEMBER STETKAR: It's not clear to me what I'm looking for. So I see motor-operated discharge isolation valves. But that's not a very good control valve typically.

MEMBER SIEBER: Right.

MEMBER STETKAR: But that was just a point of information. I was just looking for the valve because I'm kind of interested where they're located and when I think about PRAs.

MR. HEAD: Well, I mean we can certainly take the action to --

MEMBER STETKAR: If it is a departure, it would kind of be nice to be on a drawing.

MR. HEAD: Okay. So we'll do some exploration between now and at the end of Chapter 13 and see if we can uncover that for you.

MEMBER STETKAR: Thank you.

MR. CHAPPELL: Okay. Moving onto site-specific information, we have the power cycle heat sink that is a site-specific design and also the recirculating water system.

We've added some information here, some interface requirements, with the DCD to fill in some of the specific information over STP 3 and 4 sites. For example, some of the information about the main cooling reservoir. We also -- This goes a little bit back to departures, but there's no warm-up recirculation line because the site conditions don't require that for the main condenser. We don't have icing concerns at that location.

COL license information is addressed in Chapter 10 dealing with low-pressure turbine disk fracture toughness. We have to describe the turbine design overspeed conditions and we have reference where the turbine insert test inspection requirements are described in Chapter10. We also reference that the procedure development plan will include procedures to include steam hammer and discharge loads.

The MSIV leakages are a COL requirement for the site-specific applicant to provide that information and the information that we provided is unchanged from what is described in the DCD. So that's a reference to other DCD information for steam line leakage and the radiological analysis for the gland seal effluents that will be included in the offsite dose calculation.

There are a number of Tier 1 ITAAC that are associated with the systems that are described. I pretty much touched all of those in the discussion and those deal with specific aspects of them. We have incorporated by reference those ITAAC tables.

And we have also in the course of responding to RAI, RAI's added an additional ITAAC to address the diversity of the overspeed trip system devices for the main turbine. So that's what's included in Part 9 of our application. And that concludes my discussion.

CHAIR ABDEL-KHALIK: Are there questions for Mr. Chappell?

MEMBER SIEBER: Have you chosen the turbine manufacturer yet?

MR. CHAPPELL: Yes.

MEMBER SIEBER: Okay.

MR. HEAD: Toshiba. It will be a Toshiba turbine.

MEMBER SIEBER: Okay.

MEMBER STETKAR: Are there any -- I know that the orientation of the turbine is favorable per unit. Are there any concerns about any entry unit effects from turbine missiles? I don't know what the -- It looks like there's a pretty good separation there but turbine missiles from Unit 3 affecting any safety-related equipment on Unit 4 and visa versa given that the fact that now you have two unit site.

MR. DALEY: Yes, it ends up being an unfavorable arrangement.

MEMBER STETKAR: It is. So you're within the angles.

MR. DALEY: Right. We use the lower probability on our own.

MEMBER STETKAR: That makes it a little more interesting, too. Okay. Thanks.

MR. HEAD: Finish your statement though. Between 3 and 4? I heard someone say the other units also.

MEMBER STETKAR: Is it between 3 and 4 or is it even within --

MR. DALEY: No, it's not between 3 and 4. It's between 3 and 4 and 1 and 2.

MEMBER STETKAR: 3 and 4 and 1 and 2.

MR. DALEY: Right.

MEMBER SIEBER: Right.

MEMBER STETKAR: Ah.

MEMBER CORRADINI: So where is the -- You've got a cartoon up there.

MR. HEAD: Yes.

MEMBER CORRADINI: Can you point as to what we're talking about here?

MR. HEAD: Three, four, two, one.

MEMBER CORRADINI: And the unfavorable angle is because it's -- The reactor drywell containment is --

MEMBER STETKAR: No, no. They're talking about --

MEMBER SIEBER: The turbine building.

MR. HEAD: This going over to this (Indicating).

MEMBER STETKAR: They're talking about over there (Indicating) the resisting units.

MR. HEAD: Right.

MEMBER STETKAR: I mean think of that one.

MEMBER BLEY: That's a pretty small angle, isn't it?

(Simultaneous speaking.)

MEMBER STETKAR: But it doesn't say anything about that in the guidance.

MEMBER BLEY: You're right.

MR. HEAD: -- distance. So we're using a lower probability.

MEMBER STETKAR: But there is not between the two Units 3 and 4.

MEMBER CORRADINI: No. That's what I was just --

MEMBER STETKAR: Now for a single unit I know that they're favorable. But I was trying to figure out angles because I didn't know distances.

MEMBER SIEBER: -- between 3 and 4.

MEMBER STETKAR: Between 3 and 4.

MEMBER SIEBER: I don't think there will be.

MEMBER STETKAR: But apparently there isn't.

MR. DALEY: No. To me, it's clear. It's not between 3 and 4.

MEMBER STETKAR: I just didn't know what might be in what buildings, you know, around the periphery of 3 and 4.

MR. DALEY: It's the control and the reactor building, these two (Indicating). And I guess maybe it is a little bit -- This is not in the angle.

MEMBER STETKAR: Yeah, that's what I was

thinking about, those angles (Indicating). But it's not.

MR. DALEY: No.

MEMBER STETKAR: But it's over to Units 1 and 2.

MR. DALEY: Right.

MEMBER STETKAR: Okay. Thank you.

MEMBER BLEY: Both of those can align with one or two. But this is a cartoon.

MEMBER STETKAR: Well, this is a cartoon. That's the problem. It's an optical delusion. Yes.

(Laughter.)

MEMBER BLEY: Fair enough.

MR. TATUM: If I may. My name is Jim Tatum, Balance Plant Branch. Actually if you look at the description, what they provided in the FSAR, the unfavorable orientation is in fact between Units 3 and 4.

MEMBER STETKAR: Oh, it is.

MR. TATUM: There is no discussion about the impact of turbine missiles between Units 1 and 2 versus Units 3 and 4.

MEMBER STETKAR: This is in Chapter 3 of the FSAR.

MR. TATUM: Yes.

MEMBER STETKAR: As I said, I didn't have a chance to read that language.

MR. TATUM: Figure 3.5.2, 3.5.4. There's a figure in the FSAR that shows the units 3 and 4. It depicts the angle. And it shows what equipment is within the low-trajectory missile strike zone.

MEMBER STETKAR: Great. Thank you.

MR. HEAD: We will obviously go back and understand what we were discussing just now and stand on that.

CHAIR ABDEL-KHALIK: We will also confirm that the timing for this submittal of this turbine missile analysis report.

MR. HEAD: Right. If we want to just -- Yes, if this SRP audit report issue is not discussed or closed when NRC briefs you, then that would be an open item for us. The three-year aspect I would hope to be able to close before we do Chapter 13 or at the end of that.

The low-flow valve we'll attempt to identify that on a drawing for you in a break I would assume and just show you where it is on a drawing. And then this last discussion on the turbine missiles we'll attempt to clarify our understanding of that.

CHAIR ABDEL-KHALIK: And the turbine

design concerns that we raised by Dr. Shack.

MR. HEAD: Yes.

CHAIR ABDEL-KHALIK: When are you going to address those?

MR. HEAD: We will answer the NRC.

CHAIR ABDEL-KHALIK: The staff response.

MR. HEAD: Right.

CHAIR ABDEL-KHALIK: So you will be prepared to do that today?

MR. HEAD: We'll try. If not, then we'll carry it as a future open item.

CHAIR ABDEL-KHALIK: All right. Thank you. Are there any other questions for STP?

(No verbal response.)

Okay. At this time, we'll move onto the staff's presentation.

MR. TAI: Good afternoon, everyone. Welcome to the NRC. We're here today to present the safety evaluation report, phase two of the Chapter 10 for the STP COL application. My name is Tom Tai and I'm the Project Manager for Chapter 10.

By the way I am also the Chapter 3 Project Manager. So I'll take that action about the turbine missile for you later.

And with me are chapter reviewers from

Balance of Plant Branch and from Component Integrity Branch.

This slide shows the Chapter 10 contents and where we are with the review of this chapter. You can see we have three sections that are open items and they are 10.2, 10.4.3 and 10.4.7. We are going to focus today's discussion on those three sections because the other sections have no open items and the other reason is because they are for the most part IBR.

We're going to tell you our issues and most of these are more editorial clarification type of questions and we close all these. So if you have any questions on any of those chapters, we'll be happy to entertain them today.

For Chapter 10.2 the way the chapter is organized is it has turbine generator in 10.2 and 10.2 -- I'm sorry. 10.2 is turbine generator and 10.2.3 is turbine rotor integrity. Instead of separating the two SER for that particular section, we combined the two of them and have the balance of time to talk about the turbine and CIB to talk about the rotor integrity.

With that, there are two open items in 10.2 and I'll turn it over Greg.

MR. MAKAR: I'm Greg Makar from the

Component Integrity Performance and Testing Branch. And this slide is to summarize our review of Section 10.2.3 on turbine rotor integrity. And what I'd like to do is highlight some of the things we looked at and I can answer questions that you've already asked about this topic. This section does include information beyond what was incorporated by reference including departure information and a COL information item.

This departure 10.2-2 does change as Mr. Chappell said the type of rotor that's being used. So this is a so-called monoblock rotor without shrunk-on disks. And in making that change that included a higher fracture appearance transition temperature (FATT) and lower notch toughness value as measured by the Charpy impact test.

This staff did perform an audit on the process that the applicant used for evaluating Tier 2 departures to see if there was a technical evaluation associated with those departures and their conclusions. And as you -- As Dr. Shack said, the staff was satisfied that an appropriate technical evaluation was done on these particular departures. And that was written in the audit report.

MEMBER ARMIJO: Exactly how did they conclude that was acceptable from a fracture mechanics analysis or probability of fracture because those are not small changes in the transition temperature or the notch toughness.

MR. MAKAR: That's right. And the technical evaluations that the -- And I was not on the audit team. But the technical evaluations that were described to me showed for example for the fracture appearance transition temperature I believe they had drawings showing where those samples were taken which are consistent with what's in the open literature about the correlation between the sampling location for monoblock forgings and the range of values that one gets for FATT.

So these are not thick technical reports that you might be accustomed to see on some types of evaluations. But they are for these Tier 2 departures technical evaluations nonetheless.

MEMBER ARMIJO: Is the rotor itself a different material or is this a sampling issue on the same material? I'm just trying to find out what's the reason why.

MR. MAKAR: When the rotors are made this way because of the different fabrication.

MEMBER ARMIJO: It's the forging.

MR. MAKAR: Yes. And there's an

opportunity to sample from the center of the forging where the FATT values are lowest, I'm sorry, highest. And those are being compared to the SRP values which are based on measurement samples from the outside where they are lowest or best. So when you're talking about a monoblock forging what we're looking at is how not comparing those values directly to the SRP values. But to an operating experience and research, for example, there's an EPRI study that looked at a large number of monoblock forgings and they looked at different values of FATT and fracture toughness not measured from Charpy but measured from other ASTM methodologies and compact tension specimens to see how the fracture toughness and --

MEMBER ARMIJO: Is a function of where you sample.

MR. MAKAR: Was a function of where the sampling was. The material composition is very similar, nickel chrome molyvanadium steels with, say, up to 0.8 to 3.5 percent of nickel of them. So it causes of a small range of composition. But it's the same class of material.

MEMBER ARMIJO: I don't know about Bill, but I'd sure like to have a copy of that analysis.

MEMBER SHACK: Yes. I mean my problem is

the audit report doesn't have any of that.

MEMBER ARMIJO: Yes.

MEMBER SHACK: The audit report says it doesn't meet the standard review plan requirement. And then you get another one and it's not clear how they did this and there's no justification for the exceptions. And then I get to the SER which refers me back to the audit reports.

MR. MAKAR: Well, I think that's partly --

CHAIR ABDEL-KHALIK: Can you go through each one of these issues individually?

MEMBER SHACK: We had a discussion of the FATT appearance.

CHAIR ABDEL-KHALIK: Okay.

MEMBER SHACK: And in there the SRP is key to the conjunctional one rather than the monoblock.

MR. MAKAR: That's right.

MEMBER SHACK: So even though it's not clear just how many degrees you're going to give them. You know you gave them something.

MR. MAKAR: Well, for example, I believe these are the same as AP1000 and ESBWR, I think, are using the same values. And probably recent operating reactors would have, newer generation turbines would have, the same types of values.

MEMBER SIEBER: Right.

MEMBER SHACK: Okay. Then they argue that STP is limiting the average tangential stress rather than the maximum tangential stress.

MR. MAKAR: Right.

MEMBER SHACK: Now is that another forgiving thing that you give to monoblocks?

MR. MAKAR: Actually no. That's one where we asked about that and I did participate in a phone call during the audit. I thought that the applicant said that they were going to take that out. And this may be a process. Since this is not RAIs and responses and things that maybe that wasn't captured, but that was the response during the audit for that item.

MEMBER SHACK: Okay. And then the third issue was this ratio of toughness to the maximum tangential stress intensity and the comment in the audit report is "Although this requirement appears to be based on the SRP 10.2.3 acceptance criterion it is unclear to the staff how the applicant's version was derived."

MR. MAKAR: Yes. And I think that was just me not understanding how it was derived and it was explained by the staff in the AP1000 safety evaluation that that derivation is equivalent and I didn't know.

MEMBER SHACK: Okay. It just seems like a conclusion that isn't very well documented. I mean the reference in the SER is to the audit report and the audit report just lists the problems. It doesn't say anything about resolutions.

CHAIR ABDEL-KHALIK: Now you indicated that with regard to the issue of tangential stress you said you discussed this in a phone call and the results of that were not documented.

MR. MAKAR: That sounds that way.

CHAIR ABDEL-KHALIK: So how did you arrive at a final conclusion without incorporating whatever the outcome of that discussion was?

MR. MAKAR: Well, I think it has to do with the process of rather than reviewing since these are Tier 2 departures. Since we weren't reviewing them directly but reviewing the applicant's application of the departure process that there's a different -- The way we do that is different. And I'm not saying it should have been captured. But since we're not asking RAIs about these things, we're verifying that they did some technical evaluation to satisfy themselves that it was a --

MEMBER SHACK: I'm just little surprised the audit report doesn't have a statement, you know, "This issue was raised. It was discussed and resolved."

MR. MAKAR: Understand.

MEMBER SHACK: That would have made a big difference.

MR. MAKAR: Yes.

MEMBER SHACK: At the moment, all I see is just issues raised and no resolutions.

MEMBER SIEBER: But based on what we have now its documentation does not show the path that would cause you to draw the conclusion that it's okay.

MR. MAKAR: Right.

MEMBER SIEBER: So it's wrong the way it is right now.

MEMBER ARMIJO: That's right. That's why either from the applicant or from the staff I'd like to see the documentation that justifies acceptance of rotors with these material properties. It may be okay. But I just don't know how you got there.

MEMBER SHACK: And it's your own standard review plan that's being -- the differences. So I would think that you would have to resolve, you know, address, each of those departures from the standard review plan acceptance criteria.

MR. MAKAR: Except that these are departures not subject to NRC review.

(Simultaneous speaking.)

MEMBER ARMIJO: It's subject ACRS review. And I don't think it's a trivial thing. It may be just perfectly fine technically. I just don't see how you got from what seemed to be a much more tougher material to accept something that appears to be less tough in this application. And it's an important application. So we'd like to see how you got there.

MEMBER CORRADINI: Before we get back to technical, you made a comment that just went right over my head. You said it's not -- You're going to have to repeat what you said before Sam. Can you explain what you just said about because it's a departure it's not subject to -- I don't understand that.

MR. MAKAR: Well, I'll start and, Tom, you can help if necessary.

MEMBER CORRADINI: There's no good answer.

MR. MAKAR: This is Tier 2 material in the DCD.

MEMBER CORRADINI: Got it.

MR. MAKAR: So, according to the

regulations, it could be changed without NRC approval. But there is a process in the regulations in Part 52, Appendix A for departures, what criteria these departures have to meet in order to avoid or to determine whether it needs NRC approval.

MEMBER ARMIJO: It's like a 50.59.

MEMBER CORRADINI: Okay. Fine.

MEMBER ARMIJO: Yes.

(Simultaneous speaking.)

MEMBER SHACK: But is this a prior approval?

MEMBER ARMIJO: Prior approval, it has to have that.

MEMBER SHACK: I mean I understand the process like 50.59.

MEMBER ARMIJO: It's prior approval.

MEMBER SHACK: You don't need prior approval to do this. But when you go in and you find out what the change doesn't seem to meet the standard review plan and the audit, what happens then?

MEMBER ARMIJO: But the applicant even in a 50.59 has to prepare his own documentation to show why it's okay. And it's available to the NRC normally if they request it, but they don't have to.

MEMBER CORRADINI: So our interpretation

was prior approval. Is that the correct interpretation?

MR. TAI: Yes.

MEMBER CORRADINI: Okay.

MEMBER SIEBER: No, it still is Tier 2. So it doesn't require prior approval. But it requires that somebody have the documents that shows --

MEMBER ARMIJO: That shows it's okay.

MEMBER CORRADINI: And documentation of why it's okay.

MR. WUNDER: This is George Wunder from the staff. I believe I may be able to shed a little light on this. The standard we apply for a Tier 2 change is the standard that you will see through our safety evaluation report. The conclusion that we will draw is that it is reasonable that the information provided by the applicant and reviewed by the staff shows that it is reasonable that the applicant can make that change without prior staff approval.

Now sometimes what we have to do is if we look at it and on the surface it's not obvious to us that it's a reasonable thing to do. Therefore we will ask RAIs, we will pull the string, until we get to the point where we have drawn the conclusion that the information supplied allows us to draw the conclusion that they don't have to get our approval on it. Have I confused it more?

CHAIR ABDEL-KHALIK: No. But based on the questions that you heard and the answers you have provided do you still believe that this issue is closed?

MR. MAKAR: From a technical standpoint I do. We --

MEMBER CORRADINI: I want Billy to figure out why.

CHAIR ABDEL-KHALIK: What?

MR. MAKAR: Well, based on the applicant's determination of, for example, FATT was based on the sampling location, the fact that these are monoblock rotors and that monoblock rotors have lower operating stresses. As a reviewer, we say that we know that from operating experience and there's research to correlate those FATT values with fracture toughness. And other applicants and licensees have been approved for such values. So our conclusion is that not that we reviewed this in this departure in detail the same way we would a new DCD, say. But that we verified that they had done some technical analysis to conclude that the departure was okay. They followed the departure process.

CHAIR ABDEL-KHALIK: Is this sort of the norm that you piggyback your approval on prior approvals? What if somebody made a mistake earlier?

MR. MAKAR: Well, I don't mean to say that everything that was done in the past is the answer, but that that's part of the story because those other things like the other reviews we've done in this area are different than this one because they are not Tier 2 departures that don't need NRC approval. They are first-time reviews of the amendments or new reactor applications. So we have done other review work in this area.

CHAIR ABDEL-KHALIK: Are there any additional questions on this particular issue?

MEMBER CORRADINI: Well, I mean I'm listening to all you guys that know the technical side. I guess I'm just hearing that it's hard to follow the trail as to how the staff came to the conclusion.

MR. MAKAR: Right.

MEMBER CORRADINI: I don't think anybody -- I mean at least my sense is that people aren't in disagreement with your conclusion. It's just to be able to understand it. It's not in black and white anywhere and I guess my question is shouldn't it be somewhere.

MR. MAKAR: I'm not -- That's not part of the technical. I understand that, that comment.

MEMBER CORRADINI: Very good. Okay.

MR. MAKAR: I'm not disputing that.

CHAIR ABDEL-KHALIK: But from a technical standpoint, do you expect the sampling location to result in a 40 or 45 degree change in this fracture appearance transition temperature?

MR. MAKAR: Yes.

CHAIR ABDEL-KHALIK: Okay. And the basis for that level of confidence is what? Your knowledge of the quenching rates of different locations?

MR. MAKAR: Well, I can't tell you off the top of my head what the quenching rates are, but we have reports. I've looked at reports that show those values for those locations for that type of design.

CHAIR ABDEL-KHALIK: And those reports are referenced in your assessment?

MR. MAKAR: No, because again we -- This, the review of these departures is a review of the applicant's if the applicant followed the Tier 2 departure process. It's not our evaluation of the technical material.

CHAIR ABDEL-KHALIK: Okay. I think we've

--

(Simultaneous speaking.)

MR. MAKAR: -- understand how we do it.

CHAIR ABDEL-KHALIK: Thank you. So let's proceed.

MS. BANERJEE: Excuse me. This is Maitri Banerjee. Is this item still open? Are we going to ask for any of additional documents?

MEMBER ARMIJO: I would like to see the applicant's analysis that shows why this is okay. That's all. It may be just common industry practice and it's my ignorance of what's going on. I'd just like to see how they got there.

MS. BANERJEE: Okay. So it's still an open action item.

CHAIR ABDEL-KHALIK: Yes.

MS. BANERJEE: Thank you.

CHAIR ABDEL-KHALIK: Thank you. Please proceed.

MR. MAKAR: Okay. Now this is a COL information item that states that the applicant will provide the actual rotor material properties as part of a commitment. That is providing that material meets the SRP in that it will give us -- It sound like a small part. But having that actual material properties, that feeds into the turbine missile probability analysis and the maintenance and inspection program that we'll receive later. We do have a confirmatory item there because we want the phrase "as-built" added to clarify that this is the actual material properties.

There was a question about the turbine missile probability analysis in Chapter 3. My understanding is that there is still an open item there on the timing of that.

MEMBER STETKAR: It there? We haven't seen Chapter 3 by the way.

MR. MAKAR: I understand. I think there may be an open item still. It's definitely following and I think the wording in the SER, the staff's SER, is three years following the --

MEMBER STETKAR: It might be in Chapter 3.

MR. MAKAR: Yes, that's where it would be. But I think the DCD said prior to fuel load. And I think there may be an open item there on the timing.

MR. TAI: I think -- If I may add to that. I think Chapter 3.5 does have the RAI and off the top of my head I think the answer that we accepted is three years after the COL license.

MEMBER STETKAR: I will refer you to

Section 10.2.4 of the SER says, "As discussed in Section 3.5.1.3 of the FSER turbine missiles within three years of obtaining an operating license..." That's why I tripped over it because I didn't know what that meant in real time.

MEMBER SIEBER: That's a six year span.

MEMBER STETKAR: Yes. I knew -- I figured out that it wasn't three years before the COL was issued.

MEMBER SIEBER: Right.

MEMBER STETKAR: But you say that in Chapter 3 there may be still an open item regarding that timing.

MR. TAI: I do think there is an open item because I think we accepted that schedule in 3.5.1. But I will verify that.

MEMBER STETKAR: Therefore, the determination of safety for the purposes of issuing the COL would be made without that analysis.

MEMBER SIEBER: They can build part of the plant before they have to submit this. But they aren't going to build the entire plant in three years I don't think.

MS. BANERJEE: It could be a license condition maybe.

MR. TAI: Right now, I don't think it is.

MEMBER SIEBER: They can keep buying turbines until they get one that works.

MEMBER CORRADINI: But you're betting they can't build a plant in less than three years.

MEMBER STETKAR: But that also means that analysis would not be available for ACRS to review.

CHAIR ABDEL-KHALIK: Because?

MEMBER STETKAR: Because that's post COL.

CHAIR ABDEL-KHALIK: Correct.

MEMBER SIEBER: Well, one of the strange things about that design is the shrunk-on plate rings have built-I residual stresses because they're shrunk-on as opposed to the monoblock which is built in one piece and the residual stress structure in the rotor is substantially different than would be for multi-piece rotors.

Where the sampling comes from, how it's tested and all that is hard to compare the two different designs in my mind anyway. The idea of going to monoblock is to get rid of all those residual stresses so that the plate rings wouldn't come apart and create the missiles.

MEMBER SHACK: Yes. I have no problems with monoblocks.

(Simultaneous speaking.)

MEMBER ARMIJO: It's a good thing. We are just trying to understand.

MEMBER SIEBER: Yes. I was at the first plant where the plate rings broke off and they do generate missiles.

CHAIR ABDEL-KHALIK: Please continue.

MR. MAKAR: That completes this slide and this topic.

CHAIR ABDEL-KHALIK: Okay.

MR. REDDY: Goo afternoon, Members of the Committee and the Applicant and the NRC staff and management. My name is Devender Reddy. I'm from the Balance of Plant Branch of the Reactor Office and along with me is Angelo Stubbs and we are going to present the Chapter 10 STP, Sections 10.2 and 10.4.7. And I'm here to discuss about turbine generator, mainstream system, and the condenser and associated systems.

To give a brief diagram as was already alluded, the STP design, the design of the STP Units 3 and 4 is incorporated by reference of the design ESABWR with departure modifications. And the staff's evaluation of ABWR is documented in NUREG-1503. Similarly, the regulatory basis of the design for ABWR is also documented in NUREG-1503. Therefore, the staff evaluation of the STP Units 3 and 4 is only focused on the modifications and the departures from the DCD.

So as far as the turbine generator is concerned, there are a couple of interesting topics. There is as the STP staff said STP departure 10.2-3 with regard to the overspeed system. In lieu of a primary mechanical overspeed protection device, STP proposed an electrical overspeed that meets two electrical overspeed trip systems.

And the staff evaluation of this modification, of course, is based on the General Design Criteria 4. The GDC-4 requires that the structures, systems and components that are important to safety shall be appropriately protected by dynamic effects which includes the effects from the turbines themselves and pipe looping and the discharge flows that may result as equipment failures and other events from outside the nuclear block.

So in order to stipulate the GDC-4 requirement, Section 10.2 provides the details and there are a couple of things about the turbine generator. One is that it should be equipped with suitable diversity features. That's number one. And also it should have a mechanical overspeed and an electrical overspeed to fit to the turbine at 111 percent and 112 percent respectively. It is not to exceed 120 percent. The SRP criteria is 111 and 112.

Now the staff evaluation is based on this regulatory criteria that is GDC-4 and the SRP guidance. So the staff is focused on redundant and diverse features of the turbine overspeed systems and also particularly the primary overspeed system which is mechanical. In order to justify the bottom level the staff would like to request for Tier 1 and Tier 2 of the application should provide a level of protection provided by the overspeed system at least equal to that provided -- that is called by SRP guidance. That is the primary electrical system the STP is quoting should be equal at least the mechanical overspeed which is called by -- guidance.

That's what I have focused. I am in the process because it was not there initially in the application. So we ask RAIs the respondent. Still again we are ensure the follow-up RAIs and they submitted the response. We are currently reviewing that.

And what we are about to speak of are the new redundancy features on one of the -- previously.

MEMBER STETKAR: Okay.

MR. REDDY: And based on your comment we have been reviewing all of turbine generator Overspeed systems based on that not only from the sensors to the tube block but even from the tube block to the hydraulic fluid reservoir. So that's what I think we are focusing on particularly on this STP.

MEMBER STETKAR: Good. I did have a question. And we don't have the RAIs and I didn't have a chance to go look for it. So I don't have the drawing.

MR. REDDY: Sure.

MEMBER STETKAR: But in the SER there's a statement that says, "The emergency overspeed trip system and the normal speed control system used the same sensors. In other words, the speed sensors for the normal speed control that will run back the intercept stop values in the trip.

MR. REDDY: That's right.

MEMBER STETKAR: And I don't care particularly which one it is, but the thing that's called the emergency speed, they use the -- That's a common set of three sensors, speed sensors.

MR. REDDY: Yes. Common set of three sensors between the normal overspeed control system and the emergency.

MEMBER STETKAR: Yes.

MR. REDDY: But for the primary system it has different sensors.

MEMBER STETKAR: Yes, I -- But basically if I go look at the turbine, I have a total of six speed sensors.

MR. REDDY: Right. Yes.

MEMBER STETKAR: Okay. Thanks.

MR. REDDY: Any questions on the overspeed?

MEMBER SIEBER: Yes. You're supposed to have two overspeed trips. They have eliminated the mechanical one which was a spring.

MR. REDDY: Right.

MEMBER SIEBER: So the only other ones you could have would be ones that operate off of the --

MEMBER STETKAR: Well, it's just that right now, if the normal speed sensors fail, you have one backup.

MEMBER SIEBER: That is not diverse, right?

MEMBER STETKAR: It is diverse in that sense. It's not a mechanical diverse, but it's a different electrical with a different set of speed sensors with a two-out-of-three logic.

MEMBER SIEBER: In principle, it doesn't.

MR. REDDY: There are three of them actually.

CHAIR ABDEL-KHALIK: Question, Charlie?

(Simultaneous speaking.)

MEMBER BROWN: Yes. I'm just trying to -- For the normal control --

MR. REDDY: Yes.

MEMBER BROWN: -- and the emergency --

MR. REDDY: Yes.

MEMBER BROWN: -- trip device --

MR. REDDY: Right.

MEMBER BROWN: -- both utilize the same sensors.

MEMBER SIEBER: Right.

MR. REDDY: Yes.

MEMBER BROWN: Okay. And then the main, what you call the main, overspeed device.

MEMBER SIEBER: Primary.

MR. REDDY: Primary.

MEMBER BROWN: Primary, excuse me, has a separate set of sensors.

MR. REDDY: Yes.

MEMBER BROWN: Are those -- This may have come out of the sensors the same type of sensors between the two.

MEMBER SIEBER: Yes.

MEMBER BROWN: Or are they diverse sensors? The items that might have magnetic pick-up of something like that?

MR. REDDY: Actually, the emergency one is magnetic pick-up. Whereas the mechanical primary which trips the turbine at 110 percent is passive.

MEMBER BROWN: By passive you mean?

MR. REDDY: Passive sensor. It's a different sensor. It is not --

MEMBER BROWN: Well, is it self -- I was looking for is one of these a self-powered unit by getting power from an UPS or something like that. That's what I'm familiar with in some circumstances where the overspeed sensors literally provide the power for the overspeed circuit to do the trip. So they're not dependent upon anything else anywhere even plant power of any kind. Is that the case?

MR. REDDY: I think we will go to the reactor systems.

MR. TATUM: This is Jim Tatum again, Balance of Plant Branch. Based on the descriptions provided in the FSAR essentially what we know there are two different type sensors that are used for the systems. And based on the information I would not come to the conclusion that the set that's used for the primary, the passive sensors, are self-powering. The description in the FSAR would lead me to believe that they have separate power supplies for both sets of circuits. But you have passive sensor type and you have the other magnetic type pick-up.

MEMBER BROWN: Why isn't magnetic considered to be passive? I mean it's a magnetic and wire, right? It sounds passive.

MR. TATUM: That's just the terminology that we have always applied to the magnetic type pick-up sensor. You know, I can't really explain that.

MEMBER BROWN: I'm just looking for a difference between what's passive and -- I mean passive is kind of passive.

MR. TATUM: Right. The point to be made is really that they're different type sensors and the SRP in fact would allow you to use the same type sensors for both of those applications. So that wouldn't really be an issue for the staff.

But one of the things I did want to clarify here for you here is on the normal speed sensors where you have the normal control system that shares the sensors with the emergency overspeed trip device. If you have two out of three of those sensors fail, it's going to trip the turbine. Okay. I just want to make that clear so that if you have a concern with a set of sensors failing you're not left with just the passive sensors. I mean two out of three of the sensors are supposed to initiate a turbine trip.

MEMBER STETKAR: If they fail the right way.

MR. TATUM: Correct. Well, the FSAR does not explain to what extent or how they fail. But I just wanted to make sure --

MEMBER STETKAR: If you follow the rules of failure, it's true. They could fail either way.

MEMBER BROWN: Okay. Thank you.

MR. REDDY: What we are talking about here is magnetic and passive and all that. We have been seeing in all applications and most of DCD applications.

And the open item here is the applicant submitted the RAI responses. For the supplemental RAIs we wanted an ITAAC to ensure that whatever is described in Tier 2 is in Tier 1. And the ITAAC could really request for stating that these two overspeed systems, two electrical overspeed systems, they have a diverse hardware and software and firmware. Right now, those are not there. So we are looking for more details and we are going to have follow-up RAI topics.

And also like I pointed to Mr. Stetkar, you know, he asked previously. We are looking for that kind of information also in this case.

MEMBER STETKAR: You're looking all the way out to the solenoid valves.

MR. REDDY: Yes. Solenoid valves all the way up to the reservoir. Yes. So far previously we focused on the electrical I&C part of it. But now we are looking at the whole mechanical and electrical. That's one of them.

And the other open item regarding the turbine generator is very simple. It is regarding the 103 percent overspeed trip. SRP calls that for the normal overspeed trip. You know the turbine should be -- Not the turbine. At the worst speed reaches 103 percent. The control intercept valves that supplies the steam to them should be stopped. And again you should come back as overspeed dropped down.

But what is in the application, what is mentioned, is the difference from 103 percent to 105 percent and 107 percent. There the turbine trip totally at 105 percent and LP turbine will trip at 107 percent. So that's -- We don't quite understand that. So that's an open item. That's with regard to the turbine generator --

MEMBER BROWN: Okay. That did remind me of one other question. On the emergency normal control emergency overspeed trip are those two separate? In other words, the only thing sure between those is the sensors. Is the emergency overspeed trip a separate set several severable non-communicating with the control system? I mean they're totally -- It's not like taking the output of the control system, feeding both, you know, the control valves as well as feeding off to the trip system?

MR. REDDY: That is correct.

MEMBER BROWN: They are totally separate.

MR. REDDY: That is correct.

MEMBER BROWN: Other than the sensors.

MR. REDDY: Yes. That is correct to the extent I know of. But the thing is for the normal that system is DEH. That's the digital electrohydraulic system. So there is both that one. But how much they shared? I don't know.

MEMBER BROWN: That's on the hydraulic side or on the electrical side.

MR. REDDY: On the electrical side.

Electrical side when we're looking for that.

MEMBER BROWN: So your initial answer is that, no, they may be shared. It's independent, but they may be shared. They may be part of the same electronics packet.

MR. REDDY: Right now what we know is all the sensors will be shared among other things.

MR. TATUM: Devender. Again, this is Jim Tatum, Balance of Plant Branch. To respond to your question, in looking at that point, the SRP in fact specifies that the system should not be shared and in taking a closer look at the application we find that there's not enough of a description there for us to reach that conclusion and we will be pursuing that with the applicant.

MEMBER BROWN: Okay. So that's open.

MR. TATUM: Yes.

MEMBER BROWN: Okay. Thank you.

MR. REDDY: That's open. Correct. Well, if you don't have anything else on the -- Chairman, if you don't have anything on the turbine generator what I'd like to say briefly about this turbine gland seal system. Again, I think you have been discussing it with Greg.

Well, I'll tell you what. This is what

you call a standard departure in that they added gland steam evaporator to the system which is not in the ABWR DCD. So they added that for purposes they want to flexibility to supply that stream during the startup and shutdown to what they call, not to be in the steam system. That's one thing and also to supply the clean steam to the turbine glands as well as the penetrations and also the valve stems to supply clean steam to that. So they have that one.

And then we have the evaluation by the STP said that it does not require NRC approval in this one based on the Section 8.B.5 of Appendix A to Part 52. That is the design certification rule for ABWR design. Based on that that NRC doesn't need to approve this. But when they did that like Greg said into the FSAR and in the CFR that one section I quoted I think there is a new criteria. There are about eight items. We had to do that before we accepted that. That does not require NRC approval.

Based on that, we have something -- There are three simple items we need to clarify. We left it as an open item, but I think it was not that big a deal for them to respond. They did provide the response, but we are evaluating that. That's another item. So that's another item.

The bottom one conclusion is for the turbine generator we have two open items for the gland seal system. We have three open items which are minor ones. Otherwise we don't have any other open items.

CHAIR ABDEL-KHALIK: Thank you.

MR. REDDY: Chairman, that concludes my presentation and thanks for all of you.

CHAIR ABDEL-KHALIK: Thank you.

MS. STUBBS: Good afternoon. My name is Angelo Stubbs. I'm with the Balance of Plant Branch and I performed the review on the STP condensate and feedwater systems that described in FSAR Section 10.4.7. As part of my review, I reviewed the departures that STP took from the Tier 2, Section 10.4.7 DCD and looked whether those departures would have effects on Tier 1 information including DCD by incorporation by reference to the STP FSAR.

The first slide I have here summarizes one of the results of that review. On the first slide, what I found first was that the condensate and feedwater system Tier 1 information was incorporated by reference in COL with no departures or supplements. And there's a departure of 10.4-5 that modifies that system and that departure incorporates into the design new components and including condensate booster pumps which is different from what was in the original ABWR certified design.

What this led up to was the open item. The review looking at things we saw in the creation of open item 10.4.7. Because it appeared to me that the Tier 2 information was no longer consistent with the Tier 1 information. The first bullet here is about the STP COLA departure to add a new SSCs that are -- If you look at the level of design or the information that was in the Tier 1 in the DCD it seems that if you added something as significant as a booster pump it would have been shown in the design description and the drawings.

So that information was now in Tier 2, but it wasn't really reflected in Tier 1. In general, descriptions contained in Tier 1 are derived from Tier 2 information. So that was something that caught my attention.

The second bullet what we're talking about here is that the ITAAC for that system, the first item is to basically verify that the as-built facility conforms to the approved design and applicable regulations. Again, for the Tier 1 ABWR certified design, the certified design did not have a booster pump in the condensate and feedwater system. And it references a figure in terms of a simplified drawing that shows the major components and the relative locations in the system. And the Tier 2 actually now has introduced a booster pump which will be after the purification system while the regular condensate pump in the drawing are prior to the purification system.

So the third bullet, what we did was we generated an open item and asked that the applicant address this. And basically we requested that they update the Tier 1 to make it consistent with Tier 2 information. We've since received -- To get that open item addressed, we since issued an RAI, a follow-up RAI, on that and basically requested the information that we said in the open item.

And the applicant has responded to that RAI. And in their response they've taken the position that the addition of condensate pumps is consistent with the basic configuration design commitments in the DCD and that the ABWR DCD Tier 1 that's applicable to the condensate pumps are also applicable to the condensate booster pumps. And we're considering the information that they provided.

But I guess my initial feel for this information is we still have the same problem that we had with our open item. We have a system -- We're following a system drawing that was developed for a system that they departed from and to the level of information that was contained in DCD it only seems that we would have that additional component which is comparable when you think about it to the other pumps in the system reflect it.

So if you're going to confirm the design you're going to use Tier 1 information, the Tier 1 drawings, and the Tier 1 drawings don't reflect Tier 2. So my initial feeling for their response was we're still at a situation where this item will be open because to look at this as to say that they meet the requirements of providing information for -- The Tier 1 information is generally not so that it incorporates their design. I don't think it's going to be a success path.

If there are any questions.

CHAIR ABDEL-KHALIK: Are there any questions on this topic?

(No verbal response.)

Thank you. Please proceed.

MR. TAI: Well, with that, based on our review so far we don't see any major technical issues in Chapter 10. but with the feedback from the ACRS and the questions I think we do have a problem perhaps that we can work on the documentation part. So I'm going to take that as an open item or an action item to make sure that this conclusion is still correct that there is indeed no technical issues.

The open item is we're still waiting for especially 10.4.3 and 10.4.7 and STP is here. So I'm glad because they can hear what the issues are that we all have in here. And if there are any questions.

CHAIR ABDEL-KHALIK: Yes. Does the applicant want to provide any information on the issues that were raised during the staff's presentation, particularly the turbine rotor integrity and the turbine overspeed system?

MR. HEAD: Just a perspective that I'll mirror what George had said. The audit was in essence an audit of the 50.59 program, 50.59 like program, that we're obligated to implement to make the numerous Tier 2 changes that we have made and the conclusion that it did not need NRC approval. So that was the basis of the audit.

There were clearly topics. There was a number of 50.59s that were looked at and a number that caused additional dialogue and discussion, some of which you saw the results of in the audit. But our conclusion based on that change is that it did not need NRC approval. And we have a process that we went through to draw that conclusion that basically addressed and discussed a lot of what was talked about today.

CHAIR ABDEL-KHALIK: The lack of documentation, that doesn't negate the validity of the questions that have been raised during this discussion.

MR. HEAD: Yes, I understand. And I was headed towards I understand the ACRS has some technical questions. So that was all as background. And I sense an open item where you would like to have more discussion on the technical aspect of this change and we'll be more than willing to support that in a future meeting.

MEMBER SIEBER: I think it would also be helpful you obviously just like a 50.59 decision that you make as a licensee a document for the answers to those questions.

MR. HEAD: Yes.

MEMBER SIEBER: You will have a similar document for your QA records that answers the questions that satisfy whether it's Tier 1 or Tier 2.

MR. HEAD: Yes.

MEMBER SIEBER: And that would include

some areas of technical discussion.

MR. HEAD: Absolutely.

MEMBER SIEBER: And I see no evidence that staff either in its inspection or in its SER review process ever saw that document. And so the staff -- If they knew they didn't see the document, they can't draw the conclusion as I see it that it's Tier 2 and not Tier 1 because they wouldn't have a basis for saying that. So somewhere along the line somebody needs to know that they actually have looked at that, the review document, where you itemized the issues that you looked at to satisfy that it's Tier 2 and not Tier 1.

CHAIR ABDEL-KHALIK: I think in my mind there was --

MEMBER SIEBER: They have the same two open questions of the bypass reduction to the condenser. It was originally 40 percent and now it's 33 percent. And in some reactor types it makes a difference. In this one, I sort of doubt that it does.

But there should be a document that tells us Tier 2 also. And when we review it, we see "Here's the requirement. They don't meet it, but it's acceptable. And it doesn't need our approval, the NRC approval." And that just is hard to swallow for me. I mean there are a lot of instances like that.

CHAIR ABDEL-KHALIK: There are two questions, the question regarding the documentation and the process question, but there are also technical questions. And both of them can actually be answered by appropriate documentation.

MR. HEAD: During the audit I know we shared an extensive amount of information and whether the documentation just reflects that or whether we haven't just mentioned that appropriately today. Because it was a very thorough audit and this was just one of many that were looked at and then fundamentally as does 50.59 like process work because if we are not asking for approval for this.

That's the first and paramount question is does the process work. But then as going through that there was significant dialogue on this topic and some follow-up discussion which you would expect on something I guess of this nature. So I believe a lot of information was shared.

I guess we'd like to make sure we carefully craft the open items so that they'll meet your expectations.

CHAIR ABDEL-KHALIK: Right. Perhaps I can get input from Members as to what they would like to see. Would you like to see a response to the various technical issues that were raised during this discussion?

MEMBER SHACK: I just want a basis for concluding that applicant had conducted appropriate technical evaluations. You know I look at the audit report and it just sort of leaves me here with a bunch of questions. George gave me a good answer for the FATT. You know I'm willing to believe that. But you know it's the documentation. As I say, I don't think I have any real problem with the change. But I would like to see some justification for that conclusion.

MEMBER SIEBER: Well, I agree with Bill. On the other hand, the whole concept of design certification and COL following it leaves us with a lot of strings that are hard to follow I guess at least for me in that it almost feels like there are things being dropped between the two different processes.

CHAIR ABDEL-KHALIK: But on the applicant's part if you would provide the justification for the conclusion that these departures are okay I think that would satisfy --

MR. HEAD: We'll have a future briefing

that provides detail on how we can to that conclusion and it will be a technical discussion.

CHAIR ABDEL-KHALIK: Good.

MR. HEAD: And we're happy to do that.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: Am I still in court for other perspectives?

MS. BANERJEE: I'm sorry. This is related to the FATT and CV departure.

MR. HEAD: Do you know what she's talking about?

CHAIR ABDEL-KHALIK: Yes.

MR. HEAD: I really believe we found a drawing with this feature you were looking for and it will be on a laptop that we'll show you during the break if that's acceptable and if you --

MEMBER STETKAR: But it's not on the drawing in the FSAR, is it?

MR. HEAD: It is on one.

MEMBER STETKAR: Is it? Okay.

MR. HEAD: And we'll show you.

MEMBER STETKAR: Fifty percent isn't bad.

MR. HEAD: With respect to the three-year overspeed, the submittal there, that date was basically at NRC's request. It was originally I think like I alluded to earlier one year prior to fuel load and it's the maintenance program for the turbine. And it has to have included in it an assessment that confirms that the maintenance program and the turbine meets the probabilities as expected. And so it's very much like we've done on Units 1 and 2.

So that date was basically agreed to by us because that's the date that the NRC wanted. And it will be three years after COL. And it's basically consistent with COL items, the date that was of interest at the time.

MEMBER STETKAR: I was just surprised because -- And I haven't done enough homework here, but I checked a couple. And the other ones have submitted it as part of this DCD or COL application. That's been available as part of the COL issuance.

And I can't say whether that's across the board for all the five different design centers because I haven't had time here in real time to go look at five different sources of information. But I looked at two and two of them did come in before. But I don't know what the requirements are.

MS. BANERJEE: Can I ask a question please? Are we talking about the turbine missile analysis or are we talking about the turbine system maintenance program?

MR. HEAD: Well, this analysis will be embedded in that maintenance program document.

MS. BANERJEE: Thank you.

MR. HEAD: So it was the same topic. And we're still evaluating this last turbine missile issue that was raised with 3 and 4 versus 1 and 2 and maybe at the end of Chapter 13 discussion we might have more perspective on that.

And there was lots of discussion on the sensors and we're doing an RAI response that has a very nice diagram that shows that. And I was going to suggest maybe we could either make a copy of that or show that to Mr. Brown at break and if that clarifies the --

CHAIR ABDEL-KHALIK: You can show it now after the staff concludes.

MR. HEAD: Okay. Right now, it's a hard copy. So we would just --

CHAIR ABDEL-KHALIK: Oh, I see.

MR. HEAD: But we'd be more than willing to leave it as part of the record of this presentation.

MEMBER BROWN: Is that part of the RAI response?

MR. HEAD: It's in the RAI response. Yes sir. So it's already on the document.

MEMBER BROWN: Which they haven't finished with yet because that's the one that you all have.

MR. REDDY: Yes. Actually that is the one. As a matter of fact, they did supply the diagram, but it stops at the prevent block. They do have sensors showing around that. We are currently reviewing that. We may need more information on that. But right now you know --

MR. HEAD: I'm not suggesting that you finish your review. It's just it shows a pretty picture of --

MEMBER BROWN: You don't have to do it. I'll look at it.

MR. HEAD: Okay.

MR. REDDY: And, Mr. Brown, actually one more thing. I was referring to the diagram up to the prevent block. We may need more information.

MR. HEAD: Right. I was not trying to state that your review was complete. I was just --

CHAIR ABDEL-KHALIK: Mr. Brown will review it during the break.

MR. HEAD: Okay.

CHAIR ABDEL-KHALIK: Are there any other

questions for either the staff or the applicant on Chapter 13? Chapter 10, I'm sorry. I'm ahead.

Are there any other questions on the material presented so far?

(No verbal response.)

Okay. Thank you. We'll take a break until 3:15 p.m. Off the record.

(Whereupon, the above-entitled matter went off the record at 2:58 p.m. and resumed at 3:13 p.m.)

CHAIR ABDEL-KHALIK: We're back in session. At this time, we'll move to the presentation on Chapter 13 and we'll start with the applicant's presentation.

MR. HEAD: Thank you. Yes. we're going to Chapter 13 here at this time.

MEMBER STETKAR: Scott, before you roll out 13, I just want for the record Chapter 10 I asked about the rotation of that feedwater control valve. It got explained to me during the break that indeed it is on the drawing in the FSAR. You have to understand how the piping works. But it is there. So if there is any question about that, it's closed.

CHAIR ABDEL-KHALIK: Okay. Thank you.

MR. HEAD: And I was going to comment on another thing, but I was going to do that at the end.

CHAIR ABDEL-KHALIK: That's fine.

MR. HEAD: Okay. All right. So the agenda, it's pretty much our standard agenda that we've covered in all of our chapters. And assisting us today we have Fred Puleo from Regulatory Affairs and Jay Phelps, our Operations Manager, has briefed you before I believe on Chapter 18 and also in some other discussions. We have Glenn MacDonald, our Operations Training Manager, that will assist with our perspective today and Coley Chappell also from Regulatory Affairs.

I'm going to turn the presentation now over to Fred Puleo.

MR. PULEO: Thank you, Scott. Good afternoon, Mr. Chairman, Committee Members. I'm going to take a few moments to describe the features of our Chapter 13.

But let me start off with my name is Fred Puleo. I'll give you a little history of my background over the last 20 years. I'm a former Navy nuke machinist mate fleet, ballistic missile, subs. Upon getting out of the U.S. Navy I joined the Calvert Cliffs Nuclear Power Plant, Baltimore Gas and Electric at the time, as a radiation safety and chemistry technician. Back in the old days, that's what we were called initially.

Had an opportunity while working at Calvert Cliff as a post TMI thing. While there, TMI occurred. I was afforded the opportunity to work on the Emergency Preparedness Program for Calvert Cliffs at the time. Felt very fortunate in that arena.

After Calvert Cliffs, I moved to South Texas Project. I've been at the South Texas Project for the better part of 21 years now. I went to the South Texas Project as an EP specialist. Moved into the Emergency Preparedness supervisory position and had an opportunity to work on various committees both with the industry and with the regulator related to the revised regulatory oversight process.

Back in the old days if you all remember we used to do the SALP which was the Systematic Assessment Licensing Program reviews.

MEMBER RAY: Licensing Performance.

MR. PULEO: Licensing Performance.

MEMBER SHACK: We do remember.

(Laughter.)

MR. PULEO: I had an opportunity to be on the Nuclear Energy Institute Working Group for Emergency Preparedness. So I've got a little experience on the revised oversight process.

Based on my experience from the revise oversight process of being the supervisor of Emergency Preparedness, I had an opportunity to go help our security organization with the revised oversight process. I don't know if everybody remembers the history, but security was a little bit lagging in that transition if you will.

So when I went over to security I had an opportunity to help set up the force-on-force exercise program which again another acronym was OSRE which was the Operational Security Readiness Evaluation Program. Now we're doing graded exercises on the security forces very similar to what Emergency Preparedness was.

So fortunate or unfortunate I was in security. 9/11 occurred. 9/11 brought some significant changes to security programs. You know compensatory measures orders came out. I had the opportunity to assist my company moving through, responding to and preparing all of the new security programs that are in place across the operating fleet these days. In that capacity, I also had the opportunity to work on loss of large areas of the plant and aircraft impact assessments which commonly was referred to as the old B.5.b. You're probably quite familiar with that term.

Again, here four years ago, I had an opportunity. Mr. McBurnett came to me and asked me if I wanted to participate on an application for a new reactor. And I felt honored to be asked to join. So here it is four years later. I'm sitting in front of this fine organization, trying to explain what we did on Chapter 13.

This is going to be a little bit different. I think you folks are generally used to hearing a lot more technical things, technical presentations. Dealing with operational programs, there certainly is a technical side to it.

But in this particular case, STP took the opportunity from all of the things that we had in place for our existing Units 1 and 2 and rolled them into our part of Chapter 13 for our application here. So you're going to see that we took a very large amount of information related to our operational programs and put them into our Chapter 13 here.

Chapter 13 there were no associated departures. There was nothing technical that we had to change from. An organization for STPNOC, we're fortunate that we already have an operating unit. We took the experiences from our operating units and we're rolling those into our new Units 3 and 4. So our intent is to get an organizational structure in our programs and tailor them towards the programs that are in place currently in Units 1 and 2.

Obviously, we will have to make them site-specific for a different type reactor. So there would be some programmatic things that will have to be changed there.

In addition to that, as I explained my experience with the company, you can see that the company has taken some of our folks from Units 1 and 2 and specifically put them on this project to help this project move along with the expertise of our operating experience for our employees as well as we understand what our company is also. So that's moving us along in that sense.

Next, Chapter 13.2, it identifies our training programs that will be in place based on a milestone schedule and what we chose to do here is we're incorporating by reference the Nuclear Energy Institute Template for Industry Training Program. The template is an endorsed product by the Nuclear Regulatory Commission. And we thought "Why reinvent the wheel. Here's something that's working for the industry. Let's move that into our program and make it easier for everybody."

The next item is 13.3 which is our Emergency Plan which is also submitted as COLA Part 5 of our application. Again, we have this opportunity. We have two operating units. We have a proven emergency plan and emergency preparedness program over the last 20 years. So what we did is capitalized on that opportunity and of the many features that are available to us through the existing program we just rolled in the delta or the changes as a result of adding two new units.

And, of course, again it's a dissimilar type plant. We currently have a Pressurized Water Reactor and we're moving to a Boiling Water Reactor. But many of the features are applicable even regardless of what the technology is.

A couple of key points about our existing Emergency Preparedness Program is we have an excellent working relationship with our local and state agencies. We had an opportunity to use those folks early on and whether this organization or this Committee is aware of it, but we're one of the first organizations, applicants, to receive our interim finding report with no open items from the Federal Emergency Management Agency. And that's based on our experience and the working relationships that we have with our current friends and neighbors in our area.

The next item is 13.4 Sierra. Basically this is the Operational Programs Implementation Schedule. It answers all the programs that need to be in place required by there's a SECY-05-0197 I believe it is and the Regulatory Guide 1.206. So Chapter 134 Sierra again identifies all of the programmatic milestones and when those milestones will be met.

Finally, Chapter 13.5 is Plant Procedures. Again, we're going to seize the opportunity here. We have existing administrative procedures, organizational structure procedures. We have our Emergency Preparedness procedures. We have radiation protection procedures. All of these procedures need to be identified in your submittal for an application. But we also are looking at ways to take those programs and procedures and use what we have in existence and the experiences that we have from Units 1 and 2.

I'm kind of presenting how we put our Chapter 13 together. Our Chapter 13 will be implemented based on STP's experience as well as using the industry experience that's readily available to use as well.

So before I move onto the next slide, do we have any questions related to this slide?

(No verbal response.)

Okay. Our COL license information items related to our application were specific. We had 13.1 which was training. It was a Three Mile Island action item which required us to implement operating experience into our training program. We incorporated by reference NEI document 06-13 which has in that a component to make sure that operating experience is included in your training program.

13.2 License Information Item required the applicant to submit an emergency plan specific to where you're building your nuclear power plant.

13.3 identifies that we needed to provide our plant operating procedures plan of action. We have included that.

13.4 is Emergency Operating Procedures. I'm going to let Mr. Phelps talk a little bit more about that.

13.5 is again related specific to Implementation of Procedures and Plans.

COL Item 13.6 is the scope of the procedures required that we identified in that plan.

And COL Item 13. 7 as our license

applicant-specific you're required to submit a security plan specific to where you were building your plant.

MEMBER BLEY: I just have a curiosity.

MR. PULEO: Yes sir.

MEMBER BLEY: And you guys have been PWR guys for a long time and now you're both. The Emergency Operating Procedures for Boiling Water Reactors are formatted tremendously different from those for the PWR.

MEMBER SIEBER: Yes. Sort of inverse.

MEMBER BLEY: Does that reflect itself -- When you get to the other plant operating procedures is there any effort to try to fit them? Because when I look through -- And I was there for some other purpose. When you look through the -- Actually, you don't call them abnormal operating procedures but --

MR. PULEO: Off-normal.

MEMBER BLEY: Yes. When you look at those, they're kind of formatted a lot like the emergency operating procedures. Is there any effort for the boiler to make the procedures look a little more consistent or is that something --

MR. PHELPS: With the emergency operating procedures, they will remain in the flowchart process.

MEMBER BLEY: Okay.

MR. PHELPS: That is the Owners' Group Emergency Committee's guidelines and that's really all we have to work off of. Actually, the off-normals and the operating procedures, the Writers' Guides for Units 1 and 2 were basically mirrored for Units 3 and 4 and developed --

MEMBER BLEY: Okay. So they --

MR. PHELPS: So when you look at an abnormal procedure for Units 3 and 4 other than the title and the technical information within there form, fit and function are identical to Units 1 and 2.

MEMBER BLEY: Okay.

MEMBER SIEBER: So Units 1 and 2 are going to be accident-based. Units 3 and 4 are going to going to symptom-based.

MR. PHELPS: No, they're all -- As far as how they're based they're all symptom-based whether they're PWR or BWR.

MEMBER SIEBER: There is a difference.

MR. PHELPS: Yes. Okay.

MEMBER SIEBER: I have a question, a couple questions, on the emergency plan. It seems to me you did your evacuation time estimates the latest date I saw was 2008. Is that correct?

MR. PULEO: Yes sir. We redid --

MEMBER SIEBER: Why did you do it again? Because you had to do it when you first went into commercial operation. Is this for specifically Units 3 and 4?

MR. PULEO: Yes sir. There are some changes that are obviously going to take place. And we know the population is going to change in the sense of transient population with 2,000 to 3,000 workers. In addition I believe that Reg. Guide 1.206 asks you to provide an updated evacuation time estimate. But I'll check with my friend, Mr. Moody, over here and see if that is correct.

MEMBER SIEBER: While he's finding the microphone, I take it that your current evacuation time estimate includes the work force for Units 3 and 4 should an action occur in Units 1 and 2 during the construction period. Is that correct?

MR. PULEO: That is correct.

MEMBER SIEBER: Okay.

MR. MOODY: I am Bob Moody, a Senior EP Specialist here with NSIR at the NRC. The regulations specify that the emergency plan contain an evaluation of the time to evacuate. But it's not required for this particular evolution of the COL application.

MEMBER SIEBER: That's right.

MR. MOODY: Now the guidance does go on to say that it needs to be -- your plant must be maintained current and your ETD must be also maintained current. So I think this was a good opportunity for STP to do just that is to update and to keep their ETD current.

MEMBER SIEBER: Has there been any effort to look again at your meteorological data to make sure that it remains consistent? Because dose to population depends not only on which way the wind is blowing but also on the source term which would be different for Units 3 and 4 than it is for Units 1 and 2 and including your source term assumptions plus where the people are in the Emergency Planning Zone. So have you redone that or do you feel it's necessary or is it required to redo it?

MR. HEAD: Well, as part of the design basis effort, we've generated new chi over Qs obviously and I don't --

MEMBER SIEBER: Okay.

MR. HEAD: And as far as the design basis effort, I assume we're going to be using the same tools when we're in the emergency plan to make decisions if it's an emergency plan discussion you're asking about.

MEMBER SIEBER: Some plants have real time systems where they can look at the met data, look at their source term and find out where the plume is going from that. Do you have use that or do you use a static system?

MR. PULEO: Yes, sir. No, we do have real time capabilities and we intend to continue to move forward with real time offsite dose assessment capabilities.

MEMBER SIEBER: Okay. Now another things that's missing in your emergency plan area right now is the Emergency Action Levels. And those are required for the emergency plan. That determines when you go from alert site area, general emergency and gives instructions for the emergency operations manager as to what to tell people when they make notifications what level they're at. Will they be -- You will have to generate new EALs for Units 3 and 4 which you have not done yet, right?

MR. PULEO: That is correct.

MEMBER SIEBER: And you're committed to do that before the fuel load.

MR. PULEO: I believe our commitment on providing emergency action levels to the Nuclear

Regulatory Commission is 180 days prior to fuel loads.

MEMBER SIEBER: Fuel loads. Okay.

MR. HEAD: That's a license condition.

MR. PULEO: That's a license condition.

MR. MOODY: Yes, it is. That is an ITAAC.

MEMBER SIEBER: Okay. And the Emergency Action Levels actually have specific parameters that the emergency operations manager will look at to determine whether in that level or not underlying the specification of those emergency action levels is a technical basis for those. Do you have in your planning process provisions to generate the technical basis to determine Emergency Action Levels and they will also meet the 180 day limit?

MR. PULEO: Yes, sir. There is what's called the Emergency Action Level Bases document we have in our plan. Actually we do have a draft of our Emergency Action Level Bases for the new unit types. There are some specific datapoints that are not readily available until we move along a little further.

MEMBER SIEBER: In the plant analysis.

MR. PULEO: In the plant design, correct.

MEMBER SIEBER: Okay.

MR. PULEO: So we do have and there are

two industry templates. They're available through the Nuclear Energy Institute and one of them is applicable to our plant type design. So what we would have to do is put our plant-specific information in there.

MEMBER SIEBER: I think one of them is a PWR template and the other one is a BWR template.

MR. PULEO: Sir, I think they call them -- One is an advanced new reactors which is primarily based on the new digital systems or something to that -- Say it again.

MR. FOSTER: Passive and non-passive.

MR. PULEO: Passive and non-passive, yes. That's it.

MEMBER SIEBER: Okay. You're non-passive.

MR. PULEO: Yes, sir.

MEMBER SIEBER: Okay. Thank you.

MR. PULEO: Okay.

MEMBER SIEBER: Thank you.

MR. PULEO: You're welcome. Anything else on our COL license information items?

MEMBER SIEBER: Yes, I do have one more question. You're going to have a training program for operators set up in advance of fuel load. How early will you start to be giving training for plant operators?

MR. PHELPS: We'll let you hold off. Glenn and I will talk a little bit more on detail about operations staffing and those training timelines. If we don't answer that, if you can come back to that. Okay.

MEMBER SIEBER: I promise.

(Laughter.)

MEMBER BROWN: I did have one question. And I can't remember which figure it is in the FSAR Figure 13 something. It showed the organizational chart and there was a description and embedded in that was the QA organization. Does that mirror what you've done on STP 1 and 2 and are those organizational structures the same?

And I ask the question only because it seemed to me that Engineering and QA were in one group as opposed to having it independent from Engineering oversight, which seemed a little bit unusual. And I can't remember which figure it is and I didn't put my computer --

MR. PULEO: I believe our organization is described in 13.1 or 13.2 rather.

MEMBER BROWN: Yes, it was the first few pages. So my question is is the separation of the QA and Engineering functions relative to who they report to. Engineering ought not be in charge of QA. That's my background. I don't know what you do in the commercial world.

MR. HEAD: Agree. The current organization is clearly not like that. I will look at what the organizational chart you're referring to looks at and give you a perspective on that.

MEMBER BROWN: I can go get it here. I just didn't plug in.

MR. HEAD: This one shows that it reports to the Vice President Oversight Regulatory Affairs.

MEMBER BROWN: Yes, but Engineering was also there.

MR. PULEO: Well, we have a separate Vice President for Engineering and Construction.

MEMBER BROWN: QA was right here under that. And Engineering --

MEMBER CORRADINI: It's not there.

MEMBER BROWN: No, no. Yes, it is.

MEMBER CORRADINI: I don't see that.

MEMBER BROWN: How did I get that? It must have been late at night when I was looking at this.

(Simultaneous speaking.)

CHAIR ABDEL-KHALIK: Please proceed.

MR. PHELPS: It would certainly I think be our expectation that they would not be in the same organization.

CHAIR ABDEL-KHALIK: Okay. Thank you. Go ahead.

MR. PULEO: Okay. Another portion of our submittal for the application was emergency preparedness ITAAC and we maintain those in COLA Part 9, Section 4. Again, we've had an opportunity. There are some ITAAC that are identified in Reg. Guide 1.206 that because our existing features that we have in our emergency plan that we don't specifically have to meet those ITAAC criteria related to the construction and operation of the new units. And I'll give you an example.

An ITAAC may require us to from the Emergency Operations Facility be able to communicate with the Nuclear Regulatory Commission OPS Center and this is an example. Well, we already meet that. I mean we have an existing Emergency Operations Facility and because of our program that's in place today we do that regularly on our graded exercises. And that's a small example of how some of the features of our existing program will or will not be required to meet ITAAC criteria. And I shouldn't say that way. Would or would not be required to be an ITAAC. Okay.

Any other questions for me related to big-picture programs, what we included in our Chapter 13 because we wanted to take an opportunity to let Mr. Phelps who is our Manager of Operations discuss specifically our operations, plan of action and course forward here.

MR. PHELPS: Thanks, Fred. Like Fred said, I'm Jay Phelps. I'm the Operations Manager on Units 3 and 4. I've been at South Texas Project for about 22 years from positions of control room supervisor up through the Operations Manager there.

I wanted to talk really just some items of interest. You know the conduct of operations section here covers the gamut of what I call our Plant Management Group and I'm really the Operations Manager. I'm kind of focused on that and I'm really going to focus in those areas, talk a little bit about our staffing plans, training timelines, why they're set up that way to obtain experience, a little more about procedure development and how having this organization here. We think it's going to result in a little bit better plant than we saw back 30 years ago. And some of the benefits of tying in with Units 1 and 2.

Our staffing plans, we really have six licensed operator classes of 18. And here they'll start in about late 2012. We want talk any more about the schedule, but 18 classes. They'll be coming from a mixture of direct SROs, experienced SROs, within the industry as well as a transfer from Units 1 and 2, not for the technical skills, but for the culture and the operations that have been developed and established for the successful operations of those two units.

Those people are going to be provided also out of those classes our work control organization, outage organization, training and operations to get the licensed or certified people into those organizations to support the eventual fuel load and start up for these units.

We talked about timelines. 2012 we'll start to really run based on simulator availability. We will have one simulator and I'll let Glenn talk a little bit more about that training as we go through there.

CHAIR ABDEL-KHALIK: What's your history of throughput of licensing classes?

MR. PHELPS: On Units 1 and 2, we're running about -- What are you calling throughput? The number of people up for license versus that get out or the number that enter the class that you get?

CHAIR ABDEL-KHALIK: That enter the class.

(Laughter.)

MR. PHELPS: Okay. It's a different number, right, that you get. We're really running about 85 to 90 percent on Units 1 and 2 right now. Eighty-five to 90 percent.

CHAIR ABDEL-KHALIK: From the number of people that enter class.

MR. PHELPS: The number of people that enter class that we put out to get a license. Yes, we haven't had a failure in a license class in my recent memory and I can only think of one or two people out of about the last five classes that have been removed from class prior to going through class. So we've got -- Our training program and structure selection process have been very strong for us. We've been very fortunate in that area.

So the timelines are there really to support number one giving six classes, three of those classes per unit if you will. The last class will get out about eight months prior to fuel load. So it's really set up to allow every one of those class that minimum of six months of participation in construction and pre-op testing requirements to get familiar with the digital design, operation of the systems as they are, in addition to the training that they receive on the simulator out there. We think that's going to give us --

MEMBER SIEBER: You'll have licensed people available during hot functional testing.

MR. PHELPS: Yes, sir. We don't do hot functional necessarily. No PWR, but yes. We will have operators. Our plans are to have the control room fully staffed when we backfeed from the normal power source in the control room just to try to minimize other people operating those controls.

I want my guys to get all that experience and our timelines and our owners have set it up where I can hire those people and have them available with our schedule where we're the ones that are going to be operating the equipment in the control room for all that testing.

That really kind of covers the experience opportunities to maximize that opportunity to get people into there for what they're going to do, have an opportunity to work with the pre-op procedures. It's kind of interesting. I'll get into procedures I guess now.

Procedure development. It's really

divided by design responsibility. So I think you all know we have an EPC team. Each of those have a certain area of responsibility for design and they've also hired procedure writers. The majority of them are ex-SROs out of the industry that are writing our operating procedures. So if Sargent & Lundy is responsible for designing radwaste they're also responsible for generating those operating procedures associated with that.

And as I said before, we're mirroring the Writers' Guides form, fit, function, format, content of Units 1 and 2 for those. So they'll be homogenous. You won't tell the difference unless you read closely on the title number for what's in there.

Emergency Operating Procedures, we actually got our first draft of those just last week. And we expect to the get the plant-specific technical guidelines here next week. So we're moving on with those to have them ready to support the commencement of operator training because Glenn needs all this stuff to really finalize his training materials. So we're very aggressive as far as pursuing those actions.

Involvement in Design, you know this has been the most exciting part of my involvement in this project having stepped into other plants that were just designed, got a construction license to go build. Then you bring in some operators, train them to get your operator license. You're kind of stuck with what you get. This has been exciting. Let me tell you.

We've leveraged every BWR within the United States. We've been numerous times to Japan and to Taiwan taking into their experience, their control room design, and taking our experience, our requirements, to try to modify that just to fit what we view is going to fit what we're accustomed to in the United States standards and what you're used to seeing and if you walk into a U.S. control room and how the equipment is laid out. I think you'll be very impressed when you see what this plant looks like.

Involved with the system reviews. The plan layout, 3D models are just neat. I mean just being able to walk through and look at where the pipes are going to be. "That valve doesn't work right there. Let's move it a little bit so I can get to it." It's really been fun doing that.

And the other part is we've got an existing mature program at South Texas 1 and 2 from content to operations down to the admin procedures that we all have to work through from the equipment clearance orders and tag-outs to locked valve programs and all of that that we'll be able to change those as required for technology, but again maintain a single unit with four sites that all follow basically the same administrative procedures.

And that's really all I had unless you have any additional questions for me.

MEMBER ARMIJO: Yes, I had a question. To what extent are you going to have dedicated BWR operations, maintenance and engineering people compared to the PWRs?

MR. PHELPS: Okay. Operations will be strictly delineated by technology. We are I mean just honestly entertaining thoughts of some cross training to support outages, if you will, some limited scope that might fit in there. Don't know the answer to that yet. Need to spend some time with Salem to see if they're able to do that. You know, they're our -- kind of the only other mirror that we have out there that has a BWR and PWR on their site and see what lessons learned they have and how we can leverage them.

MEMBER BLEY: Millstone.

MR. PHELPS: Millstone, okay. Yeah, Salem Hope Creek. All right. We'll try that, too.

MEMBER BLEY: Millstone.

MR. PHELPS: Okay. Now as far as the maintenance goes most of that will be large rotating equipment, repacking of valves, same thing. The I&C functions are going to be different. Okay. So there will have to be a specific skill set that's dedicated to Units 3 and 4 related to the digital platforms that exist there that we do not have any experience with on Units 1 and 2. Does that answer your question, sir?

MEMBER ARMIJO: That does. Thank you.

MEMBER BROWN: You talked about your training program and the classes and that you couldn't remember the last time somebody did not enter and did not complete other than these --

MR. PHELPS: No. Did not fail. I can remember someone getting pulled out.

MEMBER BROWN: Well, that's fine. That eliminates -- You only have four or five of those. I forgot the number. Over how many years is that?

MR. PHELPS: My memory is probably only good for about the last five license classes. So that would be ten years.

MEMBER SIEBER: The older you get that shorter that time get.

MR. PHELPS: I'm looking forward to it.

(Laughter.)

MEMBER BROWN: I just had a previous boss that reacted one time when he found out nobody had flunked any exams for ten years and he started questioning our ability to suitably evaluate. This was Rickover, okay, back many years. And then Admiral McKee and then subsequent Bruce DeMars. And when we went back and looked and this was with an extant not within the Headquarters group at Naval Reactors but an extant group and we found that there hadn't been any flunks in these particular areas for probably a good six to ten years and found that there was a gradual luring of standards that then had to ratchet everything else.

If you went in and audited a program and saw, step back and just audit it, and you see everybody passes, everybody passes, everybody passes, you see that going on and on and you'd be very suspicious. I'm not questioning. I'm just saying. That's just an interesting thought process.

MR. PHELPS: Yes. As a victim of the requal process for 20 years with SRO license, I wanted to -- I felt challenged every time I went in there. But I think you're right, Mr. Brown. There's a number of things that we need to look at I think Glenn's done a lot of work in that area looking at examination techniques and to make sure that we're marching to the right level.

Ultimately that exam is the Nuclear Regulatory Commission exam that they give.

MEMBER BROWN: I understand that. Hopefully the onsite region people, this is being audited.

MR. PHELPS: Yes.

MEMBER BROWN: Hopefully that thought process goes on.

MR. PHELPS: Right.

MEMBER BLEY: And that the people you're pulling out are people you just decided --

MEMBER BROWN: You know they're not going to pass so you -- And that's fine.

MR. PHELPS: I think as an operations manager I kind of look at it as getting your learner's permit as a driver's license. There is still much to learn. It's just the permission to step in there and start that process.

MEMBER BROWN: I would still be nervous if I saw zero failures. That's all.

MR. PHELPS: Oh, I am. YES>

MR. HEAD: But I would say I don't know

those people that we've pulled are people we know aren't going to pass. It's just we don't have the confidence that they are going to meet our expectation because we have not had a failure record. I mean it's one we're quite proud of because we know the failures do have their consequences. So it's --

MEMBER BROWN: Well, that's a failure external to passing the class, passing the final exams. I mean having failures out in the plant when they do something wrong that's one.

MR. PHELPS: There are a number of failures that take place within and people have to retake exams. I mean I think they're very challenging. As you go through the systems and the procedures and the admin procedures, there are people that fail individual sections of that process called license class. And they have go back and remediate and go retake those exams and if they're not successful a second time through they're typically removed from the program.

But typically they're pretty dedicated. They're going to stay in there. They're going to do the level of work that it takes to pass that exam. And it's no easier than the first one because the bad part is they're usually made up with 75 percent of the questions are the type that you missed before which makes it even harder. So if you don't grasp that material you have a very slim chance of getting through that second exam.

MEMBER BROWN: Just a quick observation. I'm sorry. I'm done.

MEMBER STETKAR: Quick off-the-wall on staffing. Do you have an I&C tech on shift 24/7?

MR. PHELPS: We have an emergency response maintenance crew that's on staff that's typically made up of two I&C techs, two electrical maintenance techs and two mechanical techs and a supervisor. And they're there really to fill the RO functions.

And that's going to be a challenge. We faced that with the foundation shield bus that we installed in Unit 1 making sure that we have someone every crew that's qualified to address that. So as far as what qualifications are going to be required in those positions on shift, that's key. And I'm going to make sure that happens.

MEMBER STETKAR: Okay.

MEMBER SIEBER: Do you have around-the-clock rad techs?

MR. PHELPS: Yes, sir. Oh, absolutely.

MEMBER SIEBER: Okay. And part of their

duties is to support your emergency plan survey team.

MR. PHELPS: Absolutely. Yes, sir.

MEMBER SIEBER: Okay.

MR. PHELPS: Okay. With that, I'll turn it over to Glenn.

MR. MacDONALD: Thanks, Jay. Good afternoon. My name is Glenn MacDonald. I'm the Operations Training Manager for Units 3 and 4. Since this is my first time talking with you all, I'll just give you a brief rundown on my background.

I started my nuclear career in the U.S. Navy where I was a reactor operator. Left there as an engineering watch supervisor. Went on to get an RSO license at the University of Florida Training Reactor. That's a 100 kilowatt Argonaut-class reactor. Did that while I attended college.

Leaving there I went to work for a utility, Riverbend, BWR-6. I was a nonlicensed operator there. I rolled into Operations Training there. I received an SRO license there and I was a control room supervisor there.

Leaving there, I've been with South Texas working on the ABWR for the last two years. I've been the Operations Training Manager since the creation of the position a year ago. And I'm excited to be here to talk a little bit about our Operations Training Program. I'm going to try and hit some things that I found interesting. But I'm really looking for the questions that you might have about how we're going to train these operators.

To start with following the selection of the technology, the Plant Management Department was created, staffed, and we looked immediately at taking advantage of the real strength of the ABWR and that's the fact that I can get on a plane, fly and stand in one. So we went over and we started talking to the actual operators specifically Tokyo Electric Power Company, Kashawazaki, Kariwa Units 6 and 7.

Yes, sir.

MEMBER BROWN: That's interesting. I was in that plant last October on a tour and we were sitting there watching -- I was up in this little observation area looking down, very, very nice. There wasn't a single operator watching the plant, not a single one. They were all clustered over by a little panel talking about a problem with the diesel generator. There was nobody behind the panels. There was nobody looking at any screens. Three or four and they were all over there. There was nobody watching it.

So I mean if you're taking that as an example of how to observe a plant that's not going to walk the walk.

MR. MacDONALD: No. And we, of course, noticed those same behaviors. Their command and control, the way the staff the plant, the way they operate the plant, is a different strategy obviously than is available or is implemented here in the United States.

We didn't go over there to look at them. In fact, we went over there to determine what their processes were, what we could take away from them as far as training materials, processes, procedures, things of those natures that we could analyze, adapt and implement to help develop and create our programs.

I don't know if you've had the opportunity, but if you're over there, if you watch their response they do training. They have simulators. And I'll talk a little bit about that in a second. But you would not expect to see that kind of response to an emergency drill from the RES crew. Their command and control methods are different. Their implementation, things like emergency operating procedure, flow chart usage. They have a parallel product, but it is not the same. It is not implemented the same.

All the advances that we've made with human performance, the place keeping, self-checking, all those things are not readily apparent that they're used. Now they are making strides. I'll tie that into my discussion with the Boiling Water Training Center.

What we found out when we went over there to determine how do they license operators, what training materials do they have, was that all the utilities and the vendors, you know, Toshiba, Hitachi, TEPCO, Chubu Electric and a number of others, altogether own an organization called the Boiling Water Training Center where you can think of it as a common training facility. And this is where all the utilities essentially send their operators for training to be licensed operators.

Now there are some differences. You need to understand that there's only one licensed operator per crew and the utility in fact issues that license. But they use the training and the exams of the Boiling Water Training Center to facilitate that process of getting the license.

So we looked at that and we went over to the Boiling Water Training Center. And we looked at some of their materials. And in fact what we did was we purchased a number of materials from them and we reviewed those. Based on our review of those materials and the quality of that, we went ahead and scheduled a course. We went over for a one-week familiarization course and one week of simulator operation familiarization.

And I was part of that trip. We went over, had a week a training very similar to what you would actually see if you went to any licensed operator training course. We targeted specifically those systems that are more specific or more tailored to the advance boiling water reactor because at that time we were simply trying to identify what are all the differences. What makes an ABWR different than a BWR 4 or 5 or 6?

Having gone through that course, we started thinking to ourselves "This is all very similar." There are some things that are clearly different, reactor internal pumps, fine motion control rod drives, and of course the biggest difference is the digital I&C platform and the command and control function through that.

But given that we had a week in the simulator for those of us and a number of us were previously licensed on BWRs within a number of hours and bringing across our own examples of our EOP flowcharts and some procedures that we had drawn up ahead of time anticipating trying to run them on their simulator we found that it was a very similar experience from a command and control. And we were able to implement and demonstrate good command and control, good three-leg communications.

In fact, it's very quiet. It has a different feel and that's something that's just not specific to our plant with the digital I&C platform, but all the new technology plants. You don't get as many initial alarms. If a system fails, it causes some kind of a signal. It gives you an alarm, but it doesn't necessarily cause an actuation. The entire plant is much more fault-tolerant.

And that's a little bit different from a training perspective because typically we will evaluate each of the operator candidates. We'll start with something like we'll fail an APRM or something that gives a signal, causes a response, and we evaluate how they respond to that.

Well, a number of instruments that you now go to fail a single point nothing happens. I mean there's an alarm, but there's no specific plant response the operators are working on. So we've been looking at that and we can continue to go back.

What we've done now and what we do currently is we've taken this original course that we've purchased from the Boiling Water Training Center. We've Americanized it, adapted it, for our course and we, my team, now puts on that course and we do this about twice a year. We train a number of folks on it and then we actually fly over and we spend a week in the simulator.

And given that we've just received our EOP flowcharts, a draft of them, at the earliest opportunity we'll take them over there and we will run and actually get a real time input on how these will actually work in the digital control room. So that's the Boiling Water Training Center. We purchased some materials from them. Their training materials are very good. In particular, their graphics that explain certain functions and systems are excellent. We have a good relationship and we continue to work with them.

Another big influence --

CHAIR ABDEL-KHALIK: How confident are you that the simulator they have at that training center meets the ANSI standards required here?

MR. MacDONALD: I am relatively confident that the responses we see based on my experience are very similar to U.S. simulator. I have not actually compared the data at the BT-6 which is the ABWR simulator and the Kashawazaki, Kariwa. So I haven't done an actual ANSI 3.5 analysis to look at plant performance data compared to.

But we have asked that question and they indicate to us that they do prepared the data. And they haven't found any large discrepancies.

Where I do care a lot is the development of our simulator platform which is actually no borrowing any of that same software. We've acquired another software suite more in line with the tools that were used to develop the simulator at Lungmen. And that model is being completely developed from scratch using our drawings for thermodynamics and other properties.

So whether or not the specific containment response or the way the suppression pool acts as it's heated is identical to the plant, I couldn't say because I have not actually operated an ABWR, only their simulator. But I am confident that the tools that we're using to develop our simulator platform will be extremely high fidelity and will match the plant closely. I don't know if that answers your question.

We have some real advantages working with Tokyo Electric Power Company and again not from an operational perspective with how they manage things in the control room, but they are another source of information for things like operating procedures, tasks lists which of course are a key component of a systematic approach to training and just general questions when we have them about how would you do this or how is this done.

Sometimes when you look at a design for a plant you know everyone makes their best effort to understand. Well, it's very helpful for us to be able to compose an email or make a phone call and find out the exact details of how a specific activity would or might be performed.

We also have a memorandum of understanding with a number of other power companies, but specifically Tai Power because they are in the process of constructing an ABWR, in many ways an ABWR that reflects more of the Certified Design, very similar to the way the control building is constructed between the turbine building and the reactor building. So, in a lot of ways, it's a very interesting analog for us to be able to look at for how things in our plant might occur.

They also have a simulator and while we have not had the opportunity to spend a lot of time using that simulator, it is in English which has resolved a couple of issues for us. And as Jay was explaining, we use their operators to provide a lot of input for things that they found to not really work well for them. And where we can we take advantage of that.

MEMBER BLEY: Is the Tai Power operating philosophy closer to that in the States than the Japanese?

MR. PHELPS: Yes. No, no. The plant was understand that it's EPG Rev 4, not EPG SAG Rev 2. But they intended and there's a high degree of similarity to the processes that they use and those implemented in the U.S. with the NRC. Their specific model when they started construction of that plant is this plant will be built to U.S. codes and standards.

MEMBER BLEY: Right.

MR. PHELPS: And their regulatory agency is in many ways very similar. As a point of interest, they've recently had their first license class and they had three out of 30 pass. So that's a 10 percent throughput. And of course I'm watching that.

(Simultaneous speaking.)

MEMBER SHACK: Sort of puts the fear of God in license class number two, doesn't it?

MEMBER SIEBER: If you're going to staff a plant, you've got to start with a class size of 500.

(Laughter.)

MR. MacDONALD: That's right. Well, obviously throughput is something that I look at closely and I'm well versed in a number of the different numbers that we have out there. And certainly South Texas Project's throughput has been I would say very good. There is a number of reasons for that and having been a part of another utility that did not have such a high throughput there's a number of things that you can do to ensure throughput is better and a lot of them have to do with screening and selection which seems to be the most -- an area that some areas struggle with.

And I agree. Obviously, we're going to be delighted to get experienced proven SROs from other plants who might have an interest in working at South Texas as well as proven products from Units 1 and 2 bringing their culture over. But we really had to design our program from the outset that we're going to bringing in a number of folks, direct inputs from college, and training them essentially from scratch up to the SRO proficiency level. So our training program is in fact designed to do just that.

Things that help, just to sum, stop me where you want. There are just a couple other points that you might find interesting. The results of all the evaluation and training materials and training we've had really revealed to us that the differences between the ABWR and BWR5 or 4 or 6 are really similar. And with that using a systematic approach to the development of the training materials what we determined was for many of the systems we should really start with what's already been produced at other U.S. BWRs.

That gives us access to task lists that have been carefully refined over the last 20 years, proven products. And then from there we would input new data for things that were different about the ABWR. So we have a fully populated task list. Right now, it has 2200 tasks on it. Of those tasks, our task analysis really has revealed that really only 80 of these tasks are new to U.S. plants and they're related to systems like automatic power regulator, recirc flow control, things that there's just no direct analog in place at the plants that we've looked at.

But everywhere else there's a high degree of comparability. We have a high-pressure core flooder system. Very similar to high-pressure core spray. Is the engineering different? Yes. There are some differences between a flooder which is a partial ring and a spray system which is a complete ring. But as to the tasks that the operator needs to perform to use them very similar.

So that's really been the basis of our program is to build on what's already been built and to adapt it for the new plants. And to help us do that we've got a very experienced training staff. A number of experienced BWR SORs or former training supervisors in operations programs. And we also have been fortunate that two of the folks on our team actually spent six months instructing on the simulator in Lungmen for Tai Power for GE. Their experience has been good and it's confirmed a number of those.

MEMBER BLEY: You cause me to ask you a question. When you went through your history, you told us all the places you've been and done. But you didn't mention any background in training. Did you have some with the Navy or at Riverbend?

MR. MacDONALD: No. I worked for three

years at Riverbend in the Training Department training operators. That was -- Apologies if I didn't bring that up. But yes.

MEMBER CORRADINI: I guess I had a question. You had said somewhere in this last bit of discussion that you were going to particularly look for people right out of college to train if I heard you correctly. So can you kind of give me your perspective on what you'd be looking for in that regard since you were a licensed operator on the Florida reactor? Are you looking for people that actually have some license experience in the research and training reactors? And does that give you any edge in getting people that actually understand the process?

MR. MacDONALD: To be honest, I don't believe that does give you an edge.

MEMBER CORRADINI: Okay.

MR. MacDONALD: My experiences in my license at that facility were not at all comparable to my experience getting licensed on a commercial. They are in fact very different.

MR. PHELPS: If you know of any ex-Navy nucs that went on and got their degree and got a license there, send them my way. They are the ones that I think are going to do great.

MR. MacDONALD: That's what we're talking about screening. What I really intend to do and we're still finalizing a number of different possible techniques, but what I anticipate we'll use is a battery of selection tools, not just any single tool, but Profile XT. There are some actual simulations you can run students through.

I haven't determined the effectiveness or the applicability to actually producing licensed operators. But recently South Texas just started using a program called WorkKeys and so far that appears to be a good -- You know if you're successful at this particular test, you seem to be successful in our program. So I anticipate that we will have a battery of tests and we will work hard to select those candidates.

No, there is no specific criteria or degrees or background that we're looking for other than that you have a college degree and you have an aptitude.

MEMBER BLEY: There's an area I don't know anything about and I'd ask you. INPO provides a lot of guidance on training and actually comes and looks over how you do all that. Do you have anything like that people getting new designs new plants?

MR. PHELPS: There is -- Almost like the cold license process. Do you remember the plants from back in the early 1970s and 1980s? There was a cold license process and there is a new document created at INPO. I can't remember the number 0101 or --

MEMBER BLEY: 0901.

MR. PHELPS: 0901.

MEMBER BLEY: That's something new

MR. PHELPS: That does change. You don't have to be onsite for a year before you go to class and those kinds of things. But it maintains the same standards for a direct SRO, but it does shorten the time onsite to allow you to go.

MEMBER SIEBER: They still use the systematic approach to training and job on task analysis, all those kinds of things, right?

MR. MacDONALD: Yes.

MEMBER SIEBER: That's the INPO program.

MR. MacDONALD: Yes. We use in fact INPO specific. There are a number of systematic approaches to training. INPO uses one called Training Systems Development and that's the model that we've chosen to implement.

MEMBER SIEBER: That was a good idea.

MR. MacDONALD: That's what we thought. And based on your question about NEI 06-13A which to a large degree is duplicated in the latest INPO ACAD on new operator training for the new plants there's additional requirements. While it would appear that some requirements have been relaxed, six months onsite, there are other additional experience requirements. In addition to their onshift time required by the normal qual process, they have to spend additional time in the control room of an operating facility. It doesn't need to be our operating facility. They just need to be getting experience in a control room somewhere and we're looking at a number of ways of accomplishing that specifically.

MEMBER SIEBER: Now you require a degree for an SOR.

CHAIR ABDEL-KHALIK: Let's move on.

MR. MacDONALD: We do require either that you're previously licensed or you have a degree in order to meet the requirements of an instant SOR.

MEMBER SIEBER: You don't make any attempt then to move non licensed operators to licensed positions.

MR. MacDONALD: In the long term, yes,

that is our expected development path is non licensed operators become reactor operators become SORs. But for the initial rollout we're only making instant SORs.

MR. PHELPS: The intent is to staff with full SORs through this initial set of classes. The contingency plans, we'll go get people that are qualified to come in and be reactor operators having non licensed experience. But ultimately we will have the normal progression that you see at other plants where non licensed operators can move all the way through.

MEMBER SIEBER: Yes, there's no regulatory implication or even a technical implication that my experience was that degree people don't like to look forward a lifetime of shift work. And non licensed people who are good operators don't like to see a ceiling.

MR. PHELPS: Right. We agree with your thoughts and we will make sure that that program --

MEMBER SIEBER: Well, there's no requirement to do that. It's just my experience.

MR. HEAD: I understand that we're cutting into the NRC time. May I ask if there are any significant points or at least the last point on your slide about accreditation.

MR. MacDONALD: I just wanted to convey that we're working with INPO to receive our initial accreditation. That's the first check on our processes that we put in place.

MEMBER SIEBER: You are required to have an accredited program by the rule.

MR. MacDONALD: Yes.

CHAIR ABDEL-KHALIK: Are there any questions for STP on this material?

(No verbal response.)

Thank you very much.

MR. HEAD: Can I ask? Did you find the right organizational chart that showed the difference between --

MEMBER BROWN: Yes, I looked at it. I made the comment. I can't -- I'm embarrassed to ask the question now because I must have been -- At about 11:00 p.m. I was kind of foggy.

MR. HEAD: All right. And while we have the floor, on the previous chapter -- Or do you want do that afterwards?

CHAIR ABDEL-KHALIK: No, no. Please go ahead.

MR. HEAD: Okay. The previous chapter

discussion we took a little bit of detour about the turbine placement with respect --

CHAIR ABDEL-KHALIK: Yes.

MR. HEAD: And we've confirmed as the gentleman noted that we are in the unfavorable orientation for 3 and 4 and we'll have to take the appropriate action with respect to that and the probability that's associated with that.

MEMBER STETKAR: Are you also just for clarification in the unfavorable orientation for 1 and 2?

MR. HEAD: There's a very small angle that the distance is significantly different.

MEMBER STETKAR: It's something you have to look at though.

MR. HEAD: It's something we have to look at, yes.

MEMBER STETKAR: Okay.

MR. HEAD: So have we answered that question for you? I wanted to make sure.

MEMBER STETKAR: Yes.

MR. HEAD: Okay.

CHAIR ABDEL-KHALIK: Thank you.

MR. HEAD: Thank you.

CHAIR ABDEL-KHALIK: At this time, we'll

ask the staff to present Chapter 13.

MR. FOSTER: And, oh, by the way I am an ex-Navy nuc operator just in case.

(Laughter.)

MEMBER STETKAR: You ever been to Bay City, Texas?

MR. FOSTER: I was in Galveston for a year.

My name is Rocky Foster and I'm the Chapter 13 PM with the South Texas Project COL application review. I do thank the Subcommittee for this opportunity to present this chapter on the staff review. This review will cover Sections 13.1 through 13.5 as reflects in the SER with Open Items that we sent up to the Committee.

Our lead project manager for Chapter 13, the South Texas Project, COL review is George Wunder. Our technical staff reviewers for this presentation will be Jim Kellum, COLP, and Bob Moody for NSIR/DPR.

The layout for the presentation today is the COL license application open items and then we go through the different five sections of the COL which is we gear them towards the presenter's ease of that presentation.

We have one open item for Chapter 13 and we had about 100 RAIs for this chapter. The vast majority were in EP land. Okay. The very first one, we started using RAI. The first RAI we got covered 43 pages in one RAI.

MR. MOODY: In my defense -- I am Bob Moody, the Senior EP specialist. But I just wanted to explain a little bit about the 100. When we started out initially our relationship with FEMA we would handle all their RAIs. So actually a third of those are FEMA RAIs. So I really can't take too much credit for those. It does diminish in number some.

MR. FOSTER: But the staff did bring the process with FEMA, how to address the FEMA items and it took us awhile to kind of coordinate with FEMA on their process of how they did things. They redid their entire crew and formulated a new crew just to handle the new reactor reviews. So it took time, but it did work out very well.

The only open item was have is in 13.03-1 related to RAI 13.03-73 and it's TSC Habitability. We got a response from the applicant. We are right now reviewing it. And we do have an audit set up on the analysis of the documentation sent over which will happen I believe next week or the first part of July, something like that.

MR. MOODY: Friday.

MR. FOSTER: And with that I will turn it over to Dr. Kellum to do his slides.

MR. KELLUM: I am Jim Kellum. I, too, am an ex-Navy nuc. I'm a Senior Operations Engineer for the Operator Licensing Branch. I'm the lead reviewer for Sections 13.1, 13.2 and 13.5. All these sections are outside the normal scope of the ABWR DCD because plants generally have their own organization training program and procedures.

There's one confirmatory item that as we went through and looked at the procedures in the FSAR under the admin procedures the staff basically thought it was a little too general, their description. NUREG-800, Section 13.5.1.1 says they should describe the nature and the content of the procedures and like I said we'd felt what was in the FSAR was a bit too general. So we wrote an RAI in that regard.

The response to the FSAR was reviewed by the staff and they were going to change the wording in the FSAR and make it more specific and what we felt was more in-line with NUREG-0800. And they were going to incorporate that into the next revision.

So the responses were acceptable. The confirmatory item then is to make sure it goes into the next revision. That was the confirmatory item on that.

Now there were a number of COL items and these items have already largely been described by the STP folks. The first one was 13.1 in which it was incorporation of operating experience. But the training program in general per ABWR DCD said basically the training program will be the responsibility of the applicant.

So they incorporate by reference NEI document 06-13, Rev. 1 which is the template for an industry training program description. And that was endorsed by the NRC in a letter on December 5, 2008. So it's an NRC endorsed document.

That document includes all aspects of a training program for a new reactor site. It incorporates all the regulatory process like programs that are described in 10 CFR 51.20 which is everything from engineering training, chemistry training, EP training and also operator training. And additional all operator requal is described in that 10 CFR 55.

Additionally, one thing in the back and the guys have touched on this a little bit, I think the STP folks, is there's an appendix to Rev. -- That's why it's Rev. 1. The initial Rev. 0 of this

NEI document did not have it. Rev. 1 incorporates Appendix A which is cold license training program.

As was described a little bit ago, cold license training program, it describes the experience requirements and the education requirements and so forth for the folks that will make up these initial staffing to get that operating experience. All that is encompasses in NEI 06-13A, Rev. 1.

Additionally, plant operating procedures development plan, the plan provided in the FSAR describes the content as required in NUREG-800 that was reviewed obviously by the staff. And like I said we did have the one open item which had to do with the admin -- not open item, confirmatory item with the admin procedures.

The emergency procedures development, they provide a procedures generation package, writer's guide, all the things that go along with the writing of EOPs.

Okay. The implementation of the plan, their implementation again was compared against NUREG-0800 and the staff found that most of the procedures with the exception we talked with the admin procedures did describe the nature and the content of these procedures.

Next the procedures included in the scope of the plan, all the procedures that were required to be in the scope of the plan for NUREG-0800 were included and the admin procedures are broken down to Category A, Category B procedures which are different things such as temporary mod, shift turnover, etc. That list was identical to the list that's in NUREG-0800.

So the staff determined that all these COL items were adequately addressed in the STP and will be completely acceptable with the confirmatory item being incorporated.

MR. FOSTER: Any questions in these areas?

(No verbal response.)

Okay. We'll move on. 13.4 Review and Audit Section, incorporated by reference in ABWR DCD Rev. 4. They do have one COL license information item that we determined did comply with 10 CFR 50.40(b). And the compliance with Appendix B to NUREG-0933 regarding the independent safety engineering group, STP's position is that within that NUREG there are exemptions not required for future plants to have that safety engineering plan.

Operational program implementation, 13.4(S), it's consistent with the guidance in SECY-05-

0197, Reg. Guide 1.206 and NUREG-0800. We do have one point of clarification. Within the table itself, STP has a milestone listed as fuel-load. In an RAI response, they say that they would asterisk that stating that what that meant was prior to fuel-load.

MR. KELLUM: If I can just -- I was the one that wrote the RAI and it was just kind of like on the edge of my purview. But when I looked at that table there were a number of different programs and some of them were beyond Chapter 13. It was just MOV testing or something like that. But the description just merely said fuel receipt or fuel load which I didn't feel was adequate because as we know fuel receipt or fuel load that would take a longer period of time. So the RAI was written and they agreed to make that change that it would be prior to those events which it is.

MR. FOSTER: And in Jim's topic areas for training programs, they made a change to the table to make it 18 months prior to fuel-load which is long time to go ahead and do --

MR. MOODY: Good afternoon. I'm Bob Moody. I'm the Senior Emergency Preparedness Specialist that reviewed Chapter 13.3. And that section describes the onsite and offsite emergency plans.

FEMA did the review of offsite emergency plans. As Mr. Puleo mentioned, they did provide their interim finding report for reasonable assurance for emergency plan implementation for the site.

I've looked at the onsite emergency plan. Mr. Puleo made it particularly easy because I only needed to review the changes that they made to an existing approved plan.

I'd like to talk a little bit this afternoon about one COL information item, one open item. As Mr. Puleo mentioned, there were no departures. Just a couple of unique features that we've already touched upon. But basically they were the first and only actually to this point that chose to extend elements of the existing emergency plan for the existing Units 1 and 2 at the site.

As I mentioned, there was one COL information item and that was that they provide, that the applicant provide, an emergency plan which they did. The one item relates to their radiological habitability of the TSC. And the requirement is that the dose in the TSC not exceed 5 rem for the duration of the design-based accidents.

And we, as Rocky mentioned earlier, asked the RAI. The applicant has responded. And we are process of reviewing that response. The ventilation product of the TSC is being reviewed by Chapter 9.4 reviewers. That's out of my purview. And then with dose calculations, the chi over Qs and the dose calcs, for those in the TSC are being handled by Chapter 15.

MR. FOSTER: And they give us a thumbs-up. And we say yes. And they say yes or no.

MR. MOODY: We should have a conclusion by the end of July.

MEMBER SIEBER: It seems to me the old plants there was a provision for an alternate TSC.

MR. MOODY: Yes.

MEMBER SIEBER: And did you review the alternate and how they get from the new one to the alternate and what's in the alternate to give the same capability that they would have?

MR. MOODY: Yes we did and, yes, they do have those provisions. Even though they will have a habitable TSC, it will automatically isolate and things like that.

MEMBER SIEBER: You're not sure yet; right?

MR. FOSTER: That's what they're telling us. And that's we have to review to make sure.

MR. MOODY: And they do have plans to relocate the TSC.

MEMBER SIEBER: Is it on -- it should be onsite. I presume it is.

MR. MOODY: Basically, yes. They're transfer to the EOF. Correct me if I'm wrong, Fred.

MEMBER SIEBER: The EOF is offsite.

MR. MOODY: Right. Yes.

MEMBER STETKAR: Where offsite is --

MEMBER SIEBER: Some utilities do that.

MEMBER STETKAR: Where is EOF?

MEMBER SIEBER: It should be ten miles away or more.

MR. MOODY: Yes.

MEMBER STETKAR: Where is the EOP?

MEMBER SIEBER: Dallas. (Laughter.)

MR. PULEO: The Emergency Operations Facility is located in Bay City, Texas which is approximately 12 miles from the station. One of the features in the emergency plan states that should the affected unit technical support center become uninhabitable we can relocate to the unaffected unit technical support center.

MEMBER SIEBER: Now do you have communications? Is there a datalink between the plant and the TSC and if the EOF is the alternate or another unit is the alternate you have that same datalink so you can tell what's going on?

MR. PULEO: That's correct. All those datalinks need to be tested in accordance with the ITAAC. And I think what Mr. Moody was referring to is and it's a new thing and it's a hostile action-based drill that if we have to man the technical support center we actually end up at the emergency operations facility because of the hostile actions that are taking place at the site. We can't immediately get our staff there.

MEMBER SIEBER: Right.

MR. PULEO: Does that answer the question?

MR. MOODY: Then they'll have a TSC for each unit.

MEMBER SIEBER: Right. Yes. They're supposed to be close to the control room.

MR. MOODY: Yes.

MEMBER SIEBER: I think there is a walking distance.

MR. MOODY: Yes, there is a -- There are immediately adjacent to the control room.

MEMBER SIEBER: Not the -- that's a worker dispatch area the way I look at it, but that's also supposed to be close to the control room.

MR. MOODY: Yes. And I believe that will be in the lunchroom and in the service building also. So that's very close.

MEMBER SIEBER: Yes.

MR. FOSTER: Let's move on, Bob.

MR. MOODY: The application did incorporate by reference descriptions for the TSC and OSC as just discussed. They also addressed the availability of a decontamination facility. It's good to run your drain lines from the decon facility to your waste tanks. Think about that before you build a plant.

Just a few comments regarding EP-ITAAC which has been alluded to earlier. The applicant did follow the generic guidance in Reg. Guide 1.206. There are ITAAC in two locations in this application. One is in the Tier 1 material. That's been incorporated by reference in the DCD and that relates to the TSC location, size, communications and displays. Also the ITAAC Tier 1 talks about OSC location and communications capabilities.

Then the applicant also provide ITAAC related to staffing for the control room. TSC/OSC and EOF. Displays in the OSC are in the TSC and in the

EOF. They'll have ITAAC related to notifications, verifications. They can make those. Communications among the ERFs, the various emergency response facilities. The development of EPIPs and providing them to the NRC 180 days prior to fuel-load.

They did provide exercise objectives for their full scale exercise that they'll conduct prior to fuel load and then also ITAAC on completion of training, EP training.

We had some brief discussions earlier on EALs, emergency action levels. And the applicant based theirs on NEI guidance which we have approved in 99-01. And that's applicable to the ABWR. We do have new guidance in NEI 07-01 for advanced reactors, but the ABWR falls under the EALs. Right. So they followed those.

Now in a minute I'm going to mention a couple of -- Well, I'll mention it at this time. There is a license condition because of the design, the advanced design, of the ABWR. Some of the EALs don't exactly fit.

MEMBER SIEBER: Right.

MR. MOODY: So the applicant has provided some license conditions to fill those holes prior to fuel load.

There's one confirmatory item and that has to do with including a license condition related to the submittal of these EALs in the application. We've accepted their response that they need to include that in their application.

Once we get the TSC question answered and resolved the confirmatory item, then we'll draw a conclusion of reasonable assurance that there's adequate provisions to protect the public's health and safety.

MEMBER SIEBER: Now the TSC question relates to what now?

MR. MOODY: TSC has two parts. One is the ventilation system, making sure that the filtering capability is adequate to protect the TSC.

MEMBER SIEBER: Right.

MR. MOODY: Then the other part has to do with --

MEMBER SIEBER: Shielding.

MR. MOODY: Yes.

MEMBER SIEBER: From direct radiation, right. And is that -- Is the TSC design with something better than block or poured concrete walls? I know it's not required to be seismic or anything like that but surely some shielding capability.

MR. MOODY: Yes, it does.

Fred, maybe you can help me with that.

MR. PULEO: Yes, sir. Our design for the technical support center is we're looking at putting them below grade in a secured, and I'll use the term loosely, bunker.

MEMBER SIEBER: Is it close to the cable spreading area?

MR. PULEO: No, sir. It's actually in the service building which would make it within two minute walking distance to the control room.

MEMBER SIEBER: That's the requirements, right?

MR. PULEO: Yes, sir.

MEMBER SIEBER: Okay. Two minutes.

CHAIR ABDEL-KHALIK: Are the emergency action levels, the criteria by which the emergency action levels are determined for both Units 3 and 4 consistent with those for Units 1 and 2?

MR. MOODY: Yes, they are. They're based actually on the same NEI guidance document because they're not the passive design. The ABWR is not the passive design. They are really closer as the operations people were discussing. They're close to operations to the conventional BWR 6s, 4s, 5s, 6s that were --

MEMBER SIEBER: Yes, but they will be plant specific.

MR. MOODY: Yes.

MEMBER SIEBER: Because they do address certain levels of equipment availability within them.

MR. MOODY: Yes, they will.

MEMBER SIEBER: But the founding principles are the same.

MR. MOODY: Yes.

MEMBER SIEBER: It's just the equipment set is different.

MR. MOODY: Yes, there will be setpoints and things like that that won't be -- we won't know until after the plant is built.

MEMBER SIEBER: It may end up actually being site specific to a particular until because of calibrations, instrument locations and so forth.

MR. MOODY: It very well could be.

MEMBER SIEBER: yes.

MR. FOSTER: All right. Any other questions?

CHAIR ABDEL-KHALIK: Are there any additional questions for the staff on Chapter 13?

(No verbal response.)

Hearing none --

MR. FOSTER: And as soon as the staff completes its review of the other sections of 13 and finish their SER we'll submit that up and set up a schedule for our presentation.

CHAIR ABDEL-KHALIK: At this time I guess we can open the phone connection and see if there are any members of public who would like to make a statement or provide a comment.

It is open. Are there any members of the public on the phone who wish to make a statement or provide any comments?

(No verbal response.)

I guess not. Okay. At this time, we'll just go around the table and see if there are additional comments that we'd like to capture that we haven't captured in our action items.

Jack.

MEMBER SIEBER: Well, I think I've asked a lot of questions and expressed some views on a couple of issues. I have no additional questions. And I think for the most part we're in pretty decent shape except for a couple areas.

CHAIR ABDEL-KHALIK: Thank you.

Harold?

MEMBER RAY: No, sir.

CHAIR ABDEL-KHALIK: Dennis.

MEMBER BLEY: I want to say something that's not quite related to their situation. I think everything we've seen has been good. But Jack asked a question or made a comment that made me just think about something and it's that our college-degree people who become licensed operators don't want to stay on shift work.

MEMBER SIEBER: Forty years.

MEMBER BLEY: Forty years. And that's the way it seems to be. But you go to Europe and it's a position that's well respected and people strive for it including the college-degree people and boy do they know their plants inside and out. It's very interesting. I'm sure people are thinking about how they can keep people in this role. It would sure be nice if we had that kind of culture going on here.

CHAIR ABDEL-KHALIK: Thank you.

Sam.

MEMBER ARMIJO: No, I have nothing to add.

CHAIR ABDEL-KHALIK: John.

MEMBER STETKAR: Nothing more than we discussed earlier.

CHAIR ABDEL-KHALIK: Charlie.

MEMBER BROWN: No.

CHAIR ABDEL-KHALIK: Bill.

MEMBER SHACK: No.

CHAIR ABDEL-KHALIK: Mike.

MEMBER CORRADINI: No.

CHAIR ABDEL-KHALIK: Okay. At this time, I'd like to thank both STP and the staff for very informative presentations. Thank you. We're adjourned. We'll meet tomorrow. Thank you very much. Off the record.

(Whereupon, at 4:37 p.m., the above-entitled matter was concluded.)

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
ABWR Subcommittee on the STP COLA
OPEN SESSION

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Thursday, June 24, 2010

Work Order No.: NRC-314 Pages 1-199

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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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ABWR SUBCOMMITTEE ON THE STP COLA

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OPEN SESSION

+ + + + +

THURSDAY

JUNE 24, 2010

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee convened at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 p.m., Dr. Said Abdel-Khalik, Chair, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

SAID ABDEL-KHALIK, Chair

DENNIS C. BLEY

SANJOY BANERJEE

MICHAEL CORRADINI

JOHN D. SIEBER

SUBCOMMITTEE MEMBERS PRESENT(Cont'd):

WILLIAM J. SHACK

JOHN W. STETKAR

NRC STAFF PRESENT:

MAITRI BANERJEE, Cognizant Staff Engineer

STACY JOSEPH

JOHN McKIRGAN

MARK TONACCI

GEORGE WUNDER

GREG MAKAR

JOHN MCKIRGAN

ANDREJ DROZD

HENRY WAGAGE

ALSO PRESENT:

SCOTT HEAD

COLEY CHAPPELL

JIM TOMKINS

HIROHIDE OIKAWA

KENJI ARAI

JASON DOUGLASS

NIRMAL JAIN

TOM GEORGE

CAROLINE SCHLASEMAN

ALSO PRESENT(Cont'd):

ROBERT QUINN

RICK OFSTUN

KOICHI KONDO

TOM DALEY

MOHSEN KHATIB-RAHBAR

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

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

8:28 a.m.

CHAIR ABDEL-KHALIK: The meeting will now come to order.

This is the second day of a meeting of the ABWR Subcommittee of the Advisory Committee on Reactor Safeguards.

I'm Said Abdel-Khalik, chairman of the subcommittee.

ACRS members in attendance are Jack Sieber, John Stetkar, Mike Corradini and Bill Shack.

Ms. Maitri Banerjee is the designated federal official for this meeting.

Yesterday, we received briefings on Chapters 10 and 13 of the STP COLA. Today we will discuss Chapter 6.

The ground rules are the same as those for yesterday. If we need to enter into a closed session to protect proprietary information, we request that the staff and STP let us know before going into such discussion and to verify that only people with the required clearance and need to know are present.

We have again a telephone bridge line which will be blocked during the closed sessions of the meeting. The bridge line will be placed in a listen-only mode so that participants can listen to the deliberations without interruption.

We have again scheduled 15 minutes near the end of the meeting to receive statements and/or comments from the members of the public and other stakeholders, and the bridge line will be open to receive such comments at that time.

I'd like to make a note that Dr. Shack was involved in Argonne National Laboratory work under contract with the NRC to develop technical bases for chemical effects on the GSI-191 issue. Hence, during the meeting he will not participate or provide his views on that particular work, if it comes up.

As the meeting is being transcribed, I request that participants in this meeting use the microphones located throughout this room when addressing the subcommittee. Participants should first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We will now proceed with the meeting, and I call on Mr. George Wunder of NRC to begin the presentation.

MR. WUNDER: Thank you, Mr. Chairman. Good morning, gentlemen. Good morning, Maitri.

The staff's SER today will be presented on Chapter 6. Representing DNRL will be Ms. Stacy Joseph. The presenters will be Andrzej Drozd. The staff's consultant, Mohsen Khatib-Rahbar, Henry Wagage and Greg Makar.

But before we move onto Chapter 6, the first item on the agenda is to clear up a couple of open items from previous ACRS meetings. We're going to address two questions. First, I believe it's item No. 30 on the punch list that Maitri has provided to you and it has to do with population of the DRAP list, and this presentation will be made by Dr. Todd Hilsmeier. And after that, I believe it's item No. 4 on Maitri's list that has to do with dealing with Part 21s for the purpose of the STP COL, and that will be presented by Stacy Joseph.

CHAIR ABDEL-KHALIK: Please proceed.

DR. HILSMEIER: Thank you. My name is Todd Hilsmeier and I'll be discussing ACRS' open item related to the DRAP list for the STP FSAR section 17.4s. I believe you were given a handout of my response.

ACRS' first question in the open item was, "When will STP's DRAP list be effectively populated?" And in general the list of DRAP SSCs should be effective populated prior to the COL entering detailed design construction phases because quality assurance controls are applied to the non-safety-related DRAP SSCs during this time. So, in the case for STP, STP specified a commitment, Commitment No. 17.4-1, in their FSAR and this will appear in Revision 4 of their FSAR, developing a comprehensive list of DRAP SSCs by 2011, prior to entering the detailed design construction phase.

And this DRAP list will be effectively populated using the methodology that's described in FSAR Section 17.4s which augments the PRA techniques in the referenced ABWR DCD, use of an expert panel and use of the deterministic technique that's described in the FSAR, and also use of the industry operating experience. All these tools together should ensure the DRAP list is effectively populated and compensate for any limitations of the ABWR DCD PRA.

ACRS' second question was, "How will the staff ensure that STP DRAP's list and the process related to it is acceptable?" And the staff will ensure the DRAP list and implementation of DRAP is acceptable through audits and inspections. We plan to perform an audit this summer as part of the SER evaluation to confirm that the DRAP activities are prescribed by detailed procedures and are being accomplished in accordance with those procedures.

Also, we will confirm that the DRAP list is being developed appropriately in accordance with the methodology described in the FSAR. And currently they're developing this list and this summer we will go to the site and observe their expert panel in action as far as implementing the deterministic technique and analyzing industry operating experience and for those systems that they've completed, identifying the risk-significant SSCs. We will look at those systems to ensure that all the risk-significant SSCs associated with those systems are identified, but the list won't be completed this summer. It will be completed in September 2011.

And so the findings from this audit, in addition to the specified commitment in the FSAR to develop a comprehensive list of DRAP SSCs by September 2011 should be sufficient to support our licensing decision in accordance with Regulatory Guide 1206. Then to verify that the actual list is acceptable, the final list, we plan to perform an inspection in late

2011 to verify that STP has met the commitment, Commitment 17.4-1, and that the list of DRAP SSCs has been effectively populated and is acceptable. And as of now, this inspection is not planned to be part of the SER evaluation, but rather confirming that the commitment has been met.

And then lastly, in accordance with the FSAR, STP will be updating and maintaining the DRAP list as need throughout the detailed design and construction phases as changes are made to the plan's specific design and as changes are made to the PRA model. And the staff will performing inspections throughout the design construction phases to verify implementation of the DRAP including verifying the DRAP list is being maintained and updated.

It is important to note that any new risk-significant SSCs that may be identified, like when they develop the plant-specific updated PRA later in the construction phase, those SSCs will be subjected to the quality assurance requirements.

MEMBER STETKAR: Might have to back that quality assurance requirements though if those SSCs are already purchased and installed in the plant?

DR. HILSMEIER: Yes, they would need to verify that the QA requirements are met.

MEMBER STETKAR: Okay.

DR. HILSMEIER: I talked to the quality assurance group at NRC about this, and it's similar to the process of commercial grade dedication process.

MEMBER STETKAR: But I think the key of all of this, if I understand it, the DRAP list at least -- I'm trying to understand at the COL issuance stage there is a DRAP list.

DR. HILSMEIER: Yes.

MEMBER STETKAR: But that is not necessarily --

DR. HILSMEIER: It's not --

MEMBER STETKAR: I know it's an evolving process, but --

DR. HILSMEIER: Right. Because the ABWR DCD is 15 years old --

MEMBER STETKAR: Yes.

DR. HILSMEIER: -- and the PRA, in today's standards, is limited --

MEMBER STETKAR: Yes.

DR. HILSMEIER: -- one would consider that that -- and STP incorporated by reference that list which is acceptable relative to the requirements, not to say that the list is.

MEMBER STETKAR: Well, it's a list. I

mean --

DR. HILSMEIER: Right. I call it an initial list. It's an initial list, although --

MEMBER STETKAR: It's a list.

DR. HILSMEIER: Right. And it's not completely comprehensive.

MEMBER STETKAR: Right.

DR. HILSMEIER: STP recognizes this. We discussed this during an audit.

MEMBER STETKAR: Yes.

DR. HILSMEIER: And to compensate for the DCD period model, which is 15 years old, they decided to implement this deterministic technique which should identify additional risk-significant SSCs --

MEMBER STETKAR: Yes, through the expert panel.

DR. HILSMEIER: -- the PRA might have missed.

MEMBER STETKAR: Yes.

DR. HILSMEIER: And it involves more than just the expert panel. The have a subjective process for identifying additional risk-significant SSCs.

So, as an example, I think this might have been brought up during the ACRS meeting on 17.4 about a month or two ago. The check valves for the RHR pump injection line is not in the DC DRAP list. Those check valves are important. If you apply the deterministic technique, without question those check valves would be included into the RAP list. And so, I feel confident that the deterministic technique will effectively populate the risk-significant SSCs.

And then when STP develops their peer review to a plant-specific PRA model, it may identify additional risk-significant SSCs. We're not sure at this point. If it does, that's okay. Those risk-significant SSCs will need to be subjected to the QA requirements or at least verify that they meet those requirements.

MEMBER STETKAR: Okay. I'll have to think. Because it's a strange situation and obviously the population of the DRAP list evolves over time, I'm just trying to get my hands on what is the DRAP list that we should think about, you know, as our subcommittee at the COL issuance stage, which is basically our last chance to comment on things like completeness in the process and --

DR. HILSMEIER: I would think of it as --

MEMBER STETKAR: Because you're doing that through an audit process essentially after the COL --

it might actually occur before the COL is issued --

DR. HILSMEIER: Right. Exactly.

MEMBER STETKAR: -- but it doesn't necessarily need to occur.

DR. HILSMEIER: Right. I would think of the DRAP list in the FSAR as it appears now as the initial list.

MEMBER STETKAR: But we all know that's a list.

DR. HILSMEIER: Right. As an initial list that meets the requirements of the regulations. We both acknowledge, I mean, I acknowledge, I think you acknowledge and based on conversations with STP during an audit, they acknowledge that list is really not complete --

MEMBER STETKAR: Right.

DR. HILSMEIER: -- but meets the applicable requirements and finality. And that's why STP proposed this additional methodology to identify a complete list of risk-significant SSCs. And it's through the commitment, Commitment 17.4-1, that will be the driver to complete this comprehensive list. Just like Chapter 19 has a dozen or two dozen commitments which are very important, those are commitments NRC will be following and inspecting to make sure they are completed just like for 17.4.

MEMBER STETKAR: Okay. That at least clarifies the process for me.

DR. HILSMEIER: Right.

MEMBER STETKAR: Thanks.

CHAIR ABDEL-KHALIK: Okay. Thank you.

CHAIR ABDEL-KHALIK: Okay. Thank you very much.

MS. JOSEPH: Good morning. My name is Stacy Joseph and I'm a project manager for the STP COL application.

During the March 18 meeting, the members asked the staff if we have a complete list of Part 21s that were --

MEMBER STETKAR: Do you have a copy of this presentation?

MS. JOSEPH: Oh, I don't think we do.

PARTICIPANT: We have an electronic copy.

MEMBER STETKAR: Yes, I've seen the electronic copy, but do we have a paper copy?

MS. BANERJEE: Was it sent to me?

MS. JOSEPH: You know what, I don't think it was. I apologize.

MEMBER STETKAR: Okay.

MS. JOSEPH: I can --

MS. BANERJEE: Okay.

MS. JOSEPH: So, two slides, but I can get that printed out for you.

MEMBER STETKAR: That's fine. Go ahead.

MS. JOSEPH: Okay. The members asked the staff if we have a complete list of Part 21s that were ruled to be applicable to the ABWR that came down from 1997 until 2010.

At the last ACRS meeting, STP provided a list of Part 21s that they determined to be applicable to the ABWR design. The staff also performed an independent search of Part 21s issued from the time the ABWR design was certified in 1997. The Division of Construction Inspection Programs conducted the search at a Reactor Operating Experience system and identified 17 generic issues that could possibly apply to the ABWR. The technical staff reviewed 17 generic issues and identified two generic issues that could apply to the ABWR.

The first item involves a Stability Option III issue. As we all know, this has already been addressed by STP in the COL and described in previous meetings.

The next Part 21 identified an error in a GE analysis used by several operating BWRs for operating with an MSIV out of service. The GE analysis used for certain plants for operation is one MSIV out of service and closed did not take into account the long-term effects of flow-induced vibration for the potentially greater than 100 percent steam flows in the other main steam lines. As a result, GE advised the affected operating plants to limit thermal power to an appropriate level with one main steam line isolated.

To address this issue for the ABWR arc hole, the staff is requesting the applicant provide the tech spec bases for required actions that specify isolating a main steam line to clarify that continued operation with an isolated main steam line is only permitted if the plant safety analysis allows three main steam line operation. Such operation would need to be within the conditions and limitations evaluated in the safety analysis. Currently, the safety analysis for STP units 3 and 4 does not address the three main steam line operation and therefore the requested bases change will clarify that such operation is not permitted.

It should be noted that the three main steam line operation is not an expected mode of operation for operating BWRs and operating reactor tech specs as well as the ABWR tech specs do not explicitly specify operational restrictions associated with the three main steam line operation. The staff has discussed this issue with the applicant and the applicant has agreed to make the requested clarification in the tech spec bases.

And with that, the staff is confident that the Part 21s issued from 1997 until now have been or will be addressed by STP in the COL. And with the current processes put in place by DCIP for capturing new Part 21s, we're confident that any future Part 21s that affect the ABWR will be reviewed by the technical staff as well.

CHAIR ABDEL-KHALIK: Now, the time window that your evaluation covered is encompassed by the time window that the applicant reviewed in there. Now, why didn't the applicant capture the second Part 21 notification on your list?

MS. JOSEPH: Coley, do you want --

MR. CHAPPELL: I can talk to that.

MS. JOSEPH: Yes.

MR. CHAPPELL: My name is Coley Chappell with Regulatory Affairs for STP 3 and 4. That Part 21 report was evaluated by our team and we looked at what the issue was with that Part 21 report. So, an MSIV was taken out of service and three steam line operation continued. At that time for those plants that was affected they went to GE and asked for an analysis that would support operation at greater than 100 percent steam flow in those steam lines and the analysis did not take into account long-term fibratory loads due to the increased flow. And that was an operational issue and it was an issue with an analysis and operability of the MSIVs. And since STP is not relying that analysis, it is not directly applicable.

We looked at our programs that would have to be in place in order to support such an operation, and just like they did then, we would ask our vendor to provide an analysis to support operation, but we have not done that yet. But that's why we evaluated that Part 21 not being directly applicable as something we need to take into action now to ensure a safe condition.

CHAIR ABDEL-KHALIK: Okay. By the same token, the applicant identified a second Part 21 notification other than the stability-related notifications that was deemed to be applicable to them. Why was that not identified in your evaluation?

MS. JOSEPH: I believe because that was identified prior to our search, which was 1997. I think that one came through the two years, 1995 to 1997.

MR. CHAPPELL: I have the details on that. Do you remember what happened?

MS. JOSEPH: Is that right?

MR. CHAPPELL: I don't remember the details. Is that correct, Bob?

CHAIR ABDEL-KHALIK: Okay. But please verify that, that that was actually between 1995 and 1997.

MR. CHAPPELL: Okay.

CHAIR ABDEL-KHALIK: And if that is the case, that means that there are some Part 21s that slipped through the cracks during the certification process. And if that is the case, the question as to whether or not 1995 is an appropriate cut-off date is still valid, which is the question that remained from the last meeting.

MR. HEAD: Which we're still wrestling with, I guess.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: I think we feel like given the certification time window that '95 was an appropriate time to start our evaluation.

And, Bob, do you have anything to --

you're grabbing the mic.

MR. QUINN: Yes, my name is Bob Quinn. I'm with Westinghouse Licensing. I've spoken at a number of these meetings before.

Two things I would say: One, Stacy's recollection of the other item, which was a CPR value, was a 1996 Part 21. So, it was in our window and not in the window that was evaluated. So, that was a correct statement.

Why we chose 1995 was really based on the same basis that staff had, which was the certification was issued in 1997 and we were trying to take a reasonable view of when the DCD was actually finished and started into a process for rulemaking, figuring that during the time it would be unlikely, or maybe possible at least, that maybe something would slip through. Prior to '95 I would have thought that, you know, any issues that came up as generic concerns would be captured during the certification process and reviewed that the staff was underway at that time. So, it was a reasonable basis we thought.

CHAIR ABDEL-KHALIK: Yes, I understand. But I think if you were to show documentation that there was indeed a generic issue that was evaluated prior to 1995 and that was resolved during the process, then that would give us assurance that the selection of that date was appropriate.

MS. JOSEPH: I believe the staff's position as well; and, George or Mark, you can step in and help if necessary, but, you know, is that -- you know, we can't say for sure that during the certification process all of these were captured. But we do have a certified design. Those doing the certified design had guidance at the time to review generic issues, bulletins, letters. And so, to be reasonable, we have to take from the time that design was certified and move on from there.

CHAIR ABDEL-KHALIK: It is indeed a process issue.

MS. JOSEPH: Yes.

CHAIR ABDEL-KHALIK: And we just have to make sure that the process is adjusted accordingly. Okay. Thank you.

MR. HEAD: And we still have the action to -- and you almost indicated that if we found one that had been incorporated, that would be a success, but you know, we're going to go back and look and if we don't find that one --

CHAIR ABDEL-KHALIK: Well, evaluate it.

MR. HEAD: Right. But we're still

ultimately going to have to rely on what is a very robust process, you know, embraced by the industry. And so, I think something slipping through would be --

CHAIR ABDEL-KHALIK: Unlikely?

MR. HEAD: -- unlikely.

CHAIR ABDEL-KHALIK: But nevertheless, there was a hole in the process that allowed those to fall through the cracks between 1997 and now.

MR. HEAD: Well, are you characterizing the MSIV one as a hole, for example? We feel like that we would have been outside design basis and to have operated like that we clearly would have had to have gone through a process that would have --

CHAIR ABDEL-KHALIK: No, no, no, no. I don't classify a specific Part 21 notification --

MR. HEAD: Okay.

CHAIR ABDEL-KHALIK: -- as a hole. But I would classify the lack of evaluation of Part 21 notifications as a hole in the process.

MR. HEAD: All right.

MS. JOSEPH: I believe the staff also is looking at the overall programmatic process. They're not prepared, because it does cross all design centers, to address that at this time. But that is something that the staff is looking into.

CHAIR ABDEL-KHALIK: Thank you.

MS. JOSEPH: Anymore questions?

CHAIR ABDEL-KHALIK: Are there anymore questions on these two items?

(No audible response.)

CHAIR ABDEL-KHALIK: Okay. Thanks. We will start with STP's presentation on Chapter 6.

MR. HEAD: Since we are in open items, we were going to quickly cover of a couple open items and at least remind the staff, or ACRS that we're going to be addressing two open items in our Chapter 6 discussion.

CHAIR ABDEL-KHALIK: That's perfectly fine.

MR. HEAD: Okay.

CHAIR ABDEL-KHALIK: Please go ahead.

MR. HEAD: So, we're going to quickly go through the list again, and then describe a couple of topics that we're going to discuss today, one of which, because of resources, we in fact won't be discussing, but it is in your package, which I believe you have.

CHAIR ABDEL-KHALIK: We have a package.

MR. HEAD: Right. Okay. People here that will be helping us today.

Item 6, which is feed water line break mitigation not described in Chapter 15, we're going to cover in Chapter 6 today, as promised. And then item 8, which is, you know, basically GSI-91. We'll also be covering our discussions today on strainers.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: Okay? And we also wanted to talk about -- would you just go ahead and go to the next -- so, this is our ongoing list, but it does -- we wanted to talk about the English versus metric today and see if we're heading in the right direction there, a quick discussion of RCS leak detection, and then a discussion on closing switchyard breaker closing coils. The last item there, actually we had a resource issue and we're not able to, at least for this discussion. I wanted to talk to the Chairman on a break about how we might do that one possibly at the end of the day.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: Okay? Okay. Coley, would you go ahead and start on this one, and I'll weigh in as appropriate?

MR. CHAPPELL: Thank you. This is addressing the issue of use of consistent units within plant documentation. And so, STP 3 and 4 has project requirements that are in place to ensure that design documents and figures and drawings, technical specifications, all use U.S. customary or English units. We have contractual obligations that ensure that procurement is done using English or U.S. customary components. If by chance a specific component cannot meet that requirement, we have a process where that's an engineering and operations and maintenance evaluation that's done to ensure that we have an interface with the U.S. system.

Instrumentation and controls --

MR. HEAD: We're going to focus on the contractual obligations. You know, obviously this is an international project, but you know, that's our contractual obligation on the EPC team to support our ongoing operations.

And before I go to I&C, I was talking to Jay Phelps this morning, our operations manager, because, you know, we had a moment yesterday when we were talking about EOPs and what was the value in the EOPs you have? And he said, well, they're all blank right now because they're all calculational values that are being determined as we go through the process. But his expectation clearly is that those will be in English units.

The process to develop those is a calculational process, which is, as we're aware, if an input is metric, that will be changed to an English unit but it will be part of a validation calculational process. So, the process to make this happen is already established we think within the calculation and the review process that's developed in any procedures. If, for example, there's a metric link and that's important in the calculation and the outcome, then that will be adjusted either at the front or at the end of the calculation before it's inputted into an important thing like an EOP.

So, as a process, we believe, and as a contractual obligation, that we're where we expect to be with respect to making our project or our plant using English units.

So, I'll go ahead and let you go ahead finish with the I&C portion here.

MR. CHAPPELL: The I&C is a lead-in about the instrumentation. The control room design would be in U.S. customary and we'll have English units in the control room. And all the training material will be provided with the same, having English units for operations personnel. I think this consistent use of U.S. customary units in our procedures will ensure that operators and technicians have a consistent set of standards for use in plant operations.

CHAIR ABDEL-KHALIK: How about documents that are already in existence? How are those being handled. For example, there are many documents that we have --

MR. HEAD: Well, the two that we have, we've, you know, kicked around is, well, the SAR, right, obviously.

CHAIR ABDEL-KHALIK: Right.

MR. HEAD: And we plan to leave it as is for now through the licensing phase. When or if we would want to make a transition at some future date is really right now we see as a future business decision as to when we would do that.

The other one is buying equipment that has a metric basis. And when that happens, we'll obviously have to have our procedures and processes support that. And that may mean required tools that people take out into the field, that I think we all understand we do at our houses today when we have a metric or an English, you know, repair work to do, that we'll have to have our maintenance staff be able to support either one of those. So, I doubt that for like a maintenance item that we would do a significant transition. But that's also a future potential business decision, because, you know, obviously that piece of equipment is a metric piece of equipment. Transitioning of any sort might not be a worthwhile thing to do.

MEMBER STETKAR: I hate to ask this, but is there less risk from multiple unit conversions and documentation consistency to just make STP units 3 and 4 a metric plant? I mean, I can train operators to read millimeters or kilopascals.

MR. HEAD: But it's not just operators. It's not just operators at that point. It's an entire staff of people to support them. It's an entire staff that -- I'm speaking personally now --

MEMBER STETKAR: Yes.

MR. HEAD: -- that are going to be in some cases supporting 1 and 2 on an issue --

MEMBER STETKAR: Okay.

MR. HEAD: -- and then --

MEMBER STETKAR: If you do have trained staff, then it is an issue.

MR. HEAD: -- 3 and 4. And so, you know, personally I don't think that's the way the station would want --

MEMBER STETKAR: Okay.

MR. HEAD: So, I think the up-front rigor that we expect out of calculations and design documents is to validate anything, including that you've made an appropriate transfer from metric to English, is really what we're going to rely on. Obviously, you know, if we encounter an issue, well, then that would go in our corrective action program and it'll be evaluated, extent of condition, extent of cause. And so, I think if we do encounter an issue, that we would capture that and take it as a significant opportunity to look at what happened. But, as to your suggestion, I just don't --

MEMBER STETKAR: You don't think it --

MR. HEAD: I know if Jay was here, he would emphatically not want to do that.

MEMBER STETKAR: It might be different if you were a stand-alone site.

MR. CHAPPELL: I might add that the inertia at the site is a factor as well, but the industry as a whole in interfacing with other sites and emergency plan --

MR. HEAD: And public coming in or --

MR. CHAPPELL: -- and the public.

MEMBER STETKAR: Okay. Yes.

MR. CHAPPELL: So, there is a lot of

issues to address.

MR. HEAD: Being able to reach out to people to come help in training and stuff, that would I think make it a little more difficult.

MEMBER STETKAR: Convincing enough. Thanks.

MR. HEAD: Can I ask, have we addressed --

CHAIR ABDEL-KHALIK: Yes.

MR. HEAD: Okay.

CHAIR ABDEL-KHALIK: In my view, you have.

MR. HEAD: And while I have the floor, was the DRAP issue closed in ACRS' mind with respect to --

MEMBER STETKAR: Scott, I understand the process. Is it closed in ACRS' mind? I don't know. I don't speak for ACRS.

MR. HEAD; Okay. Well, I --

MEMBER STETKAR: I at least understand --

MR. HEAD: I felt that it was excellent presentation on the process.

MEMBER STETKAR: I understand the process. I'm just not sure exactly what I should think about when I look at the list that the only list available for us to actually think about.

MEMBER SIEBER: It will be out of our hands by the time you get the complete list.

MR. HEAD: Yes, that's right.

MEMBER STETKAR: -- though there is a complete list.

MR. HEAD: Well, no, there isn't. It's a state of transition. But on the other hand, our -- I mean, but you're still at that point relying on a process.

MEMBER STETKAR: Right.

MR. HEAD: I mean, after COL if we make a modification, it's got to go into that process and be evaluated. So, I think you have to ultimately rely on the process.

MEMBER STETKAR: Oh, you do. That's absolutely clear. It's just a question of a comfort level of where you are. It's an asymptotic process, you have to admit, and where you are on that growth curve when you take the artificial slice at the COL stage.

MR. HEAD: So, I'm just exploring now. Is it if we can maybe at a future meeting, and there are some time frames, if there's still an issue here, that we'll show you how close we're getting to the --

MEMBER STETKAR: That would make me feel a lot more comfortable, because what's in there right now is a bit sparse, let's say.

MR. HEAD: Right. Well, and so we're going through the process and at a future meeting, either as a continuation of this open item discussion, then I think we'll just show you how the list has evolved.

CHAIR ABDEL-KHALIK: I think that would be very helpful.

MEMBER STETKAR: That would be really, really helpful.

CHAIR ABDEL-KHALIK: That would be very helpful.

MR. HEAD: Okay.

MEMBER STETKAR: Because my sense right now is on this growth curve what we have available to look at and think about is fairly low on the growth curve. And the process, you know, on paper the process sounds very good, but it's a process on paper. So, if application of that process is currently in progress, then a little bit of information about where you are and how that's working would really help.

MR. HEAD: Right. So, okay. We're licensing a process. At a future moment we'll show you how that process is evolving and, you know, Bill Stillwell and others can --

MEMBER STETKAR: I think that would really help. Thanks.

MR. HEAD: Okay.

MEMBER SIEBER: You aren't very far along in the detailed design engineering phase. You know, some of that actually gets done during construction as --

MR. HEAD: Sure.

MEMBER SIEBER: And that's where that list becomes populated. It's part of your QA.

MR. HEAD: Right. But, actually it is a process, and when equipment is identified or even a modification made, you know, to the design, then that's, you know --

MEMBER SIEBER: That goes on for the life of the plant.

MR. HEAD: It does. Right. But this is the DRAP portion and then there are other processes that go on.

MEMBER STETKAR: That's right. You know, unfortunately the way this whole Part 52 step is evolving, we as the ACRS get a couple of snapshots. We get a snapshot at the DCD stage, we get a snapshot at the COL stage. And after that, it's difficult for us to get snapshots of anything.

MEMBER SIEBER: Until some failure occurs.

MEMBER STETKAR: Yes.

MR. HEAD: I don't know that snapshot does this justice, but I'll --

MEMBER STETKAR: No, well, let's just say a chance to perform our functions.

MR. HEAD: I understand. I understand.

CHAIR ABDEL-KHALIK: Just a way for us to see how the process --

MR. HEAD: I understand.

CHAIR ABDEL-KHALIK: -- has been applied as --

MR. HEAD: I think as a --

CHAIR ABDEL-KHALIK: -- you know, at a point somewhere downstream.

MR. HEAD: Yes.

CHAIR ABDEL-KHALIK: And that, in combination with the process would provide us the necessary assurance.

Please proceed.

MR. CHAPPELL: Thank you. The next action item I'll address deals with the reactor coolant system, leakage limits and technical specifications. You may recall that this question resulted from a departure that STP 3 and 4 took to the certified design which had a limit in the technical specifications of one GPM for unidentified leakage. The reference basis for that limit was leak before break methodology which is not being used at STP 3 and 4. And the question came up on how the Japanese experience with -- what is their limit, what is the Kashiwazaki-Kariwa limits for technical specifications, how do those compare, as well as to justification for the STP change, provide additional justification and address the sensitivity to the instrumentation?

So, the comparison that you see on your page there shows the Kashiwazaki-Kariwa 6 and 7 limits and also STP 3 and 4. Of note, the Japanese limits are the same as what's referenced in the DCD. The STP 3 and 4 departure also took into account an additional limit of an eight liter per minute, which is a two gallon per minute increase in unidentified leakage within rolling four hours, previous four hours in mode 1. And these numbers are consistent. Unidentified leakage and the general structure of this are consistent with U.S. BWRs. We took a look at a number of BWRs; three, four, five, six, and also different containments marked 1, 2 and 3 and looked at their limits. The five GPM unidentified leakage limit is a standard number to use for U.S. BWRs. And we also looked at the experience.

And let me finish this slide and then I'll show that on the next slide. The example was what experiences we might have. We thought it might be useful to know how the Japanese ABWRs operated with this limit. They have only had one instance where they had to shut down. They had some drywell high-conductivity waste floor drain leakage rates that doubled within a short period of time. And they have a different approach to handling that. In this case they chose to shut down and identify the leak, which turned out to be a gland seal leak on a valve. And it was not a boundary valve or anything like that, but it was leaking into the containment. So, they reached approximately a two GPM total leakage for that shutdown. That was the one case that led to a shutdown.

Next slide.

MEMBER STETKAR: But STP does have that rate of change --

MR. CHAPPELL: What you see on that table is the STP 3 and 4 tech specs. There is also a zero pressure boundary leakage technical specification portion in that LCO.

So, this slide goes a little bit into the sensitivity of the instrumentation, the one GPM within one hour, and that is not changed in the DCD. That sensitivity is adequate to support either limit, but based on our understanding of U.S. BWRs and standard technical specifications and how they are typically -- where they normally operate within those technical specifications, which is usually also below one GPM, we think that the operating experience indicates that it would be consistent with existing BWRs to maintain our departure limit of five GPM for unidentified leakage.

MR. HEAD: And the last one, it was the closing coil, switchyard breaker issue question and was a follow-on to our original presentation. And, you know, in essence, I'd say if Evans were here, he would be providing this presentation, but it's relatively simple, so I'm going to be doing it.

We are not aware of any regulatory process to impose this. Okay? However, we do recognize a good idea when we see one. And so, the strongest way we believe to follow through with this, which we, like I say, agree is a good idea, is that it's been placed into the current draft agreement with the transmission service provider to address the issues that you had pointed out in the original discussion about ensuring as high a likelihood as possible that you would have the ability to get power back. And so, that's our proposal at this time.

MEMBER STETKAR: I'm really happy you're doing this. This is closed. Thanks.

MEMBER SIEBER: I'm curious about something. I'm rather familiar with transmission equipment and I don't ever recall seeing a breaker with more than one closing coil. Is there such a thing?

MR. HEAD: When Evans was here with that --

MEMBER SIEBER: Closing coils are big because it's got to overcome a big spring and rapidly without drawing much of an arc close the points of the breaker. So, you know, it's not clear to me that you could even build something like that without going to extraordinary measures. And I'm not aware that you can buy anything like that off the shelf.

MR. HEAD: In our last presentation we made it clear that we're not aware of anyone that has double.

MEMBER SIEBER: Okay.

MR. HEAD: And so, this was really to address what is still a good idea, that in blackout conditions you want to have a high likelihood as possible of getting off-site power back.

MEMBER SIEBER: Yes, the only way to really do that's to have two separate breakers apparently.

MEMBER STETKAR: Well, they have separate breakers. It's just a matter of -- we're not going to design the thing here, but --

MR. HEAD: Right. Right. The way we ensure is --

MEMBER SIEBER: We'll try.

MEMBER STETKAR: I'm sure if you pushed the breaker for breaker, you know, bus one, breaker one, you go push the button for breaker No. 2 you don't then discover that they're both from the same DC power supply. That's the --

MR. HEAD: Exactly. That's how it works. So, that's just our proposal on this one.

MEMBER STETKAR: Yes. No, that's fine. That's great.

MR. HEAD: And the last one, we're really resource limited at this point, so we won't be discussing that one in any detail. So, we're now I think ready to move onto Chapter 6, if you'll let us do a rearrangement here.

MS. BANERJEE: Are we going into closed session right away?

MR. HEAD: Not now. This first section is not closed. We will identify the closed session.

MS. BANERJEE: Okay.

MEMBER SIEBER: Need an extra chair?

MS. BANERJEE: Excuse me, Scott.

MR. HEAD: Yes, ma'am?

MS. BANERJEE: Can I ask you a question? Did we discuss action item No. 32 on your slide?

MR. HEAD: No, ma'am. I'm going to discuss and see if we can do that later on this evening.

MS. BANERJEE: Thank you.

MR. HEAD: Afternoon.

MS. BANERJEE: Somehow I missed that.

MEMBER SHACK: It'll be a lonely discussion this evening.

MR. HEAD: Yes, I understand.

MEMBER SHACK: I'll be here.

MR. HEAD: That was a slip.

CHAIR ABDEL-KHALIK: Please continue.

MR. HEAD: Okay. We're going to discussion Chapter 6 today. This will be an interesting discussion encompassing some issues that we've encountered that had to be addressed as part of Chapter 6 and the strainers questions, along with a couple of other topics.

Next slide. Chapter 6 is our standard agenda that we'll go through with respect to the discussion. Today though, as you'll see, is we have a lot more detail slides with respect to some of the analytical approaches we had to take to address some of the issues we had here.

The attendees today are Jim Tomkins will be presenting for licensing. We have Mr. Oikawason in the audience with us. Araison from TANE. Jason Douglas from Westinghouse will be leading some of the discussion. Nirmal Jain, who you've met before, will be -- Tom George from NAI will be this today to talk to some of the detail discussion. And Caroline Schlaseman we'll have up here later to lead us in the discussion on strainers. And other attendees in the audience to help us as necessary.

And at this point, I'm going to turn the discussion over to Jim.

MR. TOMKINS: Good morning. My name is Jim Tomkins, a licensing engineer for South Texas. I'm going to start and just go through Chapter 6, how it's organized, and cover the basics there.

There's a number of sections in Chapter 6. 6.1 is a materials section. Talks about materials, metals and coatings in the containment.

6.2 is a very large section. It includes all the containment information. It has a number of subsections. The first subsection is containment functional design, and that's where the containment analysis resides. There's a containment heat removal section. The secondary containment functional design section. The containment isolation system is described in four subsections. Combustible gas control is this section. And the containment leakage section is in this section as well.

6.3 is emergency core cooling. It talks about the design basis of the emergency core cooling system and it also addresses the LOCA analysis and results in that section as well.

6.4 is basically control room ventilation system.

6.5 is standby gas treatment. It's the secondary containment system.

6.6 is pre-service and in-service inspection and testing class 2 and 3 components. Class 1 is covered in section 5.

6.7 is the bottled nitrogen system.

There's a number of appendices. The first two are related to standby gas treatment system and that basically talks about compliance with the regulations for that system.

6C is a very significant appendix. It has all the information on the suction strainer, so we've made some significant changes to that one.

6D is high pressure core flooder analysis. It's an outline or a method for meeting the ITACC on high pressure core flooder, and I think it's a couple-page section.

And then 6E has some bypass leakage considerations and it's a discussion of that. Most of those we didn't make changes to.

So, in summary, as far as Chapter 6, Section 6, 6.7, appendices 6A and 6E are all incorporated by reference. Many of the other sections are not significantly changed. Section 6.2, at least one of the subsections has significant changes and we'll spend much of the next couple of hours talking about those changes. Appendix 6C has significant changes and we will talk about them in detail.

There are 16 departures that impact this chapter. Four of them are Chapter 6-based, six are tier one departures that have minor impact on this section, and six are tier two departures. There's 15 COL items in this chapter, and I'll go through those actually at the end of the presentation. And there's one site-specific supplement that I will also mention at the end of the presentation.

So, I'm going to start with the Chapter 6-based departures. There's four of them. I have actually a fifth up there, but it's not Chapter 6-based, but it's related.

So, the first one is a containment reanalysis, and we'll talk in detail about why we reanalyzed that. The reason STP or STD DEP 3B-2, the pool swell analysis, is up there is that the containment reanalysis changed the forcing function into the suppression pool so we had to re-perform that analysis as well, and that just logically makes sense to talk about that today. That session will be closed, so when we get to that point, probably, I think it's about 30 slides in, we have a slide that will trigger us to close the session. And there's about 12 slides in that presentation, so it won't be real long.

ECCS section strainer is the other Chapter 6-based departure, and we will also present that. A line will come up to present that departure. And then there's two relatively minor departures, containment penetration, 6.2-3. There were some changes made as a result of design detailing on the containment isolation valves and penetrations. And then there were some minors changes to the PSI/ISI program as described in 6.6. And I'll talk about both of these two at the very end after we've gone through the next two, which would be the significant departures.

So, with that, we're going to start into the containment pressure temperature analysis. And then once we're completed with that, we will go to the pool swell where we'll close the session. And to do that, I'm going to introduce Jason Douglass from Westinghouse and he's going to tell us a little bit about his background.

MR. DOUGLASS: A little bit of background on myself. My name is Jason Douglass. I have undergraduate degrees in aerospace engineering and mechanical engineering from West Virginia University. I received my master's degree in nuclear engineering from the University of South Carolina. I started my career in the nuclear industry with Bettis Atomic Power Laboratory working on core thermal hydraulics of gas cooled space reactors; that was short-lived, and as were about 300 other people.

MEMBER SIEBER: Oil-fired.

MR. DOUGLASS: After working on space reactors for about a year, I went through Naval Nuclear Power School as a civilian and then worked at the prototype units for the Navy down in Charleston, South Carolina. After working there for awhile I moved to Westinghouse where I've been in containment and radiological analysis for the past three-and-a-half years and I've been working on the ABWR project for about two-and-a-half of those years.

So with that, I will start into the presentation.

Just an overview of what we're going to be discussing with the pressure and temperature analyses along with the pool analyses. We're going to provide you some background as to why we're doing these analyses again with seeing -- they've already been done for the original DCD approval. Along with that, I'm also going to give a basic overview of ABWR and Mark III containments. And the reason I'm going to do this is because the base methodology for the ABWR DCD is the Mark III containment methodology. So, understanding the differences between the two, it also provides some background as to why different phenomena are important for one containment and not necessarily as important for the other containment.

After that, I'll go into our containment pressure and temperature analysis model along with the benchmarking we did with the DCD and our final analysis results. And then Tom will be discussing the pool swell model including benchmarking and analysis.

Starting off with the background, I would like to just read this statement to you. Again, it kind of gives you an idea as to why we're here discussing containment again for this design.

"Even though there were no changes to the ABWR containment design, the ABWR DCD containment analysis could not be incorporated by reference into the STP 3 and 4 COLA due to corrections required in the DCD containment modeling and analysis."

So, the reason we re-performed these analyses are due to the fact that these corrections were identified by GE and we do not have access to the CE codes and the GE methodology. So, we needed to build our own methodology based on what has been approved for Mark III and for ABWR, and then we added these corrections into our modeling.

MEMBER CORRADINI: Maybe you wrote it somewhere and I don't remember it. When were these corrections? When was the deficiency noted by GE?

After '97?

MR. DOUGLASS: Yes.

MR. TOMKINS: 2006 or something.

MEMBER CORRADINI: Okay. All right.

MR. TOMKINS: COLA Rev 0.

MEMBER CORRADINI: COLA Rev 0? Okay. Thank you.

MR. TOMKINS: The first application.

MEMBER CORRADINI: Right. I couldn't remember. Thank you.

MR. DOUGLASS: And the corrections that were identified were that changes needed to be made to the loss coefficient modeling throughout the vent system in the ABWR. There were also non-conservative mass energy releases used for the balance of plant flows for the feedwater line break. And along with that, there was a non-conservative decay heat assumption. 1979 was used without any uncertainty and so we've changed that to 79 plus two sigma.

And in addition to that, we also identified one correction that we wanted to make ourselves, which was that the peak pressure analyses were performed at a nominal water level in the DCD analysis and we wanted to perform the analyses at the high water level which provides a larger static kettle of water sitting on the vents which ultimately would increase your peak pressure a tiny bit.

With that, as a result, we re-performed these pressure and temperature analyses for STP 3 and 4. And due to the fact the pressure responses changed, that also meant the driving force for the pool swell changed, therefore we had to reanalyze those.

MR. TOMKINS: We thought this might be a good opportunity to talk about one of the open items, and it's the open item related to Chapter 15, T124-2. I don't know the number of the open item, or the follow-up item, I guess we call it.

MEMBER SHACK: Let's not call our stuff open items. That would be bad.

MR. TOMKINS: Okay. Oh, sorry.

MEMBER STETKAR: Jim, could you move your microphone around from in back of your laptop so that it will pick up a little bit easier? Just slide it around to the side a little. They're a little bit directional.

MR. TOMKINS: Is that better?

MEMBER STETKAR: It's mostly for our recorder. You got it?

MR. TOMKINS: Sure.

MEMBER STETKAR: Thanks.

MR. TOMKINS: So, Chapter 6.3, Section 6.3 of Chapter 6 addresses all the LOCA analyses, and of course feedwater line break is one of the LOCA analyses that's addressed.

6.2 addresses feedwater line breaks, steam line breaks, but it's really looking at the impact on the containment. The analysis that we're going to primarily talk about today really isn't looking at peak clad temperatures or anything like that. It's looking as a containment stay whole.

The corrections that we're going to talk about today that were made had no impact on the analysis, the LOCA analysis in 6.3 just because of the way that analysis is done, those corrections. So we made no changes to 6.3.

Now, the dose analysis that I think you were asking about is handled in Chapter 15 for the LOCA. So, it's somewhat disconnected. The LOCA analysis is 6.3, the containment analysis is in 6.2 and the off-site dose analysis is done in Chapter 15. And I think that's pretty standard for FSARs.

MR. JAIN: Yes, this is Nirmal Jain from Westinghouse. That's pretty standard. And in 6.3 is really the ECCS performance analyses. In other words, it's a sizing criteria for the ECCS system. The dose is always within 15.6 typically. Please continue.

MR. TOMKINS: Okay.

MR. JAIN: So, with that, did we answer your question?

MR. TOMKINS: Does that answer that question?

MEMBER STETKAR: Yes.

MR. DOUGLASS: Okay. Well, a little bit of background on the progression of what we've done with ABWR. The ABWR methodology in the DCD is based on GE's Mark III methodology as discussed earlier, which is the NEDO-20533 methodology.

So, what we did is we took the NEDO-20533 methodology as modified by the ABWR DCD and implemented that into our GOTHIC model. So, we tried to be as consistent as we could with the ABWR DCD with exceptions of there were a couple locations where there were some discrepancies between the two. So, in those areas we used the Westinghouse-approved Mark I methodology to supplement. Then we also performed our benchmarking to the DCD analyses to show that our model was behaving the way you would expect it to considering we were generally following the same methodology.

The background on the Mark III versus the ABWR containment, I just kind of want to go through the flow paths as to what would happen in containment in the event of a LOCA.

We'll start off with the ABWR. First, you'll break and your steam will be released into your upper drywell portion. And as that pressurizes, your steam and non-condensible gases will be forced down through the vent system and into the suppression pool where your steam will condense and your gases will continue into the suppression pool chamber, the vapor space. In the Mark III containment the same general design, with the exception of you'll notice that in the ABWR containment you have an upper and a lower drywell of which the upper drywell portion is the part that -- that's where the break is. So, that's where you're initially expending your gases and forces the gas out of.

There's only one drywell in the Mark III containment. So, you have a Weir wall that holds back from the suppression pool. As you pressurize your drywell, you push down the water in that Weir well exposing your vents to where you can vent into the suppression pool and again your steam will be condensed. You're non-condensible gases will be forced into the wetwell vapor space.

One of the big differences between these two designs also is that there is a lot more wetwell vapor space in the Mark III design. You have this entire upper region of containment and as along with the annular region down near the pool, wherein the ABWR design you just have this smaller wetwell region.

So, and the reason we point this out is vent clearing is a very important phenomena in Mark III containment because your peak pressure is driven by being able to increase your drywell pressure to the point where you can clear those vents and it's the inertia of clearing those vents and your losses through those vents that are driving your peak pressure and it's very early on in the transient.

For ABWR your peak pressure is driven by getting the maximum pressure in the wetwell gas space. So, you have you've forced all of your non-condensible gases into your wetwell gas space. You have your pressure increase there. Then you have your hydrostatic kettle water sitting on your vents and the dynamic losses through the vents. And that's the time when your peak pressure occurs in the ABWR containment. So, that's why the ABWR containment peak pressure occurs so much later in time than the Mark

III containment.

MEMBER CORRADINI: The magnitudes are different also. I understand your timing issue, but the magnitudes are different also, right?

MR. DOUGLASS: Yes.

MEMBER CORRADINI: At least my memory is. I don't remember the Mark III. The Mark III is lower.

MR. DOUGLASS: Yes, the Mark III is.

MEMBER CORRADINI: But all the pressure boundaries are also lower, so everything is consistent. So, I guess I'm trying to understand. Your point is, what's the free volume in the gas space of the suppression pool?

MR. DOUGLASS: It's --

MEMBER CORRADINI: The free volume above the water.

MR. DOUGLASS: I think it's 330.

MEMBER CORRADINI: Versus it's about a factor of 10 smaller, isn't it?

MR. DOUGLASS: It's about four times smaller.

MEMBER CORRADINI: Four times?

MR. DOUGLASS: Yes.

MEMBER CORRADINI: Excuse me. Okay.

MR. DOUGLASS: I want to say -- and these are approximate numbers --

MEMBER CORRADINI: Yes, that's fine. That's fine.

MR. DOUGLASS: -- but, I want to say it was like 1.4 million cubic feet for the Mark III and about 3-400,000 for the ABWR containment.

MEMBER CORRADINI: Right. So to put it another way, just from a qualitative behavior standpoint, you exceed what would have been the peak pressure in the Mark III and continue up simply because you're pressurizing to all the smaller volume?

MR. DOUGLASS: Exactly.

MEMBER CORRADINI: Okay. Fine. Can I ask another question?

MR. DOUGLASS: Sure. Sure.

MEMBER CORRADINI: So, I guess I've learned to focus on the vacuum breakers. Is there a fundamental difference in how the vacuum breakers behave because of this in terms of frequency of operation or timing of operation? I don't know. It's an open question. It's not as if I know the answer.

MR. JAIN: This is Nirmal Jain. In ABWR the vacuum breakers would open once we start to condense the steam in the drywell.

MR. DOUGLASS: Right.

MR. JAIN: But in Mark III containment it's the same phenomena?

MR. OIKAWA: This is Hirohide Oikawa of the Toshiba operation. I'm in charge of the safety analysis in Toshiba, so may I provide some remarks about it?

MEMBER CORRADINI: Please do.

MR. OIKAWA: In Mark III containment the essential behavior of the vacuum breaker is very similar to that of the ABWR. It act when the drywell is vaporized by some ECCS phenomenon. Some kind, but very limited.

MEMBER CORRADINI: So, but I guess my question, I would assume the timing is different, but is the frequency of opening predicted to be about the same in terms of the number of cycles you'd see, or do you see more action of the vacuum breakers in this design than you would in the Mark III?

MR. OIKAWA: Essentially it's the same.

MEMBER CORRADINI: The same, but it's --

MR. OIKAWA: Very small time.

MEMBER SIEBER: Yes. I presume that the reactor power output's roughly the same in the example that you're using.

MR. JAIN: Typical Mark III containment power is coal power.

MEMBER CORRADINI: Where is the vacuum breaker in the ABWR?

MR. DOUGLASS: It's right in here. Right where my hand, or that little hand is.

MR. TOMKINS: We're going to show a better picture of it later.

MEMBER CORRADINI: Fine. No problem. No problem. Thank you.

MR. TOMKINS: But it's basically at the top of the --

MEMBER CORRADINI: That's fine.

MR. TOMKINS: Yes, it's between the gas space and the lower drywell.

MEMBER CORRADINI: Sure. Thanks. Hopefully.

MR. TOMKINS: Yes, hopefully.

MR. JAIN: Typical coal power for Mark III containment.

MR. OIKAWA: Coal power is at about 110, or 30, or I'm sorry --

MEMBER SIEBER: Thousand megawatts.

MR. JAIN: I'm not sure what Mark III containment --

MEMBER SIEBER: Yes, you're making a comparison, but I want to have a feel for what's the heat driving force.

MR. OIKAWA: The Mark III BWR has essentially the same power as those of ABWR. There is some other slightly more Mark III BWR, but the largest one is essentially the same as those in the ABWR.

MEMBER CORRADINI: We were thinking over here grand gulf.

MR. JAIN: Yes, grand gulf is comparable.

MEMBER SIEBER: You're saying it's roughly equivalent.

PARTICIPANT: Roughly equivalent I think is the answer.

MEMBER SIEBER: Okay. Good enough.

MR. JAIN: And qualitatively the phenomenon would be the same.

MEMBER SIEBER: Yes. Right. Yes, but different heat loads would give you different timing in --

MR. JAIN: Right, the timing would --

MEMBER SIEBER: -- pressures, capacity requirements and so forth. Okay. Thank you.

PARTICIPANT: Any more on the drawing?

MR. DOUGLASS: Here we just wanted to

highlight some of the things that we pointed out on that model comparison, that the ABWR does have an upper and lower drywell as opposed to the Mark III, which just has that single drywell.

There are also a significant number of vents in the Mark III containment model compared to the ABWR model. There's four times the number of vents and they are of roughly the same area for each vent. So, you get almost four times the flow area, too, for those vents.

Both have the annular suppression pool. And then the key difference that we really wanted to point out was the compact wetwell airspace versus the very large wetwell airspace.

Okay. So, for our benchmarking, what we did is we took the uncorrected DCD analysis that's in the ABWR DCD and we compared that to an uncorrected GOTHIC model. And again, both of them, we followed as closely as we could to the ABWR methodology.

And if you go to the next slide, Jim?

Here was the comparison between our two models. As you can see, four drywell pressure for a feedwater line break we compare very well in my mind to what was located in the DCD. We are slightly higher. The solid lines are the GOTHIC results. The pluses are the digitized curves from the ABWR DCD.

MEMBER CORRADINI: And just one other thing. So, I think it was in your WCAP. You tried to be faithful to the nodalization of how you want the volumes, if I remember correctly.

MR. DOUGLASS: Correct.

MEMBER CORRADINI: And then this is without the three corrections to be seen?

MR. DOUGLASS: Correct.

MEMBER CORRADINI: Okay. Thank you.

MR. DOUGLASS: So, it's uncorrected to uncorrected.

MEMBER CORRADINI: I'm with you.

MR. DOUGLASS: Kind of an apples to apples.

MEMBER CORRADINI: Sure.

MR. DOUGLASS: That's what we were going for here.

And the wetwell pressure also compared to really -- well, I'm just going to run through our comparisons so you get a general feel that, you know, we did benchmark well. For drywell temperature, pool temperature, you know, we had good comparisons.

Then moving out of the steam line break, our pressure comparisons again matched very well, and our temperature comparisons.

MEMBER CORRADINI: Maybe I misunderstood in reading the WCAP. There was some discussion about an incorrect initial suppression pool temperature. Is that going to come in the next calculation anyway?

MR. DOUGLASS: That suppression pool temperature, if I recall, that is --

MEMBER CORRADINI: The starting point was different?

MR. DOUGLASS: Yes. And that is, for this pool temperature you'll see right here for the steam line break. As you can see, the initial temperature between the DCD results, the pluses, is off about five degrees.

MEMBER CORRADINI: So, they just started low?

MR. DOUGLASS: I can't speak for what was done at the DCD. We believe they started at the same point and just possibly -- you know, I don't know if the graph got skewed. It would all be speculation, but it could have been they got --

MEMBER CORRADINI: Okay. But that's what you meant in the --

MR. DOUGLASS: Yes, that's what we meant is that, you know, we can't really defend the difference between that initial --

MEMBER CORRADINI: All right. Okay.

MR. DOUGLASS: -- five degree temperature.

MEMBER CORRADINI: Sorry. I have a curiosity question. So, I'm sure you were curious, too. So, if you were to only allow the wetwell to perform its function, you had no heat transfer to surfaces, how much higher would the pressure have been? Did you do that sort of, gee whiz, what happened sort of sensitivity? Engineers are fundamentally curious folk.

MR. DOUGLASS: Now, let me make sure I understand your question. You're saying if we didn't allow --

MEMBER CORRADINI: If you simply had only the wetwell performance suppression function and you didn't have any cold wall effects.

MR. DOUGLASS: We performed all of our short-term analyses without heat sinks in the model. For our long-term analyses we added the heat sinks. But, yes, these --

MEMBER CORRADINI: These are adiabatic?

MR. DOUGLASS: Yes.

MEMBER CORRADINI: Okay.

MR. DOUGLASS: Okay. For our actual

GOTHIC pressure and temperature analysis we corrected those corrections that were identified by GE that needed to be made, and those were the drywell connecting vents, the loss coefficients, the feedwater flow assumptions and the decay heat. And in addition to that, we also made the change to our initial suppression pool level.

All of this was documented in technical report WCAP-17058 and our resultant pressures and temperatures were higher than what were stated in the DCD. So, even with this we still feel we've met all the acceptance criteria that were set forth.

Just to kind of show you the kind of increases we saw for our GOTHIC analysis with the corrections versus the DCD analysis, the solid line here is the GOTHIC-corrected containment analysis. The pluses are a digitized curve of the DCD analysis. And you can see we did end up with a few psi increase.

MEMBER CORRADINI: And the limit is?

MR. DOUGLASS: And the limit for this is 59.65, if I recall, psia.

MEMBER CORRADINI: So, let me ask another question. Maybe this is mainly for the staff. So, you reminded me and I forgot. So, this is adiabatic.

Is that expected from the staff's expected way in which you analyze this, or was this a choice on your part to not consider the cold wall effect?

MR. DOUGLASS: The reason we did not include it in the short-term analyses we performed are because they were also not included in the DCD analysis.

MEMBER CORRADINI: Oh, so --

MR. DOUGLASS: So, in order for the continuity we tried to keep it as similar as we could.

MEMBER SIEBER: So, your results were conservative?

MR. TOMKINS: Yes, they are. Yes, that would --

PARTICIPANT: And how conservative might they be?

MR. DOUGLASS: We weren't that curious.

MEMBER CORRADINI: I thought curiosity continues.

MR. HEAD: If that was important, we might consider that as some other licensing, but for our purposes we felt like staying consistent --

MEMBER CORRADINI: Fine. Got it. Well-put. Well-put. Thank you.

CHAIR ABDEL-KHALIK: You have any idea

about the relative contributions of the three errors?

MR. DOUGLASS: The relative contributions for the long-term effects, you do see it --

CHAIR ABDEL-KHALIK: No, on this result, for the short-term.

MR. DOUGLASS: For the short term, both the losses and the connecting events do increase your initial time period a tiny bit. But again, considering we are not limited by vent clearing as much, it wasn't as large of an impact. It did add to the overall peak pressure. And again, see the total peak pressure is based on the dynamic losses through the vents.

And, in addition to that, the feedwater line break enemies are what I would say is the real -- the largest contributor to what we saw.

MR. JAIN: This is Nirmal again. One way to look at it is that the K factor increased the first -- had more impact on the first ten second. That's where you see the rise in pressure is faster, because the inertia effect of -- that is what is dominating. And the feedwater line breaks effect comes in more from the peak pressure time, so it can be seconds.

MEMBER SIEBER: I'd like to ask a question that's a little bit off the subject, but right now the original ABWR DCD, which is a rulemaking, has an analysis in it like this that's not correct. Right? So, somebody decided I want to build this plant and use the old DCD without the corrections that South Texas has made. How does the staff deal with the fact that that may not be -- existing analysis in the rule is not correct?

MR. McKIRGAN: It so happens that that DCD is up for renewal and this is an item that the staff will be looking at. I'm sorry. This is John McKirgan, Chief Containment and Ventilation Branch.

MEMBER SIEBER: Yes, let's pretend that it's not up for renewal. And philosophically, since it's the rule, it's okay. Right?

MR. McKIRGAN: It is certainly.

MEMBER SIEBER: Unless there is like a Part 21 process that says that's not good.

MR. McKIRGAN: There are processes with Part 52 that would allow the staff to revisit those issues. I mean, the bar is set relatively high to reopen that rule, but there are some provisions within Part 52 that will allow the staff to do that.

MEMBER SIEBER: Would this cause you to reopen it? You know, there's some basically incorrect assumptions in the original analysis.

MR. McKIRGAN: There is an analysis that the staff would have to undertake to determine whether it met those thresholds, and we haven't done that analysis yet.

MEMBER SIEBER: Well, my question comes from curiosity. And by simile there may be other instances where the original DCD may not be correct and nobody has figured that out since an applicant, for example, is utilizing that DCD says all these things are okay and these are the only changes I want to make. There may be some flaw that floats through this whole process that ends up being built that way.

MR. HEAD: As a practical matter, the original sponsor of the certified design is aware of -- you know, they informed us --

MEMBER SIEBER: He's aware of this?

MR. HEAD: Yes, sir.

MEMBER SIEBER: But not of everything else that may be there?

MR. HEAD: But it also says any applicant I think would pick up the STP application as a starting point for anything we did, so --

MEMBER SHACK: But he's still looking for more unknown unknowns.

MR. HEAD: Right. Yes. Right.

MEMBER SIEBER: Yes. Right.

MR. HEAD: They're always there.

MEMBER SIEBER: That certainly makes me feel more comfortable. Thank you very much.

CHAIR ABDEL-KHALIK: The issue has been noted, Jack. Thank you. Let's proceed.

MR. DOUGLASS: I just want to run through the results that we got from our containment analyses that we performed. If you don't mind, I'm going to run through the psi and degrees Fahrenheit because it's much easier for me to understand.

MEMBER SIEBER: But you're supposed to be using that, right?

MR. DOUGLASS: Yes. We also want to make the customer happy.

Our peak calculated drywell pressure was 40.9 psi gauge and this is in comparison to the DCD value of 39 psig. And the limit's set at 45, so we do have a margin to the limit.

For the peak drywell temperature, our peak temperature was 343.8 degrees Fahrenheit. The DCD value was 338 degrees Fahrenheit and the limit is 343 degrees Fahrenheit. As you'll see, we are 3.8 degrees above the limit. This lasts for less than two seconds. It's just a little excursion that occurs and it would not be enough time due to thermal inertia to heat up any of the actual components that you're trying to protect.

As for the wetwell pressure, our peak wetwell pressure was 31½ psi versus the limit of 45 psi, so there's considerable margin there. The peak wetwell air temperature that we got was 205.9 degrees Fahrenheit versus the limit of 219.2.

And for the suppression pool temperature, we were at 211.2 degrees Fahrenheit against a 100 degree Celsius/212 degree Fahrenheit limit.

CHAIR ABDEL-KHALIK: What was the basis for the limit of 340 degrees F? And wouldn't that have included any thermal inertia considerations?

MR. OIKAWA: This number 340 is based on the historical background, the property of the steam. When the high pressure steam is raised into the drywell, then there might be some heat, super heat. So, not depending on the specific content and design, this difficult design temperature had been determined based on the steam property.

MR. HEAD: Did that answer your question?

CHAIR ABDEL-KHALIK: No, but I'll check.

MR. JAIN: I'm not 100 percent sure, so if I could, with that caveat, if we could answer. I think that was really the temperature limit for the structures. And I know in older BWRs that limit was increased from 281 to 340. I think that came about because when the small steam line breaks, we're getting high temperature. But we have to get back to you on this one maybe.

CHAIR ABDEL-KHALIK: Okay.

MEMBER STETKAR: Can I ask a question because I've at least become sensitized over the last year to the terms "small" and "short." What types of uncertainties are involved in that temperature calculation? In other words, can you give me a sense for how high could that temperature be and for how long could it be sustained? Do you have any sense of where we are on the uncertainty distribution on that temperature? That's a separate -- on the calculated temperature. I'm still not clear on what's the basis for the 340, but --

MR. DOUGLASS: Well, it would be driven by the mass and energy releases, so --

MR. JAIN: Our feeling is that 343.8 is the upper limit, so --

MEMBER STETKAR: Okay. I guess I'm probing what you're feeling about the upper limit is. Is it the 99th percentile of the uncertainty distribution? Is it the --

MEMBER SIEBER: What's the basis?

MEMBER STETKAR: -- 50th percentile of the -- you know, is it your 50 percentile best estimate, or what's your confidence about that time and temperature profile based on what you understand for the input.

MR. JAIN: Yes, this 343.8 degrees come from a steam line break. And we ran two or three cases to determine which mass and energy release would give us the more limiting conditions. So, we ran -- and this case comes from -- their feedwater controller is working, trying to control the level. So, we have the steam line being above that. Only the steam is pouring out. So, we thought that by this approach and that give us the highest temperature. So, it's really the upper bound.

Now, uncertainty is hard to quantify because I don't think we have done that. In a design analysis we typically take the remitting values and just run that case.

MEMBER STETKAR: Well, but in this case you're essentially justifying the fact that this was okay because it's small and short.

MR. JAIN: Right.

MEMBER STETKAR: So, I'm trying to probe how big could it possibly be for how long, which does get into uncertainties. If you were showing substantial margin, I'd feel a lot more comfortable about the fact that that margin accounts for potential uncertainties in the analysis or the input parameters.

MEMBER SIEBER: Maybe it would help --

MEMBER STETKAR: Or if I understood what the basis for the criterion was, it might give me some confidence.

MEMBER SIEBER: Yes, the 340. If we understood, you know, I can imagine that's based on the structure.

MEMBER STETKAR: I would assume so.

MEMBER SHACK: I think Said's question was, you know, did you assume the structure was at a steady state of 340, or in fact were you counting on the fact that it's really 320 and there was a two-second excursion to 340?

CHAIR ABDEL-KHALIK: Well, if you'd just come to us with the basis for the 340, I think that will sort of inform any follow-up questions.

MR. HEAD: Okay.

MEMBER CORRADINI: Just for clarification, 340 is at what temperature, the steam temperature or the surface temperature?

MR. DOUGLASS: It's the gas temperature.

MEMBER SHACK: Which then is concerned with some surface?

MR. DOUGLASS: Right.

MEMBER SHACK: But this is adiabatic anyway.

MR. DOUGLASS: Right.

MR. JAIN: Well, that is true. Because if he were to do more realistic analysis and allow heat transfer, a temperature would --

MEMBER SHACK: I recommend you become a bit curious.

MR. JAIN: But typically 340 degrees has been asked as the EQ temperature limit, so EQ equipment is qualified to 340 degrees. So we have to make sure that even the small equipment with the large surface area doesn't heat up to 340 degrees, and it's a small excursion. So, that's typically the basis, as I understand it.

CHAIR ABDEL-KHALIK: Are you going to follow up on --

PARTICIPANT: Yes, sir. Yes, sir. We will follow up with that.

CHAIR ABDEL-KHALIK: Okay. Let's go on.

MR. DOUGLASS: In summary, for the pressure and temperature analysis we performed our analyses using GOTHIC and the corrections that were identified by GE for the DCE. And we feel that our results have confirmed that the design is acceptable for this containment. Question on that?

CHAIR ABDEL-KHALIK: Are there any questions on the material that has been presented so far?

PARTICIPANT: This concludes the pressure temperature --

CHAIR ABDEL-KHALIK: And you'll get back to us with the explanation on the 340 limit?

MR. DOUGLASS: Yes, sir.

CHAIR ABDEL-KHALIK: Okay. Let's proceed.

MR. TOMKINS: This is our trigger to go into the pool swell, which is going to be closed.

CHAIR ABDEL-KHALIK: All right. Let's take a break at this time. Okay. We'll reconvene at ten after 10:00 and at that time we'll be in a closed session.

(Whereupon, at 9:56 a.m. off the record until 10:47 a.m.)

We will continue with the presentation. We'll go into an open session time and the bridge line will be opened in a listen-only mode.

And we will proceed with --

PARTICIPANT: We're going to talk about suction strainer.

CHAIR ABDEL-KHALIK: -- slide No. 25 of the open presentation.

PARTICIPANT: That's correct.

MEMBER BANERJEE: So, we've have been through the downstream effect part already?

PARTICIPANT: No, no, no.

CHAIR ABDEL-KHALIK: No, no. No, we're not. We're on slide 25.

MEMBER BANERJEE: Oh, okay.

CHAIR ABDEL-KHALIK: Slide 25.

MEMBER BANERJEE: Got it. Got it. Got it. Okay. Thank you.

CHAIR ABDEL-KHALIK: You ready?

MR. TOMKINS: Yes.

CHAIR ABDEL-KHALIK: Please proceed.

MR. TOMKINS: We are ready.

CHAIR ABDEL-KHALIK: We are in an open session.

MR. TOMKINS: Okay. So we're going to talk about departure 6C1, which is ECC suction strainer changes. And Caroline Schlaseman of MPR is going to lead that discussion. In addition, we have Kenji Arai from TANE and he's also going to be up here.

So, Caroline, go ahead.

MS. SCHLASEMAN: Good morning. I'm Caroline Schlaseman. I'm an engineer with MPR Associates.

I joined MPR in 1981 after receiving my bachelor's in civil structural engineering from Duke University. In my many years at MPR I've worked on a variety of projects for nuclear power plants. In the mid-1990s I participated in the BWR Owners Group Suction Strainer Subcommittee which developed the Utility Resolution Guideline URG that was used to resolve the then-current issues with BWR ECCS suction strainer debris generation post-LOCA.

For the last two years I've been supporting Toshiba in licensing for the STP project. My presentation today is on behalf of Toshiba Corporation. So, with me is Kenji Arai. Araison is a senior fellow with Toshiba and he's currently serving as the vice-president of licensing TANE.

My presentation today is going to include some background on why changes have been made for the STP project from the DCD. We'll discuss strainer sizing, we'll discuss chemical effects, downstream effects and provide a summary.

Just by way of general background, the ECCS suction strainers provide debris protection following a LOCA for the following systems: Residual heat removal system, the high pressure core flooder system, and the reactor core isolation cooling system.

The U.S. ABWR DCD describes ECCS suction strainers that are compliant with the Reg Guide 1.82 Revision 1, which was issued in 1985. The DCD version discussion of the suction strainers is that they are conical perforated plate strainers on the ends of the suction Ts for each of the ECCS systems.

The Reference Japanese ABWR plant upgraded their ECCS suction strainers to Reg Guide 1.82 Revision 2 in the mid-2000s, in 2005. And the -- well, I'm going to explain the difference between Rev 2 and Rev 3, but basically that Rev 2 implemented the URG requirements that U.S. plants had gone to.

MEMBER BANERJEE: You have a picture of the strainer?

MS. SCHLASEMAN: I will in like two slides.

MEMBER BANERJEE: Okay.

MS. SCHLASEMAN: STP voluntarily chose to upgrade to Reg Guide 1.82 Revision 3 and use the Reference Japanese ABWR strainer designs for STP 3 and 4, and I'll explain way in a minute.

As I previously mentioned, Revision 2 endorsed the BWR Owners Group Utility Resolution Guideline. And then Revision 3 also endorses the Utility Resolution Guideline for strainer sizing debris generation, debris transport, strainer sizing analysis. But Revision 3 also requires an analysis of chemical effects and downstream effects. That's as a result of the PWR GSI-191 work, which I'm sure you all are familiar with.

The Reference --

MEMBER BANERJEE: Too familiar.

MS. SCHLASEMAN: I beg your pardon?

MEMBER BANERJEE: Too familiar.

MS. SCHLASEMAN: Yes, I know. That's been a, yes, busy topic in the industry for many years now.

The Reference Japanese ABWR replaced the original RHR and high pressure core flooder strainers in accordance with the URG guidance for debris generation, debris transport and suction strainer head loss testing and analysis.

And the next slide I think has my photo. There we go.

The actual strainers that are used in the Reference Japanese ABWR plant are provided by CCI. They are a cassette-type suction strainer. This is a photo of one of the cassette-type suction strainers in the EPRI test facility in Charlotte. The top right hand slide is obviously, you know, a strainer on the end of a --

MEMBER BANERJEE: Is that a cylinder at the top with pockets in it?

MS. SCHLASEMAN: Yes. Exactly.

MEMBER BANERJEE: So this is like the PWR pocket strainer?

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: Or is there a difference?

MS. SCHLASEMAN: Oh, yes.

MEMBER BANERJEE: It's similar?

MS. SCHLASEMAN: Yes, and CCI -- again, in a couple slides I'll have the list of PWRs that CCI has provided strainers for.

MEMBER BANERJEE: So, it's the same?

MS. SCHLASEMAN: Yes. And the filter pocket which is shown in the lower photograph, that's the same filter segment that's used in the PWRs that that's been tested extensively for PWR application.

CHAIR ABDEL-KHALIK: What's the scale in the top picture?

MS. SCHLASEMAN: That strainer is probably about three or four feet long and the diameter is two or three feet probably. This strainer is not the one that's actually installed at the Reference Japanese plant. They come in various sizes. The RHR system total surface area is on the order of 40 square meters, and, as I said, it's about three or four feet long and two or three feet diameter.

MEMBER CORRADINI: Per. But to get to 40 square meters, there's a slew of these guys, right?

MS. SCHLASEMAN: Well, there are --

MEMBER CORRADINI: I was trying to look at that and decide how many --

PARTICIPANT: Because isn't there 12 of them total?

MEMBER CORRADINI: That's what I was --

MS. SCHLASEMAN: Oh, actually the 40 square meters is on the RHR system and the high pressure core flooder is 37 square meters.

MEMBER CORRADINI: All right. That helps me. Thank you. Yes.

MS. SCHLASEMAN: The filter pocket design that you're seeing, the lighter parts -- the resolution is not too great, but it's the perforated plate, the holes that are 2.1 millimeter max, are the lighter portion. And so, you end up getting -- next slide, Jim -- actually the advantage of this strainer is that you end up with a very large surface area in a compact volume.

MEMBER SIEBER: Now, this is a no-fiber plant, right?

MS. SCHLASEMAN: Yes.

MEMBER SIEBER: It's all mirror insulation.

MS. SCHLASEMAN: Yes.

MEMBER SIEBER: So, you're going to get big pieces of stuff --

MS. SCHLASEMAN: Yes.

MEMBER SIEBER: -- from a jet impingement plus a lot of paint products and spalled concrete, which I think would probably pass through the smaller holes, right? Which means that a lot of the filtering is going to go on in the inlet to the fuel, right?

MS. SCHLASEMAN: I'll be addressing that a little later in the presentation. I'll explain what the debris sources are and how it's different from the Reference Japanese plant. And also, downstream effects is specifically discussed in this presentation.

MEMBER SIEBER: Okay. But you don't know what the fuel is going to be yet, right?

MS. SCHLASEMAN: You're ahead of me about 10 slides, but, I mean, if you --

MEMBER SIEBER: Yes, I actually read the report.

CHAIR ABDEL-KHALIK: Let's just give her a chance to follow her presentation.

MEMBER SIEBER: All right.

MEMBER BANERJEE: So, can you explain the second point there a little bit?

MS. SCHLASEMAN: Yes. The part about the convoluted surface area. Back actually in the mid-'90s when -- most of the replacement strainers were perforated plate stacked disc strainers that the U.S. BWRs were putting in place. And during testing by the different vendors and at EPRI, there was a thin bed effect identified where you would kind of expect that as the debris bed increases, the head loss would also increase proportionately. But what happened was for a very small thickness of a fiber bed in particular there was actually a spike in the head loss from testing. And so, the methodology that's analytically used to determine head losses over these strainers actually has a correction for thin bed effects.

And so, in the cassette-type strainer, which is a newer design, they have not actually observed the thin bed additional head loss bump in the testing. But the analysis that was used for the Reference Japanese plant does account for a thin bed pressure drop.

MEMBER BANERJEE: So, my question was not related to the thin bed, but was related to the convoluted suction surface.

MS. SCHLASEMAN: Oh.

MEMBER BANERJEE: And how that might disrupt a thin bed. I don't understand what this convoluted suction surface is.

MS. SCHLASEMAN: Oh, could we go back a slide for the photo?

Instead of having the fiber or the debris coming -- on a stacked disc strainer, basically the flow is coming in over a fairly large flat surface area. And what happens here is it's a fairly small -- the cassette, the filter pocket openings are probably -- it's about seven inches tall in this photo and about maybe 14 inches wide, and there are multiples of these. So, it's coming in. The flow is coming in and it's coming in and then, you know, going through the pockets.

PARTICIPANT: Turning?

MS. SCHLASEMAN: Turning. And in either a flat screen strainer or in the stacked disc strainer, which is basically a flat screen strainer, but there are multiple entry points to the flat screen, that's where the thin bed -- it's a broader surface area and the flow is coming straight in. And so, this design actually has more of a turn of the flow as it comes in.

MEMBER BANERJEE: I haven't seen the testing, but obviously the flows are actually quite slow in these coming in, and fibers do tend to turn with the flow.

MS. SCHLASEMAN: True.

MEMBER BANERJEE: So, I think that it would be hard to argue that you don't have a thin bed effect on these.

MS. SCHLASEMAN: I will --

MEMBER BANERJEE: Unless you show me some experimental data.

MS. SCHLASEMAN: Well, I will --

MEMBER BANERJEE: I'm always open to that.

MS. SCHLASEMAN: Yes, I will clarify that the -- go to the next slide, please.

MEMBER CORRADINI: I think they're assuming it's there even though they didn't see it. That's what I heard her say.

MS. SCHLASEMAN: Right, we do.

MEMBER BANERJEE: There is even worse to come, because to be able to use any form of analysis rather than experiments is very dangerous with strainers. So, almost everywhere we are insisting with the PWRs on prototypical experiments.

MS. SCHLASEMAN: Right.

MEMBER BANERJEE: So, the analysis part of it is probably not very important because we don't know how to analyze pressure losses, so that's why we go for prototypical experiments. If you have issues. I don't know what issues you're facing here. We're just starting. So, let's go on. But as you know, for all the PWRs prototypicality has to be demonstrated and the staff has produced guidelines.

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: And if you're going to do something here, then you'd have to follow some similar guidelines. They may not be the guidelines for BWRs. We're just getting feedback comparisons between BWRs and the staff are going to brief the ACRS. But we haven't actually been exposed to this yet. We don't know what implications it will have on BWRs.

MS. SCHLASEMAN: The staff has reviewed the testing that was done for the Reference Japanese ABWR, and they asked us a lot of questions about that testing. And the conclusion on the strainer sizing methodology for use for the Reference Japanese plant is that it bounds our plant, which I'm going to explain that in a minute.

MEMBER BANERJEE: So, the Reference Japanese plant, our staff has looked at?

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: And has reviewed the testing?

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: And has it done a -- is their finding or IRT or what process have they have gone through.

PARTICIPANT: I'm sure they'll talk about it.

MR. McKIRGAN: If I could, that will be the subject of the staff's presentation later.

MEMBER BANERJEE: Oh, okay.

MR. McKIRGAN: And so, you will hear about that. The staff has reviewed those reports submitted by STP and you'll hear more about that.

MEMBER BANERJEE: Is this NRO or NRR?

MR. McKIRGAN: This is NRO.

MEMBER BANERJEE: Okay.

MS. SCHLASEMAN: They've consulted a lot with NRR and the GSI-191 staff.

MEMBER BANERJEE: Well, I'll hold the questions, but carry on. I don't particularly agree with that second thing, but --

MEMBER CORRADINI: I get that impression.

MEMBER BANERJEE: Yes. I would rather you just took it off.

MEMBER CORRADINI: But I think one thing she said though -- just so I'm clear, the one thing she said was this is not a fiber plant. This is a --

MEMBER SIEBER: Right.

MEMBER CORRADINI: So, a lot --

MEMBER BANERJEE: There's a lot of latent debris in plants.

MEMBER CORRADINI: Right.

MEMBER BANERJEE: And you don't need much. You need very, very little.

MS. SCHLASEMAN: I'll be addressing that also.

CHAIR ABDEL-KHALIK: Let's just continue

with this and we'll see what the staff is going to present later on. Please continue.

MS. SCHLASEMAN: Hole size. The hole size is smaller than the DCD hole size.

And actually one other point that I meant to mention before about strainer sizing, and I think we've briefly discussed it, is that the Reference Japanese ABWR plant, which has the new CCI cassette-type strainers that were evaluated in accordance with Reg Guide 1.82 Rev 3 guidance, we provided three reports to the staff which they have reviewed that describes that, the sizing and the differences and evaluates the conservatisms versus the non-conservatisms and how that applies, the Reference Japanese plant applies to South Texas. The major conservatism with the Reference Japanese plant is that that plant is not all RMI like South Texas is, but they use fiber insulation and calcium silicate insulation for their small-bore piping. And so, the strainer sizing done for the Reference Japanese plant includes fiber and calcium silicate, both of which are large contributors to head loss. So, those are the conservatisms.

Those conservatisms offset the one non-conservatism with respect to South Texas and in the

Reg Guide it requires that for your pump flow you're supposed to use whatever the design basis is for the plant according to your DCD. And for us, run out flow was specified. And for the Reference Japanese plant they used the pump design flow rate, which of course is lower. So, the effect of head loss at the higher STP run out flow for RHR and high pressure core flooder is offset by the reduction or essentially lack of fiber and calcium silicate.

Okay. And then as I mentioned before, the CCI cassette-type strainer is -- several plants are currently using the CCI cassette-type strainer to resolve GSI-191. This is a list. Actually, this list comes from the staff's report in 2007, I think, when they took a trip, and inspection of the CCI facility in Winterthur.

CHAIR ABDEL-KHALIK: Please continue.

MS. SCHLASEMAN: On chemical effects. As I mentioned before, the Reference Japanese ABWR plant was evaluated in accordance with Revision 2 and that did not require the additional evaluation of chemical effects and downstream effects. So, we don't have an explicit evaluation of chemical effects from the reference plant. So, STP has gone ahead and done an evaluation of chemical effects for our plant. And we are in a positive situation of being able to prohibit by design the use of fibrous or calcium silicate insulation in our plant. We can prohibit and have prohibited the use of aluminum inside primary containment and we've prohibited the use of zinc except for inorganic zinc used in the primer of the qualified coatings.

MEMBER BANERJEE: Do you have any galvanized iron around?

MS. SCHLASEMAN: We at this time have prohibited the use of galvanized steel. It has been considered for use in duct work, but at this point we are not using galvanized steel.

MEMBER SHACK: Just on this, the only unqualified coatings would be something on pieces of equipment or something like that?

MS. SCHLASEMAN: No, all of the coatings inside primary containment are qualified coatings. And there are basically only two vendor options for qualified coating that are being considered, and in both cases it's an inorganic zinc primer with epoxy top coat. Those are coating systems that have been tested extensively as part of GSI-191 Resolution, and so we're going with what has been qualified for a GSI-191 application.

Oh, and qualified coatings, our containment is entirely stainless steel or carbon steel lined, with the one exception of the floor of the upper drywell, which is concrete, but it has qualified coatings on the upper drywell floor. And so, because of the Utility Resolution Guideline requirement that you assume that qualified coatings within the zone of influence are destroyed, we do have to account for a limited area of exposed concrete underneath that section. It's 302 square feet is the --

MEMBER BANERJEE: In the GSI-191 considerations that are going on, one of the issues that has arisen, but I don't know if it's being actually dealt with completely, is concrete scouring. And it could be that for most of the plants this would be a relatively small contribution because there's a lot of particulates around anyway. But, in this situation have you taken that into account?

MS. SCHLASEMAN: Well, our position is that the qualified coatings will in fact protect the concrete even though, like I said, for debris and head loss calculations and downstream effects calculations we're going to assume that that 300 square feet that's almost at the end of a 10-diameter distance from the break is going to come off, but that there won't be significant scouring of the concrete below that surface.

And where this comes into play is on the chemical effects over the 30-day period, the fact that potentially you have exposure to a silica and calcium source over a 30 day period, which I'm going to get into in another slide.

MEMBER BANERJEE: What's the pH of the sodium pentaborate?

MS. SCHLASEMAN: That's actually next slide also.

MEMBER BANERJEE: Okay.

MS. SCHLASEMAN: So, if you don't mind, I'm going to hold that. But basically, the reactor water chemistry for the ABWR is distilled water. And then post-LOCA, to make sure that we don't drop below our -- go to the next slide. The pH range that's in our DCD is 5.3 on the low side and 8.9 on the high side. And Toshiba has done calculations of post-LOCA suppression pool pH considering different scenarios, you know, potential for formation of nitric acid, hydrochloric acid over the 30-day period. And so, the conclusion is that sodium pentaborate, if there begins to be a drop in pH, you know, eight hours or so after the LOCA, that you would end up injecting sodium pentaborate, which keeps the pH actually, you know, up on the upper end. It keeps it around eight for the duration, the 30 days. But in our evaluation we consider the whole range and just make, you know, conservative assumptions and evaluate what -- well, this is the latent aluminum calculation.

As I mentioned before, we've prohibited aluminum from the design. So, by design there should be no aluminum in the primary containment. The staff requested that we consider the what-if if aluminum were inadvertently introduced and not detected. And so, what we did to address that concern is we did a back calculation of what would be the maximum surface area of latent aluminum that could have been left inadvertently in the drywell and sit for 30 days in the post-LOCA environment, corrode, go into the suppression pool and then not come out of solution because of the solubility of either aluminum oxyhydroxide or sodium aluminum silicate.

And to run that calculation we asked our Westinghouse colleagues to use the WCAP methodology that was developed for the GSI-191 Resolution. And like I said, to calculate what quantity of corrosion products, what surface area would result in a quantity of corrosion products that would not come out of solution in our very large volume of water.

And the results of that were actually the limiting case was for the 5.3 was the low end, because even though a very small amount of corrosion products come out, the solubility at 5.3 pH is also fairly small. So, I guess it's on the next slide.

The four-and-a-half square feet of latent aluminum meets this criterion. That was at the 5.3 pH. When you're talking pH or it's a hundred or so square feet of latent aluminum could remain in the drywell. And if you had up at the 8.9 you could have like 1,000 square feet of latent aluminum and nothing would come out of solution because the solubility is so high.

CHAIR ABDEL-KHALIK: What is this latent aluminum? I mean, what could it be?

MEMBER SIEBER: Somebody's --

MR. TOMKINS: Yes, something somebody left in there. Right, structurally it could be a -- well, it wouldn't be a ladder, you know?

PARTICIPANT: Ladder would be quite a lot of -- yes.

MR. TOMKINS: Hope it's not a ladder. Yes, we hope it's not a ladder.

MR. HEAD: But ladders are used during outages and could be. But, you know, that would be --

MS. SCHLASEMAN: But as you see in my third sub-bullet, you know, we consider that four-and-a-half square feet of latent aluminum is within the ability of our FME program to detect that.

MEMBER SIEBER: Okay. Now, you've gone through and told us all the things that you've eliminated by design.

MS. SCHLASEMAN: Right.

MEMBER SIEBER: But there still will be some strainer loading. Have you set parameters that describe how much matter will eventually get to the strainer and what you believe the constituents are? The only thing I've heard of so far is 300 square feet of painted floor.

MS. SCHLASEMAN: Oh --

MEMBER SIEBER: So, what else do you expect to go down into the strainer that the strainer will either retain or allow to pass through to go to the final filter, which is the fuel?

MS. SCHLASEMAN: We're going to discuss specifically --

MEMBER SHACK: Yes, before you get onto that, can I ask you just one question connected with the chemistry?

MS. SCHLASEMAN: Yes.

MEMBER SHACK: You said your Westinghouse colleagues did this. Did they use the same solubility correlations that they used for GSI-191? Did it come from the WCAP?

MS. SCHLASEMAN: Well, they didn't assume anything stayed in solution for the WCAP. And so, we asked them to actually make a change on that. In the WCAP methodology used for GSI-191, they conservatively assumed that if something corrodes it comes --

MEMBER SHACK: No, but they have a solubility correlation in that report, right?

MS. SCHLASEMAN: I'm not sure about that, but I can tell you what we used. We used the Argonne report, so the Argonne report that was prepared for the staff, and for aluminum oxyhydroxide. And then when the second question about exposed concrete came up, it's not aluminum oxyhydroxide. Sodium aluminum silicate is the concern. And so for that, Westinghouse actually -- we first did a literature search, which was unsatisfactory. And then Westinghouse just two weeks ago completed a bench top test to come up with a solubility of sodium aluminum silicate. And that result is going to be provided to the NRC in two weeks, I think is our supplemental RIA responses.

MEMBER SHACK: How many ppm of boron will you have in solution?

MS. SCHLASEMAN: I don't know the answer to that. I would have to go back and look that one up.

MEMBER SHACK: In the pentaborate? Okay.

MR. TOMKINS: Yes, I mean, it's going to be diluted obviously.

MEMBER SHACK: Right.

MEMBER BANERJEE: So, what do you mean by no additional testing needed for chemical effects?

MS. SCHLASEMAN: Ah. Chemical effects in GSI-191 space. Chemical effects are particulate. I mean, you end up with --

MEMBER BANERJEE: I know what they are. I'm asking you why no additional testing.

MS. SCHLASEMAN: Because the two types of substances which would not be in particulate form were the aluminum oxyhydroxide or the sodium aluminum silicate. And we've concluded that we would not generate either sodium aluminum oxyhydroxide or -- excuse me, aluminum oxyhydroxide or sodium aluminum silicate. So, the types of chemical effects that we have are particulate. And the particulates have already been tested and were part of the strainer sizing that were done for the Reference Japanese plant.

So, particulate in the form of rust; paint chips, or the coatings; sludge; and dust and dirt are the four latent types of debris that you have to assume in the URG. Those quantities have already been evaluated and tested for the Reference Japanese plant.

So, our point is that we don't need to do additional strainer -- we'll be doing confirmatory testing at the end, after the STP strainer --

MEMBER BANERJEE: I think I've understood. What you're saying is you're relying on the data. Because you need data. There is no other way to do this.

MS. SCHLASEMAN: Right.

MEMBER BANERJEE: You're relying on the data that was taken from the Reference Japanese plant.

MS. SCHLASEMAN: Correct.

MEMBER BANERJEE: And you're saying that that is applicable in your situation and that therefore you don't need to do any additional testing, if I understand. Chemical testing has already been done for the Reference Japanese plant, right?

MS. SCHLASEMAN: The --

MEMBER BANERJEE: Or not? I don't know what.

MS. SCHLASEMAN: Not chemical testing in terms of forming gelatinous goo from aluminum. Okay? Because we've convinced ourselves that the aluminum precipitants would not occur for us. We have a bounding case for latent aluminum and we believe that that's a conservative thing. The four-and-a-half square feet at our worst case pH, and every other assumption we could come up with, shows that we wouldn't be forming the non-particulate chemical effects.

So, when I say, you know, we've already done chemical effects testing, that's of the particulate form of the chemicals.

MEMBER BANERJEE: It's with what then, surrogates, or what?

MS. SCHLASEMAN: Well, I mean, of paint chips. I mean, inorganic zinc, primer and epoxy paint chips were tested. Eighty-five pounds, according to the Utility Resolution Guideline, will reach your strainer. So, we have 85 pounds of paint chips, according to the Utility Resolution Guideline. We have 195 pounds of sludge, which is, you know, rust corrosion products. We have another 50 pounds of rust flakes. And the last one is something like 100; I don't remember the exact number, of dust or dirt.

MEMBER BANERJEE: What about latent debris in the containment?

MS. SCHLASEMAN: We've checked with the Kashiwazaki-Kariwa unit 6 and 7 plant that TEPCO has provided us with their containment cleanliness program inspection results. And the latent debris that they found, we confirmed that the Utility Resolution Guideline limit of 195 pounds is bounding for their sludge quantities. We've confirmed that the types of debris that they found are things like bits of rope and -- I'm trying to think what else. They didn't actually have any rags, but as I said -- and in fact I'm going to get to it in a minute, we also assumed -- ah, thank you.

Yes, here's a specific example. There were pieces of tape. There was a cap, a cylindrical cap from a spray can or something, I guess. Metal rings, a sheet of plastic 60 centimeters by 70 centimeters, another plastic sheet that was 500 centimeters by 500 centimeters. Like I said, there was a representative small quantity of latent debris.

MEMBER BANERJEE: Was there fibrous

material?

MS. SCHLASEMAN: We have assumed that the bits of rope were fibrous. And so, what we've done to address the question -- is that on the next slide, or --

PARTICIPANT: Yes.

MS. SCHLASEMAN: I'm trying to remember where I put it. Actually, it is the next slide. Well, go forward two slides, Jim.

In addition to the four types of latent debris that the URG requires, we made an assumption about latent fiber. And we assumed rags, rope. I said the TEPCO experience did not include rags, but there were bits of rope, so we said, okay, well, that's fiber potentially. And we believe we made a conservative assumption that the amount of latent fiber would be a cubic foot. And we've agreed that in our head loss evaluation we will address that, the one cubic foot.

And then in downstream effects for downstream components and fuel, which I'm going to get to in a minute, we also address it there and include it.

MEMBER BANERJEE: If we go back to these tests --

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: -- is what I'm really interested in, you've done these tests based on a certain set of assumptions about your latent debris.

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: Okay. And you've also done some calculations to indicate that you have limited chemical effects.

MS. SCHLASEMAN: Correct.

MEMBER BANERJEE: So, are these tests described? Do you have a report that you've submitted on this, or something?

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: Because you're relying a lot on these --

MS. SCHLASEMAN: The Reference Japanese plant.

MEMBER BANERJEE: Yes.

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: So ultimately almost nothing works other than tests really.

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: So, these tests them have to be prototypical.

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: That's really what we've insisted and that they follow the staff guidelines. The staff also has chemical guidelines --

MS. SCHLASEMAN: Right.

MEMBER BANERJEE: -- within their guidelines, right, for these tests? So, have you followed the chemical guidelines, or did you somehow get around this? Because when the Japanese tests were done, they were done for a Japanese plant, right?

MS. SCHLASEMAN: Correct.

MEMBER BANERJEE: So, the real question is did you follow the guidelines that NRR has developed for these tests which were done for a Japanese plant?

MS. SCHLASEMAN: The Japanese plant were tested for the Utility Resolution Guideline quantities of latent debris that I just explained. And the testing was done both in a large scale and a small scale test configuration. The large scale configuration, when the staff reviewed that, they questioned whether or not we could prove that we didn't get debris fallout, because that was an issue with the original testing. This was all done at the same time several GSI U.S. plants were going through at CCI.

And so, we ignored the large scale test

and used only the small scale test results where it's a vertical arrangement and all of the debris, you know, is introduced above the strainer, flows straight down into the filter pockets and there's no way for you not get all of the debris into the filter pockets. And so, that was the head loss testing that was used to confirm the conservatism of the analytical head loss results and on which the strainers were sized.

MEMBER SHACK: I'm a little confused. In the Toshiba tests, I mean, there's mineral wool, there's calcium silicate.

MS. SCHLASEMAN: That's true.

MEMBER SHACK: Did you have some special set of tests with just your debris? I mean, otherwise they have a lot of particulate and fiber --

MS. SCHLASEMAN: Right.

MEMBER SHACK: -- much more than you're ever going to have.

MS. SCHLASEMAN: Correct, which is why we consider their strainer bounding.

MEMBER SHACK: Why use that? Well, I think, you know, obviously when they come to the downstream effects, since they haven't done those tests, yes, they want to take credit for it there. But at least as I read it, for the big strainer test they could take -- you know, they've done very conservative testing, at least in terms of the debris that they have. And so, they're arguing that all of that stuff covers anything they might get from the chemical effects because they've got fibers and particles from the calcium silicate to do a dandy job.

MS. SCHLASEMAN: And they also included the rust and coatings.

MEMBER BANERJEE: But, Bill, the issue is --

MEMBER SHACK: Is whether it got there.

MEMBER BANERJEE: Well, it's a complicated thing, because if you don't cover the strainers, then you've got stuff which passes through into the core. So, you have to see how much goes through.

MEMBER SHACK: Well, that's downstream effect.

MEMBER BANERJEE: It's sort of a coupled system.

MEMBER SHACK: Yes.

MEMBER BANERJEE: Basically, we have two strainers. One is the strainer, the other is the core, right, in series? So, you may gain on one; you may lose on the other. So, it's not an obvious thing, what is good or what is bad.

MEMBER SHACK: But I think you have to separate the two out. I mean, if they were just looking at the sump strainers, it seems that they had very conservative --

MEMBER BANERJEE: Yes, they've got a lot of surface area as well.

MEMBER SHACK: Right.

MEMBER BANERJEE: Yes, I'm sure that --

MEMBER SHACK: And a lot more loading that they expect, than we expect.

CHAIR ABDEL-KHALIK: So, I'd like to note that we're about two hours behind schedule.

MEMBER BANERJEE: Wow.

CHAIR ABDEL-KHALIK: So, let's proceed.

MEMBER BANERJEE: That's a record even for us.

MS. SCHLASEMAN: Okay. Oh, yes. The first slide actually in downstream effects -- actually it's one more before that, I think, because we kind of skipped a couple slides. It's slide -- yes, 35. The slides are mixed up. Yes, okay.

For downstream effects --

MEMBER BANERJEE: Wow, that's a big conclusion.

MS. SCHLASEMAN: The reasonable assurance?

MEMBER BANERJEE: Yes.

MS. SCHLASEMAN: We'll explain that one. The downstream effects was not evaluated for the Reference Japanese plant. Like I said, it was before that was an issue internationally. So, we recognized that we're committed to meet Reg Guide 1.82 Rev 3 and address downstream effects, but we don't have the components selected for downstream yet. And so, we did two parts to this.

The first part is we went through a reasonable assurance argument about what our situation is and why we think that the chance of having an issue with downstream components is very small. And then we make a commitment on what we're going to do about it to confirm that assumption, the reasonable assurance assumption.

Our LOCA-generated debris is small. You know, we're an ABWR. It is a compact containment. We don't have external reactor recirculation piping. So, our largest break size is the main steam line, which is a 28-inch pipe. All thermal insulation is RMI. We're not using fibrous insulation, calcium silicate or, you know, other things that potentially would be a problem with downstream effects.

Next slide. Well, we already talked about actually what are the -- and I have more detail about what we're actually going to test with, so I think we can go on past this one.

MEMBER BANERJEE: But you're doing tests of downstream effects?

MS. SCHLASEMAN: We've made a commitment to do downstream effects tests for the fuel and analysis for the components.

MEMBER BANERJEE: Yes, the problem of course is that different fuels, even if they have very small differences and characteristics, give you very different, at least apparently different downstream effects. Whether this is really true or not, we don't know, but we have seen things like that.

MS. SCHLASEMAN: Right. And I'll talk about it; we have a license condition. We've committed to do that testing. And we have more details about what that testing is going to involve and include in a couple more slides. But our points are, you know, we do have a pretty tight clearance in the strainer itself, 1.2 millimeters. The intent is to protect the downstream components and the fuel assemblies.

We also have diversification of delivery points. We can spray from the top, plug from the bottom. You know, there are multiple ways to get ECCS flow into the core. And so, if there was a blockage in one path, the consequences are minimized with that design.

Next slide. For the downstream effects on the components, we have committed to evaluate the pumps, the heat exchanges, the valves, clearances. According to the WCAP methodology that was used for GSI-191, we consider that this methodology applies to these components because they're similar in their configurations and their materials. And then we're going to conduct confirmatory analyses once we have the final components selected.

MEMBER BANERJEE: Yes, it's the in-vessel effects of --

MS. SCHLASEMAN: Okay. That's the next slide. In-vessel effects. Here we are.

CHAIR ABDEL-KHALIK: Will these tests be a part of the fuel license amendment for the --

MR. HEAD: That fuel will be subject to these tests.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: And to close that license condition --

CHAIR ABDEL-KHALIK: You're not going to

do experiments on GE-7, too?

MR. HEAD: No, that's not our plan. That's not our plan.

CHAIR ABDEL-KHALIK: Right. Okay.

MEMBER SHACK: It would help GE, but --

MS. SCHLASEMAN: So, to address the --

MEMBER BANERJEE: Go ahead, please.

MS. SCHLASEMAN: Go ahead? Okay. To address the in-vessel effects on the fuel, we've made a license condition to test on our final fuel design, which is the Westinghouse fuel. And in advance of that, Westinghouse has performed an analysis to calculate what would be an acceptable level of blockage based on differential pressure flow, void fraction, peak clad temperature. Nirmal Jain can answer any questions about the figure in that analysis, but we have a limit specifically on what will be an acceptable --

MR. JAIN: What is plotted, what you see is the delta P at the core inlet and the green line is the block. So, we slowly block the inlet at the fuel and make sure that the core doesn't uncover, the core remains covered. That was our criteria. And so, the maximum blockage we came up with is about 99 percent, and that gives us a measurable delta P at the core inlet. So, we would use in the test that measurement as the criteria, acceptance criteria.

MR. HEAD: Yes, this is all done to develop the acceptance criteria for the test that we're going to do.

MEMBER BANERJEE: It's a complicated business. I mean, probably we're not going to -- I don't know, Mr. Chairman. This is a very complex issue sa to whether we should go into it in detail or not, or we should do this separately.

CHAIR ABDEL-KHALIK: Absent test results, I'm not sure at this time what we can do other than to just look at the methodology.

MEMBER BANERJEE: Look at these, right.

CHAIR ABDEL-KHALIK: And so, I would propose to just let them complete their presentation and tell us what they're planning to do.

MEMBER BANERJEE: Even to look at the analysis, I mean, we would need to go over this with a fine-tooth comb, you know? Because when we've seen analyses in the past, they have been unsatisfactory and they've had to go back for two years and redo them or something. So, it's not obvious. And this is, you know, we're doing the basics officially right now. So, we need to get into some details. I mean, you're going to do these tests and then you're going to do the analysis. All you can tell us is a plan right now, right?

CHAIR ABDEL-KHALIK: I guess though the question really is -- I mean, you're using these analyses to establish acceptance criteria for your tests.

MS. SCHLASEMAN: That's correct.

CHAIR ABDEL-KHALIK: And we may need just need to look in more detail about how the analyses were performed and how you can support the conclusions of these analyses. Because after all, that's what you're going to use to decide whether or not your tests show acceptable results. So, we may need to just revisit this issue unless the staff has actually --

MR. McKIRGAN: Mr. Chairman, if I may?

CHAIR ABDEL-KHALIK: Yes, sir.

MR. McKIRGAN: The staff is still evaluating this proposal. So, we're still working this item and we will be bringing this back to the committee I believe with Chapter 4. And so, if we could --

CHAIR ABDEL-KHALIK: That would be good. We can look at the details of the analyses at that time. All right?

Okay. Let's proceed.

MS. SCHLASEMAN: Okay. As you explained, we can tell you what we plan to do for the test. And that includes we're planning on using a single fuel assembly that will be a full-scale cross-section, but a shortened length, and it will be tested in an unheated ambient temperature configuration.

As far as introducing the debris, we're going to make sure that our protocol for introduction of the debris maximizes the potential to form a debris bed. And so, the fiber, which I'm going to explain in a minute exactly what all the debris terms are -- but, you know, we're going to introduce them in order to make sure that if we can plug things, we're going to plug them. Additionally, the particulates will be added so that they won't coagulate and will be finer and potentially can block smaller interstices.

There are 187 fuel assemblies in the new fuel design.

MR. JAIN: Eighty-seventy-two.

MEMBER SIEBER: There's more than that.

MS. SCHLASEMAN: What did I say?

MEMBER BANERJEE: It's all right. You've got the right number.

MS. SCHLASEMAN: I mean, 872. I must have said it wrong. I'm sorry. Eight-hundred-and-seventy-two fuel assemblies. So the debris load is going to be one-872nd of that total amount that's predicted to pass through the strainers, and we're adding a 10 percent penalty on top of that.

MEMBER SIEBER: You're assuming a perfectly flat distribution of the debris over --

MR. TOMKINS: No, that's the 10 percent penalty is the --

MEMBER SIEBER: Okay.

MS. SCHLASEMAN: We're going to increase the quantities by 10 percent.

MEMBER BANERJEE: So, this is the thing that Bill and I had this little talk about, that how do you estimate what passes through the strainers? Because in fact one has to measure that, right, when you do your tests? And if you've got strainers with a lot of fiber and particles, they actually become better filters.

MS. SCHLASEMAN: Correct.

MEMBER BANERJEE: So, now you've got strainers which actually are probably oversized for what you need, and the holes are small, but a lot of stuff can go through.

MS. SCHLASEMAN: We're actually going to conservatively assume that all of the coatings are small enough, are less than 2.1 millimeters. So, 85 pounds of coatings, 195 pounds of sludge, 100, or, you know, 50 pounds of rust flakes and 150 pounds of dust and dirt.

MEMBER BANERJEE: You're assuming everything goes through the strainer?

MR. HEAD: No.

MS. SCHLASEMAN: We are going to conservatively assume that all it goes through, because we all -- we are, and all are my plant except for that little bit of latent fiber, which we're going to talk about in a minute, because we're going to assume some fiber also --

CHAIR ABDEL-KHALIK: I heard two things. You said yes, and he said no.

MR. HEAD: There are some things that aren't going to go through and you're going to get to those in just a second.

MS. SCHLASEMAN: I was talking about the latent items.

MR. HEAD: Okay. The little bitsy stuff.

MS. SCHLASEMAN: The four particulate forms.

Then my second bullet is about RMI. And the RMI, you know, back in -- in the BWRs we're doing this. There's destructive testing on RMI and this NUREG/CR-6808 has size distributions based on some German testing about how small, how fine the RMI would actually become. And based on that, we're assuming that two percent of the total RMI quantity -- which I don't have that number yet; that's going to be based on the detailed analysis of how much is within the zone of influence. But when we have our total RMI quantity, we will assume that two percent of that quantity is smaller than the 2.1 millimeters and we will take that quantity and introduce it for the fuel test.

MEMBER BANERJEE: That NUREG, what sort of experiments were done? Can you remind me?

MS. SCHLASEMAN: That was a German test, Siemens, I think, and I'm forgetting whether it was a steam jet or an air jet test. I don't remember. But it was a jet test on -- I don't remember either whether it was a -- but it was an RMI set.

MEMBER BANERJEE: So, this is what you're proposing?

MS. SCHLASEMAN: That's correct.

MEMBER BANERJEE: It hasn't been accepted necessarily that it's going to be two percent or three percent or one percent, whatever?

MS. SCHLASEMAN: That's correct.

MEMBER BANERJEE: Okay.

PARTICIPANT: Right.

MEMBER BANERJEE: Based on these tests, yes.

MS. SCHLASEMAN: Yes.

MEMBER BANERJEE: Okay.

CHAIR ABDEL-KHALIK: Is the staff evaluating these as part of the evaluation that they will present as a part of Chapter 4?

MR. McKIRGAN: I'd like to say that the staff is currently reviewing this submittal and the license condition.

CHAIR ABDEL-KHALIK: Okay.

MR. McKIRGAN: I think I'd like to stop there for the moment. If we need additional questions for the purposes of today's meeting, maybe we could discuss them, but this is still and ongoing piece of review by the staff.

CHAIR ABDEL-KHALIK: Okay.

MS. BANERJEE: Can I ask a question, please?

CHAIR ABDEL-KHALIK: Yes, of course.

MS. BANERJEE: So, when you say Chapter 4, Chapter 4 has already been presented. So, that's going to be part of the fuel amendment?

MS. SCHLASEMAN: No.

CHAIR ABDEL-KHALIK: No, it's part of --

MR. McKIRGAN: And thank you, Maitri, for mentioning that. So, just to be clear, this is not related to the fuel amendment. We're talking about the COL application.

MS. BANERJEE: Okay. So, it's the next phase? So, the fuel design will be available at the next phase?

MR. McKIRGAN: No.

MR. McKIRGAN: No, the license condition is being reviewed. It's an open item in Chapter 4 and we'll bring it back to the committee.

MS. BANERJEE: Okay.

MR. McKIRGAN: But we're still reviewing this topic.

MS. BANERJEE: Thank you.

CHAIR ABDEL-KHALIK: We just need to understand the timing of both the staff review and when that material will become available to us to look at. So, can we just leave this an open item as far as the timing of when the staff's evaluation of this will be available and when we can look at that evaluation?

MS. BANERJEE: So, this is for the downstream and chemical effects?

CHAIR ABDEL-KHALIK: The downstream effects.

MS. BANERJEE: Okay.

MEMBER BANERJEE: Well, I guess the staff will tell us today where they are.

MR. McKIRGAN: Right.

MEMBER BANERJEE: And then we'll take it from there.

MR. McKIRGAN: If I could, the staff will be presenting our evaluation on Chapter 6, and that includes some portion of the downstream effects, downstream effects on components, but not the in-vessel, which I know is of great interest to the committee. The staff will not be presenting on in-vessel effects today.

CHAIR ABDEL-KHALIK: We just need to find out when you guys will be ready to present that.

PARTICIPANT: Absolutely.

CHAIR ABDEL-KHALIK: Okay. Thank you.

MEMBER SHACK: But you are in the middle of this? I mean, you've got the submittal?

MR. McKIRGAN: Yes. Oh, yes.

MEMBER SHACK: You are sending out RAIs and that sort of thing?

MR. McKIRGAN: Yes. Yes.

CHAIR ABDEL-KHALIK: Okay. Please go ahead.

MS. SCHLASEMAN: Okay. And then the third bullet is addressing latent fiber assumption. And as I said before, we don't have fibrous insulation allowed inside our plant, so none of the latent fiber would come from destroyed fibrous insulation. For this test, however, we're going to assume that 10 percent of the one cubic foot, or .1 cubic feet quantity of destroyed fibrous insulation, which doesn't have a basis exactly, but it's that we're going to assume that there is such a thing for the downstream effects on the fuel.

MEMBER BANERJEE: So, why only 10 percent and not all of it?

MS. SCHLASEMAN: Because it's not destroyed fibrous insulation.

MEMBER BANERJEE: Okay. It's a proposal.

MS. SCHLASEMAN: It gets back to the -- like you said, we have two strainers in effect. We have the main strainer. And for the one cubic foot of latent fiber, we'll be using one cubic foot of rag threads, that kind of assumption, for fiber for the head loss on the main strainers. And since we had trouble visualizing how to quantify rags passing through our strainer, what we came up with was a proposal that we would take and just say, okay, we're going to assume that 10 percent of it is destroyed fibrous insulation and then that would potentially form a mat on the fuel and plug a fuel assembly. So, that was our assumption. It's not deterministic.

MEMBER BANERJEE: Right. This is a trial balloon; let's put it this way, that --

MR. HEAD: It's our proposal for --

MS. SCHLASEMAN: It's our proposal.

MR. HEAD: -- the license condition and we believe it's --

MS. SCHLASEMAN: Conservative.

MR. HEAD: -- very conservative. And so, it's --

MEMBER BANERJEE: Well, latent fiber, I don't know, because we have sort of issues with this that there are surprises that you find. And when you have a fairly large area, which is what you have in this case, which is probably oversized compared to what you need, lot of stuff can go through it because it doesn't get this bed formed which acts as a filter, you know? So, it's sort of a curious situation because you can reduce your head loss a lot by increasing the area. But if you increase it too much, then lot of stuff can go downstream. So, this is a real issue that you're facing here.

MS. SCHLASEMAN: And we agree, and that's why we're assuming that all of the latent sludge, paint chips, dust, dirt, rust that's required -- it's, you know, 400 pounds of stuff is going to pass through the strainer. We're not going to assume that anything gets held up by the strainer.

MEMBER BANERJEE: Yes, then why are you assuming that 90 percent of the latent fiber gets held up? Unless it doesn't --

MS. SCHLASEMAN: Because it's not particulate.

MEMBER BANERJEE: Unless it is not fiber. I mean, if it is truly fiber, it'll pass through most likely. If you can argue it never becomes fiber, just stays as pieces of rag or whatever --

MS. SCHLASEMAN: Ropes and rags and -- right.

MEMBER BANERJEE: Yes, that's a different matter. But if you say it turns itself into fiber, then I think it'll go through.

MS. SCHLASEMAN: Well --

MEMBER SHACK: But I think that's why they're saying 10 percent of it's assumed to be destroyed fiber. The rest of it's supposed to be rope. I mean, it's an assumption.

MEMBER BANERJEE: I don't know what that one cubic foot is, whether this is real fiber or it is just pieces of rope which hang around for --

MS. SCHLASEMAN: It's pieces of rope and the types of things -- not that much quantity, but the types of things that were found in the Japanese plant.

MEMBER BANERJEE: What I think you have to -- in this case the correct thing would be to make an argument as to how much real fiber there is and assume that the fiber goes through. Because if it's turned itself into fiber; and I have no way to know how much is going to turn into fiber, but once it turns into fiber, I think it'll go through. You know, the argument is how much is going from whatever is latent in there to a fibrous suspended state.

MR. HEAD: Okay.

MEMBER BANERJEE: That is what has to be --

MR. HEAD: I think we understand your question at this point and we'll make that as part of a follow-up item basically.

MEMBER BANERJEE: Yes, sir.

MS. SCHLASEMAN: And the last slide on downstream effects is that here is the actual license condition that we're writing into our COL application that we're going to be conducting this downstream fuel effects test not later than 18 months prior to fuel load. The test plan analysis basis debris assumptions, we've described them in the COLA markup that we've provided in appendix 6C, and that the actual test procedures will be provided to the NRC not later than 12 months prior to fuel load.

Acceptance criteria for this test, again based on the Westinghouse analysis that I think you'd like to review in more detail, is that the steady-state pressure drop is going to be less than the 5.076 psig.

MEMBER BANERJEE: Wow, that is a level of precision.

MR. HEAD: We might want to look at that.

MR. JAIN: Mr. Banerjee, this is the issue of converting SI units into English units.

MEMBER BANERJEE: Right.

MR. JAIN: It's 35 kilopascals.

CHAIR ABDEL-KHALIK: How can you sort of

provide the license renewal with that level of specificity, aside from the number of significant figure, without reviewing the analysis?

MR. McKIRGAN: This license condition is still under review by the staff. I'm sorry to keep giving you that same answer. I know it's not completely satisfactory, but it's still being reviewed.

MEMBER BANERJEE: You haven't agreed to it.

PARTICIPANT: Is it proposed?

MR. McKIRGAN: It is proposed. It's an open item.

MR. TOMKINS: In addition, we've made the calculation available, so I think the staff intends to review the documentation.

MEMBER SHACK: If you intend to review it, I mean --

MR. TOMKINS: Okay. So, they just haven't done that yet.

MR. McKIRGAN: Mr. Chairman?

CHAIR ABDEL-KHALIK: Yes?

MR. McKIRGAN: We will be reviewing the analysis that supports this figure.

CHAIR ABDEL-KHALIK: Yes, I know, but --

MR. McKIRGAN: Okay.

CHAIR ABDEL-KHALIK: -- when will that be presented to us?

MR. McKIRGAN: Right, and that's the same issue and we'll get back to you on the timing of that.

MR. WUNDER: I can give you an outside date of no later than April of next year. We'll be done with it by April 20th.

CHAIR ABDEL-KHALIK: Okay.

MR. WUNDER: No later. But we'll have the opportunity to review both the analyses and your evaluation of the analyses?

MR. WUNDER: Yes.

CHAIR ABDEL-KHALIK: Thank you.

MS. SCHLASEMAN: Okay. The final slide summary is that, you know, STPNOC has gone ahead and upgraded the DCD strainer from the Rev 1 of the Reg Guide to meet the Rev 3 of the Reg Guide requirements to assure that the strainers are going to perform the safety function. The Reference Japanese ABWR strainer design testing analyses assure that we're going to meet the URG requirements as required by both Rev 2 and Rev 3 of the Reg Guide. And that we have added on additional evaluations for chemical effects and downstream effects to show full compliance with the

Reg Guide Rev 3.

MEMBER BANERJEE: And you have done no tests yourself other than these Japanese tests?

MS. SCHLASEMAN: That is correct at this time because it's going to be the same exact strainer design, which have been tested.

MEMBER BANERJEE: But the debris loads are somewhat different though, very different, from what you've said.

MS. SCHLASEMAN: And based on the experience with all of the BWR testing and current PWR testing, based on our debris load with being an all RMI plant, we believe that all the testing that was done for the Japanese plants -- and it wasn't just the reference ABWR plant, but they also tested -- Toshiba tested several different BWR debris types, including the Kaowool and other things that we will not have and got head losses that will bound our head loss.

MEMBER BANERJEE: What were these head losses? How much was it? Typically.

MS. SCHLASEMAN: I'm going to have to look that up. It's on the order of a meter of head loss, I think, but I'm going to have to look that up.

MEMBER BANERJEE: Yes, so why don't you give us a range of what you found? You know, you're catching me cold. I haven't reviewed anything on this. Once we do that of course it will be a different matter.

MS. SCHLASEMAN: Actually, I just found it. Okay. And I guess for the staff's benefit, this is from report No. 1 --

MR. McKIRGAN: I'm sorry, did it --

MS. SCHLASEMAN: -- which is the report to the Japanese regulator --

MR. McKIRGAN: If I could just verify --

MS. SCHLASEMAN: -- a summary report.

MR. McKIRGAN: Caroline, I'm sorry, is that a proprietary report? I just want to confirm before you get too far.

MS. SCHLASEMAN: Yes, it is.

MR. McKIRGAN: Okay.

MS. SCHLASEMAN: Good point, John.

MR. McKIRGAN: So, perhaps could we save that for a closed session?

MS. SCHLASEMAN: That is correct.

CHAIR ABDEL-KHALIK: Okay. So, there may be a closed part of the staff's presentation, and at that time they can provide that piece of information for you.

MS. SCHLASEMAN: Thank you.

CHAIR ABDEL-KHALIK: Okay. Of course, you know, these statements are the applicant's statements. The veracity of these statements, we'll just wait until we hear what the staff has to say.

MEMBER SIEBER: Right.

CHAIR ABDEL-KHALIK: So, okay. Are you done with your presentation?

MS. SCHLASEMAN: Yes, I am.

CHAIR ABDEL-KHALIK: Okay. It is 12:00. We are more than two hours behind schedule, but nevertheless, is this a good time to break for lunch?

MR. HEAD: I think absolutely. But, I guess before we leave I'd like to capture what I think is at least two follow-up items --

CHAIR ABDEL-KHALIK: Yes, sir.

MR. HEAD: -- that one I'm going to offer. Okay? So, there was a question on this 10 percent versus the one cubic foot.

CHAIR ABDEL-KHALIK: Right.

MR. HEAD: I think we owe you --

CHAIR ABDEL-KHALIK: How much of the latent fiber will be assumed to pass through?

MR. HEAD: -- discussion on that or otherwise. And then, while, George, I appreciate your closing out by April 20th, I think I would like to present to the ACRS the analysis that we did to develop the license condition, a technical discussion on how we did that.

CHAIR ABDEL-KHALIK: Yes.

MR. HEAD: And we would do that much sooner. Sometime in the next set of ACRS meetings we would propose to brief you on that.

CHAIR ABDEL-KHALIK: Yes, we'll have to work out the schedule.

MR. HEAD: Okay. So, that's two follow-up items I either got or created.

CHAIR ABDEL-KHALIK: There were two other times. There was one question about what is the ppm boron in the solution. And there is another question regarding the availability of the documents that provide details of the Reference Japanese plant tests.

MR. HEAD: I think we have those.

CHAIR ABDEL-KHALIK: We have those?

MS. BANERJEE: Those were the Toshiba's -- the three.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: I think you've been looking at some of them.

CHAIR ABDEL-KHALIK: Right, I see that. Okay. Are there any other follow-up items?

(No audible response.)

CHAIR ABDEL-KHALIK: Okay. With that, with your indulgence, we'll limit lunch to 45 minutes. We'll reconvene at 12:45.

(Whereupon, the meeting was recessed at 11:58 a.m. to reconvene 12:45 p.m. this same day.)

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

12:46 p.m.

CHAIR ABDEL-KHALIK: All right. We're back in session.

We'll start with the staff's presentation, and this is an open session. Please proceed.

MS. JOSEPH: Good morning, or afternoon at this point, I guess. Sorry. For those of you who weren't here this morning, my name is Stacy Joseph and I'm the project manager for Chapter 6 review.

Let's see. The staff safety evaluation report for Chapter 6 engineered safety features was contributed to by the staff members on this slide.

Today I'm going to give you a very brief overview of what the staff reviewed in Chapter 6. I'm going to summarize the open item in Section 6.4. This is the only open item that's not related to Section 6.2.1 of the staff's SER which we we're going to go in detail today. The staff is going to provide a detailed review of the 6.2.1 section.

Andrzej Drozd and Mohsen Khatib-Rahbar will be discussing the staff's review of STP's containment analysis and pool swell methodologies.

The middle portion of our presentation does contain proprietary information and therefore I'm asking when Dr. Rahbar presents that the meeting be closed to the public.

Finally, Henry Wagage and Greg Makar will be discussing the staff's review of the STP emergency core cooling suction strainers.

As STP described, the staff reviewed the material presented in these sections of the STP FSAR. These sections incorporated by reference the certified design with the exception of some tier 1 and tier 2 departures and COL license information items that either were or will be identified by STP, depending on when they get to that section of their presentation.

The staff reviewed and evaluated the departures and COL license information items, with the exception of those open items in Section 6.2.1, which we'll be discussing in further detail. There is only one open item related to the remainder of the Chapter

6 review, inhabitability systems.

As I said, there's one remaining open item for the review of the COL license information item for toxic gases. The applicant has currently responded to the staff's request for additional information and that response is currently under review by the staff.

So, to move this along, I'd like to turn it over to Andrzej Drozd to discuss the review of STP's containment analysis.

MR. DROZD: Thank you, Stacy. My name is Andrzej Drozd and I'm the responsible reviewer for containment DBA analysis.

My first couple of slides will be a very brief history of ABWR technology; very, very brief, which will be kind of complementary to South Texas' presentation, and will indicate reasons why this review went the way it went.

As it was mentioned, the ABWR technology is an extension of classic BWR GE technology, and conceptually ABWR is basically the same as Mark II, except for the horizontal vent pipes, which are like Mark II. That makes a world of difference in pool swell behavior. Obviously, standard BWR review areas include pressure and temperature analysis, as well as you need something unique for boiler technology which is hydrodynamic loads. Related to pool swell, condensation, oscillation, chugging, as well as SRV discharge.

I'd like to stress a point that was already made by South Texas that vent clearing is almost a crucial phenomenon in the behavior of BWR containment. That, along with vent clearing, along with vacuum breaker, basically determines the response of this type of containment.

Next slide, please. The original approval of ABWR technology was based on so-called GE methodology, which is an extension of Mark II's and III's test data in the pool swell test facility. There were also done some Mark III-specific horizontal vent tests to account for horizontal geometry. But application to ABWR requires some modification, and we're going to get to that point.

The test database was formulated as an analytical tool in something called GESSAR methodology, which is General Electric's standard safety analysis review. That contains the pressure and temperature models, pool swell, as well as hydrodynamic loads definition, which are basically semi-empirical correlations, if you will, the forcing functions.

The importance of the introduction is that the direct application of standard BWR technology was not adequate; that is, the fact that there is Mark II-like horizontal vents make the difference in the suppression pool response, therefore there had to be an ABWR modification to account for the uneven pool slug which is pretty high characteristic for ABWR.

Ultimately, the standard proved ABWR design based on review of the test data rather than analytical models, and that fact is clearly stated in our FSAR, which is NUREG 1503. That's important fact, that no particular analytical model was base for approving this design.

The GE identified errors were already covered, so I'm going to skip that one.

Given that history, the focus of staff review was and obviously is recreation by the applicant, both test databases, as well as replica of GESSAR methodology. As a result, applicant submitted for the review so-called derivative technical reports covering relevant test data, pool swell analysis, pressure and temperature analysis, as well as hydrodynamic loads definitions. The GE methodology was replicated by using GOTHIC, a description of which was already presented, and my colleague and contractor, Dr. Khatib-Rahbar will go into some details of comparing GOTHIC methodology with other methodologies.

Next slide, please. Now, just to recall, the original BWR approval was based primarily on test data review. However, we did support it with some calculation using our old classic containment code, CONTEMPT-LT28. Just for the record, we also made some limited number of MELCOR runs with the early versions of MELCOR primarily for the long-term containment integrity. That was done in the 1992 and '93 as a response to one of the SECYs that required 24 hours containment integrity for all advance reactors, advance as we call them.

Now, the review of the South Texas application follows our basic approach to the review; that is, we read, we ask questions, we audit technical basis and we do confirmatory applications. Therefore, we did review and audit test databases as well as analytical stuff behind pool swell and pressure and temperature technical reports. We did audit test database as well as approach to hydrodynamic loads definition. We performed confirmatory calculation based on the newer version of MELCOR 1.8.6 supported by added value. Our contractor, Energy Research, developed their own pool swell model, which we used as a benchmark to check as an independent to the GOTHIC calculations.

There's a little note that MELCOR does use some qualified BWR models, and in your backup materials you will find at least one table comparing vent clearing timing.

Next slide, please. So, by now we are done with all the necessary audits and we review all the relevant test databases, as well as technical reports. So, the details of confirmatory analysis will be presented by Dr. Khatib-Rahbar. But as a reviewer, we can conclude as of now that GOTHIC computer program seems to be an acceptable tool for performing ABWR licensing analysis and it was suitable tool for reconstitution of the GESSAR methodology.

Also, we concluded that basically applicant successfully replicated all the original ABWR analysis. And not withstanding unfortunately the incident with that containment peak temperature poking through the limit for two seconds, all the licensing parameters that were changed are changed modestly and all the changes are, all the revised values are well within the safety margins. So, from the reviewer point of view, we think South Texas did do what they're supposed to do; that is, replicate the original ABWR design basis.

CHAIR ABDEL-KHALIK: So, what is your understanding of the basis for the 340-degree F temperature limit?

MR. DROZD: That issue would have gone away should the temperature, actual temperature transient would have been shown. The drywell temperature goes slowly to 340 -- 200 through whatever it was -- 38 degree and my our classic approach to temperature limit, they take maximum value and keep it constant as an environmental conditions for equipment qualification.

When you look at this transient, actually 99 percent of time the temperature's well below this limit, well below this limit. And in normal cases, the vicinity of temperature limit is within few minutes, at most. So, it's not a big deal in a way that something is very close to temperature limit, because it's for very, very short time. Poking through this limit for two seconds, we think that it has no effect on safety, on plant safety.

I understand that the head seal is a prime suspect to be protected against high temperatures, but also there are other instruments that needs to be qualified to be operational forever at the temperature of 340. So, from that point of view we think that given thermal response of any components or instrument, the few seconds or even few minutes of temperature at the level of temperature limit has no safety consequences.

CHAIR ABDEL-KHALIK: I guess we'll hear from the applicant later.

PARTICIPANT: Yes, sir.

CHAIR ABDEL-KHALIK: Thank you.

MR. DROZD: So, if there's no immediate questions now, I'll turn floor to Dr. Khatib-Rahbar.

MS. JOSEPH: This is where we would go into a closed session.

CHAIR ABDEL-KHALIK: Right. At this time we're going to go to a closed session, and we'll make sure that the telephone line is turned off.

(Whereupon, at 1:00 p.m. off the record until 1:46 p.m.)

CHAIR ABDEL-KHALIK: Okay. So, we are in an open session. Sir? Thank you. Please proceed.

MR. WAGAGE: My name is Henry Wagage. Sitting here with me is Gregory Makar. Greg and I will be making presentation on Mr. Kemp COLA emergency core cooling system suction strainer design review.

This is the outline of our presentation. 10 C.F.R. 5046(b)(5) requires providing long-term cooling to the core. Emergency core cooling pumps have to be capable of providing long-term cooling. That's why we are reviewing this debris strainer issue.

Reg Guide 1.82 Rev 3 provides guidance on how to meet the regulation and then detailed guidance is provided in Utility Resolution Guide guidance, we call URG, which was developed for BWRs. During this review, staff used the review guidance developed by the staff during GSI-191 program. This guidance includes strainer head loss and vortexing, chemical effects evaluations and coatings.

These are the highlights of South Texas debris strainer design. This is designed to guidance provided in Reg Guide 1.82 Rev 3. This morning South Texas noted that DCD strainers are designed for Reg Guide 1.82 Rev 1, but this is the latest issued Reg Guide on this issue.

All insulation is RMI. There is no other insulation in the containment except a small amount of Fiber assumed for latent fiber.

This containment does not have troublesome insulation like Cal-Sil or it does not have trisodium phosphate. It uses significant chemical products and it's probably better to use aluminum in the containment. There is no fiber except a small amount of latent fiber used in the analysis.

This strainer design is CCI pocket-type strainers. It has a 2.1 millimeter hole size for this screen.

Each pump has two T-connected strainers. Each ECCS has three RHR loops and two high pressure core flooder loops and one reactor core isolation cooling loop. For the design basis it's assumed that only two RHR loops and one high pressure core flooder are needed. So, our review includes confirming that two RHR pumps and one high pressure core flooder could work. That means strainers are handle to that.

This plan has suppression pool cleanliness program which limits debris in the suppression pool and there is a in-service inspection program during outage inspection done to confirm that there is no debris. And there is some debris which is not removed by suppression pool cleanliness program, then for example floating debris during would be removed during an outage.

In case in highly improbable event, all the strainers get clogged, there is alternate ACindependent water addition mode of RHR. We can provide water from a fire water system to the core and to drywell and wetwell space.

This plan uses Reference Japanese ABWR strainer design. Reference Japanese ABWR strainers were designed for more significant debris load, including significant amount of fiber and even Cal-Sil. As South Texas mentioned this morning, there is one drawback of that. This Japanese ABWR strainer was designed for pump design flow rate, but South Texas is going to design the strainers for pump run out flow rate, which is higher than the design flow rate. That's the minus effect, but overall advantage of using these Japanese ABWRs outweigh the effect of higher pump flow.

CHAIR ABDEL-KHALIK: What is the ratio between the run out capacity and the actual flow rate?

MR. WAGAGE: Actually, I have the exact numbers. That's slide No. 55 or 56. Can you change this? Okay. Yes.

CHAIR ABDEL-KHALIK: Okay.

MR. WAGAGE: These are the different flow rates.

CHAIR ABDEL-KHALIK: Just about 15-20 percent higher?

MR. WAGAGE: Yes.

CHAIR ABDEL-KHALIK: Okay.

MR. WAGAGE: But the reduction of debris fiber overweigh that effect of that increasing flow rate.

CHAIR ABDEL-KHALIK: Okay.

MR. WAGAGE: Actually, South Texas provided us the calculation report No. 003, which --

CHAIR ABDEL-KHALIK: The famous 003. Okay. That's fine.

MR. WAGAGE: And that shows that there is NPSH available for these pumps on --

MEMBER BANERJEE: I have a question about the as-built. So, does this mean that you accept the NPSH-measured -- let's say wherever the pump is made, or do you a test after installation? Because I looked at the ITACC.

MR. WAGAGE: Yes.

PARTICIPANT: It's in the second report.

MEMBER BANERJEE: What is the definition of "as-built" there?

MR. WAGAGE: As-built --

MEMBER BANERJEE: Are you are going to accept the testing done or would you need it to be after installation for the ITACC?

MR. WAGAGE: The overall -- in the acts of the methodology, what we expect be that some numbers may change. For example, insulation may be slightly plus or minus and --

MEMBER BANERJEE: No, that's not my question. It is the NPSH. If you go back to that slide now. We've answered this question. Yes. Based on as-built system, that means based on some sort of a test after installation?

CHAIR ABDEL-KHALIK: Is this a factory acceptance test, or is it an on-site test?

MEMBER BANERJEE: Is it a --

MR. WUNDER: I think this is a question for the applicant.

MEMBER BANERJEE: Ah, okay. Because he says this, that. All right.

MS. SCHLASEMAN: The ITACC is written such that the required NPSH is specifically performed at the pump vendor's facility. So, required pump NPSH is done at the vendor, the supplier's facility. The available NPSH, the way the ITACC currently reads, it says that it's based on the as-built analysis, which of course is in accordance with the Reg Guide. And we've changed it. One of the four-five assumptions under the criteria for that ITA is that the strainer shall be assumed to be 50 percent blocked. That was the old Reg Guide 1.82 Rev 0 criterion. We've changed that at staff's request to say that it will be based on the analysis and the results of the confirmatory testing and analyses that are going to be done for the South Texas project. And again, this is all based on analysis using the Reference Japanese ABWR suction strainer.

MEMBER BANERJEE: Yes, I guess there is this issue about ITACC's relationship to as-built systems in general. I mean, there are measurements that you can make at the factory which you will accept; say, the inner damage of the vessel or something. And then there are measurements which will have to be made after the installation. Now, I guess the staff is accepting a position that subject to a certain amount of analysis and technical justification you will accept certain things which are measured in the factory.

MEMBER SHACK: It's hard to measure the NPSH required any other place.

MEMBER BANERJEE: Right. Right. But that's not a reason for accepting it if it's -- it's so if you can say it's practical and therefore you allow it.

MEMBER SHACK: Well, I might be able to -- I accept it. Then I have to make some judgment and some correction.

MEMBER BANERJEE: Yes, it's not necessarily impossible, but let's say that you don't want to do it. It's like testing ADS 4 valves or something. You don't want to do it even at 30 psi. But you have to test them at maybe --

MEMBER SIEBER: You can only test them once.

MEMBER SHACK: Yes, you can only test them once.

CHAIR ABDEL-KHALIK: All right. I think we have talked about this.

Please continue.

MR. WAGAGE: For debris generation and transport, South Texas used URG methodology. There's only one insulation debris available. It's a small amount of fiber which is RMI. For RMI South Texas calculated 7.4 diameter zone of influence using URG methodology. And 50 percent of RMI in the zone of influence was to be generated and transported to the suppression pool. And once it gets transported to the suppression pool, 100 percent of debris is assumed to be suspension until the debris lands on strainers.

There is no settling assumed in this.

MEMBER BANERJEE: So, is 7.4 D consistent also with what is being done for PWRs right now, or is it different?

MR. WAGAGE: This is consistent with what is done for PWRs.

MEMBER BANERJEE: What is the number for PWRs?

MR. WAGAGE: I think maybe it's lower than this one.

MEMBER BANERJEE: No, I think it's higher. Is there somebody here from NRR?

MR. McKIRGAN: No. We'll take that and see if we can get that number.

MEMBER BANERJEE: Yes.

MR. McKIRGAN: But I believe this is bounded by the number, but we'll confirm it.

MEMBER BANERJEE: Okay.

MR. WAGAGE: Other than the insulation that South Texas assumed latent debris as provided in the URG guidance, these are quantities assumed, rust flakes and dust and dirt. These numbers come directly from URG which staff accepted. Sludge quantity, South Texas talk about that. This is 195 pounds of sludge is assumed to be conservative considering that suppression pool has stainless steel liner. There will be lest corrosion product in the suppression pool. And also that South Texas provided us with a report on Japanese ABWR walk down testing, walk down which showed significantly less amount of debris.

MEMBER BANERJEE: So, we had a discussion on this fiber. Is this one feet cubed as fiber, or what? I'm trying to understand. Remember, we had this discussion in the last presentation?

MR. WAGAGE: One cubic foot of fiber for strainers and we assume that this is all --

MEMBER BANERJEE: Fiber?

MR. WAGAGE: -- fiber.

MEMBER BANERJEE: So, this is fiber which gets to the strainers?

MR. WAGAGE: Yes.

MEMBER BANERJEE: So it's not latent debris which could turn into fiber? This is fiber?

MEMBER SIEBER: Right.

MR. WAGAGE: It's still one cubic foot.

CHAIR ABDEL-KHALIK: Let's give the applicant a chance. This is inconsistent with what was said in the previous presentation.

PARTICIPANT: Not really.

MS. SCHLASEMAN: No, I was going to say

that there is no fibrous insulation allowed within the STP 3 and 4 primary containment, and therefore this latent fiber quantity is an assumed quantity of fiber based on things like rope, rags and debris that potentially inadvertently left behind.

And then for the purpose of the downstream fuel effects testing to go ahead and come up with a conservative test criterion, we were arbitrarily assuming that it was destroyed fibrous insulation so that there would be something to potentially form something to clog the fuel. And that's just a conservative assumption.

MEMBER BANERJEE: Well, whether it's conservative, we'll see. But certainly this one cubic foot, if I understand it, the staff is suggesting agreeing to accept one cubic foot of fiber.

MR. WAGAGE: Yes.

MEMBER BANERJEE: Not one cubic foot of rope, which has not turned into fiber?

MR. WAGAGE: Yes, for the head --

MEMBER BANERJEE: This is one --

MEMBER STETKAR: It's one cubic foot of fiber.

MEMBER BANERJEE: Fiber. All right. Let's make it really clear.

MEMBER STETKAR: Not material that could eventually generate fiber.

MEMBER BANERJEE: Yes.

MEMBER SHACK: And STP is assuming that only 10 percent of that fiber gets through the strainer downstream.

MEMBER BANERJEE: Fine. Whether that's true we will look at that.

MEMBER SHACK: Well, yes, that's an assumption. True is not --

CHAIR ABDEL-KHALIK: Well, let's just clarify this, because that's inconsistent with what I heard before. Are you assuming that we have one cubic foot of fiber, or are you assuming that we have 10 percent of that that will be in the form of fiber that will eventually make its way to the strainers?

MEMBER BANERJEE: To the strainers. What gets to the strainers?

CHAIR ABDEL-KHALIK: Let's just --

MS. SCHLASEMAN: Our intent about the one cubic foot was that that was based on latent debris and therefore was in the form of rags, rope or non-fibrous insulation material. And we don't have a basis for assuming that fibrous insulation somehow gets into the primary containment. So, that was not the basis for our assumption. And the fibrous insulation aspect was 10 percent of that number just to come up with something that we could test for.

CHAIR ABDEL-KHALIK: Right.

MEMBER STETKAR: But how much of the one foot gets to the strainer?

MS. SCHLASEMAN: All of it.

PARTICIPANT: All of it gets to the strainer.

MEMBER STETKAR: All of it gets to the strainer?

MEMBER SIEBER: And 10 percent gets to the fuel.

MEMBER STETKAR: Ten percent of it gets to the fuel?

PARTICIPANT: Is in the form of -- okay.

MS. SCHLASEMAN: That we just postulate that it's in the form of --

MEMBER SHACK: But what Sanjoy will want to know is when you do your test and you have your one cubic foot of which .9 feet will end up on the strainer, does it end up as a shirt, or does it end up potentially creating a thin bed?

MEMBER SIEBER: Thin bed.

MEMBER BANERJEE: I think that's the

question, whether it's fiber or a rag? I mean, this is really -- so, is one cubic foot -- the way you've written it there, and that is what the staff is I presume recommending accepting, is one cubic foot of fiber. From the staff's point of view it's clear it's fiber.

MR. WAGAGE: Yes, it's one cubic foot of fiber landing on the strainer. That's what --

MEMBER BANERJEE: Not a rag, but fiber?

MEMBER SIEBER: Right.

MEMBER BANERJEE: If I understand it correctly.

MEMBER SIEBER: Yes, it's --

MR. WAGAGE: Of that how much passes the strainer is a different question.

CHAIR ABDEL-KHALIK: Okay. Okay. Would the applicant please clarify that question, not necessarily now, but sometime during this meeting? Okay?

MEMBER SHACK: The tests of course in Japan were performed with fiber rather than rags.

MEMBER SIEBER: Right. Yes. It's more than one shirt.

CHAIR ABDEL-KHALIK: Just clarify what the one cubic foot is, how much of it is going to be reaching the strainer and how much of it will make it to the fuel, and in what form.

MS. SCHLASEMAN: The one cubic --

CHAIR ABDEL-KHALIK: You don't have to answer right now. Okay?

MEMBER SIEBER: Yes, right. Think about it.

CHAIR ABDEL-KHALIK: Think about it, get a clear answer and then provide that answer later for the record.

MR. WAGAGE: In addition to the amount of latent debris, South Texas assumed a certain amount of miscellaneous debris. Miscellaneous debris is not considered in URG, but GSI-191 program considers miscellaneous debris. Because of that equipment tags, tape and stickers or placards affixed by adhesives were considered. South Texas assumed sacrificial area of two pockets per strainer to account for this miscellaneous debris. That means that of the total area of the strainers, two RHR pump strainers and one HPCF pump strainer would come to about 1,300 square foot effective area of the screen. Of that about eight -- this total area, they will take two pockets up for these miscellaneous debris, that it comes to about eight square foot.

Suppression pool cleanliness program is based on ABWR operating experience and INPO and EPRI guidance for cleanliness and floating material exclusion. This would limit debris in the suppression pool.

We talk about these debris head loss calculation. NUREG-CR-6224 correlation was used to calculate fiber and particulate debris head loss. And based on a small-scale test, South Texas used a bump-up factor. Finally what matters was that although that South Texas said that it used 6224 correlation, what matters were that bump-up factor raised that head loss value to be equal to the small-scale test where all the debris landed up on the strainer with a significant amount of head loss.

In the final design, we don't expect fiber. There should be only small amount of fiber and mostly RMI. RMI gives significantly less head loss. So, this is a conservative design.

This morning a question came about effect of thin bed. Even we spread that is one cubic foot of fiber on effective surface area of about 1,300 square foot, thickness of the fiber bed would be one by 64 inch, one-sixty-fourth inch of thickness. That wouldn't make a filtering bed to provide a thin bed.

Staff guidance in Reg Guide 1.82 is to consider one-eighth inch thickness to provide a filtering bed. But staff has found that smaller than that thickness will produce a thin bed for example of one-sixteenth inch. Now staff is insisting to do a head loss testing to consider one-sixteenth inch of thickness to confirm that there is no thin bed effect. So, this is one-fourth of that thickness even, so there is not a possibility of forming a thin bed in this design.

CHAIR ABDEL-KHALIK: It's much smaller than that, isn't it? I mean, one cubic foot distributed uniformly over --

MR. WAGAGE: Over about 1,300 square foot.

CHAIR ABDEL-KHALIK: -- 1,300 square feet?

MR. WAGAGE: Yes. It comes to about --

CHAIR ABDEL-KHALIK: So, wouldn't that be a whole lot less than a sixteenth of an inch?

MR. WAGAGE: No, no. I would say one-sixty-fourth.

CHAIR ABDEL-KHALIK: One-sixty-fourth?

MR. WAGAGE: One-sixty-fourth. That is whole lot lower than sixteenth of an inch. Staff was considering for operating plant and other design centers to use one-sixteenth to starting value to form a thin bed.

CHAIR ABDEL-KHALIK: That's even a lot less than a 64th?

MR. WAGAGE: Much less than one-sixteenth, yes.

CHAIR ABDEL-KHALIK: It's actually a lot less than a 64th.

MR. WAGAGE: Yes, that's right. Is less than one by sixty-four.

CHAIR ABDEL-KHALIK: Okay.

MR. WAGAGE: This is so small that --

MEMBER SIEBER: Presuming a uniform distribution.

CHAIR ABDEL-KHALIK: That's twelve over sixteen-hundred.

MEMBER SIEBER: Which I don't think that's --

CHAIR ABDEL-KHALIK: Go ahead.

MR. WAGAGE: South Texas provided tests done for full Reference Japanese plant for full scale testing. These testing just confirmed that the head loss values were lower than small scale since they were not used for any design.

Staff considered that Japanese ABWR tests done for and with the small scale pockets, four pockets strainer-type is bounding for ABWR design.

Debris downstream effect on fuel, I think we discussed that before, that staff received the South Texas license conditions to verify acceptance of impact on fuel before fuel load. Staff is reviewing that.

MEMBER BANERJEE: So, you've noted at least my concern about that 10 percent. That because, as you so eloquently said, you don't even have a thin bed, you've hardly got any coverage of the strainers. That 10 percent probably is hard to defend.

MEMBER SHACK: So is the one cubic foot, but --

MEMBER BANERJEE: Yes, we'll accept the one cubic foot, maybe. No, actually I don't know, we'd have to look at what other people are using for -- you know, we have to be consistent across the board. People are doing clean containments now, so we'll see.

CHAIR ABDEL-KHALIK: Just for reference, it's seven-and-a-half mils. That's awful thin.

PARTICIPANT: That's a thin bed.

MEMBER SIEBER: That means the pumps will run and the fuel won't get clogged.

MR. WAGAGE: All right. At this stage Gregory Makar will continue the presentation.

MR. MAKAR: For out coating evaluation we looked at the form and quantity of the coatings. All of the coatings in the containment are qualified coatings with inorganic zinc primer and an epoxy topcoat. The quantity, the applicant assumed the URG value. The staff approved this in it's safety evaluation on the URG. And the debris was included in the strainer testing for the Reference ABWR as a combination of particulate representing the inorganic zinc and flakes representing the epoxy. This is also consistent with the staff's evaluation of the URG.

MEMBER SHACK: I had a question on that, because in the SER it says that the ABWR DCD has an epoxy-only coating. And I guess is that a departure then to use the inorganic with the epoxy topcoat?

MR. MAKAR: When that was written, I believe that it was epoxy only. And since then; and Caroline, correct me if I'm wrong, but I think the first documentation of the inorganic zinc/epoxy was in the most recent RAI response. So, it's something that we have to follow up on and get clarification.

MEMBER SHACK: Well, they said that this morning, that it was.

MS. SCHLASEMAN: Yes, Greg is correct that in the first RAI response over a year ago we had thought it was going to be an epoxy-only qualified coating. However, was it last summer --

MEMBER SHACK: But is that then a departure?

MEMBER SIEBER: Yes, it would be.

PARTICIPANT: It must be.

MR. MAKAR: The wording in the DCD is ambiguous, you mean?

MEMBER SHACK: Yes, I didn't look it up in the DCD. I just --

MR. MAKAR: It says -- I'm sorry for interrupting. It says the epoxy coating will be qualified and in accordance with Reg Guide 1.5. It doesn't exclude anything else, but it doesn't mention anything else either. It seems to me it would be in the spirit of a departure, but I'm not certain about that.

MS. SCHLASEMAN: So, since that time we concluded that the only qualified coating systems that we could use effectively at South Texas would require inorganic zinc primer, so we had to change that. And we have noted to the staff that our original response was incorrect by not recognizing that we needed inorganic zinc primer.

MEMBER SHACK: With an epoxy topcoat?

MS. SCHLASEMAN: With an epoxy topcoat. That is correct.

MR. MAKAR: Okay. Any other coatings questions?

(No audible response.)

MR. MAKAR: For our chemical effects evaluation there was a number of different potential chemical debris actors that the applicant has described. Iron oxide was included in the strainer head loss testing for the Reference BWR in the form of -- or I should say iron corrosion products in the form of rust particulates. Zinc. The only zinc present is in the form of inorganic zinc coating. As you've heard, aluminum is excluded from the design, but it is included as a potential latent debris.

Now, for that latent aluminum, the applicant is using a staff-approved WCAP to calculate the amount of aluminum that would be dissolved into the pool and then using their own solubility evaluation based on open literature to look at whether that aluminum would stay dissolved and not form debris. So, we are evaluating that, and there are a couple of things that we're looking at in that evaluation.

One is WCAP calculations you would

normally put a prototypical transient in there for temperature, pH. From what we've seen so far the calculations have been done at a fixed pH. So, part of our evaluation is determining whether what they've done is bounding, because if they've done at one pH, it could be bounding compared to the transient. But we have to recognize that where you get the most corrosion is not where you would get the most precipitation of the debris, so we have to be careful looking at that.

The other is I think we just recently had clarification that the standby liquid control system and its boron would be added in all LOCAs. And that allows us to apply the solubility data that -- some that we know of that was generated in boron-containing solutions. And if there's no boron in the solution, then we have to look more carefully at those data used for solubility.

In addition, for the zinc corrosion products the applicant has stated that the zinc would be in the form of particulates rather than a gel-kind of form. And so, we're also looking at -- and the data was already including in the head lost test. So, we're also looking at these chemical conditions and whether we agree with that conclusion. And so, this review of the chemical effects is still going on. It's identified as an open item and we've recently received an RAI response to evaluate.

For downstream effects on components, the applicant intends to use again a staff-approved WCAP methodology that was developed for the PWR fleet. They haven't done this yet because, as you heard, the design details are incomplete.

So, we're looking for two things in order to approve something now in an evaluation that's going to be done in the future. One is the methodology and whether it has acceptance criteria. And so, this WCAP, the staff has written a safety evaluation with limitations and conditions. It covers the things they need to address; pumps, valves, heat exchangers. It addresses plugging of heat exchanger tubes, plugging of valves, with equations, calculations and acceptance criteria.

So, that's how they'll do it. That's acceptable to us, but there is a commitment for them to provide that analysis. And the timing of that I believe is eighteen months prior to fuel load.

And the conclusions then for these two presentations are that we do have some significant open items, but what we've resolved so far we find acceptable. There are ITACCs for the ECCS pump positive suction head based on the as-built system. The chemical effects evaluation is ongoing and the downstream effects on components will be performed and there's a commitment to perform that and provide it to us.

MS. JOSEPH: Okay. To conclude Chapter 6, so far FSAR Section 6.1 and 6.6 are acceptable. There's still three open items that we need to resolve. One has to do with control room habitability. The second has to do with -- we're looking at the structure that STP proposed for vacuum breaker protection in containment. And finally, the chemical effects issue that Greg just described. The P/T and pool swell licensing parameters are within the plant safety margins and the analysis or methodologies are considered conservative. And pending closure of open items, the strainer design meets regulation. And therefore, in final conclusion, due to open items and confirmatory items we cannot conclude final conclusions on Chapter 6 at this time.

Any additional questions?

ACTING CHAIR STETKAR: Any members have any --

MEMBER SHACK: Well, that just seems

contradictory to what I thought we heard earlier. I mean, this seems like you've accepted the proposal to do the downstream effects testing as such.

MR. McKIRGAN: Let me ask Stacy to go back one slide.

MS. JOSEPH: Okay.

MR. McKIRGAN: And what we're finding here is the strainer issue. The downstream effects is still an open item and that is still under review. The downstream effects is due to the open items and it's an open item.

ACTING CHAIR STETKAR: With respect to fuel?

MEMBER BANERJEE: Pending closure of open items.

ACTING CHAIR STETKAR: Yes, but the open items up at the top --

MS. JOSEPH: Well, because that's considered an open item in Chapter 4. That's the only reason it's not listed as an open item here. It's still considered an open item, but it's an open item in Chapter 4. So, that's why it's not Chapter 6.

MEMBER SHACK: Got you.

MR. McKIRGAN: And we appreciate the interrelationship between those two items.

MS. JOSEPH: Right.

MR. McKIRGAN: If I could also go on just to get back to one question that had been asked previously. The staff's ZOI for RMI; my apologies for using so many acronyms, is two. And South Texas has assumed 7.4. So their value is considering bounding and the staff's accepted them.

MS. JOSEPH: That was for PWRs?

MR. McKIRGAN: For PWRs, yes. Thank you.

MEMBER BANERJEE: Why did you assume seven?

MR. McKIRGAN: I believe that would be a question for the applicant.

MEMBER BANERJEE: Oh, okay.

MS. SCHLASEMAN: The 7.4 diameters is based on Utility Resolution Guideline. It's the criteria that was reviewed and approved in the mid-1990s for BWRs. And so, Toshiba conservatively goes ahead and applies the URG methodology.

ACTING CHAIR STETKAR: Anything else for the staff?

(No audible response.)

ACTING CHAIR STETKAR: Okay.

MEMBER SIEBER: I thought it was well done.

ACTING CHAIR STETKAR: Thank you very much. South Texas is going to come back up. So, we'll call you back up and finish up your Chapter 6 presentation.

Because of the timing here and our lack of the official chairman, give me some guidance. I'd like to at least get some feedback from you before we even consider any type of break on this issue of the one cubic foot of fiber. You've had --

MR. HEAD: Yes, I have a proposal on that.

ACTING CHAIR STETKAR: Okay. At least I'd just like to get something on the record from you.

MR. HEAD: Well, I'm going to go ahead and use the follow-up --

ACTING CHAIR STETKAR: Just make sure you --

MR. HEAD: Scott Head. I'm going to use the follow-up item from our earlier discussion where there was a -- we needed to provide some additional discussion on the 10 percent of the one cubic foot as it applied to the downstream effects and we had lengthy discussion.

The discussion we had just now I think all applies to that same discussion, so I'm not proposing that we answer that today.

ACTING CHAIR STETKAR: Okay.

MR. HEAD: That will be a part of that follow-up item and I think we'll be able to --

ACTING CHAIR STETKAR: Fine. Good. I just wanted to give you the opportunity in case you had something definitive to --

MR. HEAD: Well, we do, but whether it actually closes it today or not --

ACTING CHAIR STETKAR: Oh, fine. Obviously we're going to revisit this topic at a later date.

MR. HEAD: Yes, we are.

ACTING CHAIR STETKAR: So, we'll just hold it until then.

MR. HEAD: But I did have another, I guess, question on this last discussion.

ACTING CHAIR STETKAR: Okay.

MR. HEAD: And we might have to follow up with the chairman, is that at some point in time he alluded to we will get to have a presentation on all of those technical reports. And I took that as a little bit different than maybe some of the other follow-up items. And it sounded like maybe there would be a discussion on, you know, a question and answering period, or either a presentation on all those follow-up reports. Is that what I should be expecting?

ACTING CHAIR STETKAR: Scott, why don't we hold that until after Said comes back?

MR. HEAD: Okay.

ACTING CHAIR STETKAR: And when we finish up the whole meeting we can try to sort through that a little bit more clearly.

MR. HEAD: Do you want us to go ahead and go into the rest of this, or --

ACTING CHAIR STETKAR: Well, what I was going to ask is if we can go for another 15 or 20 minutes. I doubt that we'll get through all of your material in that time period.

MR. HEAD: That's our mission.

ACTING CHAIR STETKAR: It is?

MR. HEAD: Yes.

ACTING CHAIR STETKAR: If you think you can get through in 15 or 20 minutes, get up there and let's go through it.

MEMBER SIEBER: The question is are we staying until he gets done?

MEMBER BANERJEE: I'm going to the other meeting.

MEMBER SIEBER: Yes, I have the same

problem.

MR. TOMKINS: Okay. This is where I believe we left off. So, I'm continuing now through the Chapter 6 base departures. I'm going to just cover briefly two more and then I'm going to continue through some other departures that impact Chapter 6.

First one is Departure 6.2-3, and we revised some containment penetration details in Chapter 6. There are some tables at the back of 6.2 that list containment isolation valves, penetrations and information. So, we just changed some information in there as a result of the process of moving through detail design.

ACTING CHAIR STETKAR: You changed a substantial amount of information.

MR. TOMKINS: A substantial number of them. That's correct. Yes.

ACTING CHAIR STETKAR: The conclusion, this is one you concluded did not require staff review.

MR. TOMKINS: Correct. Yes.

ACTING CHAIR STETKAR: Quite honestly, I tried to go through all of those tables and think about it. I didn't identify anything that seemed to be substantially different, although there are changed positions of valves, changed power supplies to valves.

MR. TOMKINS: Right.

ACTING CHAIR STETKAR: Is there anything that changes the fundamental configuration of any of the penetrations compared to the DCD in terms of either numbers of normally opened valves or redundant signals or power supplies to those?

MR. TOMKINS: I don't believe there is.

ACTING CHAIR STETKAR: You know, in a deterministic sense?

MR. TOMKINS: Yes, I don't believe -- this is really primarily geometry changes.

ACTING CHAIR STETKAR: Well, it's more than just geometry because it's some valves were specified as closed. Now they're open. They moved signals and power supplies around. They moved types of valves around. So, it's not just -- you know, it's a two-inch valve line versus a three-inch line. It's fairly --

MR. TOMKINS: And there were some inconsistencies. There were some inconsistencies between what were in the PNIDs and what were in the tables, and we cleaned that up. We actually added some additional information. There was some information that wasn't in the tables and we put that information in.

ACTING CHAIR STETKAR: Yes.

MR. TOMKINS: But our assessment was that it didn't require NRC --

ACTING CHAIR STETKAR: I was just looking for things where there were, you know, fundamental differences in terms of, as I mentioned, either numbers of valves -- so in a deterministic sense, if they were taking credit for a single check valve and now it's, you know, two open valves. I couldn't find any, but quite honestly, there's a lot of changes.

MR. TOMKINS: Right. I don't think we did any. Yes.

ACTING CHAIR STETKAR: So, I'm asking you to kind of confirm that.

MR. TOMKINS: Okay.

MR. HEAD: But I don't know that we just confirmed that in that discussion. Did we? Your conclusion about our evaluation concluded it did not need NRC approval, which at some point challenging open/closed, all that obviously potentially could. So, our review concluded that these changes did not need their approval.

ACTING CHAIR STETKAR: No, the staff --

MR. HEAD: The NRC agreed with that, at

least in the SER.

ACTING CHAIR STETKAR: Since you've given your closeout already, I'll put you on the spot a little bit. Did you carefully think about all of those tables in the sense of, as I said, fundamental changes. I mean, the conclusion is there's no change in the risk. And when I think of risk, I think of off-site releases. So, I don't particularly care about necessarily, you know, the inside valve is a gas-operated valve and the outside valve is an air-operated valve. I'm thinking more that we're going from, you know, a single check valve isolation to two motor-operated valves or something like that.

MR. McKIRGAN: I mean, the staff's finding on this was that it did not require prior NRC approval. I'd have to pull up more details on that.

ACTING CHAIR STETKAR: Okay.

MR. McKIRGAN: But that was our conclusion as well.

ACTING CHAIR STETKAR: Okay.

MS. BANERJEE: Do you need anybody to get back to you?

ACTING CHAIR STETKAR: I don't think so. No.

MS. BANERJEE: No? Okay.

ACTING CHAIR STETKAR: It's probably a lot of bookkeeping work that's not necessary. I just wanted to make the point that it's not a simple --

PARTICIPANT: It's a lot of changes numerically.

ACTING CHAIR STETKAR: It's a lot of changes and it's a large number of changes. As I said, I actually did take a quick pass through those tables and tried to think about what they were trying to tell me, and nothing jumped out at me. But I certainly didn't do a comprehensive review. I hope the staff did.

MR. McKIRGAN: I believe the staff did.

ACTING CHAIR STETKAR: Okay. Thanks. Okay.

McKIRGAN: I said we did a comprehensive review, yes.

ACTING CHAIR STETKAR: Yes.

MR. TOMKINS: Departure 6.6-1; that again made a couple of clarifications in that section, clarified that the RHR heat exchanger will be accessible for 100 percent ISI. There's actually an RAI on that issue as well. And then we added a requirement that if there's some piping that doesn't meet minimum straight length that we would perform an evaluation in that instance. Other than that, there were very few changes to that.

Tier 1 departures that affect Chapter 6. There's a number of them. We've talked about the deletion of MSIV closure scram on high radiation. So, that really just affected a note in one table in 6. So, that's a very minor change.

RHR, you know, you heard about we've got three loops of RHR that can now connect to the spent fuel pool, the cooling. That had a very minor descriptive change in Chapter 6. No impact on any analyses.

Tier 1 departures. Feedwater line break mitigation. We talked a little bit about this during the presentation this morning. That is a trip or an actuation that was added, recommended by GE. And we've put that in our design basis. And basically it will trip the condensate pumps if you have high differential pressure between two feedwater lines and high drywell pressure. And that was not credited in the analysis directly, however, we feel like it provides additional assurance that the feedwater flow assumptions continue to be --

ACTING CHAIR STETKAR: From an old operator's perspective, you've now inserted condensate booster pumps in the design, you're tripping the condensate pumps. Are you now relying on the condensate booster pumps to trip on low suction pressure and the feedwater pumps to trip to low-suction pressure?

MR. TOMKINS: I'm not sure I can answer that one.

ACTING CHAIR STETKAR: There's a heck of a lot of pumps that --

MR. TOMKINS: Right.

ACTING CHAIR STETKAR: -- if the condensate pumps trip now don't have a lot of water available to them.

MR. HEAD: Well, I'm thinking we're headed towards the answer being yes. But, Coley, are you going to --

MR. TOMKINS: The whole idea was to keep flow from continuing --

ACTING CHAIR STETKAR: Well, but I mean, you could do that by tripping the feedwater pumps, for example.

MR. JAIN: If you trip the condensate pumps --

ACTING CHAIR STETKAR: You have to identify -- make sure that our recorder --

MR. JAIN: This is Nirmal Jain. If you trip the condensate pump, you will definitely have a trip of booster pumps or feedwater pump on the low-suction pressure. But even if they do not trip, they'll simply be spinning, because they don't have the supply of water.

ACTING CHAIR STETKAR: Well, they'll be spinning until they burn up.

MR. JAIN: True. But from a --

ACTING CHAIR STETKAR: No, no. As I said, as an old operator, not as a design basis licensing analyst. I was just curious whether from a --

MR. HEAD: That's our current plan.

ACTING CHAIR STETKAR: There are a number of different way of not having flow into the reactor vessel, and tripping the condensate pumps is one.

MR. HEAD: Yes, sir.

ACTING CHAIR STETKAR: Okay.

MR. HEAD: That's our current plan for this particular action.

ACTING CHAIR STETKAR: Okay. I was just curious how much -- it's one way of doing it. Okay.

MR. HEAD: It's our current --

ACTING CHAIR STETKAR: And I understand. From our discussion of design basis licensing analysis, this is a good thing and the analyses have not taken credit for it to date. So, this indeed helps with all of our discussion to this point today in Chapter 6. Okay.

MR. TOMKINS: And additional tier 1 departures. RCIC. I think you've heard about RCIC. We've changed the configuration there. That required changes to some of the tables in 6.2, some of the penetration tables and also the ISI equipment, because some equipment basically went away.

Eliminated the hydrogen recombiners. We did this per the regulations. That was part of the combustible gas subsection in 6.2. And so, there was some significant changes to remove that system. In addition, some of those penetrations and some of the ISI listings went away. So, those changes were all made just to implement that change that I think many plants, if not all, have made.

Safety-related I&C. Just a terminology change in the 6. I think there was a multiplexer in there and so that --

MR. HEAD: Yes, that's a constant.

MR. TOMKINS: There were some additional tier 2 departures that impacted the -- I think we've talked about this departure as well. It changed a

PNID, a Chapter 6 PNID for high pressure core flooder, because we eliminated some piping to collect leakage that we no longer need that piping to collect leakage for.

The next two were HVAC normal cooling water. We made some changes to that system. We beefed it up a little bit. And so, that changed the size of one of the -- again one of the penetrations is a little bigger to support that. And so, that changed Chapter 6 for that.

ACTING CHAIR STETKAR: I get confused among the different design centers. We've not seen Chapter 9 yet, have we?

MR. TOMKINS: No.

ACTING CHAIR STETKAR: Okay. Thanks. We're juggling too many balls these days. So, thanks.

MR. TOMKINS: And breathing air, we created a departure to have a separate breathing air system, separate from a service air system. And so, that required us to use one of the spare penetrations that was already in the DCD. So, I think that's a good change. But that affected Chapter 6.

COL items. There were 15 COL items in Chapter 6. I'm not going to talk about all of them. I'll just pick a few of them. We believe we've closed them all. There's still one that is an open item because we haven't resolved it with the NRC.

But suppression pool cleanliness, we've had a lot of discussion on that. We created and operational program for suppression pool cleanliness. It's a couple-page write-up in Chapter 6 that details the elements and the key attributes of keeping the containment and suppression pool very clean, which is obviously a very important thing.

Wetwell/drywell vacuum breakers. We heard about that this morning. We've just recently sent in an RAI response to the NRC to give some more detail on that. What that looks like is for the vacuum breakers we're going to have V-shaped plates. The drawing I saw showed the preliminary calc. They're about an inch thick. And the idea is as the water comes up and it nears the vacuum breakers, it gets deflected around so the vacuum breakers don't get hit with that wall of water that's coming up in the pool swell event.

ACTING CHAIR STETKAR: I was hoping we were going to see a little bit more about those, but apparently they're not --

MR. TOMKINS: Well, we have a --

ACTING CHAIR STETKAR: I mean, you know --

MR. TOMKINS: -- picture in the RAI of it, but I don't know --

ACTING CHAIR STETKAR: Yes, we haven't seen it. Okay.

MR. TOMKINS: And we haven't completed the design, so it probably --

ACTING CHAIR STETKAR: I mean, there's one to deflect the surge. There's another one just to make sure you don't get a lot of water into the vacuum breaker itself.

MR. TOMKINS: Right.

ACTING CHAIR STETKAR: So, it's not just force but also height. So, it's kind of a interesting design perhaps.

MR. TOMKINS: You know, that could be when we finalize the design.

ACTING CHAIR STETKAR: Yes.

MR. TOMKINS: We're not done with the design yet.

ACTING CHAIR STETKAR: Okay.

MS. BANERJEE: It should be an action item?

ACTING CHAIR STETKAR: I think it would be, yes. I think we'd like to see what they look like.

PARTICIPANT: Vacuum breakers are a big

deal.

ACTING CHAIR STETKAR: Vacuum breakers are kind of a big deal and you probably don't want to get a lot of water in there, because I actually don't know on this plant what they look like and how they might seat, if they pass water --

MR. TOMKINS: Okay. Got that.

ACTING CHAIR STETKAR: -- or get water in there. So, I think it would be good to put that down on our list, that we'd like to learn a little bit more about that.

MR. TOMKINS: Okay. The first three ECCS testing requirements. They were all sort of predicated on changing to a new fuel type as far as the COL application. So, those were all satisfied with what was already in the DCD.

Toxic gas is an action we had to take to make sure that there weren't any chemical plants, any transport of chemicals nearby the plant that could threaten the control room. We've done that analysis. We've concluded that there's no additional detection or protection needed, but we're continuing to have RAIs between us and the staff to resolve that. And it turns out there's a chemical plant that's 4.9 miles away and there are some pretty big tanks, but they're all well-protected and they have berms and --

ACTING CHAIR STETKAR: It's over by Wadsworth, right?

MR. TOMKINS: I'm sorry?

ACTING CHAIR STETKAR: It's over by Wadsworth, isn't it?

MR. TOMKINS: It's actually -- yes.

ACTING CHAIR STETKAR: Okay.

MR. TOMKINS: It's actually downwind from the plant, so we don't think it would -- at any rate.

Standby gas treatment system performance. There's a COL item that we will do a draw down test. And there's actually an ITACC as well that we will ensure that the standby gas treatment system can draw down the secondary containment to a quarter inch water gauge. I think it's in like 10 minutes or something. It's a pretty stiff requirement to be able to -- and you leave some of the secondary containment, and I think you leave the largest secondary containment penetration open. And so, you know, we've committed that we will do that test. And it's also really an ITACC as well.

The next one, standby gas treatment system exceeding 90 hours of operation. That, there was a concern that people could overuse that system. The intent would be to never use it more than 90 hours of a year. I think that would be very unusual that that would happen. But, they wanted a commitment that if we did use it for more than 90 hours in one year that an analysis would be performed and we would also check the charcoal in essence proving that the system is still operable. So, I think that one has been closed.

MR. HEAD: How many more slides?

MR. TOMKINS: About five more.

MR. HEAD: Okay.

MR. TOMKINS: I know you're pushing me.

MR. HEAD: I am.

MR. TOMKINS: Site-specific supplement. This was a table in 6.1 that had a note in it saying the materials would be site-dependent. So, we made a commitment to provide those materials. The staff asked to get what those materials were going to be. It was in the reactor building cooling water and reactor service water. And we've now provided them and they have those, and I think they've agreed with what we're providing for those heat exchangers.

I'll go through the ITACC real quickly. I mean, there's a lot of them for containment. In most cases they're not particularly dramatic or interesting, but containment atmospheric monitoring system has an ITACC. Suppression pool cooling has an ITACC. Suppression pool cleanup system has an ITACC.

This one's kind of significant. Containment structures. So, if you look at the third sub-bullet, that essentially says that when the containment's built and everything's constructed, we will go look at the as-built of the containment. We'll look at the feedwater piping and we'll make sure that all the inputs we used in the containment analysis are still valid and that the result is still valid. I don't know that we'll necessarily rerun the accident, but we'll certainly convince ourselves that the analysis of record is still valid.

There's an ILRT test that's done. There's actually an analysis of how open the vacuum breakers can be without being able to detect it in the control room, and is that amount of bypass great enough that it would cause a problem. So, that's an ITACC as well.

And then the final thing is kind of what we talked about today, is there's a structural analysis report that confirms that all the structures in the suppression pool can withstand the pool swell and the surge forces and the CO chugging and all those things. So, that will be sort of the final closeout that all these phenomena we're talking about earlier with pool swell are okay.

Standby gas treatment. I mentioned that. There's an ITACC on that to do that draw down test.

And then these last three are atmospheric control system, drywell cooling, suppression pool temperature monitoring. There's a fairly mundane ITACC on those items.

The last one that I'll mention, really Caroline kind of already mentioned this. She said there will be a required NTS test at the facility for the RHR, RCIC and high pressure core flooder pumps. And then there will be an available NPS analysis performed based on things like minimum level and, you know, the results of going through the analysis associated with Reg Guide 1.82 Rev 3.

And there's no DAC in Chapter 6.

PARTICIPANT: Ending on high note.

MR. TOMKINS: Right.

ACTING CHAIR STETKAR: Well, thank you. That was I think a good summary presentation.

I know people are probably getting pressed for time. Scott, I see you checking your watch.

MR. HEAD: So, we did a 20 in 15.

ACTING CHAIR STETKAR: What?

MR. HEAD: I just know that we got close.

ACTING CHAIR STETKAR: Yes.

MS. BANERJEE: Shall I go through the action item status?

ACTING CHAIR STETKAR: Let me first make sure that none of the remaining members have any questions regarding this presentation.

Can we open up the bridge line just to make sure that we don't have any public comments or questions before we go through the action items?

MS. BANERJEE: Hi, Theron.

ACTING CHAIR STETKAR: Theron, can you open up the bridge line?

MR. BROWN: It is open.

ACTING CHAIR STETKAR: Thank you. Anyone listening in, do you have any questions or comments that you'd like to put on the record?

(No audible response.)

ACTING CHAIR STETKAR: Hearing nothing, I'm assuming that the answer is no, if anyone's out there.

Anyone from the public have anything to say?

(No audible response.)

ACTING CHAIR STETKAR: Okay. Thanks.

Maitri, if you can --

MS. BANERJEE: Yes, I just wanted to go through the status of the open items.

We discussed first the DRAP open items. It's going to be a future presentation on how the list is evolving.

Okay. The second one was existing No. 6, feedwater line break mitigation, not in Chapter 15. And then STP discussed how Chapter 6.2 and Chapter 15 addresses these accidents. And so, I thought that was resolved.

ACTING CHAIR STETKAR: I believe that's resolved, yes.

MS. BANERJEE: Yes, so that's closed.

ACTING CHAIR STETKAR: That's closed.

MS. BANERJEE: Okay. New ones. Frequency and timing of vacuum breaker openings under design basis scenario. That was a question somebody asked. I didn't hear any answer to that.

MR. HEAD: Would you say that one again?

MS. BANERJEE: Frequency and timing of vacuum breaker openings under design basis scenario. Somebody says --

MR. HEAD: I think Oikawason answered that one, that they were --

MS. BANERJEE: Is it answered?

MR. HEAD: -- in essence the same.

MS. BANERJEE: Who asked it?

ACTING CHAIR STETKAR: I don't recall who asked it, and I do know it came up. I wasn't quite sure whether we had --

MS. BANERJEE: How vacuum -- yes, Dr. Corradini asked it. How vacuum breakers behave, frequency and timing. That was his question. I can ask him.

ACTING CHAIR STETKAR: Maitri, just check with Mike and make sure off line.

MR. HEAD: Right. I believe Oikawason answered that. So they're pretty much the same, but please do confirm that and if we need to do it again, we --

ACTING CHAIR STETKAR: We'll confirm it internally.

MS. BANERJEE: Okay. Basis for 350 degree limit of containment gas temperature.

ACTING CHAIR STETKAR: Three-forty.

MS. BANERJEE: Three-forty degree, yes. I'm sorry.

ACTING CHAIR STETKAR: That's still open.

MR. HEAD: We got that. And can I give a

shot at that, please, if we can?

ACTING CHAIR STETKAR: Sure, if you --

MR. HEAD: Well, I mean, it's pretty fundamental. We've discussed EQ today, but in the context of what we were discussing today, the containment, you know, it needs a temperature to assume the concrete and everything is --

ACTING CHAIR STETKAR: I think the question was does that 340 already account for some type of time soak, if you will, or is that an --

MR. HEAD: No, it's just --

MEMBER SHACK: But you're saying the analysis is performed as though the containment is at 340.

MR. HEAD: Is at 340.

ACTING CHAIR STETKAR: Is at 340.

MS. BANERJEE: Continuously.

MR. HEAD: Forever. Yes. Yes.

ACTING CHAIR STETKAR: Okay. So, I think that answers that question.

MR. HEAD: That answers the question.

MS. BANERJEE: Okay.

MR. HEAD: So, it is soaked.

ACTING CHAIR STETKAR: It is soaked.

MR. HEAD: Yes, right.

MS. BANERJEE: That's closed?

ACTING CHAIR STETKAR: That's closed.

MS. BANERJEE: Okay. Then PPM boron in solution is in the analysis for ECCS strainers.

PARTICIPANT: And that will be a follow-up item.

ACTING CHAIR STETKAR: That's a follow-up. That's still necessary because that affects the aluminum solubility and such.

MS. BANERJEE: Right. Downstream effects. Plus, there will be a future briefing by STP and NRO on downstream effects. Basis for assuming 10 percent of one foot cube destroyed fiber reaching the fuel.

ACTING CHAIR STETKAR: Yes.

MS. BANERJEE: It's going to be contained in that briefing.

MR. HEAD: Right.

ACTING CHAIR STETKAR: Yes.

MS. BANERJEE: Addressed in that briefing.

MR. TOMKINS: And we're going to cover the analysis for that downstream. That will be the --

MEMBER SHACK: The acceptance criteria.

MR. TOMKINS: -- in the analysis to determine the -- yes.

ACTING CHAIR STETKAR: Before we discuss

that, let's see if Maitri has anything else on the punch list. Then we can come back to that topic.

MS. BANERJEE: Okay. Somebody asked for three EPRI reports used in staff review of containment analysis, WCAP-17058.

MEMBER SHACK: I think they were ERI reports, weren't they?

ACTING CHAIR STETKAR: ERI. They're ERI reports.

MS. BANERJEE: ERI reports.

ACTING CHAIR STETKAR: That's the ERI reports supporting their models.

MEMBER SHACK: The MELCOR stuff, right.

MS. BANERJEE: Yes.

ACTING CHAIR STETKAR: Yes, and their model on the pool swell.

MEMBER SHACK: That's right, it's a model, yes.

ACTING CHAIR STETKAR: It's their model on the pool swell I think. It's not the MELCOR.

MS. BANERJEE: Okay.

MEMBER SHACK: Well, there's two.

ACTING CHAIR STETKAR: Well, yes, there's two. There's one on the MELCOR analyses and one on the --

MS. BANERJEE: So, it's two, not three?

ACTING CHAIR STETKAR: Mohsen would know. Mohsen, are you still here?

(No audible response.)

MR. McKIRGAN: Okay. Yes, there are three reports in total.

ACTING CHAIR STETKAR: Three in total?

MR. McKIRGAN: The third is a PIRT.

ACTING CHAIR STETKAR: Oh, that's right. The PIRT report for the --

MS. BANERJEE: Two ERI, plus one PIRT report?

ACTING CHAIR STETKAR: Yes, and that's also an ERI report.

MR. McKIRGAN: If we could just capture it as three, the three ERI reports.

ACTING CHAIR STETKAR: Yes, the three. But it's ERI.

MS. BANERJEE: Okay. Yes, ERI did the part.

MR. HEAD: So, could I go back one? The 10 percent issue --

ACTING CHAIR STETKAR: Yes?

MR. HEAD: -- that's one open follow-up item. There's a separate follow-up item to discuss the analysis we did for the confirmatory analysis for the fuel, you know, plugging that would occur as stuff got through.

ACTING CHAIR STETKAR: I'm sort of lumping those together in one. That's why I wanted to come back to that after Maitri finishes.

MR. HEAD: Aren't we going to do them -- well, we may, but I think they're --

ACTING CHAIR STETKAR: Okay. Let's --

MR. HEAD: -- different issues. They're totally different things.

ACTING CHAIR STETKAR: They're separate pieces. Let's come back to -- Maitri's still got one or two things.

MS. BANERJEE: I have only two left. Staff presentation on ECCS strainer slide No. 38. Debris generation and transport bounded by PWR numbers or not? That's what Dr. Banerjee asked.

MR. McKIRGAN: I believe that question was answered. That was the RMI ZOI versus 7.4 and all. Yes.

ACTING CHAIR STETKAR: That's right. So, I think we're okay.

MS. BANERJEE: Seven-point-four? Okay.

PARTICIPANT: I don't understand it all,

but I'll believe.

MS. BANERJEE: So, I don't have to enter it?

ACTING CHAIR STETKAR: No.

MS. BANERJEE: Okay. And the last one I have his design basis of vacuum breaker shield. That's for a future briefing.

ACTING CHAIR STETKAR: And that is for a future briefing. I think that just came up.

MS. BANERJEE: That's all I have.

ACTING CHAIR STETKAR: Okay. Now, we can go back to --

MS. BANERJEE: Clarify the --

ACTING CHAIR STETKAR: -- clarify what we do about downstream effects and the presentation.

MR. HEAD: Okay. And I just see it as two separate open items that we'll be presenting. One is on the 10 percent effect, and then one is on the fuel effect that we showed our calculation on and basically, the details on how we did that.

ACTING CHAIR STETKAR: Yes.

MR. HEAD: Okay. And then --

MEMBER SHACK: The green line.

MR. HEAD: I'm sorry?

MEMBER SHACK: The green line.

MR. HEAD: The green line, yes. Yes. And then one I believe that I heard from the Chairman that I just want to make sure we understand, that as he was looking at me about a future opportunity to ask questions on all these reports. And so, we've discussed a number of reports today and that sounded different than what we typically hear, so --

ACTING CHAIR STETKAR: And I'm not sure. That's --

MEMBER SHACK: Well, I think the intent there was to discuss the Toshiba reports on the --

MS. BANERJEE: Pool swell and the three ECCS strainers.

MEMBER SHACK: Well, mostly the strainers.

ACTING CHAIR STETKAR: Mostly the strainer stuff, I think.

PARTICIPANT: Reports 001, 2 and 3.

MEMBER SHACK: Zero-zero-five. I find that once you dig into them, I don't know how many reports there are.

MS. BANERJEE: Three, basically, yes. So, that's something I think we have to discuss a little more.

ACTING CHAIR STETKAR: I think probably what we should do given the fact that -- Said theoretically will be back imminently here.

MEMBER SIEBER: By 3:00, he said.

ACTING CHAIR STETKAR: I don't know if we want to take a quick break and wait for him to come back, or is it worth doing that? Or should we just try to do it off line, make sure that our staff communicates with NRC staff and we get resolution about what -- it's clear that we're going to have another subcommittee meeting. It's just the question of the exact scope of material that will be covered within that meeting.

MR. HEAD: Well, Maitri could just call us and --

ACTING CHAIR STETKAR: And we can do that off line. We don't need to have that resolved, you know, this afternoon.

MR. HEAD: -- then I'm prepared for us to support that discussion.

ACTING CHAIR STETKAR: Yes. Yes.

MR. HEAD: We would just like to know do we need a presentation on it, or would it just be literally questions? On page 44, it says --

ACTING CHAIR STETKAR: And we can resolve that off line between Maitri and the staff.

MR. WUNDER: I have one more thing, going through the punch list, if I may.

I do believe if you look at No. 8 on Maitri's list, did we address that today? We should have addressed two open items from the previous list.

MS. BANERJEE: No. 8.

PARTICIPANT: What is No. 8?

MS. BANERJEE: It's the flow blockage, not just for fuel. Address GSI-191 flow blockage.

MR. HEAD: Maybe we didn't.

ACTING CHAIR STETKAR: My guess would be no.

ACTING CHAIR STETKAR: No.

MS. BANERJEE: It's not, but it may --

ACTING CHAIR STETKAR: It's becoming better defined what that might mean.

MS. BANERJEE: Yes, better defined.

MR. HEAD: Okay. All right. So, we'll --

ACTING CHAIR STETKAR: But I think --

MR. HEAD: Maybe that will be the umbrella over --

ACTING CHAIR STETKAR: Yes, I think we're focusing in on what that might be as an issue, but --

MS. BANERJEE: Right. Okay. Thank you.

ACTING CHAIR STETKAR: Anything else?

(No audible response.)

ACTING CHAIR STETKAR: Either of the members have any closing comments, questions?

MEMBER SIEBER: No.

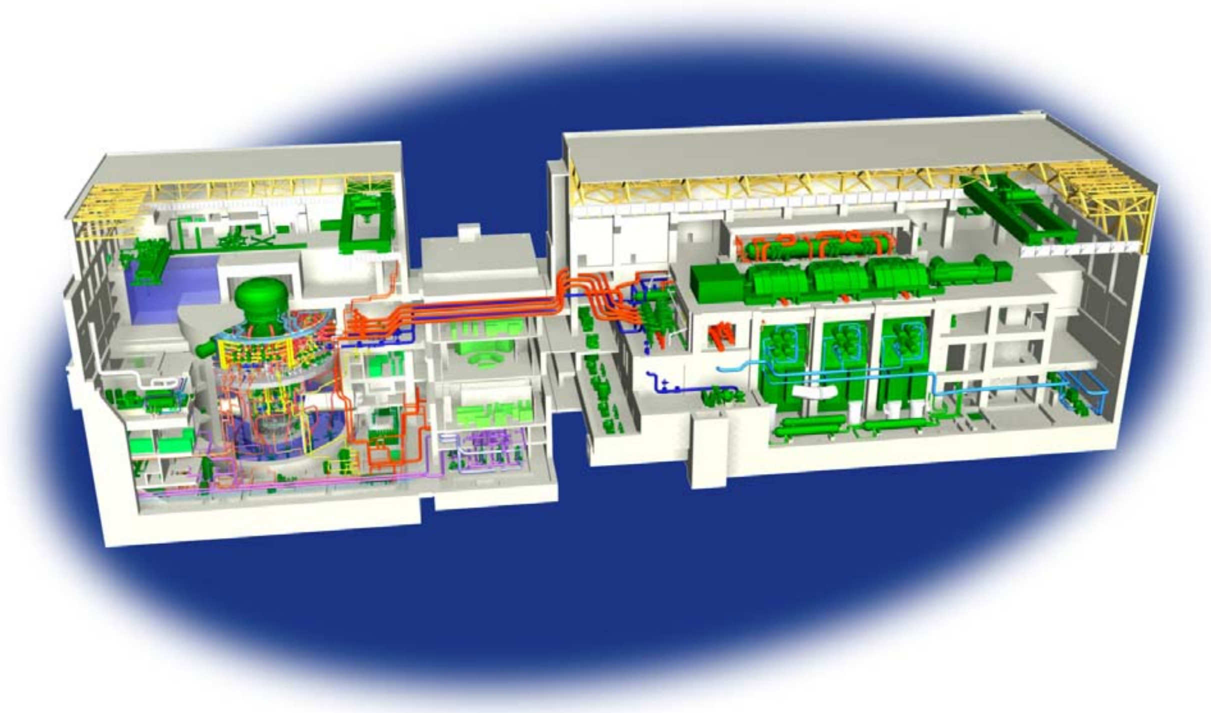
ACTING CHAIR STETKAR: Thank you, South Texas. Staff, thank you very much. I thought the presentations were very, very good. I think the discussion was good. I thank you for indulging us. We picked up an hour this afternoon.

And with that, the meeting is closed.

(Whereupon, the meeting was adjourned at 2:59 p.m.)

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 10
Steam and Power Conversion System



Agenda

- Introduction
- Summary
- Contents of FSAR Chapter 10
  - Departure Information
  - Site-Specific Supplements
  - COL License Information Items
- ITAAC
- Conclusion

Attendees

Scott Head	Manager, Regulatory Affairs, STP 3&4
Thomas Daley	Mechanical Systems Supervisor
Coley Chappell	Regulatory Affairs
Jim Agles	Regulatory Affairs

Chapter 10 Summary

- Describes the main steam supply from the seismic interface restraint downstream of the outboard MSIVs to the turbine stop valves and turbine bypass valves.
- Describes the turbine generator, including high-pressure turbine, low-pressure turbines, moisture separator reheaters, main stop and control valves, intermediate stop and intercept valves, extraction non-return valves, as well as the turbine protection system, and supervisory instruments.

Chapter 10 Summary (cont'd)

- Discusses principal design features, including the turbine bypass system, main condenser and evacuation system, turbine gland sealing system, circulating water system, condensate purification, and condensate and feedwater system.

- Safety-related Reactor Protection System (RPS) instrumentation is provided for turbine control valve fast closure, main stop valve position, turbine first-stage pressure, and main condenser pressure.

Chapter 10 Contents

10.01 Summary Description

10.02 Turbine Generator

10.03 Main Steam Supply System

10.04 Other Features of Steam and Power Conversion System

Departures

- STD DEP T1 3.4-1 – Nomenclature changes
- STD DEP T1 2.4-2 – Added safety-related switchgear and breakers for condensate pump trip (Feedwater Line Break Mitigation)
- STP DEP 1.2-2 – Changes to the Turbine Building design
- STP DEP 9.2-3 – Cooling water to Offgas condensers changed from condensate to Turbine Building Cooling Water System
- STP DEP 10.1-1 – Description in Section 10.1 revised to be consistent with Subsection 7.7.1.8
- STP DEP 10.1-2 – Revised Figure 10.1-1, Steam and Power Conversion System, to reflect other departures made to improve overall cycle efficiency, plant reliability, and availability

Departures (cont'd)

- STP DEP 10.1-3 – Heat Balance for Guaranteed Reactor Rating (Figure 10.1-2) revised to reflect turbine and steam cycle design as shown in Figure 10.1-1
- STP DEP 10.1-4 – Heat Balance Valves-Wide-Open (Figure 10.1-3) revised to reflect changes shown in Figure 10.1-1
- STP DEP 10.2-1 – Changes to reflect the Toshiba turbine design
- STP DEP 10.2-2 – Monoblock forgings for fabrication of low pressure turbine rotors
- STP DEP 10.2-3 – Implements turbine digital controls
- STP DEP 10.2-4 – Change to location of bulk hydrogen storage

Departures (cont'd)

- STD DEP 10.3-1 – Adds description of the steamline drains including function as main steam line leakage paths
- STD DEP 10.4-1 – Adds a gland seal evaporator to supply a source of clean steam for the turbine gland seal system
- STP DEP 10.4-2 – Changes to main condenser arrangement, single-pressure, parallel flow (vice multi-pressure, series flow), and site dependent design including four 25% circulating water pumps
- STP DEP 10.4-3 – Adds second 100% condenser vacuum pump, and provides the steam jet air ejectors with main steam instead of crossaround steam with main steam as a backup.

Departures (cont'd)

- STD DEP 10.4-5 – Changes to Condensate and Feedwater System arrangement and number of components, including the use of four (vice three) feedwater pumps, four (vice two) heater drain pumps, and adds condensate booster pumps
  - *Change to Technical Specification Bases to refer to four feedwater pump adjustable speed drives*
- STD DEP 10.4-6 – Clarifies bypass valve capability is 33%
- STD DEP 10.4-7 – Revises Figure 10.4-9, Bypass Valve Control, to be consistent with system text descriptions

Site-specific Supplemental Information

- Conceptual design information regarding type and quantity of major secondary side components was replaced with site-specific supplemental information (Section 10.1)
- Site-specific supplemental information related to the main cooling reservoir (MCR) and circulating water system (CWS)
  - Information outside the scope of the DCD (Section 10.4.5.7)
  - Address interface requirements (Sections 10.4.5.7.2 and 10.4.5.8.2)
  - Replace conceptual information (Section 10.4.5.8).

COL License Information Items

10.1 Low Pressure Turbine Disk Fracture Toughness:

Material properties used in the turbine rotor design will be added to FSAR after procurement and prior to fuel load (COM 10.2-1).

10.2 Turbine Design Overspeed:

Maximum speed resulting from loss of load is normally in the range of 105-108% of rated speed. Calculated stresses do not exceed the minimum material strength at 120% of rated speed. Turbine rotors are spun to a speed of 120% rated as part of factory balance verification. This is approximately 12% above the highest anticipated speed resulting from loss of load.

10.3 Turbine Inservice Test and Inspection:

Described in Subsection 10.2.3.6.

COL License Information Items (cont'd)

10.4 Procedures to Avoid Steam Hammer and Discharge Loads:

Plant Operating Procedure Development Plan is described in Subsection 13.5.3.1.

10.5 MSIV Leakage:

MSIVs are designed to limit the leakage to less than 66.1 L/min for all four lines, at a pressure corresponding to the calculated peak containment pressure for design basis accidents given in Table 6.2-1.

10.6 Radiological Analysis of the TGSS Effluents:

Included in the offsite dose calculation manual (ODCM).

ITAAC

- DCD Tier 1 Section 2.10, Power Cycle Systems, incorporated by reference, provides ITAAC related to FSAR Chapter 10:
  - Turbine Main Steam System
  - Condensate and Feedwater System
  - Main Condenser Evacuation System
  - Condensate Purification System
  - Main Turbine
  - Turbine Gland Seal System
  - Turbine Bypass System
  - Main Condenser
  - Off-Gas System
  - Circulating Water System

- In response to Request for Additional Information (RAI 10.02-4), added site-specific ITAAC to address diversity of main turbine overspeed trip systems devices.

Chapter 10
Steam and Power Conversion System

Questions and Comments

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 10
“Steam and Power Conversion Systems”

June 23, 2010

Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM, DNRL/NGE2
  - Tom Tai, Chapter PM, DNRL/NGE2
- **Technical Staff**
  - SBPA, Chief, John Segala
  - SBPB, Chief, Samuel Lee
  - SBPA, Lead Reviewer, Devender Reddy
  - SBPA, Lead Reviewer, Angelo Stubbs
  - CIB2, Chief, Michael Norato
  - CIB2, Lead Reviewer, Greg Makar

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Protecting People and the Environment

Overview of STP COLA

SRP Section/Application Section		Open Items	
		Number of Open Items	Status
10.2	Turbine Generator System	2	Under Review
10.3	Main Steam Supply System	0	0
10.4.1 & 2	Main Condenser & Evacuation Systems	0	0
10.4.3	Turbine Gland Sealing System	3	Under Review
10.4.4	Turbine Bypass System	0	0
10.4.5	Circulating Water System	0	0
10.4.6	Condensate Cleanup System	0	0
10.4.7	Condensate & Feedwater System	1	Under Review

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Protecting People and the Environment

Technical Topics of Interest
Section 10.2 – Turbine Rotor Integrity

- Several technical changes proposed in the FSAR through Tier 2 departures:
  - Integral rotor forgings rather than rotors with shrunk-on discs
  - Higher fracture appearance transition temperature (FATT)
  - Lower notch toughness (C_v energy)
- The staff performed an audit and concluded the applicant had conducted appropriate technical evaluations to justify the departures
- COL Item 10.1 – Low Pressure Turbine Disk Fracture Toughness. Addressed by proposing Commitment 10.2-1 to provide the material property data after procurement and prior to fuel load.
- This commitment conforms to the guidance in SRP 10.2.3 because the rotor material properties used to calculate the probability of turbine missile generation must be based on the actual rotor material.
- The applicant will update Section 10.2.5.1 of the FSAR to clarify that the as-built material property data will be provided in accordance with Commitment 10.2-1. (Confirmatory Item 10.02.03-1)

Technical Topics of Interest
Section 10.2 – Turbine Generator

- Turbine Overspeed – D-EHC System
  - In lieu of a primary mechanical overspeed protection device, STP proposed an electrical overspeed device
- Staff Evaluation
  - Tier 1 ITAAC needed to ensure redundancy and diversity between the two redundant electrical overspeed protection devices
- Open Item
  - Pending Staff's review and resolution of STP response to RAI 4103, Questions 10.02-3

Turbine Overspeed D-EHC System

Regulatory Basis:

- Conformance to GDC 4 requires that for the protection of SSCs important to safety from turbine missiles, the T-G system should be provided with a Protection System to minimize the Probability of Turbine Missile Generation.
- To meet the GDC 4 Criteria, SRP Acceptance Criteria (in Section 10.2) specifies that the Turbine Protection system should include Overspeed Control Systems with suitable Redundancy and Diversity Features.
- Further, the SRP guidance calls for providing a primary – mechanical overspeed device to protect the turbine at 111% of its rated speed, and also an emergency – back up electrical overspeed device at 112% rated speed to meet the redundancy and diversity features.

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Turbine Overspeed D-EHC System
(Cont'd)

STP Design:

- The STP design departs from ABWR DC, and uses two electrical overspeed systems, instead of one mechanical and the other electrical

Staff Evaluation:

- The staff reviewed the STP application, and focused its review on the redundant and diverse features of the O/S systems based on SRP Guidance.
- In the process, the staff issued RAIs for additional information to justify STP departure from the DC and SRP guidance.
- Also, the staff requested for a Tier 1 - ITAAC to confirm the redundant and diverse features of the two Electrical systems, and to conform to 10 CFR 52.47 criteria
- STP provided its responses in this regard, which is under review by the staff

Status: This remains as an Open Item, until the staff resolves this issue

Sections 10.4.3 – Turbine Gland Seal System

- STD DEP 10.4-1 modifies the standard design of the reference ABWR DCD, by adding a gland steam evaporator (GSE) to the turbine gland seal system (TGSS)
- As a result, FSAR Figure 10.4-2, “Turbine Gland Seal System,” was modified from that in the DCD
- Three Open Items related to modifications to the Figure 10.4-2
  - Deletion of Loop Seal
  - Deletion of Pressure Switch to start standby blower
  - Deletion of a Check Valve between motor-driven and regulating valves
- Staff issued RAIs requesting the applicant to address the impact of the above modifications to the TGSS
- **Status -** STP provided its responses, which are under review by the staff

Technical Topics of Interest

Section 10.4.7 – Condensate And Feedwater System

- FSAR

  - STP COL incorporated by Tier 1, Section 2.10.2 "Condensate Feedwater, and Condensate Air Extraction System," of the ABWR DCD.

  - STD DEP10.4-5 modifies the CFS standard design and adds condensate booster pumps to the system after the condensate purification system and before the LP feedwater heaters.

Technical Topics of Interest
Section 10.4.7 – Condensate And Feedwater System

- **Open Item 10.04.07-3:**

- STP COLA departs from the CFS standard design and adds new SSCs comparable in importance to those provide in the design description, functional arrangement, and ITAAC Tier 1 design in the ABWR DCD.

- The purpose of the ITAAC is to verify that an the as-built facility conforms to the approved plant design and applicable regulations. STD DEP10.4-5, results in a STP Tier 2 design that differs from the Tier 1 design if the ABWR DCD Tier 1 Section 2.10.2 is incorporated by reference with no departures.

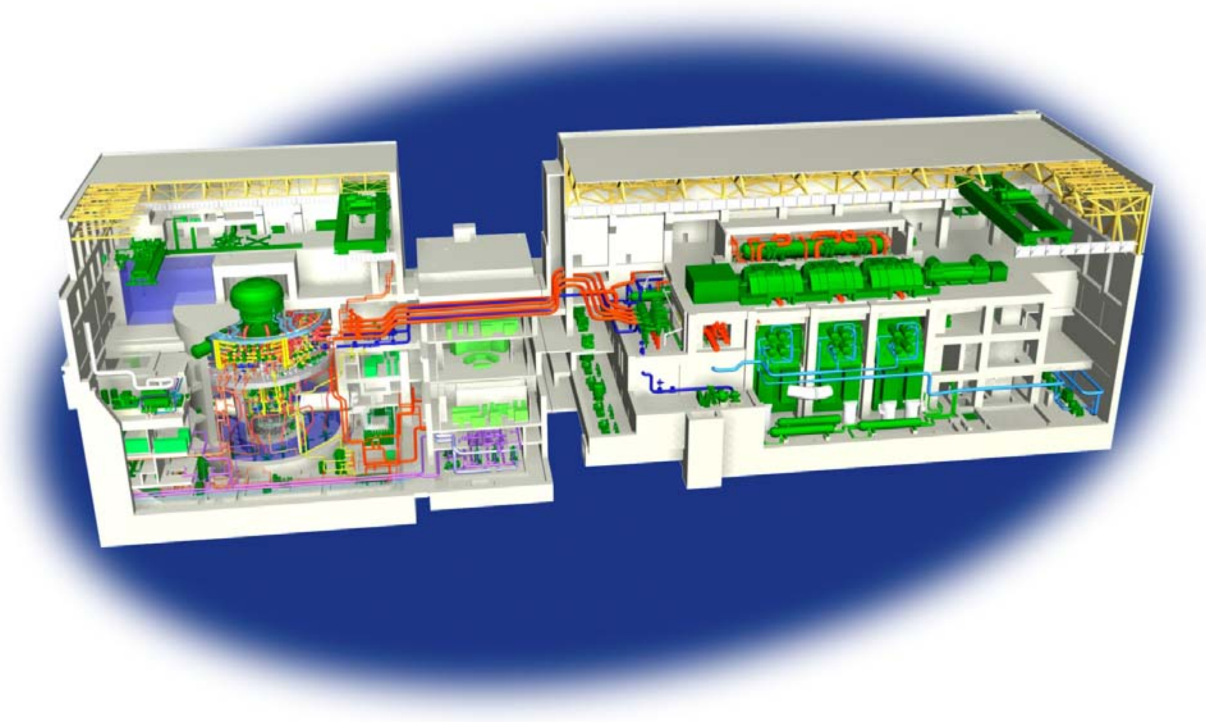
- Open Item 10.04.07-3 requested the applicant update the Tier 1 CFS design description and/or functional arrangement in Section 2.10.2 so that it is applicable to the site specific CFS design being licensed.

Conclusion

- No major technical issues identified in Chapter 10 review.
- Two (2) Open Items in Section 10.2. Responses under evaluation and possible supplemental RAI
- Three (3) Open Items in Section 10.4.3. Responses under evaluation
- One (1) Open Item in Section 10.4.7. Response under evaluation.
- One (1) Confirmatory Item in Section 10.2.3.

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 13
Conduct of Operations



Agenda

- Introduction
- Summary
- Contents of FSAR Chapter 13
  - Departure Information
  - Site-Specific Supplements
  - COL License Information Items
- ITAAC
- Conclusion

Attendees

STPNOC, STP 3 & 4:

Scott Head	Regulatory Affairs Manager
Fred Puleo	Regulatory Affairs
Jay Phelps	Operations Manager
Glenn Macdonald	Operations Training Manager
Coley Chappell	Regulatory Affairs

Chapter 13 Summary

Required a large amount of site specific supplemental information related to STP Operational Programs.

Chapter 13

- No Departures
- Site-specific supplemental information
  - 13.1 Organization – STPNOC specific
  - 13.2 Training – IBR NEI 06-13 “Template for Industry Training Program Description”
  - 13.3 Emergency Plan –
    - COLA Part 5
    - STP modified existing plan for four Units
  - 13.4S Operational Programs Implementation Schedule
  - 13.5 Plant Procedures – Site specific application

COL License Information Items

13.1 – Training, TMI Action Item for Operating

13.2 – Emergency Plan

13.3 – Plant Operating Procedures

13.4 – Emergency Operating Procedures

13.5 – Implementation of Procedures Plan

13.6 – Scope of Procedures in Plan

13.7 – Security Plan

ITAAC

COLA Part 9 ITAAC

- Section 4 – Emergency Facilities
- Implements the templates provided in Regulatory Guide 1.206

Operations

- Staffing Plans
- Training Timelines
- Experience Opportunities
- Procedure Development
- Involvement in Design
- Existing Mature Program

Operations Training

- Existing Programs
  - Boiling Water Reactor Training Center (BTC)
  - Tokyo Electric Power Company (K6/7)
  - Tai Power (Lungmen)
  - US Domestic Fleet
  - Experienced Training Staff
- Phased Training Material Development
- Initial Accreditation

Chapter 13
Conduct of Operations

Questions and Comments

Presentation to the ACRS Subcommittee

South Texas Project Units 3 and 4 COL Application Review

SER/OI Chapter 13
"Conduct of Operations"

June 23, 2010

STP COL Chapter 13 Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM
  - Rocky Foster, Chapter PM

- **Technical Staff**
  - Jim Kellum, Lead Reviewer, COLP
  - Robert Moody, Technical Reviewer, NSIR/DPR

Presentation Outline

- Overview of STP Combined License Application Open Items
- 13.1 - Organizational Structural of Applicant
- 13.2 - Training
- 13.5 - Plant Procedures
- 13.4 - Review and Audit
- 13.4S - Operational Program Implementation
- 13.3 - Onsite and Offsite Emergency Plans

Overview of STP Combined License Application

Chapter 13 – Conduct of Operations		
SE Chapter	**Subject**	**Total Open Items**
13	Conduct of Operations	1
Total Number of RAIs = 100		

Description of SE Open Items

- Open Item 13.03-1 RAI 13.03-73

  TSC Habitability

SER Sections 13.1, 13.2, 13.5

- FSAR Chapter 13, Sections 13.1, 13.2 and 13.5 are out of ABWR Standard Plant Scope of the associated sections of ABWR DCD Chapter 13.

These sections are:

- 13.1 - Organizational Structure of Applicant

- 13.2 - Training

- 13.5 - Plant Procedures

SER Sections 13.1, 13.2, 13.5 - Confirmatory Items

13.05.01.01-1 - Development of Administrative Procedures

- FSAR stated that existing unit administrative procedures would be reviewed and if any changes were required for the new units the procedures would be revised

- Staff determined that the associated RAI responses from the applicant committing to changes in the FSAR were acceptable but these changes have yet to be incorporated in the FSAR.

SER Sections 13.1, 13.2, 13.5 - COL License Information Items

STP COL Item 13.1 - Incorporation of Operating Experience (OE)

- Incorporates by reference NEI 06-13A, rev.1 which has been endorsed by the staff and includes incorporation of OE has been determined to be acceptable.

STP COL Item 13.3 - Plant Operating Procedures Development Plan

- The plan provided in FSAR 13.5.3.1 describes the process and content required by NUREG-0800, Section 13.5.2.1 and TMI items I.C.1 and I.C.9.

STP COL Item 13.4 - Emergency Procedures Development

- The applicant describes the writer's guide, format, training, technical guidelines, etc. for emergency procedure development.

SER Sections 13.1, 13.2, 13.5 - COL License Information Items

STP COL Item 13.5 - Implementation of the plan

- The applicant identified and described the classifications of procedures and commits to follow the criteria of NUREG-0800 for the nature and content of these procedures.

STP COL Item 13.6 - Procedures included in the scope of the plan

- The applicant list of procedures in the STP FSAR is identical to the list provided in NUREG-0800.

Staff determined these COL information items are acceptably addressed in the STP FSAR.

SER Sections 13.4 & 13.4S – Review and Audit/Operational Programs

- **13.4 - Review and Audit**
  - Incorporated by Reference of ABWR DCD Revision 4
  - COL License Information Item 13.2a - 10 CFR 50.40(b)
  - Complies with Appendix B to NURGE-0933 regarding an independent safety engineering group

- **13.4S – Operational Program Implementation**
  - Operational programs consistent with guidance in SECY-05-0197, RG 1.206 and NUREG-0800

Section 13.3 - Emergency Planning

- **Section Description:**
  - Onsite and offsite emergency plans
- **Topics of Interest:**
  - One COL Information Item
  - Open Item
  - No departures
- **Unique Features of Application**
  - First applicant to chose to extend elements of the existing emergency plan for the new units.
  - Staff only needed to review the additional information.

COL Information and Open Items

- COL Information Item
  - Applicant Submits Emergency Plans
- Open Item
  - TSC Habitability

Chapter 13.3 of the ABWR DCD

- **Application incorporates by reference**:
  - Description of the locations of the TSC and OSC
  - Decontamination facility

Emergency Planning ITAAC

- Based upon “generic” EP-ITAAC Tables in NUREG-0800 (SRP) and RG 1.206.

- **STP EP-ITAAC**:

  - Table 2.17.1, “Emergency Response Facilities,” of DCD/Tier 1 Material
    - TSC location, size, communications, and displays.
    - OSC location and communications.

  - COLA; Section 4.0, “Emergency Planning ITAAC,” in Part 9, “ITAAC.”
    - Staffing
    - Displays in the EOF and TSC
    - Notification
    - Communications among the ERFs
    - Procedures
    - Exercise objectives
    - Training

Emergency Action Levels

- Based upon existing NRC-endorsed scheme
- License condition to address ABWR digital instrumentation
- Confirmatory Item

Overview of STP COL Chapter 13

Discussion/Committee Questions

Backup Slides

Acceptability of the Existing Site Emergency Plan

- NRC performs oversight of a site’s EP program through inspections and by monitoring performance indicators.
  - Drill/exercise performance
  - Response organization participation in drills/exercises
  - Alert and notification system performance
- NRC inspectors perform routine inspections, observe drills and exercises, review licensee corrective actions related to EP, and review emergency plan changes.
- NRC inspectors also evaluate bi-annual exercises involving federal, State and local organizations.

Acceptability of Incorporated Information

- Three criteria
  - Applicable to the proposed reactors
  - Up-to-date when the application is submitted
  - The information is appropriately incorporated into the existing plan

Federal Emergency Management Agency (FEMA)

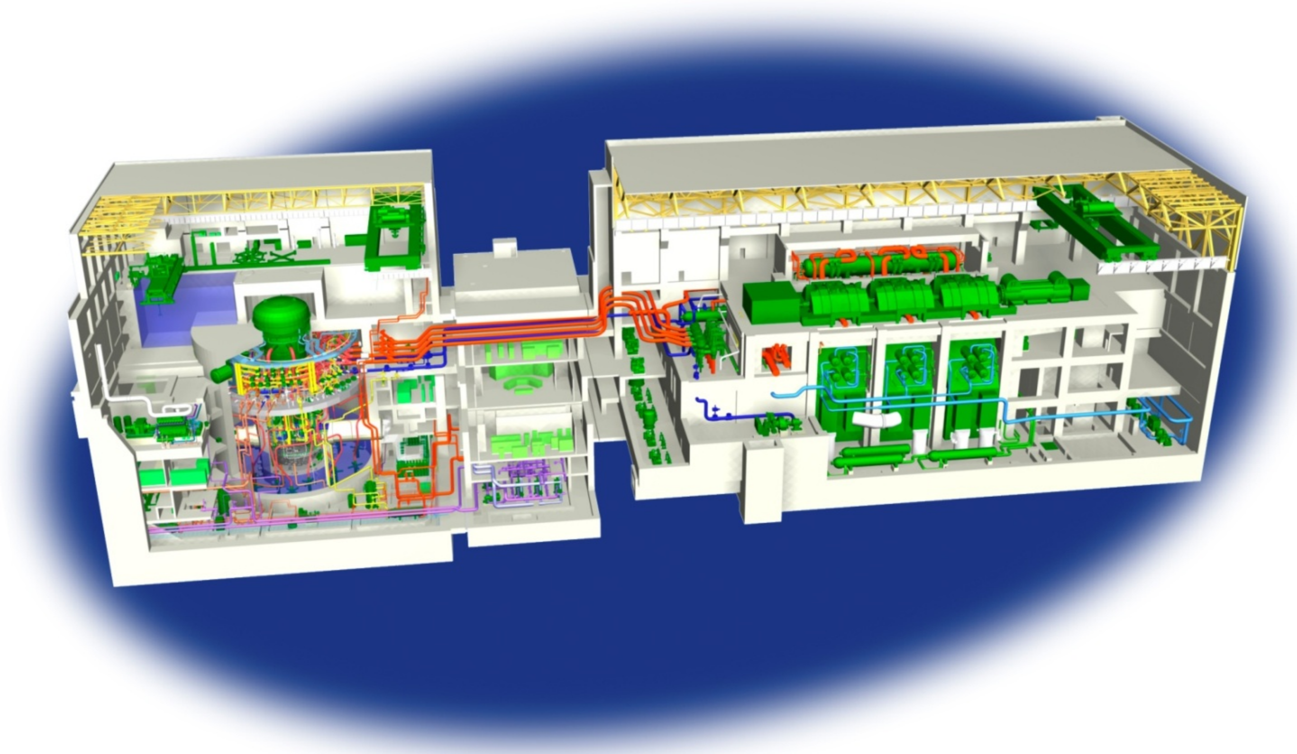
- Interface with FEMA headquarters and regional office
- Regulations in 44 CFR Part 350
- Guidance in NUREG-0654/FEMA-REP-1, Rev. 1
- Interim Findings Report incorporated by reference
- EP-ITAAC for successful offsite exercise

EALs – Digital I&C

- Digital I & C, particularly for RPS, ESF, and ECCS logic, is not part of the NEI 99-01, Rev. 5 scheme.
- Three Initiating Conditions in NEI 99-01, Rev. 5 are not applicable due to the ABWR digital I & C design.
- Four new Initiating Conditions were developed using the guidance in NEI 07-01 to address STP Units 3 and 4 digital I & C design.
  - Address unplanned, partial and complete loss of indicating, monitoring and control functions at power and when shutdown.

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

ACRS Action Items



Agenda

- Working Action Items List
- Action Items Discussion

Attendees

Scott Head	Manager, Regulatory Affairs, STP 3&4
Thomas Daley	Mechanical Systems Supervisor
Coley Chappell	Licensing STP 3&4

Working Action Items List

No.	Action Item	Owner/s – *Status*
1	Fuel-related topical reports and fuel change (amendment to COL)	ACRS
2	Address DG qualification to 60° C, occupancy issues and HVAC changes	– *Resolved DG EQ on 3/18*; *remainder to discuss in Ch 9*
3	Part 21 reports issued on stability analysis	– *Resolved 3/18*
4	Part 21 issues that affect the ABWR design	STP– ***Discussed on 6/8*** /NRO
5	Deletion of MSIV closure and scram on high radiation	– *Resolved 3/2*
6	FW line break mitigation, accident is not described in Chapter 15	STP / NRO – *Discuss in Ch 6*
7	Address FPGA in more detail	– *Discussed on 5/20*
8	Address GSI-191 flow blockage (not just for fuel)	STP / NRO – *Discuss in Ch 6*
9	Address underground piping carrying radioactive liquids	–
10	New GALE code	– *Resolved 3/18*
11	Disparity between presentations related to x/q values bounded by DCD	– *Resolved 3/2*
12	How specific DAC acceptance criteria are amenable to staff inspection	ACRS
13	How adding wetwell pressure indication on SPDS gives higher assurance of control room capability post accident	NRO
14	EDG qualification to increased ambient temperature	– *Resolved 3/18*
15	SER conclusion on operator ability to switch from digital MCR to analog RSS	NRO
16	Staff review of HFE	ACRS / NRO

Working Action Items List (cont'd)

No.	Action Item	Owner/s – *Status*
17	Staff needs to formalize handling of DAC	ACRS / NRO (See #12)
18	SER open item 1-3 on aging management	ACRS / NRO
19	Comparison of occupational doses	– *Resolved 3/18*
20	RCIC cycles during an 8 hour SBO event	– *Resolved 6/8*
21	Rx vessel EOL fluence value and error band	– *Resolved 3/18*
22	Consistent use of a set of units (English or Metric) in plant documents	STP
23	RCS leakage Tech Spec limits and instrument sensitivity	STP
24	East transmission lines capacity	– *Resolved 6/8*
25	Single or double closing coils on switchyard breakers	STP
26	Switchyard control system backup battery discharge time	– *Resolved 6/8*
27	Switching logic under various electrical transients	– ***Discussed on 6/8***
28	SBO rule, operator actions, and CTG startup time within 10 minutes	NRO
29	Qualification of submerged 345 KV cables	– *Resolved 6/8*
30	D-RAP list and staff review	STP– ***Discussed on 6/8*** /NRO
31	RAT 4.16 kV winding capability	– *Resolved 6/8*
32	Identification of ESF (and RPS) overlap testing, end-to-end testing	STP
33	Steam velocity numbers for STP 3 & 4	STP– *Discuss in Ch 3*

Working Action Items List (cont'd)

No.	Action Item	Owner/s – *Status*
34	Staff to provide FIV reports for ACRS review	NRO
35	Cyber Security ITAAC	NRO
36	Apparent discrepancy between STD DEP 7.2-2 text and Figure 7.2-8	STP
37	Provide copy of SSAR for ACRS review	ACRS
38	Provide copy of RAI letter with white paper for departure screenings	STP– ***Addressed 6/8***
39	Provide copy of RAI letter with USACE report on dam failure	STP– ***Addressed 6/8***
40	Provide copy of U.S. Bureau of Reclamation report on dam failure	NRO
41	Address failure modes of lower drywell fusible plugs to pass water	STP

Action Items for Discussion

- (#22) Consistent use of a set of units, English vs. metric
- (#23) RCS leakage Tech Spec limits and instrument sensitivity
- (#25) Switchyard breakers closing coils
- (#32) Identification of ESF (and RPS) end-to-end, overlap testing

Action Item #22

Consistent use of a set of units (English vs. Metric) in plant documents.

Response: Consistent with the NRC Commission's Metrication Policy (61 FR 31169), documents applicable to STP 3&4, including design documents, figures and drawings, construction documents, plant procedures, and Technical Specifications, will use U.S Customary (English) units.

STP 3&4 project contractual obligations require the following:

- All equipment, commodities, parts, fasteners, cables, connectors, etc. to be supplied in English units, unless otherwise approved in advance.
- Where approved, equipment supplied in SI dimensions must include a comprehensive plan detailing the specific interface requirements with U.S. equipment.

Action Item #22 (cont'd)

- For instrumentation and controls
  - Instrument scales must be calibrated and printed in English units except where appropriate, e.g., electrical units, metric units shall follow SI metric standard ISO 31.
  - Electronic transmitters used for measuring pressure, flow, temperature and other plant variables must use English units, except where appropriate to follow ISO 31.
- Training materials for Operating personnel must be provided using U.S. Customary units.

Action Item #23

RCS leakage Tech Spec limits and instrument sensitivity.

Response: Comparison of the Reactor Coolant System operational leakage limits in Technical Specifications for Kashiwazaki-Kariwa 6/7 and STP 3 & 4:

	K-6/7, same as DCD	STP 3 & 4
Unidentified	3.785 L/min (1 gpm)	19 L/min (5 gpm)
Total (24-hour average)	98 L/min (26 gpm)	114 L/min (30 gpm)
Unidentified increase in previous 4-hours (Mode 1)	N/A	8 L/min (2 gpm)

Japanese ABWRs have not exceeded 1 gpm unidentified leakage rate. There is one event (K-6) of a manual shutdown due to the monitoring of small leakage (May 2001).

Action Item #23 (cont'd)

The drain sump instrumentation has a sensitivity of detecting reactor coolant leakage of 3.785 L/min (1 gpm) within a 60-minute period, as stated in FSAR Subsection 7.3.1.1.2(3)(m).

- Ensures adequate sensitivity to alarm at 19 L/min (5 gpm) for floor drain sumps and 8 L/min (2 gpm) for increased floor drain flow within the previous four hours
- Sensitivity of the instrumentation is adequate to support a either (1 gpm or 5 gpm) limit
- Addition of 8 L/min (2 gpm) increase in 4-hours alarm provides early warning to take action below unidentified leakage limit.

5 gpm limit for unidentified leakage rate in Technical Specifications is typical for existing U.S. BWRs, which typically average < 1 to 2 gpm in drywell floor drain sump flows; therefore, operating experience indicates that establishing a 1 gpm limit could result in unnecessary shutdowns.

Action Item #25

State if there are single or double closing coils on switchyard breakers.

Response: The switchyard breakers have single closing coils.

Each the two independent battery systems capable of providing DC power for operation of the switching station's equipment will supply one half of the switchyard breakers, and will be arranged such that a single failure will not prevent all offsite transmission circuits from supplying power to the plant.

These requirements are included in the draft agreement with the Transmission Service Provider, which will have engineering and construction responsibility for all equipment located in the switchyard and the offsite power system.

Action Item #32

Identification of ESF (and RPS) end-to-end, overlap testing.

Response: Preoperational testing for Instrumentation and Control (I&C) systems will satisfy RG 1.68, RG 1.118, and IEEE Std 338

- Requires testing of logic combinations
- Does not require full end-to-end testing
- FSAR Chapter 14 meets these requirements

Action Item #32 (cont'd)

Tier 1 ITAAC specifies end-to-end testing by signal injection near sensor and detecting output response at actuator:

- Reactor Protection System (RPS) – Table 2.2.7, ITAAC 2.2.7.2
- Automatic Depressurization System (ADS) – Table 2.1.2, ITAAC 2.1.2.12
- Emergency Core Cooling Systems – Table 2.4.1, ITAAC 2.4.1.3.a (RHR-LPCF mode); Table 2.4.2, ITAAC 2.4.2.3.a (HPCF); and Table 2.4.4, ITAAC 2.4.4.3.a (RCIC)
- Leak Detection and Isolation System – Table 2.4.3, ITAAC 2.4.3.2

ITAAC for manual initiation and for required actuations following simulated initiation signals are also provided.

ACRS Action Items

Questions and Comments

Presentation to the ACRS ABWR Subcommittee

South Texas Units 3 and 4 COL Application Review

Part 21 Action Item from March 18, 2010 ACRS Meeting

June 24, 2010

.S.NRC
luclear Regulatory Commission
ople and the Environment

Notifications under Part 21

DCIP searched Reactor Operating Experience system for Part 21 Notifications issued from the time the ABWR design was certified in1997

DCIP identified 17 generic issues

Technical staff reviewed the generic issues for ABWR applicability

Staff Findings and Actions

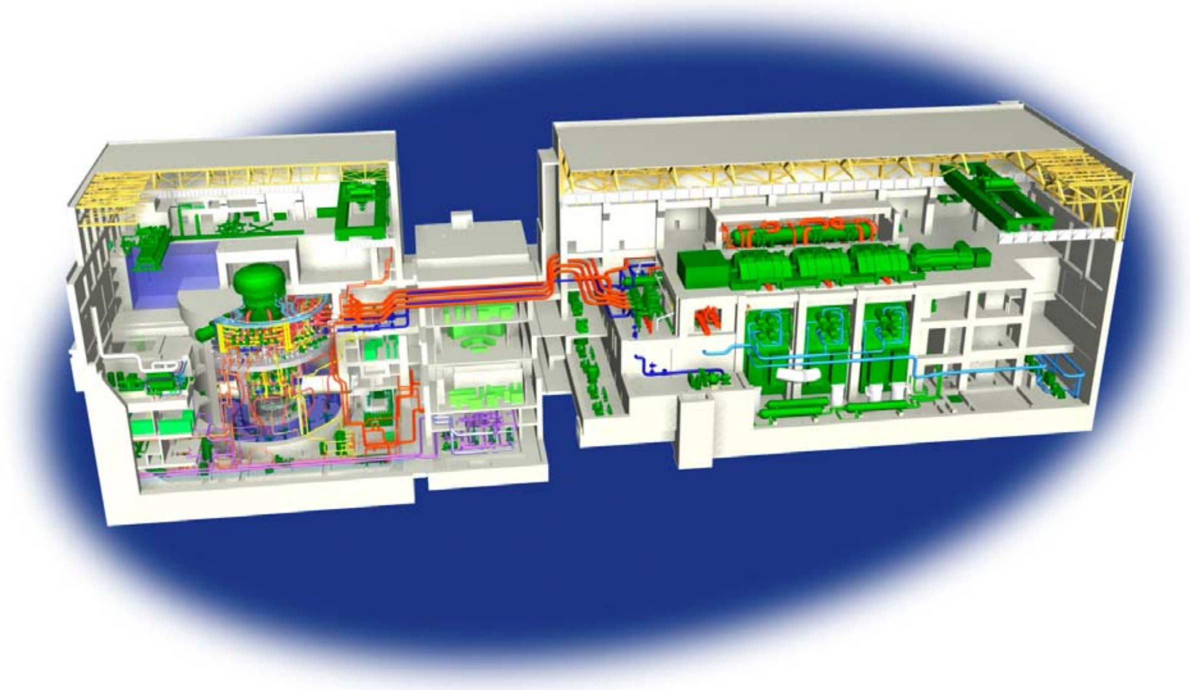
Two issues identified that apply to ABWR

- Stability Option III
  - Being addressed in COL as described by STP on June 8, 2010
- MSIV Out-of-Service Analysis
  - STP has agreed to revise Tech Specs Bases
  - RAI drafted by technical staff

Discussion/Committee Questions

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 6
Engineered Safety Features



Agenda

- Introduction
- Attendees
- Chapter 6 Overview
- Contents of FSAR Chapter 6
  - Summary of Changes to Chapter
  - Departure Information
  - COL License Information Items
  - Site-Specific Supplements
- ITAAC/DAC
- Conclusion

Attendees

Scott Head	Manager, Regulatory Affairs, STP 3 & 4
Jim Tomkins	Licensing, STP 3 & 4
Hirohide Oikawa	Toshiba
Kenji Arai	TANE
Jason Douglass	Westinghouse
Nirmal Jain	Westinghouse
Tom George	NAI
Caroline Schlaseman	MPR

Attendees (continued)

Robert Quinn	Westinghouse
Rick Ofstun	Westinghouse
Koichi Kondo	TANE
Tom Daley	STP 3 & 4 , Engineering

Contents of Chapter 6 (Sections)

- 6.1 Engineered Safety Feature Materials
- 6.2 Containment Systems
- 6.3 Emergency Core Cooling Systems
- 6.4 Habitability Systems
- 6.5 Fission Products Removal and Control Systems
- 6.6 Preservice and Inservice Inspection/Testing of Class 2 and 3 Components and Piping
- 6.7 High Pressure Nitrogen Gas Supply System

Contents of Chapter 6 (Appendices)

- 6A RG 1.52, Section C, Compliance Assessment
- 6B SRP 6.5.1 Compliance
- 6C Containment Debris Protection for ECCS Strainers
- 6D HPCF Analysis Outlines
- 6E Additional Bypass Leakage Considerations

Summary of Changes to Chapter 6

- Sections 6.0, 6.7 and Appendices 6A, 6E are incorporated by reference
- Section 6.2 and Appendix 6C have significant changes
- Sixteen (16) Departures impact the chapter
  - Four departures are Chapter 6 based
  - Six Tier 1, six Tier 2
- Fifteen (15) COL Information Items completed
- One site-specific supplement for Reactor Service Water materials

Chapter 6 Based Departures

- Containment Re-analysis (STD DEP 6.2-2)
  - Related Pool Swell Analysis (STD DEP 3B-2)
- ECCS Suction Strainers (STD DEP 6C-1)
- Containment Penetrations (STD DEP 6.2-3)
- PSI/ISI Inspection and Testing of Class 2 and 3 Components and Piping (STD DEP 6.6-1)

Containment Pressure Temperature (P/T) and Pool Swell Re-analyses

- Background
- Comparison of ABWR and BWR Mark III Containments
- Containment P/T Model
  - Development
  - Benchmarking
  - Analysis Results and Conclusions
- Pool Swell Model
  - Development
  - Benchmarking
  - Analysis Results and Conclusions

Containment Analysis Background

Even though there were no changes to the ABWR containment design, the ABWR DCD containment analysis could not be incorporated by reference into the STP 3&4 COLA due to corrections required in the DCD containment modeling and analysis

- Corrections identified by GE
  - Incorrect vent loss coefficient modeling
  - Non-conservative mass and energy releases
  - Non-conservative decay heat
- Additional non-conservatism identified – wetwell pool level assumption for peak pressure calculation

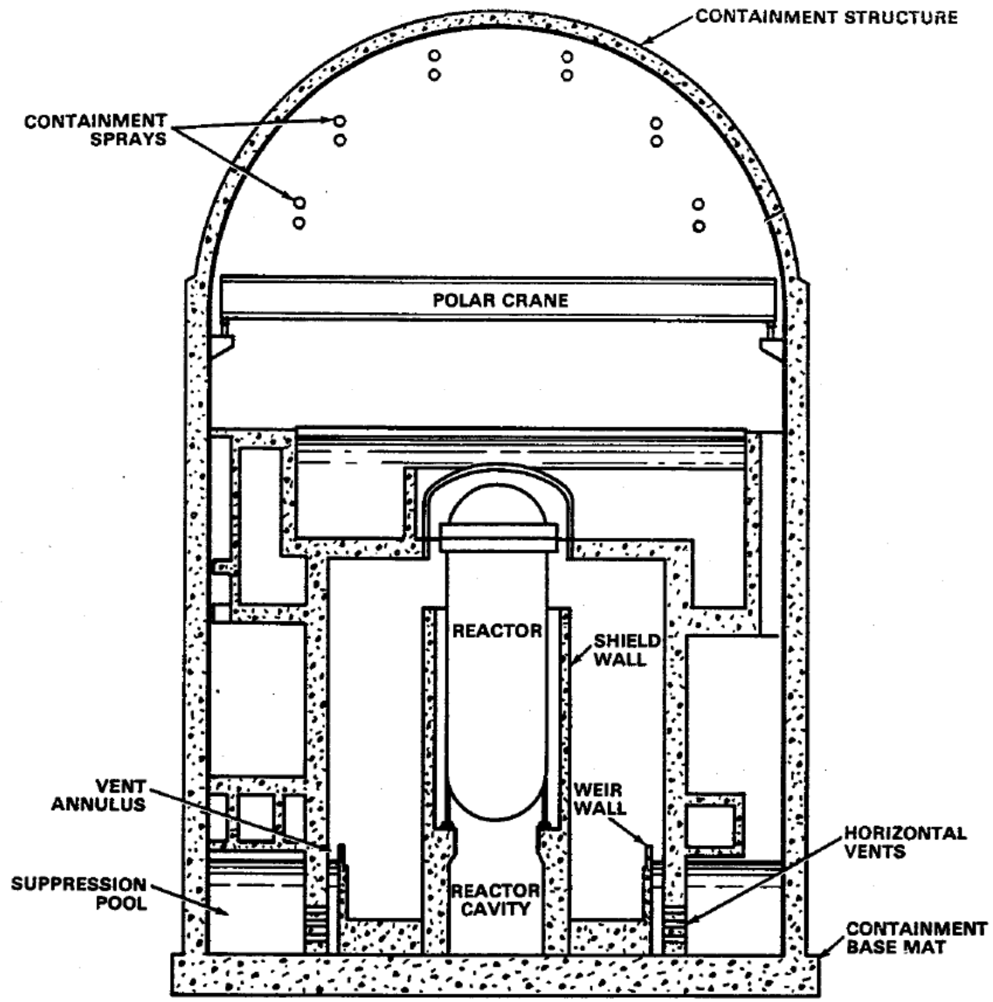
Background *(continued)*

- As a result, STPNOC had to re-perform the containment P/T analysis for the STP 3 & 4 COLA
- Resulting increases in pressure loads required that STPNOC also re-perform the pool swell analysis for the STP 3 & 4 COLA

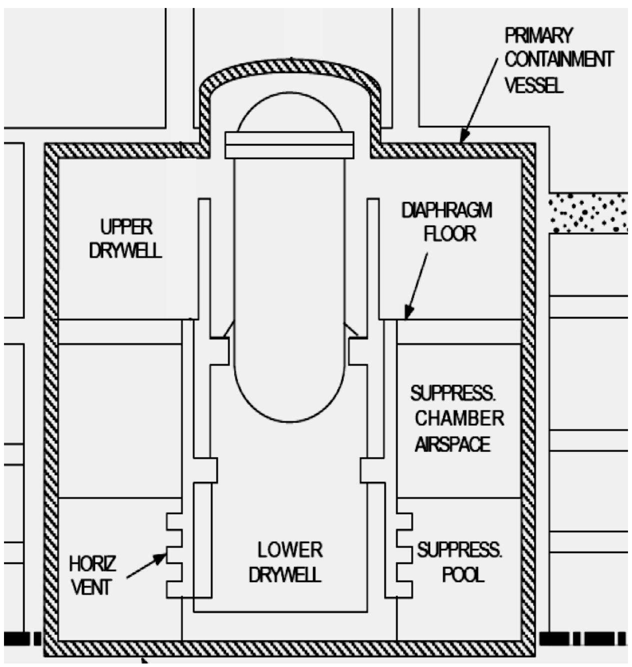
Containment P/T Model – Development

- Developed methodology consistent with ABWR DCD, which uses NEDO-20533
- Methodology implemented using GOTHIC code
  - Variables / settings in GOTHIC made to mimic DCD method
  - Approved Mark I GOTHIC methodology was used to supplement the DCD methodology where necessary
- Model benchmarked against DCD results

BWR Mark III Containment



ABWR Containment



Comparison of ABWR Containment to BWR Mark III Containment

ABWR

- Upper & lower drywell
- 10 vertical vents each feeding 3 horizontal vents (30 total vents)
- Annular suppression pool
- Compact wetwell airspace

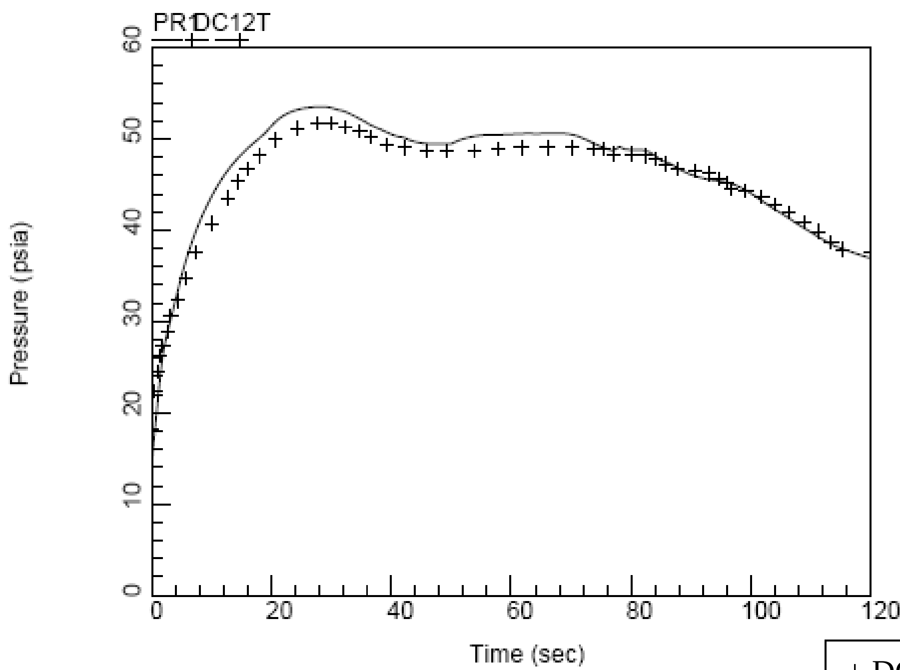
BWR Mark III

- Single drywell space
- Vertical annulus feeding 3x40 horizontal vents (120 vents total)
- Annular suppression pool
- Very large wetwell airspace

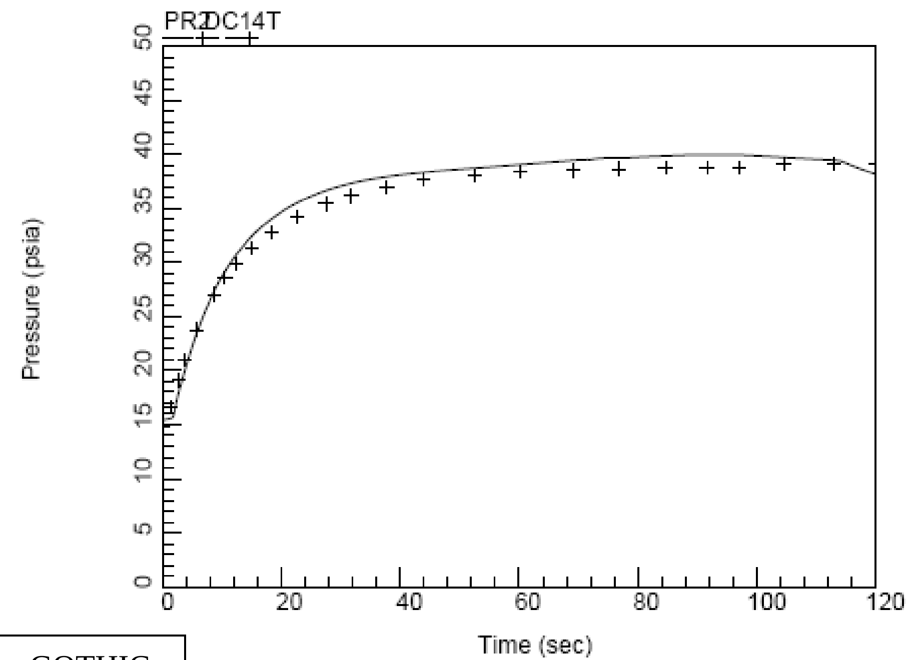
Containment P/T Model - Benchmarking

- Benchmarked using DCD analysis results (uncorrected) for both Feedwater Line Break (FWLB) and Main Steam Line Break (MSLB) accidents
- GOTHIC implementation of DCD containment analysis method (uncorrected) showed excellent comparison to DCD results (examples follow)

Benchmarking Results – Pressure Due to FWLB



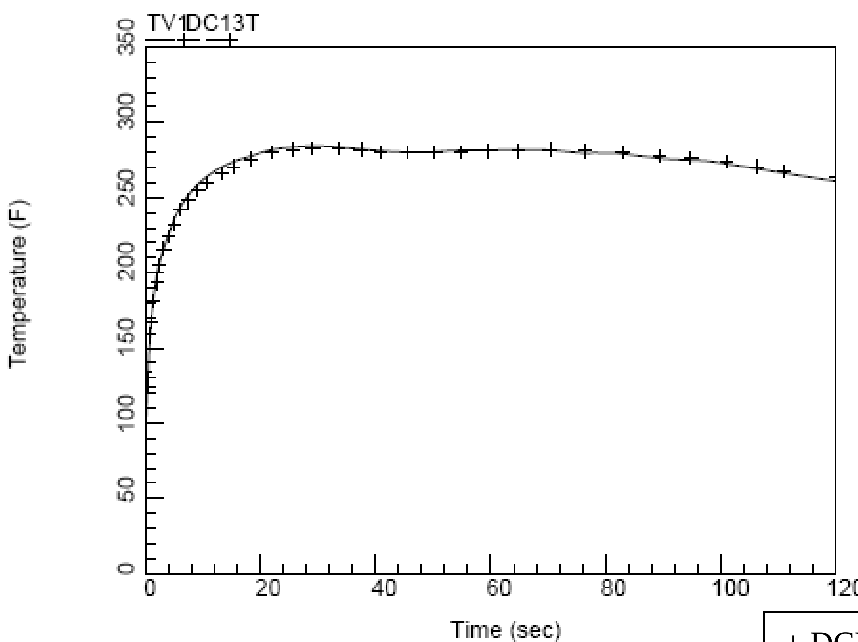
Drywell Pressure

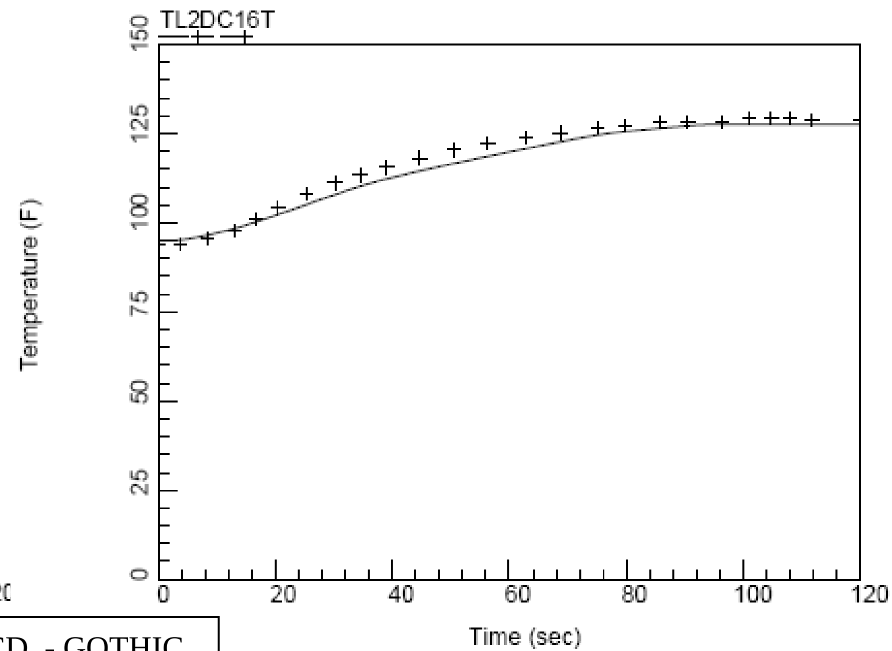


Wetwell Pressure

+ DCD, - GOTHIC

Benchmarking Results – Temperature Due to FWLB



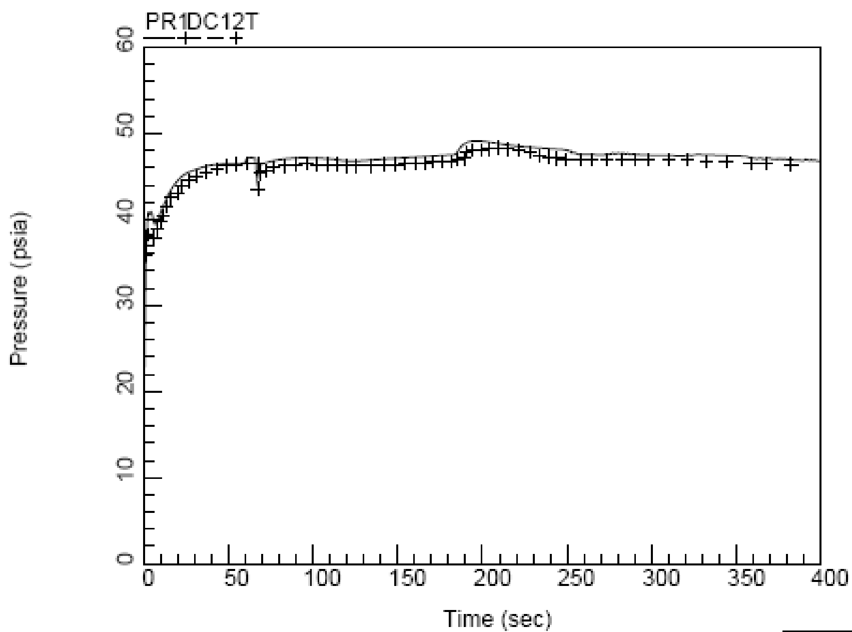


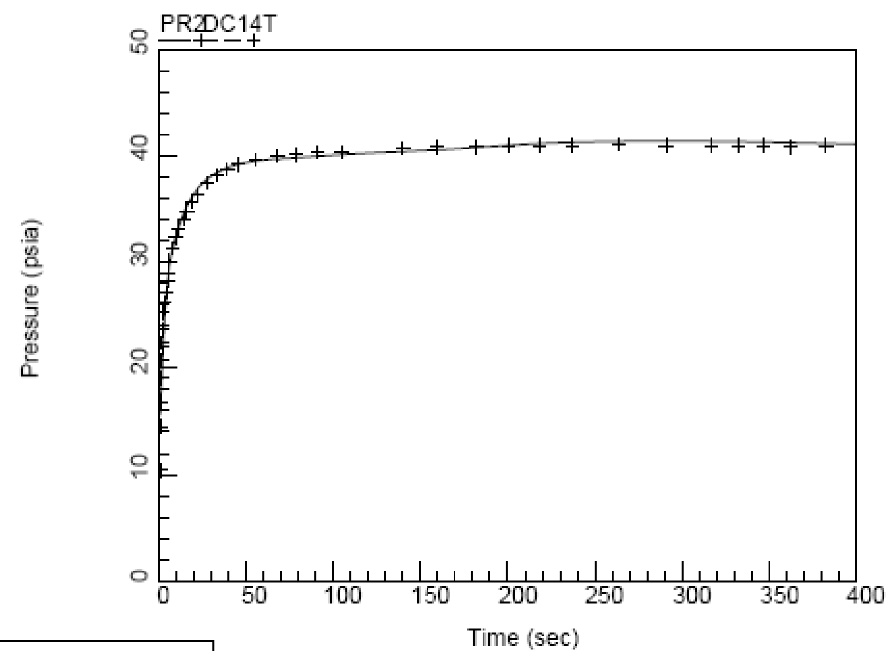
+ DCD, - GOTHIC

Drywell Temperature

Pool Temperature

Benchmarking Results – Pressure Due to MSLB



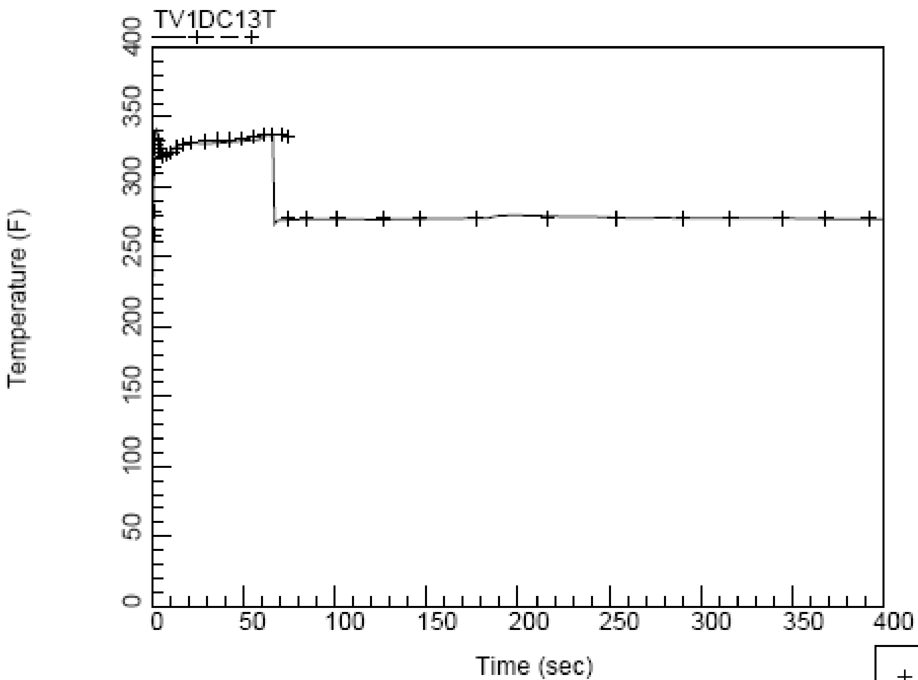


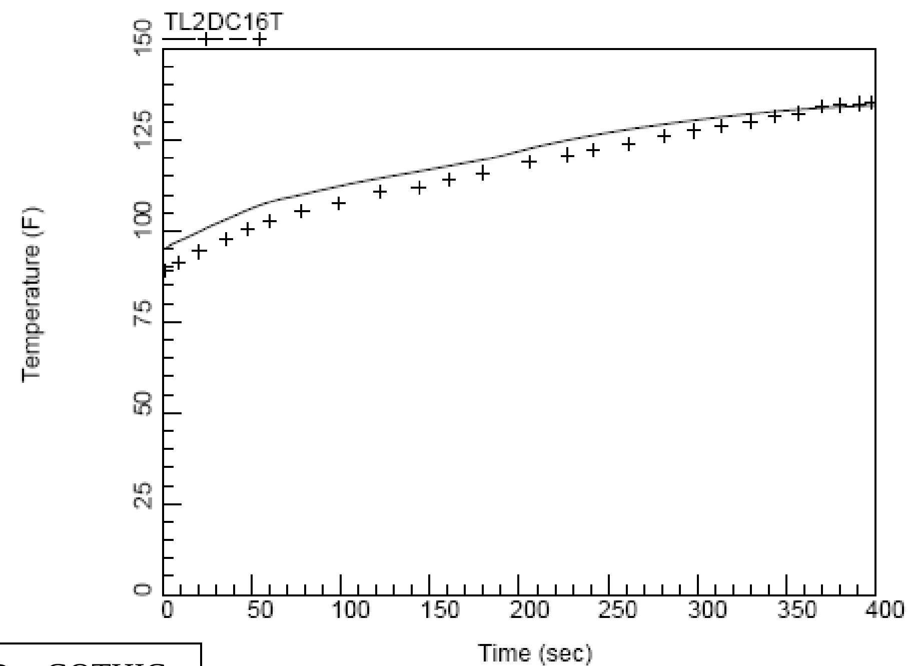
+ DCD, - GOTHIC

Drywell Pressure

Wetwell Pressure

Benchmarking Results – Temperature Due to MSLB





+ DCD, - GOTHIC

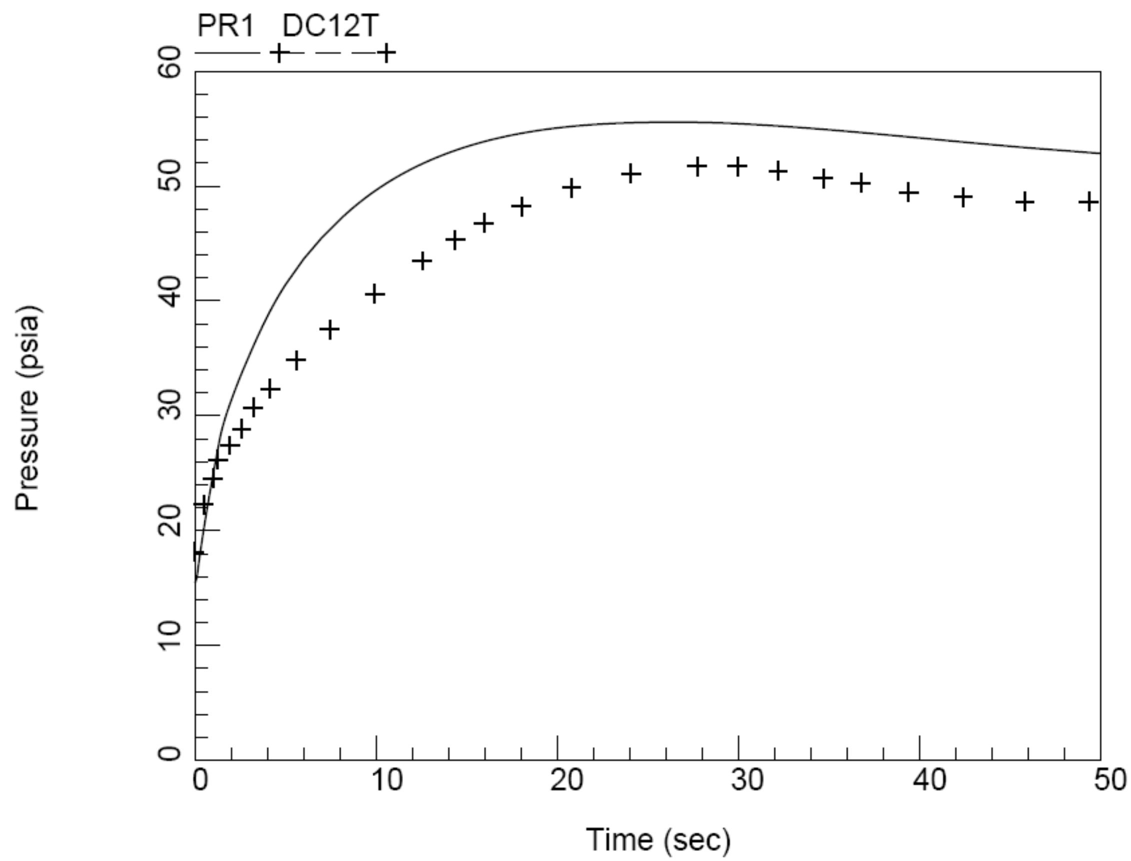
Drywell Temperature

Pool Temperature

P/T Analysis Results

- Corrected Drywell Connecting Vent (DCV) loss coefficient, feedwater flow assumptions, and decay heat and addressed suppression pool level assumption and performed analyses
- Analysis results submitted in Westinghouse Technical Report WCAP-17058 (June 2009)
- Revised containment analysis results in higher pressure and temperature
- Revised containment analysis results meet acceptance criteria

Peak Drywell Pressure



GOTHIC:

55.6 psia

DCD:

53.7 psia

+ DCD, - GOTHIC

Containment Reanalysis Results

Parameter	DCD Value	Calculated Value	Limit
Peak Drywell Pressure	268.7 kPaG (39.0 psig)	281.8 kPaG (40.9 psig)	309.9 kPaG (45.0 psig)
Peak Drywell Temperature	170 °C (338 °F)	173.2 °C (343.8 °F)[1]	171.1 °C (340 °F)
Wetwell Pressure	179.5 kPaG (26.1 psig)	217.2 kPaG (31.5 psig)	309.9 kPaG (45.0 psig)
Wetwell air Temperature	98.9 °C (210.0 °F)	98.6 °C (209.5 °F)	104 °C (219.2 °F)
Suppression Pool Temperature	96.9 °C (206.4 °F)	99.56 °C (211.2 °F)	100 °C (212 °F)

Note: (1) Drywell temperature exceeds limit for less than 2 seconds. Due to thermal inertia, drywell component temperature remains below limit.

Pressure Temperature Summary

- P/T analysis re-performed using GOTHIC to correct DCD
- Results confirmed acceptable design of containment

Pool Swell Analysis

- The Pool Swell Analysis contains proprietary information and will be discussed in a closed session

ECCS Suction Strainers

- Background
  - RG 1.82 Rev. 3
- Strainer Sizing
- Chemical Effects
- Downstream Effects
- Summary

STP 3 & 4 Suction Strainers

- Provide debris protection in suppression pool for the following systems following a LOCA:
  - RHR (Residual Heat Removal)
  - HPCF (High Pressure Core Flooder)
  - RCIC (Reactor Core Isolation Cooling)

Decision to Upgrade Strainers

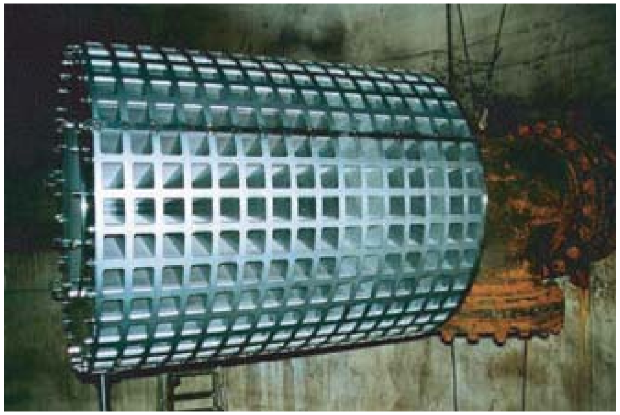
- US ABWR DCD describes ECCS suction strainers
  - Compliant with RG 1.82, Rev. 1 (1985)
  - Conical strainers on ends of tees
- Reference Japanese ABWR (RJ-ABWR) upgraded ECCS suction strainers to RG 1.82, Rev. 2 requirements in 2005
- STPNOC voluntarily chose to upgrade to RG 1.82, Rev. 3 and use RJ-ABWR strainer designs/sizes for STP 3&4

RG 1.82 Rev. 3

- RG 1.82, Rev. 2 endorsed BWROG's Utility Resolution Guideline (URG)
- Rev. 3 = Rev. 2 + downstream and chemical effects evaluations
- RJ-ABWR replaced original RHR and HPCF strainers in accordance with URG
  - Debris Generation
  - Debris Transport
  - Strainer Head Loss Analysis and Testing

Strainer Sizing

- Based on Reference Japanese ABWR (RJ-ABWR)
- Control Components, Inc. (CCI) (Winterthur, Switzerland) "cassette-type" strainers
  - Full-scale test in EPRI Charlotte facility
  - View into cassette filter pocket



Strainer Sizing *(continued)*

- Large filter surface area in compact volume
- Convoluted suction surface disrupts formation of debris “thin bed” and protects NPSH margin
- Maximum hole size 2.1 mm (smaller than DCD 2.4 mm)

Strainer Sizing *(continued)*

- Several US PWRs using CCI cassette-type strainer to resolve GSI-191
  - ANO
  - Byron & Braidwood
  - Calvert Cliffs
  - D.C. Cook
  - Oconee
  - Palo Verde
  - Salem

Chemical Effects

- STP 3 & 4 primary containment design prohibits:
  - fibrous and calcium silicate insulation
  - aluminum
  - zinc (except inorganic zinc primer in qualified coatings)
- ABWR water chemistry is essentially distilled water, with post-LOCA scenario:
  - initiation of SLC (addition of sodium pentaborate)

Chemical Effects *(continued)*

- NRC requested consideration of "latent" aluminum
- Used modified-WCAP methodology to calculate largest amount of "latent" aluminum that would corrode, but not come out of solution
- Considered:
  - pH range 5.3-8.9 (from DCD)
  - post-LOCA temperature profile

Chemical Effects *(continued)*

- Concluded 4.5 ft^2 “latent” aluminum:
  - Results in small amount of corrosion products, but would not precipitate out of solution
  - Includes consideration of exposed concrete (within ZOI)
  - Is within ability of Foreign Material Exclusion (FME) and containment cleanliness programs to detect
- Additional evaluations concluded other debris (e.g., zinc primer within Zone of Influence (ZOI) of postulated pipe break) would:
  - Be in particulate form
  - Already evaluated during RJ-ABWR strainer sizing
- Therefore, no additional testing needed for chemical effects

Downstream Effects

- ABWR design provides reasonable assurance that debris passing through ECCS suction strainers does not result in detrimental “downstream effects”
- LOCA-generated debris minimized
- Fibrous material prohibited (but “latent” fiber evaluated)

Downstream Effects *(continued)*

- Latent debris required by URG confirmed applicable to ABWR based on Japanese ABWR operating experience
  - “sludge,” rust, dirt/dust, qualified coatings within ZOI
- Additional “Latent” debris assumed for these evaluations:
  - 1 ft^3 latent fiber (e.g., rags, rope)

Downstream Effects *(continued)*

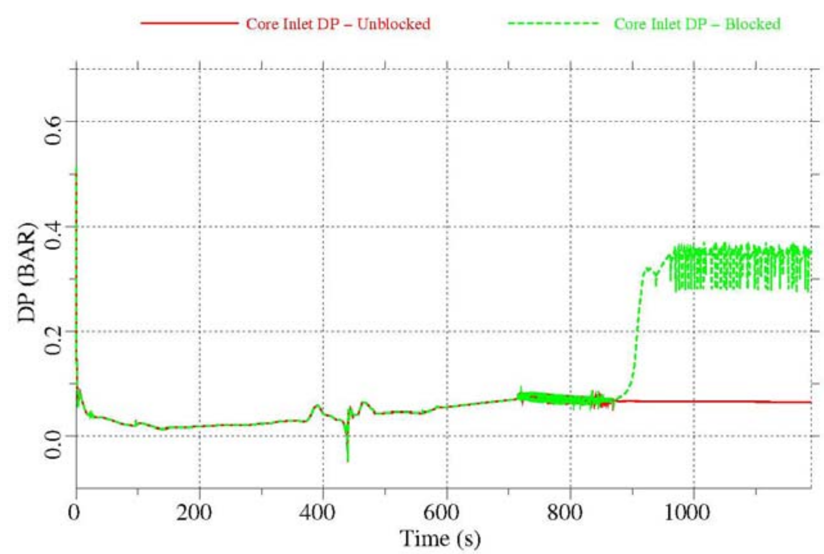
- Strainer design restricts debris greater than 2.1 mm from reaching:
  - downstream components
  - fuel assemblies
- ABWR has diversification of ECCS delivery points, which reduces consequences of blockages, should they occur

Downstream Effects *(continued)*

- Evaluations of downstream effects on pumps, valves and heat exchangers in PWRs documented in WCAP-16406
  - This methodology applies to STP 3 & 4 components due to similarity in materials and clearances
- STPNOC will conduct confirmatory analyses per WCAP methodology when final ECCS downstream components selected

Downstream Effects *(continued)*

- License Condition to test final fuel design for downstream effects
- WEC performed analysis to determine acceptable level of blockage, including: ΔP, flow, void fraction, peak clad temp



Downstream Effects *(continued)*

- Test plan includes:
- Single fuel assembly description
  - full-scale cross-section
  - shortened assembly length
  - unheated, ambient temperature
- Protocol for introduction of debris
  - fiber added first to promote formation of “mat”
  - particulates added to avoid coagulation (easier to plug interstices in fiber mat)

Downstream Effects *(continued)*

- 872 fuel assemblies, debris for test is 1/872 total debris predicted to pass through strainers (with 10 % penalty)
  - Coatings, sludge, dust/dirt, rust flakes all prepared to be smaller than 2.1 mm
  - 2% of total RMI destroyed assumed smaller than 2.1 mm (NUREG/CR-6808)
  - Of 1 ft^3 latent fiber (none from destroyed insulation since prohibited) 10% assumed to be destroyed fibrous insulation that could pass through strainers

Downstream Effects *(continued)*

License Condition

"A downstream fuel effects test will be conducted and the results provided to the NRC no later than 18 months prior to fuel load. The test plan, analysis basis, and debris assumptions are described in Appendix 6C.3.1.8. The test procedure will be provided to the NRC no later than 24 months prior to fuel load. The acceptance criteria for this test will be a fuel assembly inlet steady-state pressure drop less than 5.076 psid."

Suction Strainer Summary

- STPNOC upgrade of DCD strainer (per RG 1.82, Rev. 1) to current RG 1.82, Rev. 3 requirements assures ECCS strainers perform their safety related functions
- RJ-ABWR strainer design, testing and analyses assure STP 3 & 4 strainers meet URG requirements (per RG 1.82, Rev. 2 and 3)
- Additional evaluations of chemical effects and downstream effects show full compliance with RG 1.82, Rev. 3

Chapter 6 Based Departures

- STD DEP 6.2-3
- Revised containment penetration details as a result of detailed design
  - Corrects penetration elevation, azimuth, offset, diameter, and barrier type information
  - Adds detail regarding CIVs that was not present in DCD

Chapter 6 Based Departures PSI/ISI

- STD DEP 6.6-1
- Clarified that 100 % of RHR heat exchanger will be accessible for ISI
- Added requirement that an evaluation for sufficient access must be performed if less than minimum straight length is used in final design

Other Departures *(continued)*

Tier 1 Departures Affecting Chapter 6

- Deletion of MSIV closure and scram on high radiation (STD DEP T1 2.3-1)
  - Removed Note in Table 6.2-7
  - Not credited in analyses in Chapter 6 or 15
- RHR System and Spent Fuel Cooling (STD DEP T1 2.4-1)
  - No impact on safety analyses

Other Departures *(continued)*

Tier 1 Departures Affecting Chapter 6

- Feedwater Line Break Mitigation (STD DEP T1 2.4-2)
  - Trips condensate pumps on high differential pressure between 2 FW lines coincident with high drywell pressure
  - Ensures that flow assumptions made in the containment analysis are conservative.

Other Departures

TIER 1 Departures Impacting Chapter 6

- RCIC Turbine Pump (STD DEP T1 2.4-3)
- Eliminate Hydrogen Recombiners (STD DEP T1 2.14-1)
- Safety Related I & C Architecture (STD DEP T1 3.4-1)
- All of these departures resulted in minor descriptive changes to parts of Chapter 6

Other Departures *(continued)*

TIER 2 Departures impacting Chapter 6

- Leak Detection and Isolation System Valve Leakage Monitoring (STD DEP 7.3-11)
- HVAC Normal Cooling Water System (HNCW) (STD DEP 9.2-7)
- HNCW Cooling Water System (STD DEP 9.2-9)
- Breathing Air System (STD DEP 9.3-2)

COL Information Items

- Protective Coatings and Organic Materials (6.1)
- Personnel Safety (6.2.5.6)
- Alternate Hydrogen Control (6.2)
- Administrative Control Containment Isolation (6.3)
- Suppression Pool Cleanliness (6.4)
- Wetwell/Drywell Vacuum Breaker Protection (6.5)
- Containment Penetration Leakage Rate Test (6.5a)

COL Information Items *(continued)*

- ECCS Performance Results (6.6)
- ECCS Testing Requirements (6.7)
- Limiting Break Results (6.7a)
- Toxic Gases (6.8)
- SGTS Performance (6.9)
- SGTS Exceeding 90 hours operation (6.9a)
- PSI/ISI (6.10)
- Access Requirement (6.11)

Site-Specific Supplements

- DCD Section 6.1, Table 6.1-1 identified Reactor Building Cooling Water heat exchanger and Reactor Service Water heat exchanger, piping, and valve materials as site dependent
- Materials were provided in RAI response on 1/28/2010
- Table 6.1-1 will be updated in COLA Revision 4

Containment ITAAC

- Containment Atmospheric Monitoring System (2.3.3)
- Suppression Pool Cooling (2.4.1.4)
- Suppression Pool Cleanup System (2.6.3)

Containment ITAAC *(continued)*

- Containment Structure (2.14.1)
  - ASME Code document review
  - Structural Integrity Test
  - Containment Pressure Analysis using as-built parameters
  - Integrated Leak Rate Test
  - Inspection of as-built SRVDL quenchers, horizontal vents etc.
  - Analysis of Vacuum Breakers

Containment ITAAC *(continued)*

- Standby Gas Treatment System (SGTS) (2.14.4)
  - As-built inspections
  - Drawdown test of SGTS performance with as-built containment

Containment ITAAC *(continued)*

- Atmospheric Control System (2.14.6)
  - Factory test of key components
- Drywell Cooling (2.14.7)
  - Inspection of as-built system
- Suppression Pool Temperature Monitoring (2.14.9)
  - Inspections
  - Logic Tests

Containment ITAAC *(continued)*

- For RHR, RCIC, and HPCF ITAAC
  - Required NPSH Test at Vendor Facility
  - Available NPSH based on analysis
    - Suppression pool at minimum level
    - Strainer blockage in accordance with RG 1.82 R3 instead of DCD 50% blockage criteria
    - Suppression pool at 100 deg C

Containment Design Acceptance Criteria (DAC)

- NONE

Chapter 6
Engineered Safety Features

Questions and Comments