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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

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TUESDAY, JUNE 8, 2010

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ROCKVILLE, MARYLAND

The Subcommittee convened at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 1:00 p.m., Dr. Said Abdel-Khalik, Chairman, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

SAID ABDEL-KHALIK, Chair

J. SAM ARMIJO

DENNIS C. BLEY

MARIO V. BONACA

MICHAEL CORRADINI

HAROLD B. RAY

WILLIAM J. SHACK

JOHN D. SIEBER

JOHN W. STETKAR

NRC STAFF PRESENT:

MARK TONACCI

GEORGE WUNDER

ED FULLER

ROCKY FOSTER

TODD HILLSMEIER (via teleconference)

JOHN LAI

MARIE POHIDA

LYNN MROWCA

THERON BROWN

ALSO PRESENT:

SCOTT HEAD

BILL STILLWELL

STEVE FRANTZ

RICK SUMMITT

EVANS HEACOCK

COLEY CHAPPELL

BRAD MAURER

TOM DALEY

I-N-D-E-X

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

(12:59 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 am Said Abdel-Khalik, chairman of the Subcommittee.

ACRS members in attendance today are John Stetkar, Sam Armijo, Dennis Bley, Jack Sieber, Harold Ray and Mario Bonaca. Mike Corradini, Bill Shack and Michael Ryan may join us later.

Ms. Maitri Banerjee is the designated federal official for this meeting. The NRC Staff Review of the STP Combined License Application is generating Safety Evaluation Reports with Open Items by chapters.

In our last meetings of March 2 and 18, and May 20, we discussed the COLA FSAR and the corresponding SERs with Open Items or Chapters one, four, five, seven, eight, 11, 12, 14, 15, 16, 17 and 18.

In today's meeting we are scheduled to discuss Chapter 19. We will also discuss the status of several follow-up items from the last three meetings.

We have scheduled one more ABWR Subcommittee meeting for June 23 and 24 that 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 SER. The rules for participation in today's meeting were announced in the Federal Register on May 24, 2010 for an 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 am asking the NRC staff and the applicant to identify the need for closing the meeting before we enter into such discussion 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 be 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 this meeting, either in this room or through the bridge line to make a statement or provide a comment.

As the meeting is being transcribed, I would 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 call on Mr. Mark Tonacci of NRO to begin the presentation. Mark?

MR. TONACCI: Thank you. We welcome the opportunity to talk with you today and I am going to turn it over to George to introduce our speakers.

MR. WUNDER: Thank you, Mr. Chairman, gentlemen, Maitri. I am George Wunder. I am the lead project manager for the South Texas Project Combined License Review.

Today we are presenting on Chapter 19. The staff presentation will be led by Project Manager Rocky Foster and the members of the technical staff presenting are Ed Fuller, John Lai, David Jeng, Marie Pohida and Todd Hillsmeier. I would now like to turn it over to Scott Head to introduce the South Texas

SAP.

MR. HEAD: Okay, good afternoon. We appreciate the opportunity to brief the ACRS on Chapter 19 today and I will introduce our participants as soon as we have the back-up.

Today we are going to be discussing Chapter 19. That's the only topic and after Chapter 19, if we have time in the afternoon, we do have a number of open items that we will be prepared to brief the staff on.

So our agenda today, pretty much our standard agenda, the introduction, we have the summary and then we will go into details of Chapter 19. There are a couple of interesting topics there for us to discuss.

And our attendees today are Bill Stillwell, who has presented on Chapter 17. We also have, assisting us, Gene Hughes and Ricky Summitt today to help us as necessary. And with that I am going to go ahead and turn the presentation over to Bill Stillwell.

MR. STILLWELL: Good afternoon. My name is Bill Stillwell. I am the supervisor for PRA for STP units 3 and 4. Prior to that, I was the supervisor for

STP units 1 and 2 and a supervisor, I probably led the greater quality assurance risk-informed application, U.S.-managed technical specifications risk-informed application, 119-day diesel generator extended allowed outage time.

Prior to that I guess I got my start in PRA with some friends over here. When we did the original Zion and Indian Point probabilistic safety study, shortly after the show-cause order after TMI, I was also involved in the Seabrook full scope Level 3 PRA work with Pickard, Lowe & Garrick. So I guess I could say I've been doing this for a while. That doesn't mean anything.

Okay what we are going to talk about is Chapter 19, the Probabilistic Risk Assessment for the ABWR as modified to support the licensing of STP 3 and 4. I thought I would start with a little bit of background and summary of the ABWR PRA, just so everyone is starting on the right page.

Chapter 19 was developed as part of the original certification effort to support the licensing and certification of the ABWR design. The effort was primarily performed in the late 1980s and the early 1990s. Those that perform PRAs, who have been in the industry for a while, realize that all of the operating class for performing plant examinations in response to the Generic Letter 88-20 in the same time frame.

So if you think of the ABWR PRA as an IPE, individual plant examination, with external events, sort of modified. It was actually a little bit better than most of the IPEEEs that were being produced in the late 80s and early 90s.

The certification PRA is a Level 2 internal events PRA with generic consequence evaluations. For external hazards analysis, they looked at fire hazards analysis and performed a fire screening assessment using EPRI's methodology for fire-induced vulnerability evaluation.

They also did seismic margins assessment for the seismic part of the PRA so there is not an actual quantification for fires and seismic events. What they did was, I guess, state of the art in the early 90s fire-screening and seismic margins assessment screening.

They did do a shutdown analysis, sort of. It's not what I would call a low-power shutdown PRA but they did evaluate shutdown sequences for the dominant initiating events: loss of residual heat removal, loss of offsite power, loss of support systems and compared those against the goal of 10 to the minus five per shutdown -- it may have been a 10 to the minus five per hour initiating event frequency -- and showed for the dominant sequences everything was less than that shutdown screening criteria and made a conclusion that shutdown risk would be a small or insignificant fraction of the total core damage frequency that they were calculating for internal events.

And the NRC staff in their review, as documented in the final Safety Evaluation Report, agreed with that conclusion.

MEMBER ARMIJO: Before you go on, I am having a little bit of problem when you say they did this and they did that. Now that was certainly not a -- that was at that time it was GE that prepared that PRA and I'm just trying to understand, is this PRA that you are referring to and that you are updating, is that a public domain document that says this belongs -- anybody who wants to update that PRA can go ahead and just grab it and do that.

MR. STILLWELL: Let me see if I can

explain.

MEMBER ARMIJO: I just want to know what we are building on.

MR. STILLWELL: If I can explain it, before I start to go astray, I'm sure somebody is going to come up, leap up. The PRA itself, the public documentation of the PRA, that's the Design Control Document. If you have looked at Chapter 19, the DCD, there's no numbers in there. And in fact there's no documentation of fault trees or event trees in there.

MEMBER ARMIJO: That was my concern.

MR. STILLWELL: There was a decision made and this is where I would Steve Frantz to help me, during certification there was a decision made to take the standard Safety Analysis Report that was reviewed to support certification and modify that for Chapter 19 to remove a lot of material, fault trees, the details you need to recreate a PRA out of the DCD.

The NRC have reviewed it and documented their review in the Final Safety Analysis Report but the DCD itself is just basically words.

MEMBER ARMIJO: Are you basically building a PRA from scratch using the -- I don't know, structure of the original PRA?

MR. STILLWELL: Not really. We had the safety analysis report that GE developed to support certification and we just started with the Safety Analysis Report and we'll get to the slides in a minute. But we basically recreated that PRA and validated that we were getting results, similar results within certain error bands.

MEMBER ARMIJO: Okay I won't take any more of your time but you might want -- one of my colleagues will need to address some of that.

MR. STILLWELL: The next slide will be addressing that. Steve Frantz.

MR. FRANTZ: Yes, my name is Steve Frantz. I am regulatory counsel for South Texas. I was also regulatory counsel for GE during the design certification of the ABWR. What Bill has described is really a two-part process for certification.

Initially as part of their application, GE submitted what was called the SSAR, the Standard Safety Analysis Report. That, as far as I know, was on the docket. It was a publicly available document, still is, I believe, a publicly available document. There may be portions which are proprietary or SUNCI but in general I believe it's publicly available, including the fault trees and event trees and the various CDFs.

As part of developing the Design Control Document, the DCD, for the rule itself, that information was excised because of concerns regarding the change process in 50.59.

If you recall, 50.59 at that point in time said any increase in probability of an accident would require an NRC amendment. We were concerned at that point in time, back in the 1990s, that if there was a change in an accident sequence that went from, say, 10 to the minus tenth per year to 10 to the minus ninth per year, that would require an NRC approval which was obviously an absurd situation.

As a result, the DCD omitted the numbers, but those numbers and the fault trees and event trees are still available in the SSAR.

MEMBER ARMIJO: Okay. Okay.

MR. STILLWELL: Thanks, Steve. So continuing, unless there are more questions. The PRA has updated while maintaining the original format to reflect site conditions and selected departures.

What I mean by original format, if you look at Reg Guide 1.206, it establishes a format for

PRAs for Design Certification and Combined License applications. Chapter 19 of the AWBR doesn't meet that format requirement. It was done back in the mid-1980s, 1990s -- certification, and we have 20-something chapters. The Reg Guide 1.206, I think, has six or seven chapters and the information played out a little bit differently.

Because of the certification rule and correct me again if I'm wrong, we have to stay within the format of the DCD so we kept the content and format of Chapter 19 consistent with the DCD content and format and so it's broken up a little bit, or a lot differently to what you see from an applicant from another plant.

What we do provide is a roadmap and Chapter 19.1S to Chapter 19 ABWR versus Chapter 19 Reg Guide 1.206, so if you can you can trace it and see where specific information that you are interested in seeing is located.

The updated PRA is bounded by the results of the original PRA. What does that mean? In Reg Guide 1.206C.III.1.19, for a DC, an approved design, if we can show changes and site-specific information included in the PRA is not a significant change, then we basically don't have to make significant changes to Chapter 19. We don't have to go in and document a lot of sequence information and stuff, as long as we can show that what we've done to change the plant design with departures or what we've done incorporating site-specific information, that's not significant -- and by significant I mean 10 percent core damage frequency change -- the Chapter 19, Reg Guide 1.206.C.III.1.19 says we just basically make a statement to that effect, no significant changes.

MEMBER CORRADINI: And then, just for clarification, so you have done the analysis, but the analysis is not part of the DCD nor the application. It is auditable by staff but not --other than your conclusion, that you just repeated, other than that, it's an audit.

MR. STILLWELL: It's an audit. And in fact the audit was performed last September and it's been looked at two or three times since.

MEMBER CORRADINI: Right. I saw that. Okay.

MR. STILLWELL: So that's a little bit of a history. Next slide, please.

MEMBER BONACA: Is the CDF the only criterion to judge --

MR. STILLWELL: If CDF were significant, then we would have to look at other aspects of the PRA. As long as CDF was not significant, we made an argument to convince everyone that we don't have to look at Level 2 because there's not a significant change in the Level 1 input.

MEMBER BONACA: Even if you had a different profile now, that is, the profile is different?

MR. STILLWELL: If the risk profile were significantly different, and by significant, if I could stay within 10 percent total but I had a specific set of initiating events because of site characteristics that changed significantly, that would be, I would say, we would be in a grey area and we would have to defend it more. We would probably have to spend more time looking at that specific set of sequences.

I will say, fortunately, I believe we didn't get there.

MEMBER BONACA: So you have look at more than one parameter alone to make a decision or a determination?

MR. STILLWELL: Yes, sir.

MEMBER BONACA: Okay.

MEMBER STETKAR: Bill, you use the word significant a lot and I don't understand the definition of that word so I -- I don't have a dictionary here. What does that word actually mean in real technical terms when you say it hasn't --

MR. STILLWELL: Ten percent change in core damage frequency in Reg Guide 1.206 and it's an increase or a decrease, by the way, which is a kind of a funny situation.

MEMBER STETKAR: And because at least I have not had access to the SSAR, I don't particularly know what sort of numbers you are dealing with. Do you have those numbers so I have a feel for a benchmark? Ten percent, we are talking about 10 percent around a value of one or 10 percent around a value of 10 to the minus 40th or --?

MR. STILLWELL: I'll talk to you about it.

MEMBER STETKAR: Okay.

MR. STILLWELL: The base case core damage frequency for the ABWR Level 1 was, I believe, and I'm going to have more digits than I need, 1.76 times 10 to the minus seventh per year.

MEMBER STETKAR: 1.76 minus seven, okay.

MR. STILLWELL: But don't quote me on that because it's kind of, pretty close to that.

MEMBER STETKAR: It's kind of a couple minus seven.

MR. STILLWELL: Well, the 1.7 is significant, times 10 to the minus seven. Okay? Let me get through this and then I will tell you where we are now.

MEMBER CORRADINI: And that is the internal events you just quoted.

MR. STILLWELL: It's internal events only. Because of the state of the art PRA back then, nobody was summing sequences and specifically in this one they said they didn't sum sequences.

MEMBER STETKAR: Internal events full power?

MR. STILLWELL: Internal events full power.

MEMBER STETKAR: Thank you.

MEMBER CORRADINI: Just to close to the loop with one of the staff that clarified something, this though is in the public document if one went back to it, the SSAR?

MR. STILLWELL: I am going to say I hope so, but we have had difficulty finding it because it's so old. There may be microfiche pages. It's not something I can go to and find on ADAMS. I can find the DCD but I can't find the SSAR. We can find transmittal letters but we can't find the SSAR, although it was documented obviously.

MEMBER BLEY: Bill, I would like to kind of parrot back what I think I've heard and it's a little different than what I thought I heard from some staff before I came. So originally, with the certification, GE had a PRA and they had a summary of it in the DCD which had no numbers.

South Texas has, from the information available and the safety analysis, built your own Level -- and that was a Level 2. You have booked your own Level 1, 100 percent PRA for the design.

MR. STILLWELL: Yes, sir.

MEMBER BLEY: And that is what we'll hear some about. Now you're also, separate from this, you are doing a much more thorough, plant-specific PRA, all modes.

MR. STILLWELL: All modes, all initiating events, internal and external initiating events. That was actually, very briefly, that's a two-phase project. We're about half-way through the first phase with at-power, low-power model, external events, selected external events are being folded into that: model, hurricane, floods, tornadoes.

That PRA will be peer-reviewed about this time next year. So we'll take it through the ASME peer-review process, given its current state and given the fact that we don't have any operating experience and we won't have any operators at this time.

The second phase, during construction, will be the fire and external events, or fire and seismic because we can't really complete those until we have something that we can touch and look at.

That one is expected to be complete probably nine months or so before one year before fuel load.

MEMBER BLEY: So will that one include, that one will be an integrated Human Reliability Analysis that includes your own procedures and --?

MR. STILLWELL: Yes, sir. That one will be, the Human Reliability Analysis will actually be performed with the current model, to the best we can. But everything in that model will be updated to current codes and standards and all of it will be integrated into what we will call the STP 3 and 4 10 CFR 50.71(h) PRA that satisfies --

MEMBER BLEY: That's about a year before.

MR. STILLWELL: We have to make that PRA current to codes and standards that exist that the NRC has endorsed in Reg Guide 1.200 at one year prior to fuel load.

So to do that we intend to basically have integrated all of the PRA into one common model as much as we can, updated it because we have to update it for things like, we've got operators now, we've got procedures now and we've got a little better understanding of what's going on, and any changes in codes and standards so that we can perform peer review and be complete about one year prior to fuel load.

One year prior to fuel load, we basically say are there any changes in Reg Guide 1.200 or in the codes and standards and we will do a delta or an update. But hopefully, the way the standards are coming out, there won't be.

MEMBER BLEY: Okay. As you go through the COLA PRA, the one you guys have done, point out places where it's not as complete as you'd like it to be or if there's anything that's not, the non-plant-specific parts if you can do it as go, but not up front.

MR. STILLWELL: Can I ask you to remind me periodically? I think I can talk about it but if you remind me I know I'll get it back to you.

MR. HEAD: But to your point, what you described and what Bill has been trying to describe was sounding to me to be the same.

MEMBER BLEY: I think so. That's why I wanted to ask --

MR. HEAD: The interesting moment that we have imposed on us is the next page where in essence we have transitioned to Toshiba and so that has, you know, made our work a little different and that's what we'll do describing here.

MEMBER BLEY: But the PRA that is there now, you guys did, it's not -- Toshiba didn't do that, or did they do their own?

MR. STILLWELL: The PRA that is described in the DCD?

MEMBER BLEY: No, in the DCD.

MR. STILLWELL: The PRA we are using to evaluate departures. The PRA we are using to evaluate departures is what we did starting from the SSAR benchmarking is another step --

MEMBER STETKAR: It is the effort to replicate --

MR. STILLWELL: Replicate is a good word.

MEMBER STETKAR: -- SSAR, PRA to the best ability.

MR. HEAD: So that we could do the evaluations we needed to do.

MEMBER BLEY: Okay, somewhere along the line I thought I heard that Toshiba did that.

MR. STILLWELL: No, Toshiba has not done --

MEMBER BLEY: You guys did that.

MR. STILLWELL: We did that, and it's not Toshiba is here, it's that GE is not.

MEMBER BLEY: I understand that. Okay go ahead.

MR. STILLWELL: So, the key from all of the discussion is we don't have access to the certification PRA, the original codes and the models and everything. So what we have done --

MEMBER ARMIJO: And the staff doesn't either, right? Does the staff have access to that?

MR. STILLWELL: I don't know if I can answer that question or if I know the answer to that question.

MR. FULLER: Hi, this is Ed Fuller from the PRA Branch in NRO. We have somewhere a non-electronic version of it. As far as, I didn't use it in my review for the Level 2 severe-accident piece. I'm not sure if the people who did the Level 1 review used it, but we did rely on the SSAR.

MR. HEAD: For our purposes, obviously, for doing evaluations, we would need our own to do --

MEMBER ARMIJO: Sure I understand that, I'm just trying to see what the staff compared your work with, if they had access to it or not.

CHAIR ABDEL-KHALIK: Please proceed.

MR. STILLWELL: So, as we described, we took the SSAR PRA description, basically rebuilt the system fault trees, system event trees. This is the data that was used in the original quantification, evaluated that model and fixed any discrepancies that we found and we found several, probably documentation things or things that we were doing wrong, changes in code version because CAFTA was basically the DOS version and now it's much more user-friendly and easier to transfer information between.

You see the reconstituted Level 1 PRA includes partial sequences that transfer where eliminated, that's primarily due to the change in CAFTA code. And in the original PRA, the Containment

Overpressure Protection System, COPS, was actually credited in Level 2 to provide core cooling so we could prevent sequences from going to core damage if COPS actuated successfully.

And it made it difficult to understand what was Level 1 and Level 2 so this model, we basically put COPS with Level 1 where it was appropriate so that core damage, when you could get it out, is actually core damage rather than an artificially inflated core damage that COPS is going to recover in Level 2.

MEMBER STETKAR: Bill, I -- tell me when we are running short on time. The --

MR. STILLWELL: We knew this was going to take a while.

MEMBER STETKAR: It's going to be brutal. Just get over it. You just mentioned that sort of relocation of COPS and obviously I don't know anything about the models because I haven't seen any models but the words that I read were that some number of core-damage recovery functions, COPS being one of them, had been implemented through post-processing of, I don't know what you call them, cut-sets or sequences, post-processing of results, cut-sets. Is that true, is that

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the way that's actually been --?

MR. STILLWELL: That's the way it was done originally.

MEMBER STETKAR: That's the way it was done originally. Have you actually wired those systems into the Level 1 models as fault trees now?

MR. STILLWELL: I'll ask one of my friends to answer that question, if I could.

MR. SUMMITT: My name is Rick Summitt. We help support STP on the development. Initially, we did it post-processing and in the final reconstituted model, it is in the model that we have the actual pieces in there so we can quantify to get the actual cut-sets, but it's a simplistic model that basically relates back to what was done by GE.

So there were basically only two aspects that we had to look at.

MEMBER STETKAR: When you say simplistic model, I don't particularly care about definitions of basic events. Do you at least have fundamental support system, like electric power and cooling water, I have no idea even what these systems are.

MR. SUMMITT: Yes that is correct.

MEMBER STETKAR: You at least have that

wired to go.

MR. SUMMITT: Yes.

MEMBER STETKAR: Okay good.

MR. SUMMITT: COPS is one of them and COPS is a fairly, you know independent system by design.

MEMBER STETKAR: Okay.

MEMBER BONACA: I have one more question. Is the methodology that you used, the analytical tools, are they consistent with what you would have in the mid-90s?

MR. STILLWELL: Yes.

MEMBER BONACA: Like cutting off sequences?

MR. STILLWELL: The tools are basically updated -- CAFTA has been upgraded by EPRI, it's an EPRI tool. GE used MAAP 3.0b and modified it for the ABWR design and they called that model MAAP ABWR.

We actually developed a MAAP 4 model using the best information we could get on fuel design, just in the event we needed to evaluate a departure that started to look like it was going to affect sequences or timing on our Level 2 analysis.

But the codes and standards are basically what we had then but they've been upgraded over the years so we've used the latest versions.

MEMBER BONACA: You don't expect that the different methods made a difference much in the results?

MR. STILLWELL: Actually for some of the benchmarking, and correct me if I'm wrong, for the MAAP analysis, some of the results changed but not significantly and it was due to code changes in MAAP.

For the CAFTA, I am not sure that we could say that there are any significant changes. We have found things that they didn't see and we saw and they probably saw things that we didn't because CAFTA DOS was a lot more difficult to work with than CAFTA Windows.

Windows makes it a lot easier to link systems and everything. You don't have a lot of funny intermediate steps to transfer information through a set of linked fault trees.

So I think the codes and standards have helped us ,probably, an awful lot in recreating the model.

Okay. Core damage frequency results compared favorably with that published in the DCD, actually what was published in the SSAR, we were within one or two percent of the total, I believe, and on a sequence by sequence, or initiating event by initiating event, some cases we were right on and in some cases we were a couple of percent off or fractions of a percent off.

So we feel that the exercise established that this model is consistent and coherent with the base model or the model that was described in the SSAR.

MEMBER CORRADINI: Well, stop right there. Just to get back to -- Mario had a question and you answered about if the profile changed significantly, you would be in a grey area and you might have to address it, so did any of the accident-sequence ordering significantly change?

MR. STILLWELL: The ordering probably changed a little bit once you got down into it a little bit. But for the dominant sequences and the set of equipment that was important, it basically looked the same.

MEMBER CORRADINI: Okay.

MR. STILLWELL: Now, you could go to an individual sequence and say, hey, this one jumped up three or four; why? We could always find things like that.

MEMBER CORRADINI: But in terms of, I guess, as I understand it, contribution to the cumulative CDF, the dominant sequence has remained --

MR. STILLWELL: The dominant sequence for the base model. Okay so we established that the base model PRA was about 1.76 times 10 to the minus seven. Our model PRA, I think we got 1.77 but something like that, so it's really close.

Okay, now follow me through this one because it's really complicated and he still doesn't understand.

MEMBER ARMIJO: He is not alone.

MR. STILLWELL: I think in the later stages of developing the DCD, probably, or translating the SSAR to the DCD, the NRC identified a significant, I don't want to say error or oversight, in the modeling of common-cause in the ABWR PRA.

If you have access to the Standard Safety Analysis Report, in Chapter 19D.8, you see the results of a sensitivity evaluation GE performed to talk about this oversight.

It turns out that they did not correctly model or did not model correctly common-cause failure of reactor service water, reactive building cooling water, high-pressure core flooder and RHR systems. Those aren't important.

(Laughter.)

But when they did the sensitivity analysis and then they incorporated those common-cause failures in those mechanical systems, the core damage frequency that they calculated from the sensitivity runs was 30 percent higher than the core damage frequency that was reported in the Standard Safety Analysis Report. About 30 percent.

And they had a note that says the next time we change this model, we have got to incorporate this because, obviously the NRC knew about it. They are the ones that said, hey, you've got to fix this.

Okay so we have a note in 19D.8 of the SSAR that says update the PRA the next time we use this model to incorporate the fix for the common-cause.

So we had a PRA that is consistent with the SSAR and we have an error that we have to fix that was identified during certification. Everybody accepted it and said it's not going to affect the conclusions but we had to get this error incorporated into the model that we use for a base.

So that bullet that says we incorporated common-cause failure of those systems that were identified in SSAR Appendix 19D.8 so we have a base model that has a core damage frequency of about 1.77 and I have a modified base model that incorporates a common-cause error or fixes a common-cause.

That PRA, if we go to the next, real fast --

MEMBER STETKAR: Okay, I'll let you finish.

MR. STILLWELL: Go ahead. We'll call that the STP ABWR model. So that is the new base model that incorporates a fix or correction to common-cause.

MEMBER STETKAR: In the S -- whatever you just called it, that thing.

MR. STILLWELL: Yes, sir.

MEMBER STETKAR: That now has common-cause modeled correctly, what is the scope you -- recognize I've never seen the SSAR PRA so I have no idea what was in there and what was not in there and I understand that the staff identified the fact that common-cause failures should be evaluated for nominally important equipment and it now has been input for nominally important equipment, does the STP ABWR model include common-cause failures, a full common-cause failure analysis of all pumps, active valves and, let's start out with circuit breakers, or is it still a partial selected common-cause failure analysis?

MR. STILLWELL: The answer I guess, and bear with me, this PRA was started in the late 1980s and went through the early 90s so it's state of the art for the about IPEEE vintage PRAs which was basically those components that are important are going to have pretty decent common-cause.

It does not have what I would call to get to Dennis' point, a state of the art treatment of common-cause. What I would say in a PRA that we would bring into the staff to support a risk-informed application under the current rules.

MEMBER STETKAR: So it still has a partial treatment --

MR. STILLWELL: Remove it back to -- it's a partial treatment. It's a little bit better than what, bringing in historical context, what we did in Zion and Indian Point but not quite as good as what we did for Seabrook.

MEMBER STETKAR: Okay. Thanks.

MR. STILLWELL: Did that kind of answer the question?

MEMBER STETKAR: Sort of, I am just trying to get a sense of whether -- how much stuff has been selectively added as a response to a specific staff question recognizing also when that question arose in the history of things, compared to what we would do today on a clean slate in terms of the scope of equipment-failure modes.

MR. STILLWELL: The PRA we are building to satisfy current codes and standards will have all active failure modes, all active equipment, breakers included.

The PRA, the ABWR PRA would have the important equipment, the diesel generators, I was kind of surprised to see high-pressure core flooder in there but it made it in there.

MEMBER STETKAR: But not necessarily all pumps.

MR. STILLWELL: Not necessarily all, not necessarily all ventilation systems.

MEMBER STETKAR: Yes, or valves, probably.

MR. STILLWELL: Valves they actually didn't do a bad job on, I think they actually got the valves pretty well but what got them was the pumps.

MEMBER STETKAR: That helps.

MEMBER ARMIJO: So just one last thing.

MR. STILLWELL: Yes, sir.

MEMBER ARMIJO: You took -- corrected deficiencies that were in the certification PRA, right? You are syaing you did that and created the STP Level 1 PRA.

MR. STILLWELL: Yes.

MEMBER ARMIJO: But then you -- but also say that the STP PRA or the updated PRA is bounded by the results of the original?

MR. STILLWELL: PRA.

MEMBER ARMIJO: Which had deficiencies.

MR. STILLWELL: And --

MEMBER ARMIJO: So they had compensating things? So I just don't understand; if the original one had problems, why do you feel you need to be bounded by the results of the original one?

MR. STILLWELL: Because they actually performed sensitivity analysis in Chapter 19D.8 to calculate the new core damage frequency. So that's why I think we can say it's bounded. They actually did a quantification of it.

MEMBER ARMIJO: Okay.

MR. STILLWELL: They just didn't carry it throughout the whole Chapter 19. Okay so they found an error, they fixed the error, they showed how bad it was.

MEMBER ARMIJO: And they have a number.

MR. STILLWELL: And they have a number and then they made a determination that there was no reason to go back and update every place in the SSAR where core damage frequency was talked about because they didn't change any of its conclusions.

MEMBER ARMIJO: Right and so you built your thing and you found out your number was consistent or bounded by their number.

MR. STILLWELL: Our number was -- base-to-base or modified-to-modified we are bounded by the original results, that the departures to be included did not significantly affect any of the results.

Back to the original, next slide, previous slide. Okay so the STP updated model accounts for the departures and site-specific information that may impact PRA results and now we go to the next slide.

So when you look at this slide, what's important is that STP APWR model is the base model with common-cause corrected, as described in the

Standard Safety Analysis Report. The STP 3 and 4 departure model is the model that we used to validate departures and has departures incorporated in it. So that's, if you want to think of it as a site model or something like that --

MEMBER STETKAR: That is the model of record for the COL application.

MR. STILLWELL: It is the model we use for the COL application. We have some issues with model of record because model of record is the DCD PRA or something like that.

MR. HEAD: It is the one we are using to evaluate departures.

MEMBER STETKAR: I forgot I'm not a lawyer.

MR. STILLWELL: Don't feel bad.

MEMBER BONACA: It is amazing that you came that close.

MR. STILLWELL: If you go to individual sequences or initiating event frequencies, and the reason I rounded it off is because it's really not any significant change and I didn't want to spend a lot of time talking about 2.62 versus 2.64.

I'm sorry, at 10 to the minus 10, I don't really care.

MEMBER BLEY: You pointed out --

MEMBER ARMIJO: Station Blackout for half an hour to two hours is the biggest one I can see.

MEMBER BLEY: You pointed out the things that are common-cause. As far as the basic system models that have matched up pretty well, are they reasonably state-of-the-art kind of models?

MR. STILLWELL: Now, yes.

MEMBER BLEY: Okay.

MR. STILLWELL: It sounds like we are criticizing what they did. They did a very good job building a PRA, given codes and standards that existed and the state of the art and in fact they went beyond what most people were doing in the IPE and IPEEE.

So at the time that was a very good model. It wasn't --

MEMBER STETKAR: I am going to ask him about a few of the departures and the statements that are in Chapter 19 that might ferret out some of that information so -- yes, I know he's got slides on departures. Eventually we will get there.

MR. STILLWELL: The other column that is on this table is, one of our COL action items was to compare the Loss Of Offsite Power frequency and recovery to -- because it was generic, to what our current, what we have currently.

We are an ERCOT liability, reliability, Electric Reliability Council of Texas, right? Those of you that work with ERCOT or work in the industry realize ERCOT, we are basically an island, we don't sell power across state lines. We also have a fairly reliable grid, we think.

Using ERCOT data from NUREG, I forget exactly the number, the latest loss of offsite frequency after the last Great Northeast Blackout, you will see that with ERCOT data and Loss Of Offsite Power frequency and recoveries for the various causes, we actually should see a significant decrease, or significant, we see a change in core damage frequency of about 20-plus percent.

So what they used originally was at least conservative.

MEMBER STETKAR: Well you still retain, all you did is change ERCOT. You just changed grid data, you kept the switchyard and the plant-centered and the weather-related. You did; I checked the numbers.

MR. STILLWELL: Yes, we did.

MEMBER BLEY: And for the others, looking, if you look at the LOOP, Loss Of Offsite Power scenarios, that's where you'll see the different --

MR. STILLWELL: Yes, everything else stayed the same. The only thing we changed was associated with grid stuff.

MEMBER BLEY: Oh it would be Station Blackout.

MR. STILLWELL: Station Blackout. Okay moving on, Chapter 19 content. I said Chapter 19 remains consistent with the format presented in the Design Control Document. We added two new sections. 19.4S has to do with maintenance and it describes how we are going to maintain the PRA that we have got to have going forward that provides specific information requested by Reg Guide 1.206.

We also added 19.1S, which as I said is the roadmap between requirements of Reg Guide 1.206 for Chapter 19 and what the ABWR DCD has.

Chapter 19 includes departure information, site-specific supplemental information, information on COL license information items and information on COL applicant safety issues, which are generic safety issues, unresolved safety issues and things like that.

The next four or five slides are basically a summary of a lot of bookkeeping. Chapter 19.1, purpose and summary. There were two departures; they were editorial, primarily. They were editorial.

Chapter 19.1S, as I mentioned, it's a map from 1.206 to the DCD PRA, 19.2 is supplemental information. The important thing in 19.2 from a review standpoint is that's where we present our screening information for all the departures that we looked at.

So if you look at table 19.2-1, we summarized all of the departures we looked at and described, if it had an effect, was it even talked about in Chapter 19, if it had an effect, what we did about it and we summarized where the effect is talked about in Chapter 19.

19.3 is internal-events analysis, it was originally the summary. There's eight departures that basically affect words but they are departures for things like grid or not grid, electric power distribution changing from 6.9 to 4.16. But it's primarily just text descriptions.

19.4 is external events and low-power shutodwn. It's a summary section and there's an editorial departure.

Did you have anything specific you wanted to talk about?

MEMBER STETKAR: Keep going until you get to 17.

MR. STILLWELL: Or can I go through these fairly fast? 19.4S, plant-specific PRA, that satisfies 10 CFR 50.71(h).

19.5: source term sensitivity studies. That describes sensitivity studies performed and documented in 19E.3, I believe.

19.6 is measurement against goals. We have an admin departure in 19.7 PRA it's a design tool, four departures, primarily editorial.

19.8, important features identified by the ABWR PRA, we have three departures, basically words.

19.9, COL License information items, 30 COL License information items, six departures to account for departures in other sections of the Final Safety Analysis Report.

19.4.10, assumptions and insights, systems outside ABWR design control. One departure for the Reactor Service Water Pump House.

19.11, human action overview, four departures and we picked up a significant human action in 19.11 and we talk about it in more in 19R for external flood and it's verify that the flood doors are closed.

The description in the COL says it's closed for the flood doors but in response to discussions with the NRC, we have now very the doors are closed, the doors are not closed.

MEMBER SIEBER: The shutting of the doors.

MR. STILLWELL: Sorry?

MEMBER SIEBER: Is that one? The shutting of the doors.

MR. STILLWELL: What we have done is modified the request for additional information in response to the doors will be closed and embarked on a more detailed flood analysis to support our position that the doors can be opened.

But right now the COLA has been modified in the RAI response to say the doors are closed.

MEMBER SIEBER: Okay.

19.11, human action overview, we just talked about.

19.12, input to the Design Reliability Assurance Program, that was actually IBR, incorporate by reference, so we made no changes to that.

MEMBER STETKAR: Bill, on that, I will

interrupt you hear rather than waiting. On the Reliability Assurance Program, we haven't seen Chapter 17 yet.

MR. STILLWELL: Yes, you have. In March.

MEMBER STETKAR: Okay, well, we've seen Chapter 17, then. One of us has completely forgotten it.

At what level, the question I had, which I should know but I didn't actually go back and look for it, is, at what level of detail is your Reliability Assurance Program specified. Is it by system, by train within a system, by individual component, by specific failure mode for individual component?

MR. STILLWELL: The answer is yes.

MEMBER STETKAR: Okay.

MR. STILLWELL: Basically it depends on what the system is. It's some cases it's at system level.

MEMBER STETKAR: But it is down to the level of detail of individual -- for some equipment.

MR. STILLWELL: For some equipment it actually goes down to failure mode. And in fact one of the open items that we are going to talk about today talks about a question that you raised when we did present DRAP on how do you get the information before construction.

We had a very good discussion about it.

MEMBER STETKAR: I'm sure we did.

MR. STILLWELL: 19.13, some of your insights came from the PRA, two departures in the external flood.

19A is a response to the CPML rule, 10 CFR 50.34. One departure having to do with hydrogen recombiner elimination and that was an editorial departure.

19B, resolution of unresolved safety issues and generic safety issues, I had two departures that were primarily editorial, that were editorial. If I say primarily editorial, I really mean editorial.

19C is design conditions for reducing sabotage and that was incorporate by reference and it was not originally part of the DCD. They had to refer to the Standard Safety Analysis Report, which in turn said this is proprietary, security-related information and it was a separate report, just historical background.

19D, and this is where everybody gets confused. That's where all the documentation to the

PRA is, but it's not part of the DCD. You have to refer to the SSAR if you want to see fault trees and event trees and operator actions and data and all sorts of good stuff. It's all in 19D.

MEMBER STETKAR: But has the SSAR been updated to document your -- whatever you called it, ABWR fault trees and event trees which --

MR. STILLWELL: No, SSAR is a GE document.

MEMBER STETKAR: Okay.

MR. STILLWELL: What we have done is document what we did and then the changes we made to evaluate departure. So we have model documentation that evaluated --

MEMBER STETKAR: But that model documentation is only available for staff audit in your offices, is that right?

MR. STILLWELL: It's actually down the road.

MEMBER STETKAR: But it's not in any --

MR. STILLWELL: No it's not --

MEMBER STETKAR: Published --

MR. STILLWELL: It's not.

MEMBER STETKAR: Document that we have.

MR. STILLWELL: It's not been formally

transmitted. What we've done is make it available for staff audit.

MEMBER STETKAR: Okay.

MR. STILLWELL: It's three blocks or four blocks that way, whichever way it is.

MEMBER BLEY: Here in Washington?

MR. STILLWELL: In Washington. In Westinghouse's office.

CHAIR ABDEL-KHALIK: So would a Subsequent COLA be able to reference your modified base model?

MR. STILLWELL: I don't know how to answer that question. I guess I would ask Steve Frantz to answer it. That goes outside of anything I'm familiar with.

MR. FRANTZ: There are statements in the FSAR which are standard statements that a Subsequent COLA could reference and presumably under the one-time, one-review, one-result role the staff has, it would not go back and look at that information again unless there was a different departure or unless there were different site-specific information.

And then that applicant would need to come up with its own evaluation or that departure or that site-specific information.

CHAIR ABDEL-KHALIK: So they have to start sort of plowing that ocean one more time.

MR. FRANTZ: They may have to depending. There's a lot of ways to look at the evaluation, do you evaluate departures or do you evaluate site-specific information, it may be able to do a qualitative analysis, they maybe have to do some kind of quantitative analysis. They would not necessarily have to go back and regenerate a PRA. There are other ways of looking at departures.

MR. HEAD: There is obviously business decisions and licensing decisions associated with all of that so, you know --

CHAIR ABDEL-KHALIK: I am just trying to see how consistent what you've done is with the, sort of, the original intent of the process, with you being as the lead COLA application and then a Subsequent COLA coming back.

MR. HEAD: That's part of the business and underlying strategy that I think we're consistent absolutely with that. I mean, we evaluated our departures and, if someone wants to follow on with, you know, our -- you know, the Toshiba approach then we are set up clearly right now to do that, so.

CHAIR ABDEL-KHALIK: Okay. Please proceed.

MR. STILLWELL: Then we get down to 19E which were primarily Level 2 and consequence analysis evaluations, an awful lot of sensitivity evaluations with the MAAP ABWR code.

19F, next page, in 19FA, were containment ultimate strengths. Those were incorporated by reference

19G was not used therefore it was incorporated by reference.

19H and 19I describe the seismic capacity analysis and the seismic margins analysis to support screening of seismic -- the screening that was performed to support the seismic margins assessment.

19J was not used. 19K is PRA-based reliability and maintenance. That's basically describing the inputs and how the original DRAP tables or Table 19K.4 were developed.

The DRAP tables in 19K were a combination of Level 1 quantification, Level 2 quantification, low-power shutdown insights, not really quantification, fire screening insights, flood screening insights, seismic screening insights.

So it's not entirely quantitative, it's

quantitative and qualitative, which is what it probably should be for a Reliability Assurance Programs. We have maintained that consistent so we've got, we actually added components to the Reliability Assurance Program, the external flood doors, for instance, in another site-specific supplement.

But we have also maintained the Table and that's what we are evaluating right now. In reference to your question, we have got the expert panel for Design Reliability Assurance meeting, well, three or four times a year. We've had three now and we are actually starting the process of evaluating, at a high level, systems and going down to components in an expert panel.

And when we get to the open-item closure, we will talk about that a little bit more.

19L is ABWR shutdown-risk evaluation and it goes along with 19Q, QA, QB, QC.

19M is fire protection where we document the results of the fire screening assessment.

19N is the analysis of common-cause failure of essential communications. That has one departure, the departure -- Tier 1 departure for I&C.

One thing you will see in here, we

originally thought that was going to be a very big deal in the PRA, but because of the way it was analyzed in the original PRA and the fact that we really don't have a design because we are designing the system as we speak, there was no change to what was included in the PRA or what was modeled in the PRA.

So if you think of it as a black box in the original PRA we still have the same black box, we just changed some of the names. It had a little bit more detail than a black box. It wasn't a single number. But it's not -- it didn't change as a result of the I&C departure.

19P is evaluation of potential modifications and that's got a pretty good discussion of the steps that GE performed during certification to add, to modify the design based on PRA insights, if you are interested.

19Q, QA, QB, QC, describe the low-power shutdown analysis and 19R is the probabilistic flooding assessment. There we have five departures: the external flood assessment, the Reactor Service Water Pump House flood assessment and the reevaluation of the control room flood assessment and that's probably where most of the actual PRA work was done during the flood assessment: the two buildings and the external flood.

Questions so far?

You said you had a question on a specific chapter?

MEMBER STETKAR: No, keep going.

MR. HEAD: That was 17, I think.

MR. STILLWELL: Okay. Departures, with the exception of technical specification editorial departures, all of the departures for STP 3 and 4 were evaluated within the context of the PRA. So the screening and evaluation process was consistent with that described in Reg Guide 1.206 C.III.1.19 and it basically describes the five or six step process that says you identify the departure, you map the departure to a specific element, you see if it actually changes something, is it just description, and if it actually changes something then you have to evaluate it using the PRA.

So that's basically the process we followed. We had 13 Tier 1 departures, one Tier 2* departure involving codes and standards, a Tier 2 departure on technical specifications, pardon me, nine

Tier 2 technical specification departures and one Tier 2 analysis method.

The reason I have mentioned those is all of those require prior NRC approval.

MEMBER BLEY: The Tier 2 ones, too?

MR. STILLWELL: The Tier 2 codes and -- Tier 2 codes and standards, Tier 2 technical specifications.

MEMBER BLEY: Yes, Tier 2* but Tier 2 does not I believe.

MR. HEAD: If you do the analysis and it needs NRC approval it -- it needs --

MR. STILLWELL: Technical specifications analysis methods require NRC approval.

MEMBER BLEY: Okay.

MR. STILLWELL: The rest of the Tier 2, we had 127 other Tier 2 departures and we have a site-specific information change. By that I mean GE in the original DCD described a conceptual ultimate heat sink that was a pond some distance away from the plant.

We actually have a basin with cooling towers so the design is significantly different. That's among other things site-specific information that had to be included.

Eleven of the departures and the information change did not pass the initial screen. The initial screen in our case was it's not even mentioned I can throw it away. It's mentioned but it's only words, okay I can probably throw those away, I talk about the words but those screen very quickly; it is mentioned but it has no significant effect.

Well, those, mentioned but no significant effect we basically kept for I have got to do something with it, let's look at them. So that's the 11. As a result of the departures there is no significant change to the PRA results presented in the DCD.

So we basically say we are consistent with what was described in the DCD, including the site-specific information so there are no significant changes therefore we feel that what is described in Chapter 19 we are pretty safe in saying there is, we don't have to go back and change a lot of stuff about sequences and what's significant and things like that that Reg Guide 1.206 allows us that flexibility.

Next slide. How am I doing for time?

Departures requiring further review. Departure Tier 1 2.4-1, residual heat removal and spent fuel pool cooling. What that did, the original design residual heat removal provided backup cooling for spent fuel in two trains. The departure adds a third train capability for RHR. It gives us additional flexibility in shutdown scheduling maintenance with RHRs spent fuel pool cooling. Has no effect, just additional redundancy.

Standard departure Tier 1 2.4-3, RCIC according to what used to be the WIR design, now it's the TWL design, table and water lubricated design.

It turns out it has a minor effect because we got rid of things like lubrication system, oil lubrication systems, barometric condensers, the things associated with steam seals. But based on data we got, we were able to collect from operating plants that have actually installed the turbine and auxiliary feedwater.

We don't have enough data to warrant changing failure rates but it tends to support, we expect to see a decrease in start reliability and a decrease in unavailability associated with maintenance.

MEMBER BLEY: Decrease in reliability?

MR. STILLWELL: Decrease in unreliability.

MEMBER BLEY: Unreliability.

MR. STILLWELL: Increase in reliability, decrease in unavailability. Than, you for catching that.

MEMBER STETKAR: Bill.

MR. STILLWELL: Yes sir.

MEMBER STETKAR: Now we are going to slow down and you tell me when to stop.

MR. STILLWELL: Please go ahead.

MEMBER STETKAR: In addition to just swapping out the RCIC turbine and you know taking out some of those support systems, the design change also made a change to the steam admission system.

MR. STILLWELL: Yes sir.

MEMBER STETKAR: It used to have a small steam admission bypass valve that had to open and then the main steam admission valve opened. Did the original PRA model those valves in series, that valve number one had to open and then valve number two had to open, or were they parallel steam supplies such that the current single valve opening would be a much higher unreliability for start.

Because now a one out of one valve needs to open rather than a one out of two. I saw no mention of that for example in the discussion of this. All of the mention was on how much better the turbine is and you have removed support systems.

MR. STILLWELL: We have removed support equipment, yes.

MEMBER STETKAR: What about the steam admission system?

MR. STILLWELL: We did not change the steam admission modeling.

MEMBER STETKAR: Oh. Okay so you did not check the difference on that part of the design change.

MR. STILLWELL: No.

MEMBER STETKAR: Okay. You are going to hear a lot of this. Keep going.

MR. STILLWELL: Okay. We are prepared to talk about steam admission.

MEMBER STETKAR: I am sure you are.

MR. STILLWELL: Later today kind. Safety-related I&C architecture. We talked about its text changes associated with going from multiplexes to whatever we had.

Departure Tier 1 5.0-1 site parameters, it gave us the site design basis external flood from a reservoir breach.

Departure 5.4-1 reactor water clean-up. It actually increased the heat removal capacity of the system. Instead of 250 percent pumps and heat exchange we now have 200 percent faster systems. It makes a slight difference in shutdown cooling scenarios but not enough to quantify and it was actually credited in some of the at power core damage sequences but not early. So it has an insignificant effect. We actually didn't include it in the model.

6C1 --

MEMBER STETKAR: I'm sorry Bill, I am talking out of the side of my mouth here. You said reactor water cleanup was sort of modeled or not?

MR. STILLWELL: It's modeled in low power shutdown but it has no significant effect. Basically it increases --

MEMBER BLEY: Don't you take credit for it for makeup for full power?

MR. STILLWELL: They talk about it for makeup and it may have actually been modeled but it didn't ever make it to the list of significant sequences and because it is not good enough in the short term.

MEMBER STETKAR: Let me, is there a fault tree in the Level 1 PRA model today for the reactor water cleanup system?

MR. STILLWELL: I am not sure if there's a fault tree. I believe there's an operator action. Because the operator --

MEMBER STETKAR: The pumps are perfect?

MR. STILLWELL: No, the operator has to basically line things up and bypass heat exchanges. So you take credit for decay heat removal. You have got to bypass the resins or everything. We could check on that but --

MEMBER STETKAR: The increase in capacity of the pumps is such that they could have one pump, one out of two pumps running instead of whatever so that would change the number of running pumps and change the model but --

MR. STILLWELL: And it's not significant.

MEMBER BLEY: So if it is only an operator action I am assuming that -- the quantification of operator action is high enough that you --

MR. STILLWELL: Oh they use screening of values and in general it's 0.1 in real close to that. It's similar to what we've done with condensate that operator action is actually a little model but it doesn't significantly affect anything because operator action dominates it and in this case, because of the timing and what we have to do I am pretty sure it's dominated by operator action. Low power shutdown, it just didn't make a difference because it was a backup to a backup to a backup. But we will check.

Containment debris protection of ECCS strainers, they are actually model strainers but there's no effect based on what we are talking about because we are not crediting strainers' operation in extreme core damage sequences.

Plant medium voltage electrical system design.

MEMBER BLEY: Say that last one again, what does that mean?

MR. STILLWELL: It means --

MEMBER BLEY: Are you not counting the chance the strainers could plug?

MR. STILLWELL: No, they don't, we don't look --

MEMBER BLEY: You don't use them?

MR. STILLWELL: We don't use them at that point. The strainers, if we have extreme core damage the strainers are useless. The only way I can get there is if I don't have core cooling systems. So at that point, that's not even in the model.

MEMBER BLEY: Okay.

MR. STILLWELL: Plant medium voltage electrical system design. Going from 6.9kV to 13.8 and 4160. Coming down to primarily being code exchanges although we did have some minor PRA modeling effects because we had additional breakers from the combustion time regenerated to the Class 1E systems.

9.2-5, reactor service water system. That was conceptually it's the same system as described in the DCD, in truth this system is now in a pump house that is below the ultimate heat sink. Because of the change of the location in the pump house we also changed the design of reactor service water system.

The pump house is a lot closer to the control room than the conceptual design described in the DCD so inside the DCD they had limits of length of piping and it related to control building flooding in the basement for the reactor building cooling white heat exchanges.

Our system is a lot closer but we are also gravity head rather than siphon. So that we had to redo the control building flood analysis and get rid of things like vacuum breakers and RSW system.

Fire protection, 9.5-7, the system described in the DCD is for a single unit site. We have a shared fire protection system for two units and that's probably been one of the more interesting issues we have had with the NRC staff in evaluating the shared fire protection system in the context of Chapter 19.

Departure 19.3-1 is actually the departure we identified to incorporate the error the common-cause described in 19DA. So it's not really a change to the design but it's a way we had of getting it into the COLA to say we had to do something with it.

And departure 19R-1 is an actual RSW pump house redesign but we had to go in and evaluate RSW pump house internal flooding.

And for your information the RSW pump house, pumps are about elevation 10, the ultimate heat sink, basin height is about 85, and control building basement is about -30, -35, so we have got a pretty good head going from the ultimate heat sink down through the pump house.

The pump house is three separate

divisions, each division is essentially watertight top to bottom.

MEMBER STETKAR: Bill, before you flip the slide I need to get a few of the bugs that have been bothering me. The first thing that I did when I started to look at Chapter 19, you had this really well documented table 19.2-2 that systematically goes through each departure from the standard design and identifies what the departure is and summarizes the potential effect on the PRA.

So I started to think about if I was going to have a PRA for a BWR and not having ever seen this PRA, which of these departures might affect something in the models that I would have. Then I went through that exercise and I was bothered by several of the conclusions.

You summarized the things that you looked at. I'm a little bothered by the things that have been just dismissed. The first one, I'll mention a couple, but the first one is you've added a fourth division, a fourth division of instrument power and reorganized things to be supplied from that fourth division of power and the conclusion for that change to the plant is that there is "no quantifiable effect on the model."

What does that mean? Does it mean that it was never modeled at all?

MR. STILLWELL: The power supply we are talking about is actually for distributed instrument control. It's not instrument power. They always had four channels of instrument power.

MEMBER STETKAR: Okay.

MR. STILLWELL: It was an instrument -- it wasn't quite the same thing. It's non-safety.

MR. HEACOCK: Let me clarify this. I'm Evans Heacock, with South Texas. What we added was a non-safety, non-UPS backed instrument power system for maintenance purpose so that if we did need to take out some of our UPS systems we would not drop our instrumentation on our fourth division so it's a, it's diesel-backed but it's not UPS-backed.

The UPS-backed channel four always existed and still exists. What we did was make it consistent with divisions 1, 2, 3 and we just added a fourth. Divisions 1, 2 and 3 already had this power. We just added one more.

MEMBER STETKAR: So it's not, I guess I must have misinterpreted then.

MR. STILLWELL: The table wasn't real clear. We responded and we had an RAI response where we went in and cleaned up the words because it wasn't real clear in the table. So I'm glad you're asking about this.

MEMBER STETKAR: Let me ask about a couple of others then that might be a little easier. Turbine building closed cooling water, is it modeled in the PRA?

MR. STILLWELL: It's modeled, it's discussed in Chapter 19 and analyzed as part of the turbine building flood. Is it modeled in the PRA?

MEMBER STETKAR: Is it modeled as a support system for the feedwater and condensate systems?

MR. STILLWELL: Off the top of my head I don't think so. They didn't go into that level of detail.

MEMBER STETKAR: They didn't model a cooling water system? How important is feedwater and condensate?

MR. STILLWELL: The system function is important to their support systems. They didn't credit turbine development -- if the initiating event was support system driven, they didn't credit condensate and feedwater.

MEMBER STETKAR: No, no, no, no.

MR. STILLWELL: That's basically how they handled it.

MEMBER STETKAR: Don't dance around too much. How important is feedwater and condensate for mitigation of LOCAs and transients?

MR. STILLWELL: They are risk significant, the functions are risk significant.

MEMBER STETKAR: If turbine building closed cooling water failed would those systems fail?

MR. STILLWELL: They would fail.

MEMBER STETKAR: Okay. S

MR. STILLWELL: And it's a support system initiated --

MEMBER STETKAR: Is turbine building closed cooling water modeled in the -- do you have a fault tree model for turbine building closed cooling water and turbine building service water in the PRA?

MR. STILLWELL: I don't know. What they did was handle it by initiating event. So they --

MEMBER STETKAR: That's okay. I can understand the initiating event part of it. I am worried about the other 99 percent of the events that don't, aren't caused by that initiating event. It's why you model electric power you know, and all of the other support systems in a PRA.

MR. STILLWELL: Let me see if I can rephrase your question. You are asking if we have modeled turbine building --

MEMBER STETKAR: Do you have a fault tree for --?

MR. STILLWELL: No.

MEMBER STETKAR: Okay.

MR. STILLWELL: Basically, what I said was if the initiating was loss of support for turbine building auxiliaries, they didn't credit feed and condensate.

MEMBER STETKAR: I understand what you did. I'm just trying to find out how come -- what I'm trying to do, Bill, is try to find out how complete, not knowing anything about the SS -- the original, years-ago models, trying to infer how complete those models were and whether or not your conclusions -- there are several conclusions that you draw that says not important, no effect on the PRA, not modeled, not quantifiable.

All of those types of terms lead me to

believe that the thing that has changed from the certified design to the current design has not been evaluated either because it was never in the PRA, so the delta is zero because something that is not there can't have a change, even though it might be worse, it could be worse today.

MR. STILLWELL: If I model it in detail. Yes.

MEMBER STETKAR: Or is it, did you actually look at it and conclude that there was really no difference, you know, which means it is in the PRA and really the design change is an insignificant design change.

Because we are looking at deltas and you talk about 10 percent differences on a couple of times 10 to the minus seven number, it's pretty easy to get one of those, especially if something hasn't been modeled and you now look at the current design and say well, what is the real risk contribution from the thing that was never modeled before, which was you know, infinitely optimistic.

MR. STILLWELL: I agree, but it was the state of the art -- the only thing I can go back to is it was state of the art in the `90s, we didn't go into that level of detail for turbine auxiliaries. Currently we do, I will give you --

MEMBER STETKAR: We who?

MR. STILLWELL: We, industry in general. In IPEEEs. We didn't have an awful lot of detail for balance of plant support systems.

MEMBER BLEY: Oh but some people did.

MR. STILLWELL: Some people did but industry in general did not.

MEMBER BLEY: That's probably true.

MR. STILLWELL: So that's why I say feedwater and condensate was almost a black box. It did have a rudimentary model for feedwater and condensate but it was --

MEMBER STETKAR: That is what I was going to ask. You have added condensate booster pumps. Is there a fault tree now for the feedwater and condensate system?

MR. STILLWELL: We have included a feedwater and condensate fault tree but it was or-ed with an operator action so condensate booster pumps we looked at it in terms of, gee we had condensate pumps adding condensate booster pumps when I need one out of four or-ed with an operator action point one has no significant effect.

MEMBER STETKAR: Or-ed with an operator action of point one for what, the system is normally running so for transience and --

MR. STILLWELL: Restoring condensate.

MEMBER STETKAR: For restoring condensate but for events when it's normally running, adding the condensate booster pumps makes it less reliable. How much I don't know. I mean, you know, it's 10 percent, I don't know if it's 10 percent, two percent --

MR. STILLWELL: I need one out of four.

MEMBER STETKAR: Okay I have said enough. I just wanted to get a few things --

MR. STILLWELL: Okay.

MEMBER STETKAR: I have about 15 pages of these but we don't have time to go through item by item --

MEMBER BLEY: I guess, though there are things that we would model carefully today and I am still at this, you know, we are in an uncomfortable spot and we are in that with all of the design certs and COLs where we don't have a PRA of the kind we are normally used to seeing.

MEMBER STETKAR: That is true, but on the other hand there's very little, there's nothing that we can do today about the PRA that was approved for the certified design. There's nothing that we can do about that. That is beyond our control.

It could be whatever it was. However at the current moment there have been changes made to that design that should be evaluated within the context of a PRA and there have been conclusions made about the relative risk effects from those changes to the design.

And in my opinion at least is if the old PRA had a known deficiency in it that didn't model that thing and didn't give me the capability to even evaluate that change in the design, that seems to be an issue that we could at least think about in this stage in the game.

I don't know. Perhaps a lawyer would differ with that opinion, but --

MEMBER BLEY: I mean it's pretty generic and most of the others we have seen, it's a pass-through when you come here and it's an awkward spot.

But I agree with you that there's certainly, we're not getting a real evaluation of the effect of the changes against a PRA that could measure them.

MEMBER STETKAR: In the places where the PRA can measure them I think we are getting that effect of the change but where the PRA can't, you are left, that discomfort about --

MEMBER BLEY: And it's a discomfort and I don't know if it would be, let me ask you, are you arguing that it would be reasonable to require the PRAs to be improved enough to evaluate the changes? If you do that, then why not make the PRA a whole lot better?

MEMBER STETKAR: Well I think that's a stretch but having a bit more confidence that the work that's been done, remember, our sort of independent input process here, that the work that has been done by the staff and their audits of this process, and the work that has been done by the applicant to actually run through that process, provides reasonable assurance that the things that they have discounted as having, you know, no effect or something that couldn't be quantified but by implication is insignificant, indeed that there is reasonable justification for that.

I mean that's sort of the concern, how

you, I'm not advocating, you know, doing a full upgrade to the PRA but kind of questioning about how do we have assurance that that process and the staff's admitted audit of that process indeed has been okay.

MEMBER BLEY: Let me go back to the qualitative way you justified --

MEMBER RAY: Before you do that can I ask you another question? John, are you certified that the things that were included in the PRA as certified and which now are changed are being adequately --

MEMBER STETKAR: Yes.

MEMBER RAY: Evaluated.

MEMBER STETKAR: Yes.

MEMBER RAY: You said you were but I am just asking the question again.

MEMBER STETKAR: Yes I am. Yes. For the record, yes. Because reading, not having seen any numbers and not having seen any models but at least reading, and you know, it seemed to make sense, the conclusions that they drew and indeed they identified things like the external flood that you know, were something very site-specific.

On the other hand, there are several other, the vast majority of the departures have been basically screened out on bases that it's not clear to me whether they are simplistic qualitative bases or whether there was actual you know, some type of analysis performed to conclude that something was insignificant.

MEMBER BLEY: But if we had seen an RAI on one of these issues and a thorough, qualitative argument came back explaining why it wouldn't, that would be different from what we have now.

MEMBER STETKAR: That's right. That's why in my notes several of the things that I originally came up with said "resolved" because indeed, I saw a few RAIs that did that.

But I didn't see an awful lot of --

MEMBER BLEY: So this is as much a, you know, a criticism when the staff gets up here. I juts wanted to sort of get feedback from you. Because I had difficulty understanding when it says no quantifiable effect or not modeled. I was trying to understand what context you are dealing with to evaluate those changes. There were a lot of those that are characterized that way.

MR. STILLWELL: One of the later RAI responses I believe was in January, we went through and modified Table 19.2-1 completely and also included a white paper that described the screening process.

So that RAI response, we took, I hope we took, particular pains to make sure that if I said that it screened -- this is what the words mean. So if I say it's not in the PRA, it's not describing Chapter 19 any place.

If I said it is an editorial only, this is what those mean and we kind of parse them out to what at least, in terms of numbers, which ones went with what text.

So it's a little bit cleaner if you look at the comments at the end, when I say no quantifiable effect, this is what it meant. Or if I said --

MEMBER STETKAR: Yes, I had a sense that there was some sort of code words in there --

MR. STILLWELL: So the white paper describes this in a lot more detail and like I say, I think it was an RAI response from early January. We can get the letter number to you.

MEMBER BLEY: I think that would be helpful. That would help me.

MEMBER STETKAR: That would help.

MEMBER BLEY: Because I didn't see it in

the SER but then staff summarizes your responses so that might be the kind of thing that --

MR. STILLWELL: We will get you the letter number.

MR. HEAD: After the break we will provide that.

MEMBER STETKAR: Or the staff can give it to us.

MR. STILLWELL: We have got it. I've got it on the computer.

CHAIR ABDEL-KHALIK: Let's proceed. We are quite a bit behind schedule but that's okay.

MR. STILLWELL: We got through all of the departures, the information change on the ultimate heat sink. It's not a significant change in that it didn't affect core damage frequency by 10 percent.

It was a change obviously, it's an increase, before we had a pond, now we have cooling tower fans.

The fans were included in the design reliability assurance program.

The ultimate heat sink design, again, we've got a cooling tower for each unit. There's three normally operating trains or divisions, there's two fans in each division, one fan is normally operating support plan operation.

In addition the ultimate heat sink has a 30-day water supply with no makeup for post-LOCA conditions.

MEMBER STETKAR: And just for the record Bill, in the PRA now the ultimate heat sink is modeled explicitly, it has the fans and pumps?

MR. STILLWELL: Yes, yes. The Reactor Service Water pump house, before it was a standard lakeside pump house, it went over the dyke wall, there was a problem with siphoning and they had a limit on the number of meters return and supply to this control building flood height.

Now the Reactor Building Service Water pump house is adjacent to the ultimate heat sink. It's actually below-grade or the basement is at 10 feet.

Three normally operating trains or divisions, two pumps per train and again one pump per train is normally operating to support plant operations so key in this one is Reactor Service Water, ultimate heat sink and reactor building cooling water are three operating divisions. They operate continuously, which is somewhat different than normally operating BWRs where those safety systems are on standby.

Other insights, and now we get into the next thing that people want to talk about. Main cooling reservoir breach. It goes into design basis flood height. If anybody has ever gotten Google Earth and looked at South Texas you can see this really impressive stock tank. It's a feature you can see from space.

Core damage frequency for the design basis flood is on the same order of magnitude as internal events core damage frequency, so it is by 10 to the minus seven. And we are working through that.

Per the ASME standard, we feel that this flood would screen. ASME standard, it gives me three criteria for screening external events except for fire and seismic.

The first one is if you satisfy the standard review plan NUREG-0800, so that the plan is designed and meets the requirements of the standard review plan as described in NUREG-0800, you can screen that external event.

That lets you screen things like aircraft crashes or turbine missiles from external events analysis.

The second criterion has to do with core damage frequency if you can show -- pardon me, initiating event frequency -- if you can show initiating event frequency is less than 10 to the minus five, they assume that conditional core damage probability is at least 0.1 or less so that external event could screen.

And the third would be a total core damage frequency of 10 to the minus six. Now that's ASME standard. Reg Guide 1.200 I think it's Revision 2, it was issued March of 2009 and modified slightly in July of 2009, because it has a slightly different eternal events screening criteria for new plants and it's words to the effect it has got to be commensurate -- basically it's commensurate with the, new plants have a lower core damage frequency and having a 10 to the minus six screening criteria with a 10 to the minus seven core damage frequency doesn't make a lot of sense.

So Reg Guide 1.200, the new words say, is it's got to be commensurate or something like that with core damage frequency. It didn't really say a new criterion, it just says you've got to be aware of what your core damage frequency for internal events is and make sure that what you're screening is consistent with that criteria.

So ASME standard Reg Guide 1.200 is slightly apart but I'm sure that's going to be resolved soon. So per the ASME standard we screen because we satisfy the SRP criteria which is also consistent with Reg Guide 1.200 and the core damage frequency is low. It's on the same order of magnitude as the internal events core damage frequency.

Insights, the external flood doors are in the reliability assurance program. Obviously we want those doors to be capable of performing their function. And we have a main control room action to verify the doors are closed.

And as I mentioned we had a discussion and a path forward for this open item just to close those external flood doors while we pursue a detailed risk-based or probabilistic-based flood analysis for the reservoir breach. I have been advocating for 20 years.

MR. HEAD: This reservoir breach is a design basis --

MR. STILLWELL: This is the design basis reservoir breach. Questions?

CHAIR ABDEL-KHALIK: Please continue.

MR. STILLWELL: Other insights, we are close to the Gulf of Mexico, we are about 12 miles away. Safety-related structures in South Texas are designed for tornadoes and high wind. I can't imagine why.

MEMBER BLEY: Let me take you back to the design basis from the last slide. What's the basis for the frequency of the breach of the --

MR. STILLWELL: What's the basis?

MEMBER BLEY: Yes. Seismic is very low there right?

MR. STILLWELL: Actually, for unit 1 and 2 licensing, they analyze that reservoir for seismic failure and a safe shutdown earthquake. It's 0.1 for unit 1 and 2 and it's 0.15 for 3 and 4.

MEMBER BLEY: Why is it that high?

MR. STILLWELL: It's designed --

MEMBER BLEY: I thought it was lower. Okay.

MR. STILLWELL: I think it's 0.15, correct? Russ? The SSE? Actually it's a spectrum -- so they actually analyzed the reservoir embankment for response during a safe shutdown earthquake and my analysis showed that the reservoir embankment would remain intact. It wouldn't structurally fail during a seismic event.

MEMBER BLEY: So what is the basis for your --?

MR. STILLWELL: The 3 and 4 basis is a postulated piping failure through the reservoir either through the walls or through the, underneath the embankment wall.

MEMBER STETKAR: For people who don't understand dam failure modes, explain what piping means because they are thinking pipes.

MR. STILLWELL: It could be. Piping, and we have professor -- I'm a layman so I'm not a dam engineer. Piping describes a process where, because of differential pressure between where the reservoir is and where the water is coming out, you actually create a leakage path.

And as it goes through and starts washing away, you are actually creating like a pipe. And you wash away more material in the reservoir and it is carried out and the pipe gets bigger and eventually the reservoir embankment collapses.

Layman's terms.

MEMBER BLEY: And 10 to the minus sixth.

MR. STILLWELL: Actually, we were fortunate. We found a Corps of Engineers manual that discusses failure modes for embankment dams and they break it down by embankment failure, over-top failure and other failure modes and they have a pretty good discussion of failure rates in the international community from large dams and how you can screen particular failure modes for age and for dam construction, you know, what kind of dirt do you use, what kind of source of protection do you use, how long it's been around.

Using that process, support is something that we had done for units 1 and 2 back in IPE days, where we had a similar failure rate but we didn't have as much breakdown of the data.

I think it turns out we weren't, we actually did a pretty good job back then in terms of screening.

MEMBER BLEY: Can they just begin to fail or is it usually associated with storms or flooding or --

MR. STILLWELL: Accidentally you are getting very close to what I am not comfortable talking about. The piping failure mode for dams that have been in construction, what I've read, are once they have been in operation for a while, you should, if you've got a good inspection program, see piping start to develop and you fix it.

So, being this is not what I do, and speaking as a layman, the evidence is that things like piping or other failure modes that are basically of that sort, you should be able to see them in well established dams.

And this is not really a dam dam, this is a water control structure. We don't have varying water heights. If we vary 10 feet in a year that's a bad year, an unusual year.

We basically maintain a constant level as close as we can with periodic makeup from the Colorado River. We don't change 100 feet in a day. We couldn't change 100 feet if we wanted to.

Whereas water control dams or collect control dams, you see constantly changing water levels as rains come and you draw down and you use them for hydroelectric.

So ours is basically more like an in-ground stock tank if you will.

MEMBER STETKAR: Do you have, can you find just the reference to that Corps report?

MR. STILLWELL: Again, I've got a letter and I can give it to you.

MEMBER STETKAR: That would be good.

MR. STILLWELL: It actually came out in 2006. I was really happy to find it. It's a set of reports on how do you do screening assessments for dam failures so they use it to determine allocation of resources.

MEMBER BLEY: That will help me. I would like to see it.

MR. STILLWELL: Hurricanes. Again, safety related structures are designed for tornado and high wind. The non-safety related combustion turbine generator and the switch yard are actually designed for 134 miles an hour in South Texas.

Core damage frequency from hurricane is in order of magnitude less than the internal events core damage frequency using an conservative screening assessment.

Basically, we looked at likelihood of failure of three diesel generators in the CTG at each unit and said what's the core damage frequency?

And we actually credited the AC

independent water addition function of the portable diesel driven fire pump in core damage frequency, it's pretty low.

MR. HEAD: During a hurricane one of the diesels would already have been running so that would be a different failure mode for that.

MEMBER BLEY: And loading?

MR. STILLWELL: Yes, and we start one diesel, well unit 1 and 2, we start one diesel generator two hours before the winds get to the shutdown speed and load it on the safety bus and it's basically divorced from the grid.

Unit 3 and 4 are similar designs so we are going to do the same thing.

MEMBER SIEBER: So that would be in your tech-specs?

MR. STILLWELL: It would be in the Abnormal Operating Procedures but not a tech spec. So it's a site procedure.

MR. HEAD: It might cause us to enter a tech-spec action statement doing that, but that's what we do.

MR. STILLWELL: That's what we do.

MR. HEAD: Getting ready for the hurricane.

MR. STILLWELL: That's consistent with the NEI guidance for what do you do for storms and the INPO guidance for storm stuff.

So per the ASME standard, again, hurricane screens because it meets the SRP criteria and the screening core damage frequency is very low. So that is why you won't see a very big distinction.

MEMBER BLEY: Are hurricanes not a threat to your dyke dams?

MR. STILLWELL: No. They looked at storm surge from hurricanes from various locations and one of the reasons the dam is so high relative to the height of the water is to handle storm surge from hurricanes.

So if you look at the dyke, operating level is 47, we have four units we'll be at 49 and we have 66 feet or thereabouts is the crest of the dam and that's primarily to handle storm surge, or the winds associated with the hurricane, not the storm surge.

MR. HEAD: But the actual storm surge is still an open issue with NRC staff right now, that we are still working through.

MEMBER BLEY: Oh okay. That's right.

MR. STILLWELL: Questions on hurricanes?

CHAIR ABDEL-KHALIK: Would this be a good time to take a break?

MR. STILLWELL: Yes sir it would.

CHAIR ABDEL-KHALIK: So why don't we take a break until ten after, ten till.

(Whereupon, the above-entitled matter went off the record at 2:34 p.m. and resumed at 2:48 p.m.)

MR. STILLWELL: Okay now we are talking about COL license information items unless somebody has a question about what we have talked about to date. Not hearing any on the floor.

COL license information items are talked about in three places, two places in the application, it's actually 19.9 and 19A.

19B actually talks about unresolved safety issues, generic safety issues, TMI action items and things. Most of the COL information items in 19.9 have to do with ensuring the assumptions made during one facet of PRA analysis or another are actually incorporated into the design of the procedures moving forward.

For instance 19.1, a procedure for an

unisolated clean-up water line break, that was actually the result of a spirited discussion during ACRS hearings for licensing of the ABWR design, where they had a concern about unisolated clean-up water line breaks.

So what we've done is converted into a COL license information item and we have converted that to a commitment with a description of how we are going to ensure that the commitment actually gets realized, which in our case is develop a procedure and modify the final safety analysis report when the procedures are available for review.

So you will see that in several places here where we talked about procedure development in accordance with 13.5 and FSAR update in accordance with 10 CFR 71.

And I guess I will move through these fairly rapidly and just go page by page and give everyone a couple of seconds or so to see if anybody wants to talk about them rather than read them.

CHAIR ABDEL-KHALIK: No, I think you ought to just read them as quickly as you would like but I think that would be better.

MR. STILLWELL: Okay, so 19.1, post-accident recovery procedure for unisolated clean-up water line break. 19.2 is confirmation of clean-up water operation beyond the design basis.

19.3 is event specific procedures for severe external flooding. 19.4 is confirmation of seismic capacities beyond the plant design basis. We are in the process of developing high-confidence, low-probability failure for new plant-specific equipment and buildings. That's expected to be completed by the end of September this year, at which time we will modify a response traditional information request to provide the updated HCLPF values for buildings like the ultimate heat sink, the reactor service water pump house, the reactor service water piping tunnels et cetera.

In addition we have to perform a validation or verification of HCLPF prior to fuel load. That's go back and evaluate or look at the site-specific, as-designed, as-built structure systems and components and make sure that the HCLPF that we would determine for this significant equipment is similar to or bounded by the HCLPFs that GE assumed for the original design.

That has to be done prior to fuel load, it can't be done until we have something we can actually evaluate.

We have to look at the potential for seismic-induced soil failure as 1.67 times the site-specific safe shutdown earthquake and we will modify the FSAR in accordance with 10 CFR 50.71(e).

In addition we have to do a seismic walkdown prior to fuel load where we actually put hands on equipment and verify some of the assumption. All this is contained in commitment 19.9-4.

Plant walkdowns, we have a procedure development, we have to have a procedure on how we conduct plant walkdowns for seismic and fire. Those will be developed in accordance with the procedure descriptions in 13.5 of the COLA.

Confirmation of loss of AC power event, we talked about that. It was a requirement that we validate that the loss of offsite power frequencies and recoveries that we actually see at our site are consistent with what GE assumed in the original DCD.

And as we have shown with the ERCOT data, we are actually a little bit better than what they assumed.

19.7, procedures and training for use of AC-independent water addition system. Procedure development and training in accordance with 13.5 and 13.2.

Action to avoid common-cause failures in the essential communications function and other common-cause failures, that's actually procedure development and how do we perform maintenance events testing in the digital I&C systems and that will be included in procedure development described in 13.5.

Action to mitigate station blackout events, that actually has to do with procedure developments and calculations and we will update the FSAR when the calculations are available but it's things like the eight-hour RCIC capability for station blackout, control room ventilation, our control room have an ability for eight hours given station blackout conditions, battery loading for eight hours given station blackout conditions, for all of those a commitment that it will be provided in an FSAR update.

Actions to reduce the risk of internal flooding, procedure development and training in accordance with 13.5 or 13.2 of the FSAR.

Actions to avoid loss of decay heat removal and minimize shutdown risk, it's included in the procedure development in 13.5 and it implements the requirements guidelines described in not INPO, INSAC document 9108 or whatever it was for shutdown, what do we do for shutdown risk assessment.

Procedures for operation of RCIC outside the control room, again that will be included in procedure development and training in 13.5 or 13.2.

The central core cooling systems, test and surveillance intervals, it's included in procedure developments in 13.5.

19.14, accident management, procedure development in 13.5 and training in 13.2. and that's as far as we go.

Manual operation of motor-operated valves, we'll have procedures in place in accordance with 13.5 to manually operate motor-operated valves in locations where necessary.

High pressure core flooder discharge valve, that's a procedure development that has to do with ensuring the valve is opened after maintenance because it's a manual valve in site containment.

Capability of containment isolation valves, that's a verification of containment isolation valves can survive severe accident pressures as opposed to design bases pressures. And that will be done in the FSAR update in accordance with 50.71(e).

Procedures to ensure sample lines and drywell purge lines remain closed during operation. Again that's procedure development in accordance with 13.5.

Procedures to align the combustion turbine generator to supply power to the condensate pumps. Procedure development in 13.5. do you have a question? Okay.

Actions to ensure the reliability of the supporting service water reactor building cooling water systems. That has to do with testing. It's in procedure development 13.5.

Housing of the AC-independent water addition equipment, and that will be, what is that, that's an analysis to show that the AC-independent water addition pump house will survive seismic events and basically remain functional for other site external events. And we will do, we will indicate that one in the FSAR update.

.19c, procedures to assure SRV operability during station blackout, it's a procedure development.

.19d, procedures for ensuring integrity of freeze seals, it's a shutdown issue and it's going to be covered in 13.5.

Procedures for controlling combustibles during shutdown, procedure development 13.5 it's again a shutdown risk issue.

Outage planning and control, procedures in development 13.5 and it's an outage risk issue.

Reactor service water system definition, it was a requirement that we basically describe or analyze the design that we have and that's included in the application. So the system that we have, the reactor service system, is actually included in the PRA that we are using to evaluate the other --

CHAIR ABDEL-KHALIK: Unless the members have questions about the specific items on these slides through slide 31, then we should just go to slide 32.

MR. STILLWELL: Thank you sir, I appreciate that. Okay, 19.29, seismic capacity. Again we are going to -- we are on slide 32 -- providing high-confidence, low-probability-of-failure for new plant-specific equipment, that's expected to be completed by September of this year and we'll provide an update to an RAI response to put it on the docket.

Comparison for as-built HCLPFs to as-assumed HCLPFs will be done prior to fuel load. Soil-structure interaction analysis at 1.67 and at walkdown prior to fuel load are all included in commitment 19.9-4.

19.30 is the PRA update and that's included in our application where we incorporated the specific departures that affected the PRA and site-specific information.

Additional commitments, 19.4S, added four additional commitments for the plant-specific PRA to satisfy the requirement of 10 CFR 50.71(h), three procedures to control model development, configuration control, who is qualified to do the model.

Those three would be issued prior to COLA issuance and to satisfy the requirements of 57 we will modify the FSAR requirements of 50.71(e) to notify staff on the availability of those procedures.

And again, the ASME peer review required for the ASME standards in Reg Guide 1.200 will be complete at least one year prior to fuel load to meet the requirements of 50.71(h).

ITAAC Chapter 19, there are no ITAACs specifically directed at 19, Chapter 19. However there are ITAAC associated with several of the design features that were incorporated into the auxiliary boiling water reactor, ABWR as a result of the severe accident analyses described in Chapter 19.

For instance, the basaltic concrete, it's one of the design requirements that we have basaltic concrete rather than the more limestone-based concrete for hydrogen control post-accident.

Vacuum breaker position switches, which is, that is the controlled, bypass leakage, basically, it bypasses the suppression function of the containment.

An addition would be the corium shield for the containment sumps where we actually have a corium shield above the containment sumps to make sure that we don't inadvertently or as a result of a super reaction burn through the sumps and have a direct path outside.

In addition, there are ITAAC associated with risk-significant structures, systems, and components in the Design Reliability Assurance Program in Chapter 17. Next slide. Questions. Comments.

MEMBER STETKAR: Bill, the Design Reliability Assurance Program list, I went back, I remembered why I didn't remember anything, because there wasn't anything there.

When does that list actually, when is it actually generated? I know you said you have the panel has been meeting, when will the final list be generated and where will it appear?

MR. STILLWELL: Okay what we've got right now is PRA input to that list, so the PRA input is basically --

MEMBER STETKAR: You have your risk ranked set of whatever --

MR. STILLWELL: I have my risk-ranked systems, systems structures and components.

What has to be done is basically go through the expert panel process. They bring their insights, engineering insights, design insights so we can come up with a combined list of what are we going to do about it. That's the process that we are in right now.

MEMBER STETKAR: And that list will eventually appear where?

MR. STILLWELL: The list will eventually appear in Chapter 17 and let me back up --

MEMBER STETKAR: The section 17 simply says that it incorporates by reference the DCD section 17 which only has a simplistic example of the standby liquid control.

MR. STILLWELL: But you have to go back to 19K, which is really the list of risk-significant components. 19K4 is in fact the integrated list of those sets of SSCs that made it into DRAP.

What we have done now is, I have provided the PRA input to the tables in 19K and we have modified 19K4 for the PRA insights. What we are actually doing in the expert panel is systematically going through all of the systems and at a system level, high level, screening quickly.

This one is or is not risk-significant and here's why, document that, go on to this, the next one. This one, we haven't --

MEMBER STETKAR: But eventually, I guess to cut to the chase, eventually for the COL, at the COL stage, will section, I'm going to take a stab at it, 17, contain an actual tabulation of SSCs that are included in the reliability assurance program?

MR. STILLWELL: Prior to COLA issuance, in the third quarter of 2011, the set of DRAP SSCs and the program that is in place to control future activities, will be complete and the FSAR will be updated in accordance with 10 CFR 50.71(e) so by the end of the third quarter of next year that --

MEMBER STETKAR: And it will actually appear in Chapter 19K.

MR. STILLWELL: It will appear in 19K eventually. What we will probably do to get it in place and before the staff is to supplement an RAI, that here is the table, it's been through the process.

MEMBER STETKAR: Okay.

MR. STILLWELL: But it kind of depends on what's the update schedule, whether or not we an make it in the update about that time or have to wait for the next --

MEMBER STETKAR: Well I mean, you know, if it's in an RAI it will become a confirmatory item for Rev x but -- there will eventually be a table.

MR. STILLWELL: Yes.

MR. HEAD: Again what we put up was this was one of the action items.

CHAIR ABDEL-KHALIK: We will probably get to it later on after this --

MEMBER STETKAR: Sorry.

CHAIR ABDEL-KHALIK: No. No problem.

MR. CHAPPELL: We have the letter references for the two documents, one an RAI and one a Corps report. We will provide that to the staff. Actually both of them are RAI responses.

MEMBER STETKAR: Okay just give them to Maitri.

CHAIR ABDEL-KHALIK: Thank you very much.

MEMBER CORRADINI: I had a question just to make sure that I am clear. So we focused on the Level 1 part, the Level 2 part you essentially refer back to what was already docketed.

MR. STILLWELL: Yes sir.

MEMBER CORRADINI: And you, I noticed there were some staff questions on Level 2.

MR. STILLWELL: There were staff questions if we had identified a departure that touched on Level 2, we would have reconstituted the Level 2 model also. We actually have pieces of a Level 2 model. We have a containment response analysis, using the best information that we got out of the SSAR. We have a MAAP model, a MAAP4 model of the ABWR, using the best information we could get out of the safety analysis report.

So we were prepared to take the next step and actually build the Level 2 if we had identified a departure that would have forced us to do an evaluation for a change. Fortunately we didn't have any departures that we thought affected the Level 2 analysis. So we didn't have to take the next step to build the Level 2 model.

CHAIR ABDEL-KHALIK: Are there any other questions for Mr. Stillwell? Hearing none, we will move now to the staff's presentation on Chapter 19.

MS. BANERJEE: Let's have Todd Hillsmeier unmuted, please.

A.J.?

CHAIR ABDEL-KHALIK: Do you want to confirm that Mr. Hillsmeier can communicate with us?

MS. BANERJEE: Can Mr. Hillsmeier hear us and talk to us to confirm that he is unmuted?

Hello?

CHAIR ABDEL-KHALIK: He is not on the line.

MR. FULLER: I saw an email from him earlier today that he was going to sign on at about 3:15 our time.

CHAIR ABDEL-KHALIK: Well, that's okay. Then unfortunately we cannot wait for him, so.

MS. BANERJEE: Can somebody call and as a backup while we start.

CHAIR ABDEL-KHALIK: Yes please proceed. Who is making the staff's presentation?

MR. FOSTER: Good afternoon. My name is Rocky Foster, I am the Chapter 19 project manager for the South Texas project combined license application review.

I would like to thank the subcommittee for allowing us to make this presentation on the SER with open items.

Here is our list for our project team. Dr. George Wunder is our lead. Project manager beside me is Dr. John Lai, Ms. Marie Pohida, Dr. Ed Fuller and Todd Hillsmeier will be calling in on the telephone shortly.

Also from our seismic people is David James.

MEMBER BLEY: Oh, somebody joined us.

MS. BANERJEE: Hello, is that Todd Hillsmeier?

MR. HILLSMEIER:. Yes it is, this is Todd Hillsmeier from NRC.

MR. FOSTER: And Todd is available for technical questions on the DRAP program. The overview of the presentation outline is basically our combined license application open items, a description of the open items, the review of approaches that staff took looking at the application and then open items of interest and the Appendix K PRA base reliability and maintenance program.

Overall, for Chapter 19, we had 17 open items and we have resolved quite a few of them. I do have a correction of the slide. We do have eight items right now that are unresolved and we are working with South Texas to complete the resolution, the path toward resolution on these.

The next five slides I have are basically summary descriptions of the open items that we had. The ones that are in bold are the ones that are still open items.

MEMBER BLEY: Did any of them appear troublesome for you?

MR. FOSTER: For me? For me, no. For the technical staff, there are some areas that we do have --

MEMBER BLEY: If you'd highlight those, we'd appreciate it.

MR. FOSTER: -- concern. What we'll do Dennis is as we go through the open items of interest, they'll express their levels of concern with them.

MEMBER BLEY: Okay.

MR. FOSTER: I do have two corrections to these slides. One is, for open item 19-6 we have confirmed that as a confirmatory item now. It's a closed waiting for the Rev 4 to come in. And on slide number eight, open item 19-14, this is the RAI number that appears in the SER, the supplemental RAI that we issue was 19-33.

And we do have that corrected on the significant items slides later on in the presentation, and then with that I will turn it over to John Lai to talk about our review approach.

MR. LAI: I am John Lai, I just recently moved to ACRS. So in case you wonder why I'm not here.

MEMBER CORRADINI: You looked familiar.

MEMBER BLEY: But we will consider that you are not here.

(Laughter.)

MR. LAI: Today I represent NRO to talk about the review approach. I thought that I want to, maybe I can address some of the questions the members have to the STP applicants.

For the feedwater condensate systems, actually they do not have the fault tree model in there. Basically which is use the human-error

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approach, it's a point estimate.

If you are familiar with the IPEEE days, that is the top EQ, that's what the original DCD and also the STP model has, just the point estimate does not have the fault tree model in there.

And then you also have the question on the reactor building.

MEMBER STETKAR: John, when you say there was some discussion and I didn't bring up the numbers, there's some number in there. There's just basically a basic event to replicate the hard work.

MR. LAI: Yes just one point yes, just one point.

MEMBER STETKAR: No support systems, no power supplies, no cooling water, no nothing.

MR. LAI: Correct. And you also want to know if the reactor building circ water system, that serves the water system are in there, actually they are in there. So I checked the model. They are there.

And as far as the screening process goes, they are going to send members a paper or an RAI response. We have that. So in there they actually changed the unquantifiable statements to some statement that is more readable like RAI in fact is more, so you will be able to see that.

So just let me talk now quickly about our review approach. We actually concentrated on the departures. Anything departures has impact on PRA we will evaluate that.

So as a matter of fact I think that we have an issue RAI is almost all the departures they have in Chapter 19. The reason we do audit it is because STP does not really provide any quantitative results.

But the reasoning is their delta CDF of the plant site-specific PRA model to the STP with regards to the model is less than 10 percent, which is based on our ISG-3 guidance there.

So if they meet that requirement they do not have to provide us quantitative results. So the staff have to really have to go in there to do audits, to find out what their model looks like.

MEMBER BLEY: John, how did you address the thing Mr. Stetkar was asking about when he said if you have a change and you go to evaluate the change in risk, but you didn't have that component in your PRA, and you know that the change is insignificant, have you questioned that?

MR. LAI: Yes, that actually, they address in that RAI response.

MEMBER BLEY: And that pretty much met your expectations.

MR. LAI: Yes, pretty much so.

MEMBER BLEY: We'll look forward to seeing it.

MR. LAI: And they actually provide our PRA model documents, the hard copies, in Westinghouse Twinbrook office, which is about one stop north here.

So we, this is there very often, you know since April of 2009 I think we have been there at least four or five times.

And we actually had a face to face audit with STP staff and contractors that was happened on September 22 or 23 2009. We sat down with them, we look their models, look their electronic model, we trace the results and we generate the RAIs after that.

MEMBER STETKAR: John, for that audit where you used the, where you had the actual models available, what was the basic scope of that audit? Did you look at one or two initiating events and try to follow those through?

I am trying to understand you know, what you did.

MR. LAI: Yes, we described it pretty much in detail in the audit report. We looked through a few sequences, we go through there, the event tree sequences, we look at each branch point and follow the fault tree approach.

MEMBER STETKAR: Okay yes, thanks.

MR. FOSTER: We provided the ADAMS accession number for the audit report with the SER --

MEMBER STETKAR: I have the audit report, thanks.

MR. LAI: So that is basically what our approach is. I am going to turn to Marie to talk about more interesting open item issues.

MS. POHIDA: Now the first thing I would like to draw your attention to is slide 11. What

I would like to discuss is our review approach for where, for topics where there was not a PRA performed. For example for fires, the five methodology was used, for fires that shut down, a qualitative approach was used, for floods that shut down a qualitative approach was used, for seismic, a PRA margins approach was used. And for shutdown there was only a quantitative reliability study of the decay heat removal function, okay?

For these topics we referenced the regulations on 10 CFR 52.79 and this is for applicants that are referencing a design certification.

And what they are supposed to use is the PRA information for design certification, and it's supposed to be updated to account for site-specific design features and any design changes or departures.

So based on a lot of discussion with OGC, our PRA review was limited to site-specific features that are not bounded by the ABWR site characteristics. And what I mean by that is in Chapter 2 of the DCD, of the ABWR DCD, the site characteristics for the certification are listed and they include such things as design basis wind speed, or maximum flooding elevation.

So site-specific features that are not bounded by those site characteristics, we looked at. The second feature is site-specific features where there is PRA information to update and that's important, where there's PRA information to update.

For example for hurricane risk, there were full power and shutdown loss of offsite power of event trees, so for hurricane risk there was PRA information to update.

Third we looked at design departures where there is PRA information to update. For example for the fire water design departure that I will be speaking to next, the fire water system was quantified in the full power and shut down event tree so we could evaluate that departure.

I would like to move to slide 12 please and I would like to discuss open item 19-9 and it is the fire water system design departure.

When the ABWR design was certified, it was certified with one diesel-driven fire water pump per unit and STP requested a design departure where they had one diesel-driven fire water pump per site and the impact of this design departure when the hurricane CDF and LRF was not evaluated. Okay?

In a response to staff RAIs we found that they used the PRA standard when they used the screening criterion for external events other than fire and seismic. And if you look in the standard there's three criteria that you can choose for screening of these types of external events and they used criterion (a).

And basically if it meets the NRC standard review plan, you can screen the external event. And for hurricane risk, STP stated that the site for hurricane risk, the site was within the parameters specified in the DCD for high winds and tornadoes and therefore they didn't need to evaluate hurricanes.

Also as a result of staff RAIs, hurricane risk was struck or removed from revision 3 of Chapter 19 of the FSAR.

So what we did is we did our own screening estimate and what I did is I've used hurricane return frequencies from NOAA for the Gulf Coast and I also evaluated coastal weather-related LOOP frequencies during shutdown, because, you know, during a hurricane the plant is going to go to shutdown from NUREG-6890.

And what I found using my screening estimate, because as you recall, hurricane risk was struck from the FSAR, that based on the information that I had, that hurricane risk exceeded the large release frequency goals.

So we had a discussion on this topic at the public meeting with South Texas on April 27 and they agreed to evaluate this design departure quantitatively, in more detail, and what they are going to do is document the compensatory measures in the FSAR that would be taken prior to the arrival of a hurricane, which are going to be outlined in the hurricane procedures that are going to be developed, and they also gave us more detail at the public meeting such as they are going to keep a containment de-inerted and other risk reduction features that they are going to implement.

MEMBER STETKAR: Marie.

MEMBER BLEY: You mean inerted.

MS. POHIDA: Yes, you mean containment inerted, thank you.

MEMBER STETKAR: Back up that, I'm just trying to think through that logic process.

MS. POHIDA: It is a lot.

MEMBER STETKAR: It is, and I'm trying to phrase a question that is somewhat coherent. Run me through that logic process again in abbreviated form, because if a hurricane hits the site, you will lose offsite power.

MS. POHIDA: Yes.

MEMBER STETKAR: Now, to me --

MEMBER BLEY: But how did you get large release? Go ahead John.

MEMBER STETKAR: If, if, if, well how did you get the large release --

MEMBER BLEY: That's what I want to hear.

MEMBER STETKAR: Did you get the large release because the plant was at power --

MS. POHIDA: Oh no.

MEMBER STETKAR: Or because the plant was shut down?

MS. POHIDA: No, it's because the plant is shut down, okay?

MEMBER STETKAR: Okay.

MS. POHIDA: So what I did, is I went to the NOAA website --

MEMBER STETKAR: No, no, I understand how you got the frequency of hurricanes I'm trying to --

MS. POHIDA: Okay, so what we did is basically analyze two scenarios and I'm going to pull up my -- their screening calculations. Okay. Basically what I did was I found the frequency of a Cat 3, 4 and 5 hurricane and I combined that with an approximated common-cause failure of all six emergency diesel generators and that meant that one unit is going to have the diesel-driven fire water pump and one unit would be without the diesel-driven fire water pump.

That, the plant without the diesel-driven fire water pump was presumed to go to core damage. Now you have to remember they are at shutdown. The tech specs do not require --

MEMBER STETKAR: Well no, no, wait a minute, okay go on.

MS. POHIDA: Okay. The tech specs as written for the containment do not require the containment to be inerted below mode one.

So for this screening estimate, okay because I had --

MEMBER STETKAR: That is a pretty artificial screening estimate if I have been operating at power and I decide to shut down because I know a hurricane is coming I probably wouldn't immediately de-inert my containment, for example.

MS. POHIDA: I agree but what, it wasn't, but all the hurricane risk information was removed from revision 3 of the FSAR.

MEMBER STETKAR: No, I, it's a separate issue I am trying to understand how you got to the very high largely early release. And that's, the de-inerted containment --

MEMBER BLEY: It's a pretty coarse screen.

MEMBER STETKAR: It's a pretty coarse screen.

MS. POHIDA: It is. It's a very coarse screen. And then what I did was I ran through another scenario where you have a Cat 3, 4, 5 hurricane, and all three units, all three of a given unit's diesels fail and injection from the diesel-driven fire water pump fails.

MEMBER STETKAR: So you took credit, there you took credit, let the fire pump fail.

MS. POHIDA: Yes, that is correct.

MEMBER CORRADINI: So we are debating, I am trying to understand, is it the fact that it's de-inerted and the containment is open that gives you the large release or is it the fact that something physically is expected to happen because it's de-inerted or just something between those two?

MS. POHIDA: I did a core screening evaluation because there was no information provided in the FSAR so because, so what I assumed, that CDF was going to be equal to LRF unless I was given further information on what they planned to do with our containment, you know, prior to the arrival of a hurricane.

Yes it was a coarse screening estimate.

MEMBER CORRADINI: Okay.

MEMBER BLEY: And they are now -- tell

us again what they are doing in response.

MS. POHIDA: What they are going to based on that public meeting that we had on April 27, what they are going to do is they are going to do a quantitative evaluation of the fire water pump design departure.

And what they are going to document in the FSAR is the type of compensatory measures to limit the risk of a hurricane and that will be included, that will be documented in the FSAR.

For example, you know, starting one of the emergency diesel generators prior to the arrival of a hurricane, you know, keeping the containment inerted, you know and other compensatory measures.

MEMBER BLEY: So they are not providing a hurricane PRA, they are just --

MEMBER STETKAR: But they are not actually going to quantify -- yes. They are not going to quantify the hurricane risk with a realistic estimate for the frequency of hurricanes that would strike the site.

MS. POHIDA: They are going to quantify the impact of the design departure on hurricane risk, the CDF and the LRF.

MEMBER BLEY: Which means they have to have the hurricane PRA before and after the departure.

MS. POHIDA: Which basically comes down to, as I understand what we received, basically the impact of having a hurricane and extended loss of the offsite power.

MEMBER BLEY: Okay, and that is coming later.

MS. POHIDA: That has been, I have actually received that but I didn't have time to review that prior to this meeting.

MEMBER STETKAR: Is that -- I am still a bit confused because the words that you said could mean a qualitative evaluation of compensatory measures without actually quantifying a delta risk. Does the submittal that you have, that you haven't looked at yet --

MS. POHIDA: I am sorry, I haven't looked at it yet.

MEMBER STETKAR: You haven't even opened it up yet?

MS. POHIDA: Yes, not real -- no.

MEMBER STETKAR: Okay. Does it have a quantitative measure of delta risk or is it simply a qualitative discussion of the compensatory measures that would enable you to ride out a hurricane?

MR. FOSTER: We have the author here so --

MR. STILLWELL: If you don't mind, Bill Stillwell from South Texas. What we have provided was the quantitative screening assessment where we assumed a hurricane frequency of Category 3, 4 and 5 and we built a simple event tree model of unit 3 and unit 4 with only diesel generators and combustion turbine generators and said okay, we have a hurricane.

We assumed offsite power was gone but that wouldn't necessarily be the case but in the screening assessment we assumed it was gone and then we just looked at diesel generators and combustion turbine generators.

We actually ran two sensitivity cases, one with the CTG and one without the CTG and showed a change in core damage frequency.

Did you look at all, Marie was talking

about the shared fire water pump, you didn't even look at the fire water pump?

MR. STILLWELL: Hold on.

MEMBER STETKAR: Okay.

MR. STILLWELL: What we did for the diesel generators was this is the configuration we are going to be in. One engine has already been started and running so we get rid of common-cause start failures, common-cause run for the first hour failures, breaker close start common-cause, all of that stuff.

And so we have, two diesels have to start and one diesel is already started and running loaded.

MEMBER STETKAR: Why did you get rid of the common-cause run failures -- Why did you get rid of the common-cause run for the first hour?

MR. STILLWELL: Because this one started running two hours before the hurricane shows up on site. The other two wouldn't start until I actually lost offsite power.

MEMBER STETKAR: So you could still have common-cause run failures of those in the first hour?

MR. STILLWELL: Not if it's running. It's running.

MEMBER STETKAR: Of the other two, in the first hour.

MR. STILLWELL: Yes, those, the two that are in the same mode have all the common-cause. The one that is already running and loaded, we added a bunch of common-cause steps and we have no maintenance.

MEMBER STETKAR: On that one.

MR. STILLWELL: The model does not include recovery of diesel generators or offsite power for 24 hours. It's basically just a snapshot to say what happens if. Once we determine core damage frequency, and it's a real simple sequence model, it's only I think six or eight sequences, you know, CTG works or not, diesel generator works or not. If the CTG doesn't work, so it's not very many sequences.

For the core damage sequences, I multiplied each core damage sequence, or the sum of the core damage sequences for either unit 3 or unit 4 by the likelihood of failure of the AC-independent water addition function because that's the departure that we are talking about and that is the one that was credited in low power shutdown.

So I have a sequence frequency sum --

MEMBER STETKAR: You did that for a single unit.

MR. STILLWELL: I did it for both units.

MEMBER STETKAR: Simultaneously?

MR. STILLWELL: No, in the model I actually looked at the likelihood of failure of both units through the hurricane, but for that sequence, where both units have failed, I didn't include any recovery from AC-independent water addition, it's about a 10 to the minus ten sequence.

MEMBER STETKAR: Okay.

MR. STILLWELL: But for the sequences where it's individuals, I said if you had three fails, unit 4 is working, AC is going to go to 3 or vice versa. And we included the AC-independent water addition for a unit core damage but not for the combined unit core damage and it, at that point, without credit for AC-independent core damage frequency is on the order of 10 to the minus six as a screening assessment, with credit for AC-independent water addition it goes down to about 10 to the minus eight.

MEMBER STETKAR: Good diesel.

MR. FOSTER: So staff will review this RAI response and then see if it mutes the resolution of the open item.

MS. POHIDA: Are there any further questions?

CHAIR ABDEL-KHALIK: Please continue.

MS. POHIDA: Okay, thank you. I would like to move on to slide 13. And this is open item 19-12. And this is external flooding due to breach of the main cooling reservoir.

You know as Bill stated, the main cooling reservoir is a 12.4 mile earthen-filled embankment dam and a postulated design basis breach results in flooding at the site of approximately five feet.

Following a postulated breach, the security personnel is supposed to notify the operators, okay? And the operators are to ensure that three normally open doors are shut.

And these doors are the watertight

control room access door and two watertight doors in the reactor building access corridor, and if one of these three doors is left open, core damage is assumed.

It could be that if one of the three doors is left open, the control room is flooded, a loss of all DC power, since these rooms are below grade.

For this event, in the responses to our RAIs, STP also used criterion (a) from the PRA standard so as a reason as to not to do a detailed evaluation so they did a screening assessment.

And STP's breach frequency was two orders of magnitude more optimistic than published dam failure data. Initially their dam failure frequency was 1E-6 and this dam frequency excluded certain failure mechanisms as impossible. It took credit for 25 years of successful operating experience that was already included in the data and this 1E-6 dam breach frequency also was limited to a certain, 1,000-foot section of the northern embankment of the dam, which is 16,000 linear feet.

When I went through and looked for published dam failure data and using published dam failure data combined with, of 1E-4, times a human error probability for the operator closing one of three doors in 30 minutes, that gives you a core damage frequency that exceeds the Large Release Frequency goals.

Now, regarding where we got published dam failure data, I am looking right now at a slide from the U.S. Bureau of Reclamation and it's respective on failure rates.

And this slide that I am reading from actually was covered in a training course for dam risk and they listed six sources of dam failure data and the dates of this data range from 1981 to 1998 and the U.S. Bureau of Reclamation concludes that very roughly, dams fail about at a rate of one per 10,000 per year, depending on the age and failure mode.

And what they believe is that this failure rate can really be used as an anchor to dams that show really no tendency toward being more adverse or more favorable.

MEMBER CORRADINI: So this is actual

data from a range of earthen dams?

MS. POHIDA: It's actually published dam failure data from a range of sources, yes.

MEMBER CORRADINI: But --

MEMBER BLEY: Well, they were telling us they used the Corps of Engineering data on the same kind of earthen dam they have, is, how does that relate to this, is this all kinds of dams in all kinds of applications, all kinds of use?

MEMBER STETKAR: I thought the Corps is responsible for dams and Bureau of Reclamation isn't, are they?

MS. POHIDA: Okay, this is based on, what I did is, once we, I went to the audit in September of 2009 and I found this screening analysis on dam failures.

I went to FEMA. FEMA gave a course on dam risk and dam safety and the U.S. Bureau of Reclamation has people that specialize in risk assessment for dams.

MEMBER RAY: Yes, that's right.

MS. POHIDA: Now, regarding your other question about the sources of data, I think you were asking about failure modes, or --

MEMBER BLEY: Well, no, I was, the way you began this it sounded like you used real published data and they didn't. They told us they used data from the Corps of Engineers report that was from similar kinds of dams. So my first question was did you look at that and I wonder why it's not appropriate.

My second question was from the data you took, from Bureau of Reclamation, is that for similar dams or for just all sorts of dams?

MS. POHIDA: Let me, I probably should go back and go through a little bit of the background of the RAI responses that we have had back and forth between the staff and South Texas.

When South Texas initially provided the screening evaluation for MCR breach, what they used was their source of data was the Baecher paper and the Baecher paper provides a generic failure frequency of 1E-4, okay?

And what South Texas did is they took, they used the Baecher paper as their generic frequencies and took a number of reductions from this frequency to obtain their MCR breach frequency of 1E-6.

And I can give you a detailed list but some of these reductions include excluding certain failure modes as impossible, taking credit for 25 years of successful operation for this dam that is already included in the Baecher paper --

MEMBER ARMIJO: So there may be double-counting, is that what you are getting at?

MS. POHIDA: The staff believes it was double-counting, yes. And also taking a reduction because only a certain 1,000-foot linear section of the northern embankment was evaluated and the linear footage of that northern embankment was 16,000 feet.

So when you take a 1E-4 frequency, and combine it with these reductions combined with the 1,000 divided by 16,000 you know 500 linear feet, you arrive at a breach frequency of 1E-6 and we had concerns with that.

MEMBER BLEY: Let me rephrase my question. Maybe there's a time sequencing issue here.

MS. POHIDA: Okay.

MEMBER BLEY: They told us about the

Corps of Engineers data.

MS. POHIDA: Yes.

MEMBER BLEY: Is this something they did later?

MS. POHIDA: That was something they, that is something we discussed at the April 27 meeting.

MEMBER BLEY: So you began with a rough estimate from them. You did an estimate of your own.

MS. POHIDA: Yes.

MEMBER BLEY: And they have done something more.

MS. POHIDA: That is correct.

MEMBER BLEY: So we have these out of sequence events.

MS. POHIDA: That is correct.

MR. FOSTER: And to kind of cut to the chase here, we had a public meeting on the 27th and this was one of the major topics we talked about in South Texas.

MEMBER BLEY: Okay.

MR. FOSTER: And out of the meeting, basically we, the differences of the information that was provided, the justifications for some of the information that was provided during the frequency calculations, South Texas had told us that they would provide us justifications for those and some of the information that they had at the time was the best information that they had.

They had gotten new information and would provide that in a response to us. What they decided to do at the public meeting was for now to provide us a supplemental response to shut the doors and they would go through their evaluation process, possibly using a dam failure expert to subsidize their information to provide that to us so that we could then position ourselves to respond to their new position on the doors, okay?

So we have gone through a path of resolution to get it to this point where the doors are shut, that we know some of the information is kind of an imbalance between the applicant and us, the regulators.

And we have got to that point now where the doors are shut and they will, they have the option to supplement that information later on, probably this summer, and we will start looking at that.

MEMBER BLEY: Just another question on that and I didn't ask them because they said they are going to close the doors now, but are these doors, is it possible to close these doors after the breach or is that a real stretch? I don't know what the doors look like, I haven't seen --

MR. FOSTER: They are original and I hate, and interrupt me any time Marie that I speak on this.

MS. POHIDA: No I'm listening here.

MR. FOSTER: I mean their position was they wanted to have the doors and all be open and they would post the security guard with a clear view of the MCR itself and it would breach, they would notify operations to shut the door.

They felt they had a 30-minute window for doing that. The staff questioned that amount of time, okay, and so it became apparent during the April 27 meeting that the best approach right now was to shut the doors and they would look at what options they could provide to us for the staff to review to accept them being open.

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MEMBER BLEY: Okay that helps. Without a sequence of steps I was having real trouble understanding what was --

MS. POHIDA: Yes.

MR. FOSTER: This meeting was very eye-opening to all of us on the information.

MEMBER RAY: I realize we are in Chapter 19 and we are talking about PRA but is there a deterministic consideration here in terms of flooding risk?

MS. POHIDA: Yes there is. The hydrologists in DSIR are working on this issue and we are working with them to resolve this issue. We are actually working with DSIR to get a dam risk consultant to evaluate --

MEMBER RAY: Okay I mean it's kind of like building a plant below sea level or something. The issue is what, aside from debates about dam failure rates and so on, is what is the design requirement that you impose on the plant as a result of its location relative to this muddy water?

MR. HEAD: And we have that in the Chapter 2 discussion we will discuss the design basis flood level that we considered with a 479-foot breach of the MCR. We will present more detail on this on Chapter 2.

MR. FOSTER: So we are working with the Chapter 2 people on this.

MEMBER RAY: Yes, I mean, because regardless of how this debate over whose paper counts, it seems like something that ought to be looked at deterministically as well.

MS. POHIDA: And we agree and also when you think of this in the context of defense in depth and if you read the defense in depth guidelines that are documented in Reg Guide 1.174, we keep on coming back to the same statement is that you wanted to minimize a reliance, on over-reliance, on programmatic activities to compensate for weaknesses in plant design and our concern is that if you had a breach, the only thing that was left was you know, operator actions.

And so that was something that concerned the staff. So you know, following the public meeting, STP committed to keep these normally open doors closed and we are still

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working on the issue.

MEMBER ARMIJO: What about the existing, the current, the plants that are already there. Do they have doors that are already shut or --?

MR. FOSTER: They are but the control room is above ground level.

MEMBER ARMIJO: The control room is --

MR. FOSTER: So you know, we voiced all our concerns on the different information that came in. South Texas agreed that it now would go ahead and shut the doors. They reevaluated and more than likely they will resubmit, trying to address all these different areas of concern that we have and then the staff will evaluate and see if we can seek resolution on things.

MS. POHIDA: All right that concludes my discussion. Does anybody have any additional questions?

Thank you.

MR. FOSTER: Let's move on to Dr. Fuller.

MR. FULLER: Thank you. I'll be discussing the next three slides. So on slide 15 we are discussing open item 19-5, which is COL license information item, 19.14 on accident management.

We reviewed the information that they have in section 19.9.14 of their FSAR which would refer back in turn to the SAR and determined that the application didn't address all of the items required to establish, in our mind at least, a sufficient technical basis for developing accident management procedures for units 3 and 4.

We believe that consistent with what we have been discussing for quite some time now with GE on the ESBWR that accident management strategies need to be developed to address the consequences of flooding the lower drywell after vessel breach.

The current severe accident guideline with the BWR owners' group has for the ABWR discusses flooding, if you will, the upper drywell for certain scenarios but not the lower drywell.

On the other hand, there is a design feature drywell flooder that would indeed if it worked properly in the ABWR do this in the event of severe accident. That the after vessel breach the core debris would come into the lower drywell, which would be dry and this lower drywell would heat up and once the temperature reached 500 degrees Fahrenheit or 533 kelvin, fusable plugs would melt and water would pour through this drywell flooder valves, plural, basically from the suppression pool but through the downcomer regions in between.

And the idea is to quench the debris to prevent core debris-concrete interaction and basically if heat removal is working properly stabilize the melt and working in conjunction with the Containment Overpressure System, they would avert containment failure.

Okay? That's the idea.

CHAIR ABDEL-KHALIK: And there is no mechanism for water to get into the lower drywell before the melt gets there?

MR. FULLER: No. I suppose there are certain LOCAs where you could do it, but basically no.

CHAIR ABDEL-KHALIK: Okay.

MEMBER CORRADINI: Ed, can I, I don't remember this. So there's a skirt that keeps water from coming down similar to the ESBWR in terms of just a geometrical thing? I don't remember --

MR. FULLER: You can't get water from the upper drywell to the lower drywell.

MEMBER CORRADINI: Is there some sort of skirt that essentially catches everything?

MR. FULLER: Yes. Okay. We are also concerned about the possibility of premature opening of the fusible -- and we, so, we as part of a confirmatory assessment project that I will be discussing in a few minutes, we noticed that in certain relatively low-likelihood scenarios, that our MELCOR calculations were indicating that it was possible that you could get lower drywell temperatures above 500 Fahrenheit before vessel breach.

MEMBER BLEY: And that is the temperature that will melt the fusible links?

MR. FULLER: Yes.

MEMBER RAY: It is supposed to --

MR. FULLER: So we basically feel that we are talking about very low-probability events here, way below Large Release Frequency criterion. But when you are dealing with accident management, we don't think about frequencies. We think about what you could do in this particular plant given that you have something like this happen.

And so you know, all these other accident management procedures are also addressing very low-frequency events.

MEMBER STETKAR: And the total estimated core damage frequency is 2.7 times 10 to the minus seven which in itself is a minuscule value so --

MR. FULLER: This is not a PRA issue, this is a severe accident management issue. So we have a path to resolution that we worked out as a result of RAI questions and responses and reiterated again in the public meeting in April.

MEMBER CORRADINI: What is that? Oh you're getting there. You're on your way.

MR. FULLER: I am almost there. I am just weaving a story. South Texas is agreeing to follow the industry guidance in NEI 91-04 revision 1 on closure accident, severe accident issues and in particular the accident management, reduction of accident management strategies turning into procedures.

And so they are committing to incorporate severe accident strategies into their overall accident management program.

Changes in the EPGs, Emergency Procedures Guidelines, which are prior to core damage, and severe accident guidelines, which by the way GE combines into one overall strategy, so changes in those, such as the containment flooding strategy, would be included as inputs to the plant specific technical guidelines, which would be developed in this case by South Texas by the time they load fuel. You can't do those yet but they can develop those procedures and training programs around them at a later date.

We find this approach acceptable with the caveat that we want to be sure that the technical basis for ABWR severe accident management is established based on current understanding of severe accident progression and the ABWR.

Reading between the lines of what I just said, the current accident management strategies were developed based on the work General Electric did back in the mid-90s and earlier even, based on using the earlier version of the MAAP code that Bill was discussing during his presentation a little while ago.

One of the issues there is that the earlier versions of MAAP assumed that once you got core debris into the lower vessel head, you immediately assumed the vessel was going to fail.

In reality, the current state of the art models of MAAP, MELCOR, et cetera, say you have several hours. That changes the name of the game in accident management space quite a bit.

MEMBER CORRADINI: So I guess I want to understand, I didn't mean to interrupt you if you still have more to say but I am trying to interpret what you said and the stuff on the board.

So are you saying that the path to resolution is that the STP folks are going to come up with a series of guidelines on what should be done to minimize the chance that this would occur? Or --

MR. FULLER: No, at this point we want

to make sure that they understand what their technical basis is and I'm not sure they do yet but they do have the tools to determine it.

MEMBER CORRADINI: So you are not telling them, so the path to resolution is they are going to go think about it.

MR. FULLER: They are committing, they are basically committing to incorporate the severe accident strategies. This is an open item, Mike.

MEMBER CORRADINI: Okay, okay, fine.

MR. FULLER: Okay?

MEMBER ARMIJO: These are procedural changes.

MEMBER CORRADINI: That is what I guess I am trying to --

MR. FULLER: No no, yes, they would be procedural changes but they need to be based on the best understanding of how severe accidents would progress and how they could be mitigated at the time, up to date understanding, not 15-year-old understanding.

MEMBER RAY: But this fusible thing, is it part of an existing certified design?

MR. FULLER: It is, they took a departure on it, which gave me a reason to raise this whole question. It is, they did change their logic on it some, on when they are going to use it and what the --

MEMBER STETKAR: Well, they actually changed the design of the valves themselves, didn't they?

MEMBER RAY: Yes. I mean, this opens at a precise temperature.

MR. FULLER: More or less precise, yes, you know.

MEMBER CORRADINI: So can I just use an analogy, I'm sure that the STP people will be upset with this but what is it different than something I have in the room here which is at some prescribed temperature plus or minus uncertainty this thing will start pouring water into the room?

Am I missing something? Or is that just basically it?

MEMBER BLEY: Lower temperature.

MEMBER CORRADINI: Yes, thank you. But is that it?

MR. STILLWELL: This is Bill Stillwell from South Texas. What was described in the DCD was temperature actuated fusible plug valve that actuated at 533 degrees kelvin I believe.

MR. FULLER: Right.

MR. STILLWELL: During certification they evaluated a range of temperatures above that and looked at what happened, what would be the consequence of the lowest drywell flooder actuated at higher and higher temperatures.

But they didn't really evaluate what happened if it opened at a lower temperature. So what they did in the DCD was say the valve cannot open below 533 degrees.

What our original departure said, did for us was to change the valve design to something we think we can build and also gave us the tolerance on that, 533 plus or minus 10. And when the NRC brought it up to us, we said gee whiz you are right, there is a lower limit that we should not have gone below.

So we have modified the departure to take away the temperature band and went back to what was described in the DCD and kept the design with something we feel we can build.

MEMBER SIEBER: But there is an implicit assumption that melt-through of the vessel --

MR. STILLWELL: Prior to the lower drywell flooders actuating.

MEMBER SIEBER: To me there is a lot of uncertainty there too, probably more than the fusible link operation. And to have that operation first is not a good thing. You've got the potential for steam explosions and different challenges to containment.

MR. FOSTER: This is Rocky Foster. Bill you have responded to this supplemental RAI, right, or this RAI?

MR. STILLWELL: It came in at the same time we sent the supplemental response.

MR. FOSTER: The staff is evaluating it to see if --

MEMBER ARMIJO: So is the temperature where these plugs melt, is it the right temperature, should it be higher if in fact the vessel doesn't breach as quickly as you thought?

MR. FULLER: Well I think the way you have to look at it is, you have to look at the temperature responses to these accidents while the debris is still in the vessel and if you are getting relatively close, I don't know close is too close, then you have to wonder whether or not they are going to open prematurely.

As I said, in one of the scenarios we looked at in our confirmatory assessment, which happened to be initiated by a main steamline break inside containment, we saw with a MELCOR calculation, you were getting right up there, right up in that range before the vessel was calculated to be breached.

And as you would imagine there is a ton of uncertainty in the models of the various phenomena of what's going on in the vessel with molten core material in it.

MEMBER ARMIJO: So you don't want it to open too early, you don't want it to open too late so that you have got a big problem.

MEMBER CORRADINI: So I guess I have a question.

MR. FULLER: Well, if you have a steam explosion it doesn't mean it's the end of the world so just think of that too.

CHAIR ABDEL-KHALIK: Mike.

MEMBER CORRADINI: So, it is for the moment, the answer I guess I got back from the STP folks is more procedural at this point.

MR. STILLWELL: Yes, the response to this particular RAI's procedure.

MEMBER CORRADINI: Speak into the microphone.

MR. STILLWELL: I'm sorry, I'm sorry. Yes, the response for this RAI is procedural and following the owners' group guidelines and accident management --

MEMBER CORRADINI: But just to follow the thing, I happen to have been at an ACRS meeting back 20 years ago when this was talked about. And there were calculations put into the record by, for the DCD, for exactly this, for FCI calculations.

I mean, they were presented by GE and actually strength calculations were done for the lower drywell so is that something that is known to you folks?

MR. STILLWELL: Yes.

MEMBER CORRADINI: Fine, just wanted to

make sure.

MR. FULLER: Okay, any more questions?

MEMBER BLEY: Yes, I have one question. Building a valve that you can build, are there failure modes that could allow this to open without temperature melting the fusible link?

I would like somebody to think hard about that for some time.

MEMBER CORRADINI: These damn things leak all the time.

CHAIR ABDEL-KHALIK: Mr. Fuller, please continue.

MR. FULLER: Thank you very much. Let's go to slide 16. And while I am talking about this, think back to what Marie was talking about regarding the shutdown risk consideration because these are tightly coupled.

One of the departures that they took was to eliminate hydrogen recombiner because they don't, you know the existing plants don't really need them anymore. And because we wanted to get some more information about shutdown risk, we decided to create an RAI around this.

And basically we believe that during

normal operation this departure, adopting this departure doesn't have any impact on the risk of severe accidents initiated during normal operation or on accident management strategies you know, from normal, accidents from normal operation.

There are however concerns about startup and shutdown operations when the containment would not be inerted. Now you've heard a little while ago that they are essentially committing to keep that containment inerted in the event that a hurricane comes along.

Okay we had an RAI question, 19-3 it was, that asked the applicant to explain whether or not the leading, this system, including the recombiners, would affect considerations of hydrogen combustion when the containment may not be inerted and I wasn't really thinking about hydrogen recombiners being able to control such an event.

What I was after was if the containment was not inerted, and you had all that hydrogen in it from a severe accident, what would their likelihood be, their estimate be of the likelihood of failing a containment from a hydrogen burn or overpressure or what.

So we also requested in that RAI question a discussion of the impacts on the Large Release Frequency and conditional containment failure probabilities from low power and shutdown scenarios for units 3 and 4.

And that is because we realized that a core damage event would probably be somewhat close to, you know, a large release would have a fairly high probability of happening if you had the core damage event, if you had the containment not inerted.

So while this is going on, Marie issued the RAI that she just talked about, 19.01-31 that's open item 19-9, related to the departure on the fire water system design.

So two things, they sent in a response to the question pertaining to whether or not the recombiners, what impact they would have, and they basically showed that they couldn't really prevent major hydrogen combustion during any severe accidents that could be initiated during

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shutdown and we concur with that.

And we are also, we have also decided that Marie's RAI question is more encompassing than what my question was regarding the Large Release Frequency and conditional containment failure probability because it was to me, getting more to the point.

And so our path to resolution is basically that they already answered the question on the impact on the hydrogen recombiners and whatever we accept on open item 19.9 and would let it close would be good enough to also close open item 19-8.

Is that, was I clear about that?

MEMBER SHACK: Ed, I don't see that really resolves your issue, I mean, it's going to be inerted when they are coming down from full power but there are certainly going to be times during startup and shutdown this is not going to be inerted.

MEMBER ARMIJO: That is right.

MR. FULLER: Yes, but the likelihood of, the other part of the resolution of Marie's question had to do with this analysis that Bill

Stillwell talked about in terms of what the frequencies are of this happening and assuming that they get these frequencies down low enough, that it's not close to a 10 to the minus six large release frequency, then we would consider it resolved.

But if the, this is still an open item, but if the answer comes in that a large release frequency is somewhere in the order of 10 to the minus six, then we have got more to talk about.

You look puzzled Said.

MR. FOSTER: Does that make sense?

MEMBER SHACK: No, I'm still, I look at them as two different problems. One is to handle the hurricane, the other is something associated with startup and shutdown operations. Now, you can maybe make the argument that well, the likelihood is small enough that you can live with it, but I don't see how the two are connected, I guess --

MR. FULLER: Well, to me the shutdown risk is primarily going to be contributed to by external events like this hurricane. The internal events will be quite low, in the order of the existing at power large release frequencies.

MEMBER STETKAR: That's an assumption.

MR. FULLER: Yes, but you know, they didn't do a level 2 PRA and they didn't do --

MEMBER STETKAR: That's the problem isn't it.

MR. FULLER: And they didn't do a shutdown PRA level 1 or level 2 so, and we, you know, in our conversations with lawyers, we are not sure we are allowed to push them to do that.

MEMBER STETKAR: Fortunately this committee isn't governed by lawyers. We can talk about technical things.

MEMBER SHACK: It is not any different for an existing BWR, right, it's going to have the same problem. It's going to be inerted.

MR. FULLER: Exactly, yes.

CHAIR ABDEL-KHALIK: Please continue.

MR. FOSTER: I think Ed is talking about if the frequency calculations from what South Texas provides us for the justification addresses, Marie's open item provides us a very, very low probability -- That then will illuminate Ed's concern because of the low probability right off the frequency calculations.

MEMBER SHACK: If I assume that -- if the assumption is that hurricanes is the only precursor to shutdown.

MEMBER STETKAR: During shutdown.

MR. FULLER: Well, it's not the only but --

MEMBER SHACK: You think it is the dominant one.

MR. FULLER: It's my guess, yes, it's a guess. Okay.

MR. FOSTER: Remember this is severe accident management, a lot of it is probabilities and what are the likelihoods.

MR. FULLER: Yes this is a PRA question not a severe accident question. Okay let's go to slide 17 which is my last one and this is an open item that is not associated with an open RAI and I need to explain why that is the case.

It's related to a departure, a change in the drywell lower fusible, lower drywell fusible plug valve that we were just discussing a few minutes ago.

This lower drywell flooder consists of

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10 pipes that run from the vertical pedestal vents into the lower drywell. Each one has an isolation valve and a fusible plug valve connected to the end of the pipe that extends into the lower drywell.

And as I said earlier, they would melt presumably when the surrounding air reached the temperature of 533 degrees kelvin.

And if you think about it there are 10 of these, even if only half of them work, you are probably going to flood properly, okay, so there's a little more tolerance than just talking about one, quite a bit more.

So they would remain open after the water would come in and the, it would flood the lower drywell until you came to a head equilibrium between the water in the drywell and the water in the suppression pool.

They also have another way to get water in through the AICW if they need to. But let's just talk about this for now. The recoolability by an overlying water pool has not been yet conclusively demonstrated by ongoing research activities although being somewhat cognizant of

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the core-concrete interaction experiments now going on out at Argonne for the OECD, I believe we are getting closer and closer to such a demonstration.

So we are concerned that this containment liner failure may not be averted for 24 hours after core damage even with water on top of it, the core debris.

And because of that concern we decided to carry out a confirmatory assessment using the MELCOR 1.8.6 code and we, to do this particular confirmatory assessment we asked a couple of RAIs, RAI 19-1 and RAI 19-28 to get information from them that would enable us to do the confirmatory assessment.

And what we needed was information on their MAAP model and we wanted to use that information to do MAAP calculations. So the confirmatory assessment works as follows.

My contractor does the MELCOR calculations, I myself do the MAAP calculations, we see what it says for two or three representative scenarios that they used in their PRA and also to use to put their MAAP model together.

And then if anything showed that you couldn't achieve containment integrity for 24 hours or less then we would be concerned. If you couldn't show that then we wouldn't be concerned. If you showed that you could keep it intact for at least 24 hours, then they would meet our requirements.

And so we have done the calculations and --

MEMBER CORRADINI: You are concerned?

MR. FULLER: We are not really concerned. We are still documenting them and the path to resolution is that once we successfully complete the calculations, we'll do the checking of the calculations and completing the documentation that this item would be a closed item.

MEMBER CORRADINI: Okay so you don't see anything in terms of comparing two computer calculations that give you pause at this point?

MR. FULLER: Well that is the way we do our confirmatory assessments now for the other plants, for the design certifications.

MEMBER CORRADINI: The reason I am asking that is not for this plant actually, I am trying to understand what you did for other potential plants.

MR. FULLER: Well, for the other plants we used the vendor/applicant's MAAP calculations and we set up our MELCOR calculations through the Office of Research to get the MELCOR runs done and then we put --

MEMBER CORRADINI: The reason I asked the question though, just precisely though, is my memory is, again from a long time ago, is that the ABWR satisfies the EPRI Utility Requirements Document in terms of how many square meters per something or other --

MEMBER SHACK: You probably wrote that Ed.

MR. FULLER: No I didn't actually write that, but for your information we don't pay much attention to that requirement.

MEMBER CORRADINI: I am sure you don't but on the other hand what I was trying to get at, was I was just trying to understand what to compare it to in terms of other designs. That's all.

MEMBER SHACK: No, but I mean, in the original certification they didn't buy the coolability either.

MR. FULLER: That is correct. There's a lot of uncertainty that was referred to in the SER.

MEMBER SHACK: So I mean this is still an issue that is not very different from 1990.

MR. FULLER: My predecessors certified the design.

MEMBER SHACK: Well that's why it's basaltic concrete.

MR. FULLER: You see, we didn't, the models are different now than they were then. We wanted to satisfy ourselves.

CHAIR ABDEL-KHALIK: At this time let's proceed with the last two slides in your presentation please.

MR. FULLER: And I am done.

MR. FOSTER: Thank you Ed, for that very informative discussion.

The next two open items we have are the seismic margin analysis areas. We have two open items, 19-14. This deals with the standard departure, South Texas, reclassify the right-of-way from seismic category one to a non-seismic.

We issued an RAI requesting the STP to augment its response with analysis procedures equivalent to the SRP section 3.7.2.8c and a related ITAAC.

Next open item is 19-17, sequence- and plant-level seismic HCLPF capacities. This is a COL license information item. It should include an update of the system model development of DCD -- incorporate capacity reductions due to site specific effects and site specific SSEs.

Commitment 19.9-4, South Texas has committed to go ahead and provide us with the sequence level and plant levels, seismic, HCLPF capacity pursuant to 10 CFR 52.79(a)(46). And that is supposed to come in in September 2010 this year.

Questions? Next item.

MR. LAI: Okay this is actually a review by Todd Hillsmeier and he is not here today so I am just going to present it for him.

STP already discussed this. I am just

going to talk from a staff point of view. The initial identification of a size specific SSCs is incorporated by reference with the list of risk-significant SSCs in Appendix 19K of the satisfied and approved ABWR DCD.

STP's process for developing, maintaining and updating a comprehensive list of risk-significant SSEs is based on the methodology described in STP, FSAR section 17.4S.1.4, which includes that identification of risk-significant SSCs based on PRA risk importance measures, risk insights and the key assumptions.

And STP is going to use expert panel to identify additional risk-significant SSCs based on deterministic equips and operating experience, which augment the PRA techniques.

By September 2011, and prior to STP entering the detailed design in the construction basis, STP expects to provide a comprehensive list of risk-significant SSCs using the methodology described in section 17.4S.1.4.

STP commits to completing these activities under commitment 17.41 in section 17.4S. The staff plans to conduct audits in the third quarter of 2010 as part of the safety evaluation for section 17.4S.

Questions?

MEMBER STETKAR: Yes.

MR. LAI: Okay we can have Todd Hillsmeier unmute his phone --

MEMBER STETKAR: He has control of his own microphone.

MR. HILLSMEIER: Can you hear me?

MEMBER STETKAR: We can hear you now Todd.

MR. HILLSMEIER:. Is the background noise too loud?

MEMBER STETKAR: You are. You can back off from the microphone though.

MR. HILLSMEIER:. Okay.

MEMBER STETKAR: That's better. How is the staff, I am staring at table 19K.4 in the certified design DCD, and I see things like individual check valve by number fails to open. So individual components and failure modes are listed in that reliability assurance program table.

We have already heard that the PRA is

not complete, in fact it doesn't have models for even some systems in it. How can the PRA be used with very specific numerical criteria of Fussell-Vesely importance greater than or equal to 0.005 and Risk Achievement Worth of greater than 2.0 to identify the equipment failure modes that are in the reliability assurance program list when a lot of the equipment isn't even in the PRA?

How do you have assurance that that list is indeed complete especially to the level of detail of not systems even, but individual components and failure modes?

How does the staff develop assurance that that PRA support for the reliability assurance program list is indeed valid?

You can now speak.

(Laughter.)

MR. HILLSMEIER: Are you still there?

MEMBER STETKAR: Oh, yes.

MR. HILLSMEIER: Okay. Because part of your question is getting chopped off.

MEMBER STETKAR: Oh, is it? Okay.

MR. HILLSMEIER: But I understand the basis of your question. As John and I stated, the initial identification of DRAP SSCs was incorporated by reference in 19K. And my personal opinion also is in alignment with yours, that that 19K in the DCD is not an entirely complete list. It is even based on a model that is 15 years old, and that is just my opinion.

And, first, the reason why we identify the DRAP SSCs is because the non -- during the design and construction phase is because the non-safety-related DRAP SSCs will be subjected to the QA controls when STP enters the detailed design construction phase.

And it should also be noted that DRAP only adds additional controls and processes to the non-safety-related SSCs. It doesn't decrease any existing requirements. And in STP's FSAR, STP provided a revised methodology, and it is this revised methodology that gives me confidence that the list of risk-significant SSCs will be sufficiently complete.

So prior to STP entering the detailed design construction phase, STP will have updated the list of DRAP SSCs using the methodology described in their FSAR Section 17.4(s).

And this methodology helps compensate for the potential limitations of the PRA through two ways. First, STP's methodology uses a lower PRA importance threshold criteria. Instead of a RAW of five that the DCD uses, they will be using a RAW of two.

MEMBER STETKAR: Just let me stop you there. If something is not in the PRA, its risk achievement --

MR. HILLSMEIER: Right.

MEMBER STETKAR: -- worth is precisely zero.

MR. HILLSMEIER: Right.

MEMBER STETKAR: So you can use the risk achievement worth of, you know, .2, and it would never show up. So it's --

MR. HILLSMEIER: Right.

MEMBER STETKAR: -- that is not a crutch.

MR. HILLSMEIER: No, but it is part of --

MEMBER STETKAR: Okay. Go on.

MR. HILLSMEIER: -- part of the crutch. It's --

MEMBER STETKAR: It is --

MR. HILLSMEIER: The other -- the second part of the crutch, which is more important --

MEMBER STETKAR: There you go.

MR. HILLSMEIER: -- is they will be using the expert panel to identify additional DRAP SSCs based on the deterministic technique that is described in FSAR Section 17.4(s).

MEMBER STETKAR: Okay.

MR. HILLSMEIER: And --

MEMBER STETKAR: So you --

MR. HILLSMEIER: -- Section 17.4(s).1.4 describes that detail, this deterministic technique. And Bill Stillwell could describe that technique in more detail, if you'd like to hear more about that.

MEMBER STETKAR: Well --

MR. HILLSMEIER: And I should also mention that through current RAP guidance, which is SECY 95-132 and SRP 17.4, there is no requirement to use PRA to identify these RAP SSCs. The PRA is simply one tool that can be used, and STP is using that as a tool, but also

STP is using the expert panel with this deterministic technique to identify the other RAP SSCs.

When STP completes their plant-specific PRA, they will need to update the list of risk-significant SSCs relative to that plant-specific PRA also. So based on the revised methodology that STP described in Section 17.4(s) for identifying the DRAP SSCs, PRA is just one tool that is used, and also the deterministic techniques that they provide -- that they describe is another very interesting tool to identifying the RAP SSCs.

CHAIR ABDEL-KHALIK: Thank you.

MEMBER STETKAR: Okay. Thanks.

MR. FOSTER: Okay. Any other questions on Table 19K?

MEMBER CORRADINI: Mute, please.

MR. HILLSMEIER: Any other questions?

MEMBER STETKAR: No.

MR. HILLSMEIER: No?

MEMBER CORRADINI: You can go mute.

MR. HILLSMEIER: Okay.

MEMBER CORRADINI: Thank you.

MR. HILLSMEIER: Put it on mute?

MEMBER CORRADINI: Yes.

CHAIR ABDEL-KHALIK: Thank you.

MR. FOSTER: Okay. That completes our presentation on Chapter 19.

CHAIR ABDEL-KHALIK: Are there any other questions for the staff?

(No response.)

All right. Thank you very much.

MR. FOSTER: Appreciate it.

CHAIR ABDEL-KHALIK: Appreciate it. At this time, let's take a 10-minute break, and then we will come back and discuss the followup on the open items from the prior meetings. Okay? So we will reconvene at 20 minutes before 5:00.

(Whereupon, the proceedings in the foregoing matter went off the record at 4:27 p.m. and went back on the record at 4:38 p.m.)

CHAIR ABDEL-KHALIK: We are back in session.

So Maitri has a list of I believe three items from this meeting, and we will just make sure that that's -- that squares away with everybody's record. Okay?

MS. BANERJEE: The first item is for me to get a copy of Chapter 19 SSAR, if the members are interested.

Okay. The second one is the white paper that describes what the words in Table 19.2 means.

(Laughter.)

I don't have any other reference to that white paper. So I'd like to have a better --

MEMBER BLEY: It was response to an RAI.

MEMBER STETKAR: It was an RAI response, just so -- and STP will provide that.

MR. HEAD: Yes, we are going to provide you that RAI response, correct, today.

MR. CHAPPELL: We have a letter reference to that.

MEMBER STETKAR: Okay.

MR. CHAPPELL: We will confirm that number, and after the session provide it.

MEMBER STETKAR: Okay.

MS. BANERJEE: And the third one was

actually -- this may be one or more reports, one was the Army Corps of Engineers report on dam failure data 2006.

MR. CHAPPELL: Right. And we are going to provide you that also.

MR. HEAD: That is part of another RAI.

MR. STILLWELL: It is identified in another RAI response. We'll give you both of those.

MS. BANERJEE: Okay. And then, staff used this U.S. Bureau of Reclamation dam failure data. Is there a report associated with it, if the members are interested? And this Baecher report, Baecher paper, they were --

MEMBER BLEY: Yes. I think it would be -- I think we ought to have that. I got the impression they just had a table from it, but that should be from staff.

MS. BANERJEE: That should be from the staff, yes.

MS. MROWCA: This is Lynn Mrowca. We can give you a copy of that Baecher report.

MEMBER BLEY: Okay. Thank you.

MS. BANERJEE: Baecher paper and then

the U.S. Bureau of Reclamation dam failure data.

CHAIR ABDEL-KHALIK: Anything else on anybody's list?

MR. HEAD: Yes.

CHAIR ABDEL-KHALIK: Yes, sir.

MR. HEAD: I just want to go over to see if they are open items. Early on, we had a discussion on the RCIC steam valve failure --

MEMBER STETKAR: Model for it.

MR. HEAD: -- model for it. And that was coupled with an RWCU discussion also, so I wondered, is there is an open item on that one specifically, or --

MEMBER STETKAR: Let's hold off on that for a while, because I think when we finish up the meeting here and go around the table -- are we doing that --

CHAIR ABDEL-KHALIK: Yes, sir.

MEMBER STETKAR: -- now?

CHAIR ABDEL-KHALIK: No, no, not now.

MEMBER STETKAR: Okay. When we finish up and go around the table, I'd like to float a couple of ideas, but --

MR. HEAD: Okay.

MEMBER STETKAR: -- hold off on that, Scott.

MR. HEAD: All right. Well, then, the last one I heard was there was a fusible link failure mode question you asked us.

MEMBER BLEY: I said, "Is there a failure mode of those valves, the ones with the fusible links, that will allow water to pass through them without the fusible link melting?"

MEMBER RAY: And to ensure they have a seismic fragility, for example.

MEMBER BLEY: They must have some other failure mode. If not, that's going to be interesting news.

MEMBER STETKAR: Yes. We'll follow up on that.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: That's all I had.

CHAIR ABDEL-KHALIK: how about staff?

MR. WUNDER: We don't have anything in addition to that. We agree with what you --

CHAIR ABDEL-KHALIK: Thank you. Okay. At this time, we will proceed to discuss the action items from prior meetings.

MS. BANERJEE: And I have a -- this is Maitri Banerjee. I have a list attached to the agenda that I distributed at the beginning of the meeting.

CHAIR ABDEL-KHALIK: So we can just follow up. They were referred to the -- the open items by number.

MS. BANERJEE: Yes. If you could reference open items by number that we are going into to discuss today that will be helpful.

MR. HEAD: We will in fact be showing you that this is something of a work in progress for us, okay? So we have a similar list, and we obviously need to reconcile that this is being shown, to let you know that we are keeping track of everything that we are under -- you know, that we are getting from these meetings.

I don't know, Coley, are these the same numbers that --

MR. CHAPPELL: These are the same numbers that were provided in the public reference.

MR. HEAD: Okay.

MR. CHAPPELL: And with the exception

of the last few from the May 20th meeting, which I added on without -- because there was no reference.

MS. BANERJEE: Good. Thank you.

MR. HEAD: So we are both -- our intent is to show you the status of this at each meeting.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: Let you know a visual view of the progress. And our intent today is to talk about the following open items.

MEMBER ARMIJO: The ones that are bold?

MR. HEAD: Well, yes, they are bolded on this list, and here is the list of the actual ones we are going to talk about today. They are the Part 21, and then a series of electrical switchyard issues, a RCIC cycle, a RCIC question that was from one of the previous meetings, and then a DRAP that we got actually up on the screen earlier.

CHAIR ABDEL-KHALIK: Okay.

MR. HEAD: Okay?

CHAIR ABDEL-KHALIK: Yes, sir.

MR. HEAD: All right. Part 21 is going

to be lead by Brad Maurer from Westinghouse.

MR. MAURER: Good afternoon. My name is Brad Maurer. I work for Westinghouse. My current position is Manager of ABWR Licensing at Westinghouse. I have been with Westinghouse for over 36 years now, many of those in the licensing area. Prior to that I did piping analysis and support design, turbine missile probability studies, and also electrical equipment seismic qualification.

This afternoon I will talk to the action item -- this is action item Number 4 on the detailed list, Part 21 issues that affect the ABWR design.

Back in our March 2nd meeting, the Committee raised a question concerning the Part 21 issue relative to the stability issue, and we responded to that in the March 18th meeting specifically. We have taken the action to look at all Part 21 issues to see if there are others that affect the ABWR design, and we have done that.

We looked at Part 21 reports going back to 1995, thinking that the ABWR DCD was approved in about mid-1997, so we backed off a couple of years thinking anything before that would have been included in the DCD itself. So from -- we looked at '95 to the present.

As a result of their review, we identified 45 Part 21 reports, which we felt might be applicable to BWR issues, and we did a detailed review of those 45 reports. And as a result of that, we came up with a number -- several reports that fell into two different areas. One area was the stability option 3 area, which was the subject of the original question from the Committee, and the second area was the calculation of SLMCPR, which is the safety limit for minimum critical power ratio.

These two areas were already known and were identified in the STP 3 and 4 COLA as COL items. In the table here, we talk about these two items in a bit more detail. The stability option 3 was identified in four of the Part 21 reports, in some cases plus supplements.

The COLA Part 2 COL commitment, 4.4-3, commits us to provide an updated stability analysis addressing the current -- or the design

-- fuel design that will be used at STP 3 and 4. The second item, the SLMCPR, came up in two different Part 21 report. And also, this item is a commitment in the COL or in the COLA, COM 4.4-2, and this also commits us to perform an analysis on the thermal limits, which includes the SLMCPR.

So both of these areas will be addressed, utilizing our methodology in a fuel design that will be used at STP 3 and 4.

MEMBER ARMIJO: Well, when will that be done?

MR. MAURER: I'm sorry?

MEMBER ARMIJO: When will you do that? You know, you need the actual fuel design that you are going to put into the plant in order to do these analyses, and so my question is: when are you going to do that to make sure everything is okay?

MR. MAURER: Well, those analyses are currently underway right now. We are providing a stability topical report with our methodology to the staff by September.

MEMBER ARMIJO: Well, we'll want to be

looking at --

CHAIR ABDEL-KHALIK: For which fuel, though?

MEMBER ARMIJO: Yes. But which fuel is going to be --

CHAIR ABDEL-KHALIK: We don't want it for the GE7 fuel.

MR. HEAD: Right. These will be closed for the fuel used for the plant, is I think what you're really asking.

MEMBER ARMIJO: Yes, the fuel, the SVEA96 plus, whatever that design is, that's the one that is -- that we are interested in.

MR. HEAD: The commitments will be closed when we have actually done those analyses for the fuel that we are going to be loading in the plant is what --

MR. MAURER: That's right. That is what you're --

MEMBER ARMIJO: I'm just asking, will the ACRS see this -- these --

MR. HEAD: Yes. And we'll -- in terms of those topicals, I think you have already recognized that you have the opportunity to review those as those become available.

MEMBER ARMIJO: Yes. And you have provided a list of topical reports to us, and I think we need to do some homework here to make sure that we get on the agenda to --

MS. BANERJEE: Yes. If I may say that the Committee decided at the April P&P that it is going to be a joint subcommittee, Thermal Hydraulics, ABWR, and probably also Power Uprate, that will look at those, you know, list and select --

MEMBER ARMIJO: The Fuel Subcommittee will want to be part of that, you know, so --

MS. BANERJEE: So it's the full --

MEMBER ARMIJO: -- make sure that --

MS. BANERJEE: -- full committee.

MEMBER ARMIJO: It's pretty much a full committee, because it's important to everything.

MS. BANERJEE: And Zeyna and I are working.

MEMBER ARMIJO: Okay.

MS. BANERJEE: She I think probably is going to provide you with a list pretty soon.

MEMBER ARMIJO: Okay.

CHAIR ABDEL-KHALIK: Now, the assumption in this response that any Part 21s prior to 1995 would have been captured during the original DCD review --

MR. MAURER: That was our assumption, yes.

CHAIR ABDEL-KHALIK: Now, how good is that assumption? Is there something inherent in the process that gives you that assurance?

MR. MAURER: No, there isn't. Our assumption was simply based on the fact that in 1995, or prior to 1995, the DCD was under active review with the staff, and that any issues that GE would have brought up at that time related -- that affected the ABWR would have been included in the ABWR design and the DCDs.

MR. HEAD: I think there is something inherent in the process.

CHAIR ABDEL-KHALIK: There is?

MR. HEAD: Within the Part 21 process itself --

CHAIR ABDEL-KHALIK: Right.

MR. HEAD: -- and the expectation that the vendors, the expectation that the vendors have to making the report, the expectations that the applicant or licensees have to react to that information. And I think there is also that -- that is a topic that is inspected by the NRC as to the validity -- you know, the robustness of the Part 21 process, either at vendors or at licensees via their corrective action program.

MR. WUNDER: This is George.

CHAIR ABDEL-KHALIK: You know, a Part 21 that may be applicable to the ABWR may not have been generated by either the vendor or the applicant. They could have been generated by somebody else.

MR. WUNDER: This is George.

CHAIR ABDEL-KHALIK: They may be relevant to the ABWR.

MR. WUNDER: This is George Wunder for the staff. This is an excellent question, and I think that it will probably be part of it. I think it is probably appropriate to address it in the staff's presentation on this issue, which we will be doing not today but we hope at the next meeting, at the beginning of it.

CHAIR ABDEL-KHALIK: Okay.

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MR. HEAD: Okay?

CHAIR ABDEL-KHALIK: Thank you.

MR. MAURER: What we have presented, though, is the results of our research.

CHAIR ABDEL-KHALIK: Right. I think, still, the open issue is whether the 1995 date, cutoff date that you have selected, is really appropriate, or maybe something may have fallen through the cracks in the process.

MR. MAURER: Understand.

CHAIR ABDEL-KHALIK: Thanks.

MR. HEAD: Okay. The second topic will be -- and, as a matter of fact, there are a number of electrical topics. It will be led by Evans Heacock.

MR. HEACOCK: Good afternoon. My name is Evans Heacock. I'm design engineering lead for South Texas Project. I presented the Chapter 8 information to the ACRS, and just wanted to go back over the open questions that were presented from last time.

Starting off with the first one, would be the question was confirmed that the east offsite transmission lines, the Velasco, which are on the screen, the two on the right-hand side circled, number 8 and number 9, and whether they are capable of supplying power to all four units if we lose what was known as the north northwestern corridor, which -- of all the other lines, 2 through 7 there at the top.

We went back and --

MR. HEAD: I'm just having Coley to maybe mark them with the pointer, if he can. There you go.

MR. HEACOCK: Over there on the right-hand side.

CHAIR ABDEL-KHALIK: What are those two?

MEMBER CORRADINI: Make your hand wave again.

(Laughter.)

MEMBER SHACK: North is at the top always.

MR. HEACOCK: Yes. The question was I guess the transmission lines going out all bundled. We ended up, anyways, going back to our transmission service provider for South Texas Project's Units 3 and 4 and asked them to run some studies for us.

What we had them do is look at the normal load for Units 1 and 2, which is about 16 megawatts, and then Units 3 and 4 are about 100 megawatts each from load. They put that into their analysis and came out and showed that, yes, the transmission lines were capable of supplying adequate load with just those two lines, when basically the 8 was the Velasco 27 to Units 3 and 4, and number 9 line coming in, Velasco 18.

MEMBER STETKAR: Good.

MR. HEACOCK: Okay?

MEMBER STETKAR: Thanks.

MR. HEACOCK: The other question you had, is there one or two closing coils in our switchyard breakers? There are only one closing coil that can be in our switchyard breakers, which is consistent with industry. We even asked the vendors if there were -- if they have ever seen anybody ask for two, and nobody has ever asked for two closing coils ever.

So this -- I guess the followup on this is, because you have two DC sources out there -- in order to reclose those breakers to restore electric offsite power, you know, you have dual trip coils that are powered from each of the separate DC sources, so you are pretty well assured that the breakers are going to open.

MEMBER STETKAR: Yes.

MR. HEACOCK: On the other hand, if you lose a DC source, the allocation of breakers out in that switchyard, between the DC power supplies, is a little bit important to have assurance that you can get offsite power back in, and you can reclose those breakers.

MEMBER STETKAR: Right.

MR. HEACOCK: It is a little logic problem that you need to think about.

MEMBER STETKAR: Well, and let me finish with the rest of your logic. Part of -- when you are clearing a breaker with the two coils, it is important for us to make sure that we trip a line during a fault, so it does not spread, so the reason for that.

However --

MR. HEACOCK: However --

MEMBER STETKAR: -- the other part is is that you do lose -- if you lose part of your grid, or in this case if we lost our switchyard, does not mean that all our breakers are going to open. They will actually stay closed and wait -- awaiting restoration of offsite sources in, and --

MR. HEACOCK: That is presuming a lot about the type of fault that you had.

MEMBER STETKAR: Well, we're getting into a grid, which is going to -- which is going to be, whatever caused it, it could be local or it could be remote -- you're correct. Typically, you do not clear your whole switchyard, though, on a situation for a fault. If your backup breakers are caching, it is usually going to strip one past, and your breakers even in your switchyard are going to stay closed.

MR. HEACOCK: Just -- I'm not going to try to run through all of the possible ways that you can get faults that may or may not open --

MEMBER STETKAR: Well, yes.

MR. HEACOCK: -- combination of breakers in the switchyard. It is just a caution that when you think about supplying power to the closing coils on those breakers --

MEMBER STETKAR: No, I understand that.

MR. HEACOCK: -- make sure that you have a little bit of diversity.

MEMBER STETKAR: Yes, not necessarily all off the same battery

MR. HEACOCK: Not off the same battery.

MEMBER STETKAR: That's right. I understand.

MR. HEACOCK: Or --

MEMBER STETKAR: They also have manual methods to go out and close, too. You can also go out there mainly to close breakers. You do it electrically and then manually.

MR. HEACOCK: Can you really do that manually?

MEMBER STETKAR: Oh, yes, it's a push-button. It's a push-button on the breaker.

MR. HEACOCK: If it's a push-button on the breaker, you are energizing that coil.

MEMBER STETKAR: Not always. Some of those are manual. Some are manual, some aren't.

MR. HEACOCK: A lot of people say they can close breakers manually mechanically, and then they find out that they can't close the breakers manually mechanically. They can open them manually mechanically, they can close them with the local button that energizes the closed coil, but --

MEMBER STETKAR: Yes.

MR. HEACOCK: -- a lot of times people don't like to have human beings out there --

MEMBER STETKAR: No, it's not -- it's not --

MR. HEACOCK: -- methodically closing these.

(Laughter.)

It could kill that.

MEMBER STETKAR: That's not preferred, I agree. And we will take that into consideration for which things -- the use of diversity in --

MR. HEACOCK: That's --

MEMBER STETKAR: We can look at that and use diversity.

MR. HEAD: Mr. Chairman, I was wondering, just as we maybe -- referring back to the previous one, could we acknowledge -- have we addressed the ACRS's concern with --

MEMBER STETKAR: Yes.

MR. HEAD: -- this second one?

MEMBER STETKAR: Yes.

MR. HEAD: On this one, you have --

MEMBER STETKAR: This one, at least you have -- I know the answer. The concern -- the concern derives from what we were just discussing.

MR. HEAD: Right.

MEMBER STETKAR: The concern is that the design describes in some detail the redundant DC power supplies and makes- the fact that you have dual tripping coils, so you are sure that you can clear a fault, and all that kind of thing. But for the station blackout restoration of offsite power function that you also have to address, the question is: does the design provide adequate redundancy for that function, which means, can you have assurance that given a failure of a DC power supply you still have a path that you can reclose those breakers.

MR. HEACOCK: Yes.

MEMBER STETKAR: Under the worst conditions where you just strip the entire switchyard through some fault, or combinations of faults, form related --

MR. HEACOCK: Some adversity --

MEMBER STETKAR: -- do that a lot.

MR. HEAD: And so that is my question, is we can agree to go back and consider that. Is that sufficient to close this, or how would we -- I mean --

CHAIR ABDEL-KHALIK: You are asking about a process whether we close this action item and create another one or --

MR. HEAD: Well, that would be --

CHAIR ABDEL-KHALIK: -- just this would be simply a clarification of the action item, and the fact that this response may not have addressed the concern?

MEMBER STETKAR: Well, the response -- the response provides information.

MR. HEAD: Right.

MEMBER STETKAR: I mean, if they came back and said, "Yea, verily, each breaker has two redundant closing coils," there would be no followup because, you know, you'd power one from each one, and that's the problem. I knew this one would --

MR. HEACOCK: Yes, I figured you probably would be, too.

CHAIR ABDEL-KHALIK: Rather than proliferating the action items, I would rather we keep this open and just address the concerns.

MEMBER STETKAR: Yes. I mean, the real issue here is the ability to restore and -- restore at least one offsite power supply.

MR. HEACOCK: Yes. And then, I guess I would -- from the standpoint of what we're saying close -- being able to close it even with the future, I don't know how I would keep it open and address your concerns, unless we -- I'm not sure how I would end up closing it.

CHAIR ABDEL-KHALIK: We can open a new one, if that makes it easier for you.

MR. HEACOCK: No, no.

MR. HEAD: What you're asking us to do, it seems like somewhat -- we've got to go through a design evolutionary process to address that, and --

MEMBER CORRADINI: I guess I just -- I wanted to ask -- I want to ask John, is this something that you'd fall on your sword over, or is this a little item?

MEMBER STETKAR: It's -- it could be potentially important, if indeed for loss -- if loss of offsite power events are important contributors to core damage, and, a) they are; therefore, the ability to recover offsite power, which is explicitly modeled in the PRA, could be important.

Now, if for some reason the design of the switchyard is not conducive to the -- to your ability to restore power to the plant, that numerically could have an effect.

MEMBER CORRADINI: Okay.

MEMBER STETKAR: So it is -- I'm not going to fall on my sword over it, in that sense, but it could be a potentially -- you need to have a failure of DC power. I'm not going to do a risk assessment sitting at a table here, but it is something that probably has not been considered in the risk assessment.

MEMBER CORRADINI: Okay.

MEMBER STETKAR: And it is something that probably has not been considered in the --

if I can use the term "design of the switchyard" where the design of the switchyard includes the allocation of circuit breakers -- specific circuit breakers between the two available sources of DC power to say that, even with the failure of one source of DC power, I still can restore an offsite power of supply back into the plant. Right now, there is no assurance that you can do that, because you don't know how those breakers are allocated among the -- between the two different DC power supplies.

MR. HEACOCK: And I guess -- and bringing it up, I don't know of any other plant that has gone through something -- what you're asking for. And there really has not been any guidance on our side trying to ask for it. Maybe we can go back and --

MEMBER STETKAR: This gets back to an issue between -- our role is to ask technical questions. It is probably devolving now into an issue between you and the staff in terms of, you know, what is the requirement for the --

MEMBER CORRADINI: So I guess that's what I --

MR. HEACOCK: And there's not a requirement. That's part of it: there's no requirement out there.

MEMBER STETKAR: But there is a requirement that you'd be able to demonstrate that you can restore a source of offsite power.

MEMBER SIEBER: Right.

MR. HEACOCK: I would say yes.

(Laughter.)

MEMBER STETKAR: Station blackout.

MR. HEACOCK: Station blackout, yes. We'll discuss about how --

CHAIR ABDEL-KHALIK: So how do you want to leave this, John?

MEMBER STETKAR: You know, Said, I don't know. I mean, you know, it's getting to the point that we -- you know, South Texas raises a valid issue in terms of in licensing space, you know, where is that boundary? And I don't know the answer to that question. I just don't know. That's something that the staff needs to answer.

CHAIR ABDEL-KHALIK: For the time being, we will just say we will revisit --

MEMBER STETKAR: Okay. I agree.

CHAIR ABDEL-KHALIK: -- this at a later date. Otherwise, we are going to --

MEMBER STETKAR: Yes.

MS. BANERJEE: Revisiting at the full committee meeting, and then we decide whether we are going to send a message or not.

MR. HEAD: Maybe on the 23rd or 24th, we might have another perspective or additional insights to share.

CHAIR ABDEL-KHALIK: Okay. That would be fine. We'll talk about it.

MEMBER STETKAR: I mean, from a design/licensing perspective, I agree with you completely. There is -- you meet the criteria. On the other hand, it is in a gray area that could be numerically important to restoration of offsite power. So it's in that gray area.

MR. HEACOCK: It's a good question. It's a good question.

CHAIR ABDEL-KHALIK: Let's proceed.

MR. HEACOCK: Okay.

CHAIR ABDEL-KHALIK: Thank you.

MR. HEACOCK: The next item we talked about was, what is the discharge time for the batteries in the control system? We went back into our transmission supplier and talked to them, and had actually several conversations. We basically ended up with saying their normal -- it was actually eight hours. We went ahead and asked them to extend it to 10 hours, so we will have a coping -- the battery being able to last 10 hours without a charge.

MEMBER STETKAR: They will exceed the coping time for --

MR. HEACOCK: Yes, exactly.

MEMBER STETKAR: Okay. That's good.

MR. HEACOCK: Yes.

(Laughter.)

That's kind of why I asked --

MEMBER STETKAR: You kid about these two-hour batteries. The former question would have been a lot more interesting.

(Laughter.)

MR. HEAD: No. We were kind of hoping this one might reflect on the first one.

MEMBER STETKAR: Well, it does help. It does help, because this says that you need to have a failure of one of those battery supplies to get you into the situation where I was concerned about, where you could have a configuration where you might not be able to restore -- you know, restore a pathway. So this is good, this helps.

MR. HEACOCK: The other information is our normal seismic criteria in accordance with IEEE standards. It's a 25 percent aging margin and 10 percent design margin, and typical batteries -- lead acid batteries are 10 to -- 15 to 20 years.

MEMBER STETKAR: So.

MS. BANERJEE: So we can close --

MEMBER STETKAR: And this is closed, yes, absolutely.

MS. BANERJEE: Okay. Thank you.

MR. HEACOCK: The next question was asked, "Address the qualifications for submergence -- submerged 345 cables." I'd like to make a little clarification -- is that our -- these cables are actually not qualified. They are non-safety-related. They are transmission -- owned by the transmission company. They do not necessarily qualify them per se.

These also are not continuously submerged. They will be submerged from time to time based on rainfalls and what not. So the rest of the response being that these cables are lead-sheathed.

What that lead sheathing does, it provides an impervious barrier from the insulation, from the groundwater or any kind of a flood situation, from actually getting to the insulation and working its way through and causing a fault. So the lead sheath is the path -- is the item to keep it from actually getting wet all the time.

It's in accordance with our IEEE and NEMA standards. As you can see, we list several standards there, and NEMA's WC 71, also 74, and the definition for -- in the NEMA WC 71 and 74 says that a lead or smooth aluminum sheath, with or without out supplementary protection, i.e. a jacket of some sort, shall be used when impervious covering is required.

This is -- these are cables that have been used by the transmission company for some time. As you can see, we have actually talked

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with the transmission companies, gotten an idea how well they actually work. They have been in service 40 years, and they say they test like new, so this is -- this is "the qualification." They are not fully qualified in accordance with a 10 CFR --

MEMBER STETKAR: But at least there is operating experience from --

MR. HEACOCK: That's correct.

MEMBER STETKAR: -- from your --

MR. HEACOCK: Right.

MEMBER STETKAR: -- transmission service provider with similar cables.

MR. HEACOCK: Right. And they are actually used in industry, like Florida Power and Light uses them down in their nuclear plants. They put lead sheath down, since they are wet all the time, so --

MEMBER STETKAR: For the rest of the Committee's benefit -- the Subcommittee's benefit, the reason for concern about this question is that it is related to the first question about the capacity of those -- the two eastern circuits to supply the unit. And one of

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those eastern circuits indeed goes through one of these cables underground, specifically they are Units 3 and 4. I think this is the --

MR. HEACOCK: Right.

MEMBER STETKAR: -- feed, so this is up -- I think we are good on this one.

MR. HEACOCK: Okay.

MEMBER STETKAR: We're good on this one.

MR. HEACOCK: Thank you. The next question you had asked, a question about the performance of the switching logic under various electrical transients. In specific, you had asked, what about the loss of a unit auxiliary transformer?

MEMBER STETKAR: You know, and, Coley, you can go through this. But I will be honest with you, I'm going to have to go back and rescrew my head around a little bit to remember. This one was fairly subtle, if I recall. And I haven't thought about it --

MR. HEACOCK: Okay.

MEMBER STETKAR: -- before this, so -- so run through the presentation, and then -- but

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I suspect we will probably wind up leaving it open for me to be able to think about it a little bit.

MR. HEACOCK: Okay. That's fine. And what it will do is that we went ahead and put out -- graphically, it's a little bit easier to show you the normal lineup. What you're seeing now on the screen, it will be the normal lineup for Units 3 and 4.

You will see that our -- and we didn't label them, but the very top set of buses -- I'll point to them -- these are power generation buses, 13.8, are typically energized on the unit auxiliary transformer. The plant investment protection buses, which is the next set down, are normally energized by the unit auxiliary transformers.

And then, our -- two of our safety-related buses, Division I, Division II, are going to be typically powered by the unit auxiliary transformer.

The third division is typically going to be powered, and normally energized through one of the reserve auxiliary transformers that you

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see on the dark, heavy path coming down. And that is an intentional feed, so that we don't have them all on one source, and that we have to go with all diesel, so that we have immediate access to an offsite source at any given time, should we have a transient.

So as we go forward in looking at a fault, if we had a fault on our unit auxiliary transformer, our generator breaker will open up right at the generator, and we will also have generator breakers in the switchyard open up to isolate the unit auxiliary transformer, whichever one was faulted.

The feeds into the PG buses, the plant investment protection buses, and Division I, Division II breakers will open on undervoltage. The diesel generators for Divisions I and II will receive an automatic start signal due to loss of voltage on the bus. And Divisions I and II will connect as the diesels come uprate at speed and frequency.

Division III bus will remain energized by the reserve auxiliary transformer alpha. Also, the combustion turbine generator that we have will actually -- it will receive an automatic start signal based on loss of the PIP buses, voltage on the PIP buses, and come up to speed. But it actually will not load, since we actually still have a feed from one of the other reserve auxiliary transformers.

And then, we have two pre-selected PIP buses we will load back on to the reserve auxiliary transformer through one of the CTG -- bus number 3. And if you go back down to the next figure, you'll show how that -- how that occurs.

We fault one of the unit auxiliary, as we're showing. It deenergizes all of the 13.8 PG buses. It will deenergize the PIP buses, and it will deenergize two of the safety-related buses.

After the diesel generators come up, as we talked about a minute ago on Divisions I and II, the bus will reload on the diesel generators. And then, the third division, you will notice that the diesel generator does not start and it stays energized by the reserve auxiliary transformer.

And then, also, you will see that two

"pre-selected" PIP buses will transfer over to CTG3 bus and reenergize, and also the combustion turbine generator is now black, which shows that it started but it's not loading, since we still have a source of power.

MEMBER STETKAR: Okay. This would probably resolve it. I just need to go back through my thought process to make sure that this answers all the questions.

MR. HEACOCK: Yes, I think it might have. If I can help -- you might have been asking I think that -- you are worried about the stripping possibly of the third division --

MEMBER STETKAR: Right.

MR. HEACOCK: -- I think is what you were asking, sir.

MEMBER STETKAR: I think that's right, but I -- as I said --

MR. HEACOCK: Yes.

MEMBER STETKAR: -- I haven't thought about this one, so I'll need to do that.

MR. HEACOCK: Okay.

MEMBER STETKAR: So we'll keep it open, but --

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MR. HEACOCK: Okay.

MEMBER STETKAR: -- don't worry about it.

MR. HEACOCK: Okay.

MR. HEAD: It's poised to be closed maybe.

(Laughter.)

MR. HEACOCK: The last question it asks us, is a RAT -- the reserve auxiliary 4160 winding capable of fitting two plant investment protection buses and one safety bus? The answer is yes, it can feed it.

But we have -- and we have multiple ways. What we explained here are the multiple different directions we can actually feed that PIP bus, the safety buses and the PIP buses.

MEMBER STETKAR: That's fine. As long as it --

MR. HEACOCK: Yes.

MEMBER STETKAR: -- windings enough to carry that load, that's all I was looking for.

MR. HEACOCK: We also have some procedural guidance that we will have a place to say that Operations will have to look to make

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sure we don't overload.

MEMBER STETKAR: So, in effect, if you can flip back up to the -- if you lost -- go back to 16. You went two, up two. There we go. If you lost, for example, the third safety bus there, the diesel didn't start, you could still -- you could still power those two PIP buses and --

MR. HEACOCK: And the safety bus.

MEMBER STETKAR: -- the two PIP buses and the third safety bus --

MR. HEACOCK: Correct.

MEMBER STETKAR: -- from that single winding --

MR. HEACOCK: Correct, yes.

MEMBER STETKAR: -- without kicking on the CTG.

MR. HEACOCK: Right. As you can see, yes, from a RAT, we can come down through the reserve auxiliary.

MEMBER STETKAR: Yes. I think that was part of my concern, to figure out what the switching was doing --

MR. HEACOCK: Yes.

MEMBER STETKAR: -- and figure out whether or not I had to load the CTG to pick up the specific combination.

MR. HEACOCK: Yes, I think so, too.

MEMBER STETKAR: Yes.

MR. HEACOCK: Okay?

MEMBER STETKAR: Okay. Thank you. This one is certainly closed.

MR. HEACOCK: Yes.

MEMBER STETKAR: I still want to go back and make sure I thought about the switching logic correctly.

MR. HEACOCK: Okay.

MR. HEAD: All right. For this action item, I am going to turn the discussion over to Tom Daley, who was here for one of our previous discussions.

MR. DALEY: Good afternoon. I'm Tom Daley, Mechanical Engineering Group supervisor for STP Units 3 and 4.

During our discussions on the departure associated with the new RCIC turbine, we talked about potential failure mechanisms, most notably turbine overspeed. The question was asked,

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"Well, during your design basis scenario, how often would this turbine be exposed to the possibility of this overspeed event?"

So we asked Toshiba to take a look at this. And they did -- they did run a quick analysis, and it shows that about four times in that eight-hour period would we cycle between the start-signal receipt at a Level 2 and the secure signals receipt at Level 8.

The new pump is a turbine water lubricated pump. This is typically supplied by Wier.

MR. HEAD: Hey, Tom, just one second. That was -- that was one action item, right, was the answering of that one?

MR. DALEY: That's correct.

MR. HEAD: I was just wondering, are there any further questions on --

CHAIR ABDEL-KHALIK: This is information that is --

MR. HEAD: Okay. All right.

MR. DALEY: And I, once again, want to just quickly mention that for our new Wier-type pump, turbine water lubricated pump, I put a --

again, put a simple schematic for the control system arrangement there.

This control system has a governor which directly senses the pump discharge flow and pump discharge pressure. And it then, in turn, through a direct linkage, all internal to the turbine pump arrangement, adjusts the throttle valve directly to make sure you get the correct and set flow rate for that situation.

So your Terry-type turbine uses an electro-hydraulic system with a servo mechanism with -- it is driven right off the shaft of the pump. So it starts up and drives the oil, which in turn it uses to control itself. So that is why it ends up being sometimes more prone to overspeed events during startup.

However, with this direct mechanical type arrangement on the Wier pump, we agree with the vendor that it ends up with a smoother startup rate, as shown in the curve on the right side of the picture up there.

CHAIR ABDEL-KHALIK: I think this item is closed.

MR. DALEY: Okay.

MEMBER STETKAR: Yes. The reason that I actually asked about the -- it is a two-part thing. The reason I asked about the number of cycles, one is for overspeed and whether it needs to be reset. The other, which I probably learned earlier today, is probably not even modeled, because the PRA is so simplified they would never think about this, is looking at the number of cycles of the RCIC turbine start-stop cycles during a station blackout event.

So, but I already know that's not modeled, so --

MR. DALEY: For sure, that is not modeled.

MEMBER STETKAR: For sure, that is not modeled. But, you know, if you had a real PRA, you would -- it looks like you would model four cycles within a nominal 24-hour period, or at least you have now some information about how many cycles, depending on the offsite power recovery time period, during these station blackout events.

So, thanks, we can close this. It's --

MR. HEAD: I think this is the last

open item, right?

MEMBER STETKAR: Yes.

MR. HEAD: Okay.

MR. STILLWELL: This is Item 30, when DRAP would be effectively populated. We talked about this a little bit earlier this afternoon. We intend to complete a majority of the system reviews, and by "system reviews" I mean a high level, very rapid screening assessment to determine whether the system is used in emergency procedures, can contribute to a plant trip, affects systems that are modeled in the PRA, the questions that you had asked to screen systems out of the maintenance rule.

Those will be complete -- the majority of those will be complete by the end of this year. All of the system reviews for all of the systems in the ABWR will be complete next year, including going down to the component level and failure model level to identify what needs to be in DRAP to control those non-safety-related systems, structures, or components to ensure their continued availability and reliability as the plant goes into operation, and what other special testing we may need to identify for safety-related systems, structures, or components. And that will be finished by the third quarter of 2011.

What we intend to do is when that list is completely populated, we will amend an RAI and submit that to the NRC saying, "Here is the final list, and this is the set of equipment that we intend to monitor, and here is the controls we have in place, and here is what we ask -- we are asking the operational programs to consider."

And then, we will amend the FSAR at the first amendment cycle after we have completed the actions.

MS. BANERJEE: Is that going to be after fuel --

MR. STILLWELL: No. This --

MS. BANERJEE: -- after COL is received?

MR. STILLWELL: This is before COL is issued. It's the third quarter of 2011, and it would amend the RAI responses before COL issuance. We are just not sure we can get the FSAR updated in the short period of time between the third quarter of 2011 and the potential issuance of the --

MEMBER STETKAR: I mean, in terms of the timing, the importance is that there will be a list submitted to the staff with appropriate supporting, you know, analyses to justify the population on that list before the COL is issued.

MR. STILLWELL: Yes.

MEMBER STETKAR: Whether or not there is a confirmatory item to get it into the next, you know, version of the FSAR is not as important as whether or not the list is developed, and the staff has an opportunity to review the process. And I use the word "review" rather than "audit," review the process to populate that list.

MR. STILLWELL: As they mentioned in this slide, they intend to perform an audit on the process. Do we have the procedures in place, and are we following our process third quarter this year? And that's what we hope.

MEMBER STETKAR: Yes.

MR. STILLWELL: And then, periodically, I would assume they will review what we have done, or we can provide, hey, we finished this

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part. I don't know how that is going to work. But then, RAI response would be modified when it's complete.

If I could to amplify on something that was talked about, the reason we use the expert panel -- and if you're familiar with South Texas Units 1 and 2 and the graded quality assurance process, we used the expert panel in graded quality assurance to make up for known deficiencies in PRA.

We expect those people to come to the table prepared to talk about the significance of plant systems, structures, and components, that the PRA doesn't model, things like control room ventilation or control room filtration, or, in this case, systems that didn't make it to the PRA for whatever reason.

We have a set of deterministic questions that we expect the expert panel to answer during the sessions, and they have basically five topics, and it is topics that you would expect in a maintenance rule. Is it used in emergency procedures? Can its failure affect systems that we do rely on? Off the top of my head, I forget what the other three are. And we will --

PARTICIPANT: Shutdown?

MR. STILLWELL: Is it used in shutdown analysis or shutdown -- is it used in shutdown space, for either shutdown cooling or to get the containment hatch closed? Or something like that. And we rate that quantitatively based on what we think its importance is, and we sum that, and it can go into DRAP entirely based on deterministic criteria.

So we'll put it in the list, because we think, based on the expertise at the table, that the control room filtration system should be important. It should be a risk-significant system, although it is not modeled in anybody's PRA.

MEMBER BLEY: Have you set a policy on how you -- what kind of people you have to have when you --

MR. STILLWELL: Yes, that's described in 17.4(s).

MEMBER BLEY: Okay.

MR. STILLWELL: So we have all of the

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engineering groups represented. By "groups" I mean Toshiba, Fluor, Sargent & Lundy, STP. It has PRA, it also has operations.

MEMBER BLEY: It has operations? That's what I wanted to get to.

MR. STILLWELL: What we don't have right now, what we rely on the other members, is maintenance people. So we rely on the other engineering organizations to provide maintenance experience, but, yes, we've got all of the major disciplines that you would expect to see at an operating plant, and you were going through a maintenance rule, with an awful strong representation from design engineering, because that's the stage we're at.

MEMBER BONACA: I think we have to review that list, however, when it comes out. The end of next year?

MR. STILLWELL: It will -- the goal is to finish it by September of next year, and modify an RAI response.

MEMBER BONACA: Because, I mean, the number of systems or components fall within the PRA. If I understand it, it's a very small fraction of the ones you rank.

MR. STILLWELL: Yes, that's a true statement.

MEMBER BONACA: I think about maybe 2,000 components, and you are ranking 30- or 40,000. And this is for Units 1 and 2. That's --

MR. STILLWELL: We reviewed 30- or 40,000, and I think we wound up ranking in the graded quality assurance about 2- to 3,000.

MEMBER BONACA: All I'm saying is that for many of them the PRA doesn't give you any insight, so, therefore, you have to make a judgment --

MR. STILLWELL: We rely on the expert panel.

MEMBER BONACA: -- and, you know, but I have always been curious about that, because, I mean, we were never allowed to use a system of this nature to discuss among a number of experts. And the rank -- and the ranking was done with specific classification of the safety systems, and so on and so forth, okay? With certain specific rules.

So this is pretty subjective, the way you are doing it. I'm not saying that it is not a valid way. I think we have to look at it.

MR. STILLWELL: Speaking for 1 and 2, it's subjective, but it's repeatable, that I can bring in different people to substitute for expert panel, and we get remarkably consistent results. And maybe because we bias everybody the right way, but I think we've got --

(Laughter.)

We're asking the right questions. We have guidelines on what the responses mean. So if we say something is extremely important, it falls into this set of rules. If we say it's something that is not important, it is obviously down here in this set of rules.

MEMBER SHACK: After all, we did approve 50.69, which is -- it's a very similar process.

MR. STILLWELL: Exactly.

MEMBER BONACA: Well, you know, some people approved it with more enthusiasm than others.

MEMBER STETKAR: I think the real

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challenge -- and it's -- we could discuss this forever, but the real challenge is that the PRA experts must clearly elaborate what is explicitly modeled in the PRA, that and what is not. You know, that there -- that must be stated very, very clearly, especially if that list is going to be populated at the level of detail of individual components and failure modes.

That's -- it's really important that those experts who know nothing about PRA, they have this ultimate faith that you have this wonderful model that is 100 percent complete. And if something doesn't show up as numerically important from that model, therefore, I trust that.

MR. HEAD: And after you've ranked 100,000 components, you will know a lot about the PRA, and you do know a lot about its weaknesses. You know some of the value you are adding to the process, because --

MEMBER STETKAR: But, you know, and especially in a situation like this where the PRA is a bit murky, let's call it, it is really important.

Now, if the ranking was only going to be done on a system basis, or a flow path type basis, there is a little bit less concern about that.

MEMBER SIEBER: You still need a good PRA.

MEMBER STETKAR: Well, but given the fact that you don't have a complete model --

MR. STILLWELL: May I modify that slightly? You need a PRA that you understand its limitations.

MEMBER STETKAR: Well, but you also need a PRA person to clearly specify what --

MEMBER BLEY: What is and isn't working.

MEMBER STETKAR: -- what is and isn't handled, so that the whole panel has that information. The whole panel -- you know, I come back to that turbine building closed cooling water system. The feedwater pump right now, for failure to run, is currently on the list. The condensate pumps are not on the list, and there is not even any -- certainly no mention of the system that cools both of those pieces of equipment.

If you're not careful, you know, if somebody says, "Well, did you model feedwater in the PRA?" The PRA people says, "Well, yes, we did." "Well, you must have modeled condensate, you must have modeled" -- you know, "Well, we didn't model the condensate booster pumps, because I know they are new, so I might ask why they're not on the list."

MEMBER SIEBER: Not on the new system or the --

MEMBER STETKAR: But you must have modeled the turbine building closed cooling water system, and the turbine building service water system, because, you know, I know they are required. So I don't need to think about those.

So the PRA people need to explicitly say, "Hey, we did not model those things. You need to think about whether we should do that." That's a really --

MR. HEAD: That's crucial to the process.

MEMBER STETKAR: That's a -- yes. I mean, that's a heavy burden on the part of the

PRA people to explicitly state what is not there.

CHAIR ABDEL-KHALIK: So at this time this item is closed, but we will have an opportunity to review this?

MS. BANERJEE: Yes. We can keep it in the organizational memory, because this whole thing is going to come back at Phase 6. Is that --

MR. HEAD: Well, yes, I guess I would like to ask that. If on this schedule the SER will have -- already have been issued by September of 2011, and it will be past the last ACRS, so I guess the schedule aspect of it -- not to presume I'm not -- where the schedule is actually going to be, but as of right now that would be past the --

MEMBER ARMIJO: We will never see the DRAP test.

MR. HEAD: I was just reacting to the fact that you all wanted to see it again, and I understand that, and maybe there are ways to -- but in --

MEMBER STETKAR: But as I understood it, though, Scott, you said that the DRAP list

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would eventually be supplied as an amended response to an RAI. It is not clear to me how the staff -- and this is the staff's business, but how the staff could issue a final SER with no open items if they still have an incomplete answer to an RAI.

MS. BANERJEE: License condition is one way of doing that.

MR. HEAD: No, I don't believe this is -- I think what we're defining here is the process we are going through and how soon it will be available to us, the station, to go through the process.

MEMBER STETKAR: Understood. That's a timing issue, but I'm -- you know, this concept that the SER will be written and we -- we, as the ACRS, will have thereby lost any opportunity to go back and revisit this issue, my question is, is, you know, can the staff actually issue an SER without any open items with something like this remaining, you know, an outstanding submittal.

MR. HEAD: Is this an open item at this point? I believe, having defined this schedule, haven't we resolved the staff's --

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MR. STILLWELL: We have admitted the RAI response to provide this information. Is it an open item? It will probably be an open item with confirmatory action.

MR. CHAPPELL: By the date they -- it's unlikely the staff has completed their review of this RAI.

CHAIR ABDEL-KHALIK: Yes, Jack.

MEMBER SIEBER: The difficulty I think that the staff is going to have is if they use the DCD PRA, modified only to reflect change -- physical changes in the plant, how will they review the DRAP?

MEMBER STETKAR: Well --

MEMBER SIEBER: Because they are -- you know, because it's not going to be modeled or --

MEMBER STETKAR: Well, but, I mean, it should be -- the justification for what is on the DRAP, and by implication what is not on the DRAP, would come from the expert panel, the documentation of the expert panel, you know, elicitation process, or whatever you call it.

MEMBER SIEBER: So if you want to decide whether the expert panel really did its job, how are you going to do it without a good PRA?

MEMBER STETKAR: Well, I mean, that's --

MR. STILLWELL: PRA is one piece of it and --

MEMBER STETKAR: -- the PRA is one piece of it, but --

MEMBER SIEBER: Yes.

MEMBER STETKAR: -- I think in terms of the review process -- well, you know, we could talk about this for a long time, but in terms of the review process the reliability assurance program list is supposed to be available at the COL stage.

MR. HEAD: Good question. I don't know if I have a good answer to that.

MEMBER STETKAR: Okay.

MS. BANERJEE: How about if we ask the staff to come back at the next meeting?

CHAIR ABDEL-KHALIK: Right. Is the staff --

MEMBER STETKAR: I would hate to be caught in a bind, you know, a -- a process bind

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where something that is supposed to be delivered at the COL stage, and reviewed at the COL stage, so that -- you know, and by implication, because it's reviewed at the COL stage, we get a chance to look at it, is caught in an area where the SER is written, and there is a confirmatory item on something that really hasn't been reviewed.

CHAIR ABDEL-KHALIK: We'll have the staff provide an answer to this timing issue. Okay. thank you.

MEMBER BONACA: It seems to me -- just one last note -- the PRA is being used for two purposes. One is to support the certification process, okay, and I think that -- I think we can wrap it up earlier. The second portion is to rank, and that is more of an operations support step. So maybe that is -- and a reasonable expectation for us to expect that the whole thing will be completed by a time. I don't know. We need to think about that.

MEMBER SIEBER: By the ACRS.

CHAIR ABDEL-KHALIK: But, nevertheless, I think a clarification of the timing would be helpful. Okay. Thank you.

Are there any other questions to STP regarding any of these open items?

(No response.)

Okay. Do you have any questions for us in terms of --

MR. HEAD: No. I was going to --

CHAIR ABDEL-KHALIK: -- you know, the status or, you know, whether an item is fully closed or is still open? Do you have a clear indication?

MR. HEAD: Item 25 on the closings, which is still open, and we will look at that some more for a future item. The last one we just discussed, it sounds like it's open for NRC to come back and provide a --

MEMBER STETKAR: You know, what I think, from my perspective, prompted that was just to make sure that indeed the list would be available prior to issuance of the COL. We have determined -- I'm not sure what we determined based on that. The answer is, yes, the list will be available, but it's a bit gray.

MR. HEAD: Where that list plays in the COL process versus the ITAAC is --

MEMBER STETKAR: I mean, the point -- yes.

MR. HEAD: -- we need all of that.

MEMBER STETKAR: That's correct.

CHAIR ABDEL-KHALIK: And the first item, I guess there is just a need to clarify or justify the 1995 cutoff date.

MR. HEAD: Okay. So that one is still open for us from that perspective, and the NRC also owes you a discussion on the --

CHAIR ABDEL-KHALIK: Right.

MR. HEAD: -- process.

CHAIR ABDEL-KHALIK: Correct.

MR. HEAD: Okay.

MS. BANERJEE: So can I go over the status quickly?

CHAIR ABDEL-KHALIK: All right. Okay.

MS. BANERJEE: I'm sorry.

CHAIR ABDEL-KHALIK: No problem. No problem.

MS. BANERJEE: Part 21, question on Part 21 report, Item Number 4. It is not closed --

CHAIR ABDEL-KHALIK: Right.

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MS. BANERJEE: -- pending staff's presentation on Dr. Abdel-Khalik's question on the cutoff date.

MR. HEAD: And a presentation from us on the cutoff date.

CHAIR ABDEL-KHALIK: Right.

MS. BANERJEE: Yes. Okay. And then, we go into Item Number 20, the next one that is closed, number of RCIC cycles.

CHAIR ABDEL-KHALIK: Yes.

MS. BANERJEE: Okay. Number 24, east transmission line capability, that is closed.

CHAIR ABDEL-KHALIK: Yes.

MS. BANERJEE: Number 25, single closing coil, it is still open pending Dr. Stetkar's brainstorming.

MEMBER STETKAR: No. It's a different issue, but for the simplicity it is still open.

MS. BANERJEE: Oh, I'm sorry. Yes, it's still open.

MR. HEAD: It's still open for us to go think about after what we've heard today.

MEMBER STETKAR: 26 is closed.

MS. BANERJEE: 26 is closed.

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MEMBER STETKAR: 27 --

MS. BANERJEE: Battery life.

MEMBER STETKAR: 27 is temporarily still open, but --

MS. BANERJEE: Pending your --

MEMBER STETKAR: -- nothing is -- nothing is -- nothing more is needed from you guys.

MS. BANERJEE: Right. Number 29 is submerged cable, closed. Number 30, DRAP list, we -- the staff will make a presentation at the next meeting. Number 31, 4.16 kV winding, closed.

MEMBER STETKAR: Yes.

MS. BANERJEE: That's it.

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

MEMBER STETKAR: Thank you.

CHAIR ABDEL-KHALIK: Okay. At this time, we would like to see if there are any members of the public, either in this room or joining us by phone, who would like to make a statement or provide a comment. First, is there anybody here in this room who would like to make

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a statement or provide a comment?

(No response.)

Okay. There is none. How about on the phone? Is the telephone line connected so that we can hear them?

MS. BANERJEE: I don't know.

CHAIR ABDEL-KHALIK: Could you please check for me?

MS. BANERJEE: Yes, I'm going to check. But I was wondering if they can hear me. AJ, can you hear me?

MR. BROWN: Yes, the phone is still open.

MS. BANERJEE: Okay. Thank you.

CHAIR ABDEL-KHALIK: Okay. Is there anyone on the phone who would like to make a statement or provide a comment?

(No response.)

Hearing none, then I guess we will go back to the next item on the agenda, which is the Subcommittee discussions. I would like to just go around the table and see if members have additional comments that we need to capture in the summary of this meeting. Jack?

MEMBER SIEBER: Okay. I will be very brief. I don't want to open any open items, but I -- in the review and our meeting today, I come away with the impression that the PRA from the DCD is missing things, and probably does not describe in sufficient depth the equipment and processes to give a real good answer as to what is going on.

Because of the way the rule is written, the staff accepts the DCD as approved already, and the applicant is faced with describing, by analysis, any deviations in their design from the design in the rule, which means that that process perpetuates the deficiencies that were originally in the PRA from the DCD.

And when I think through it, to the extent that it will cause problems in the ultimate licensing of the plant, with the exception that DRAP, which has a lot of other input to it, that is probably the only place where it would occur, and that's why I am not prepared to make an open item out of it. But, to me, it is troublesome.

CHAIR ABDEL-KHALIK: Okay.

MEMBER SIEBER: That would be the most significant thing that I have.

CHAIR ABDEL-KHALIK: Thank you, Jack. Sam?

MEMBER ARMIJO: Yes, I am a little confused still about, you know, the linkage between the certified design, the PRA and the certified design, and the current PRA that takes into account departures and deficiencies in the certification PRA and everything else, in that the certification PRA, at least I heard from one member of the staff he didn't really use it to compare with what South Texas has done with their PRA.

And the question I had is: 1) is it important? Is that certification PRA important for the regulatory process to be legitimate? And, if so, does the staff have that certification PRA in their position? And do they need to use it to be sure that the original certified design is properly linked to the design you are going to build? And, to me, it is confusing, and so it's more a question for the staff.

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I don't know if this -- all this links up together in a neat way where we can say, "Okay. The South Texas PRA plugs in right here, and we, the staff, have the certification PRA that we can compare to what South Texas has done and convince ourselves that everything is in order." So you can use a certified design there. It's -- and maybe that's garbled, but that's where I'm at.

MEMBER SIEBER: Same thing.

CHAIR ABDEL-KHALIK: Okay. Harold?

MEMBER RAY: There already is an open item on the issue that we touched on having to do with the elevation of the reservoir, and so on, relative to the plant and the vulnerabilities that may exist. So there is no need to add to that, I don't believe, although I understand, further, that it will be discussed in Chapter 2 as well. And it is in that domain rather than in the area of dam failure probabilities that I would look to be satisfied with the provisions.

CHAIR ABDEL-KHALIK: Okay. Dennis?

MEMBER BLEY: Yes. I have asked most of the things I am especially concerned about,

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and I think seeing that -- the RAI response, white papers, seeing the SSAR, and the other things that Maitri had, will help me.

Jack and Sam's comments -- you know, we've got a problem in all of these COLs with the PRAs. I think the interesting process they had to go through here reconstituting the PRA has shined a light on that in a way we haven't noticed it before, but I think the problem is everywhere. And there is not an easy way around it. You know, they won't really have their PRA until a year before operation, and that is the one that really matters. But this has raised things for us to think about, but I don't have anything new to add because of that.

CHAIR ABDEL-KHALIK: Okay. John?

MEMBER STETKAR: Yes. I think that we have already heard other members' kind of concerns and a bit of uneasiness. I tend to look at the PRA from the perspective of, given the fact that the certified design PRA was indeed accepted, and that there were -- if we can call it -- the "reconstituted PRA" replicates that certified PRA. That, indeed, is the best thing that we can have, you know, as far as the PRA for the design certification.

So, and that's something we have to live with. You know, regardless of how comfortable we may feel about that PRA, it is something legally, if nothing else, we have to live with.

That being said, there is a couple of things that the PRA process needs to address at this stage of the licensing, and one of those things is the adequacy of the PRA process. And I'll keep using "the process" rather than the word to distinguish between what may or may not be in the model.

How does that process give us assurance that indeed the changes that have been made to the design have been adequately addressed in the sense of their effect on plant risk? So that long list of design departures -- do we feel confident, "we," the ACRS, feel confident that indeed the PRA process has adequately addressed the risk implications of those changes? Because that is, indeed, one of the requirements.

And the second part is developing a

confidence, or at least an understanding, to the degree at which the PRA can support the numerical results from the PRA, those important measures can support the population of the reliability assurance program list, so that, indeed, we at least have some confidence of what is in the PRA, where the PRA numerical importance measures are useful, and what is not in the PRA, where the numerical importance measures, you know, are basically unavailable, or that something is only partially modeled such that a numerical importance measurement may be generated, but it might not be a complete -- a fully valid numerical measure, because a particular function has been modeled for some initiating events, and not other initiating events, or vice versa.

It is a really subtle area. But if you're dealing with .0005 as a black-line cutoff, you need to be worried a bit about those types of things.

So, you know, I am uneasy a bit about the PRA process in those terms. And I think we can talk a little bit later, perhaps offline, about, you know, how do we, as the Committee,

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gain some confidence in that process and the tools to support, you know, what we're interested in right now, which is -- which is the COL stage of the licensing process.

CHAIR ABDEL-KHALIK: Okay. Thank you, John. Bill?

MEMBER SHACK: Well, I guess I have more confidence in the DRAP process. I mean, I think it really does depend strongly on the expert panel, and I don't expect that at any other -- you know, it will never get away from a strong dependence on it.

And you have to look at the purpose of the DRAP program, which is to identify components before detailed design for additional attention. And I just don't think, between the PRA and the expert panel, that they will miss any particularly risk-significant component.

You'll get a second shot at this again with a much more valid PRA when we come back to the ORAP program and the maintenance rule, that, you know, things will be looked at again. This is -- this is just the first look, so that you -- when you are doing the design, you are getting it right, but it is not the last word, and it can't be the last word.

So I -- to me, it is such a big improvement in the process that I'm not going to worry if it's not the absolute best list that we will ever possibly have.

CHAIR ABDEL-KHALIK: Okay. Were you done?

MEMBER SHACK: I'm done.

CHAIR ABDEL-KHALIK: Mike?

MEMBER CORRADINI: I guess I'm not concerned about the pedigree of the Level 1 part of this. I think I understand where it evolved and where we are. On the Level 2 part, I guess I am -- I am waiting to see the response from the applicant relative to some of the questions that are still open from the staff. But my impression is that they know where they're going, and they should be able to answer them, particularly with diffusible plug questions.

CHAIR ABDEL-KHALIK: Okay. Mario?

MEMBER BONACA: Yes, I already expressed my thoughts on the PRA. I agree with Bill in a way, however, that for the purpose of

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what we are trying to do at this stage, that is going to be probably unacceptable, too.

CHAIR ABDEL-KHALIK: Okay. Well, thank you.

At this stage, I'd like to express our thanks and appreciation to the applicant and to the staff for a very good meeting.

MR. HEAD: Thanks very much. Thanks for letting us continue the meeting past, you know --

CHAIR ABDEL-KHALIK: Oh, no problem. No problem.

The meeting is adjourned.

(Whereupon, at 5:49 p.m., the proceedings in the foregoing matter were adjourned.)

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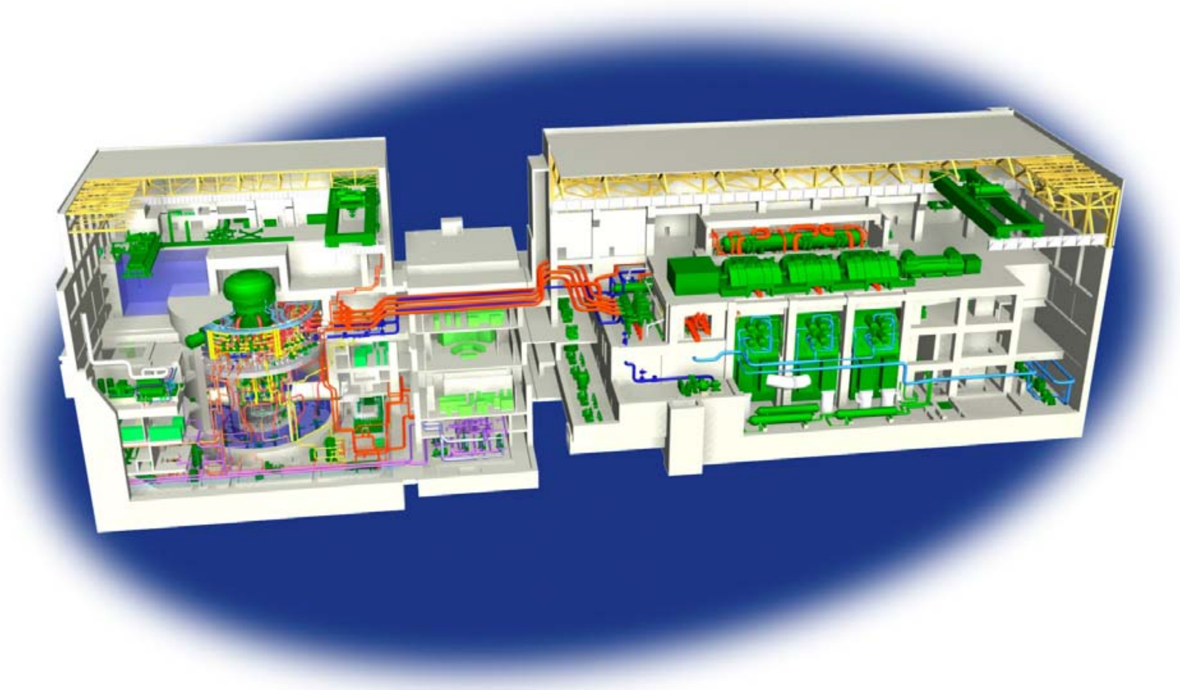
South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 19

Probabilistic Risk Assessment



Agenda

- Introduction
- Summary
- Contents of FSAR Chapter 19
  - Departure Information
  - COL License Information Items
  - Site-Specific Supplements
- ITAAC
- Conclusion

Attendees

Scott Head	Manager, Regulatory Affairs, STP 3&4
Bill Stillwell	PRA Supervisor, STP 3&4
Gene Hughes	ETRANCO
Ricky Summitt	RSC/ETRANCO

Chapter 19 Summary

STP 3 & 4 FSAR Chapter 19:

- The PRA for the ABWR was developed as part of the original Certification effort in the late 1980s and early 1990s.

- The Certification PRA is a Level 2 Internal Events PRA with generic consequence evaluations

  - Fire Hazards Analysis (FIVE), Seismic Margins Assessment, and Shutdown screening analysis included

- The PRA has been updated, while maintaining the original format, to reflect site conditions and selected departures

- The updated PRA is bounded by the results of the original PRA

PRA Reconstruction

- STP does not have access to the Certification PRA
- STP ABWR PRA model reconstructed using ABWR DCD (SSAR) information and findings from our review.
- Reconstituted PRA (Level 1 only) revision includes
  - Partial sequences that transfer to other event trees were eliminated
  - Credit taken for containment overpressure protection system (COPS) and control rod drive systems
- CDF result compared favorably with that published in the DCD (SSAR)
- Incorporated CCF of the RSW, RBCW, HPCF, and RHR systems which were identified in the ABWR SSAR Appendix 19D.8
- The STP updated PRA model accounts for Departures and site-specific information that may impact the PRA results

Model Results

Initiator	Description	STP-ABWR Model (/yr)	STP 3&4 (DEP) (/yr)	Sensitivity Run With ERCOT LOOP (/yr)
ATWS	ATWS Accident Sequence	2.6E-10	2.6E-10	2.6E-10
BE0	SBO for More than 8 Hours	1.6E-08	1.6E-08	1.6E-08
BE2	SBO for 0.5 to 2 Hrs	7.3E-08	6.7E-08	6.7E-08
BE8	SBO from 2 to 8 Hours	2.8E-08	2.6E-08	2.6E-08
S0	Large Break LOCA	3.7E-09	3.7E-09	3.7E-09
S1	Medium Break LOCA	1.2E-08	1.2E-08	1.2E-08
S2	Small Break LOCA	1.7E-09	1.7E-09	1.7E-09
TE2	LOOP from 0.5 to 2 Hours	8.2E-09	8.3E-09	2.2E-09
TE8	LOOP from 2 to 8 Hours	2.3E-08	2.3E-08	6.0E-09
TEO	LOOP for Over 8 Hours	2.6E-09	2.6E-09	6.7E-10
TIO	Inadvertently Open Relief Valve	1.0E-08	1.0E-08	1.0E-08
TIS	Isolation/Loss of Feedwater	1.1E-08	1.1E-08	1.1E-08
TM	Reactor Shutdown Frequency	1.8E-08	1.8E-08	1.8E-08
TT	Turbine Trip	4.7E-09	4.7E-09	4.7E-09
	Total CDF	2.1E-07	2.1E-07	1.8E-07

Chapter 19 Contents

The format of Chapter 19 remains consistent with the format presented in the ABWR DCD.

- Two new sections
  - 19.4S PRA Maintenance – Provides plant specific PRA information requested by RG 1.206
  - 19.1S – Roadmap between RG 1.206 and original Chapter 19 format
- Departure information
- Site-specific supplemental information
- COL License Information Items
- COL Applicant Safety Issues (GSIs, USIs, etc.)

Chapter 19 Sections

19.1 Purpose and Summary

- 2 Departures, editorial

19.1S Additional Information to Support COLA

- Map from RG 1.206 to DCD PRA Chapter

19.2 Introduction

- Supplemental Information, Departure Screening Summary

19.3 Internal Events Analysis

- 8 Departures

19.4 External Events and LPSD

- 1 Departure, editorial

Chapter 19 Sections (cont'd)

19.4S PRA Maintenance

- Plant Specific PRA for 10CFR50.71(h)

19.5 Source Term Sensitivity Studies

- Incorporated by Reference (IBR)

19.6 Measurement Against Goals

- Admin Departure (text change)

19.7 PRA as a Design Tool

- 4 Departures, editorial

19.8 Important Features Identified by ABWR PRA

- 3 departures, editorial

Chapter 19 Sections (cont'd)

19.9 COL License Information

- 30 COL License Information Items
- 6 departures to account for departures in other sections of the FSAR

19.10 Assumptions and Insights, Systems Outside ABWR Design Certification

- 1 departure, RSW Pump house

19.11 Human Action Overview

- 4 departures, External Flood HEP in Flood Model

19.12 Input Into the RAP *(IBR)*

19.13 Summary of Insights Gained from the PRA

- 2 departures, external flood

Chapter 19 Appendices

19A Response to CP/ML Rule 10 CFR 50.34(f)

- 1 departure, Hydrogen Recombiner elimination, editorial

19B Resolution of Unresolved Safety Issues and Generic Safety Issues

- 2 departures, editorial

19C Design Conditions Reducing Sabotage Risk *(IBR)*

- Not part of DCD, refer to SSAR

19D Probabilistic Evaluations *(IBR)*

- Not part of DCD, refer to SSAR

Chapter 19 Appendices (cont'd)

19E Deterministic Evaluations

- 3 departures
- 19E.1 Introduction
- 19E.2 Deterministic Analysis of Plant Performance
- 19E.3 Consequence Analysis

19EA Direct Containment Heating *(IBR)*

19EB Fuel Coolant Interactions *(IBR)*

19EC Debris Coolability and Core Concrete Interaction *(IBR)*

19ED Corium Shield *(IBR)*

19EE Suppression Pool Bypass *(IBR)*

Chapter 19 Appendices (cont'd)

19F Containment Ultimate Strength *(IBR)*

19FA Containment Ultimate Strength *(IBR)*

19G (Not Used) *(IBR)*

19H Seismic Capacity Analysis

- 1 departure, R/W Building Classification

19I Seismic Margins Analysis

- 2 departures, Dual Unit, MOV to AOV in one penetration

19J (Not Used) *(IBR)*

19K PRA Based Reliability and Maintenance

- 6 departures

Chapter 19 Appendices (cont'd)

19L ABWR Shutdown Risk Evaluation

- 7 departures

19M Fire Protection PRA

- 6 departures

19N Analysis of Common Cause Failure of Essential Communications Functions

- 1 departure, I&C

19O (Not Used) *(IBR)*

19P Evaluation of Potential Modifications to the ABWR Design *(IBR)*

19Q ABWR Shutdown Risk Assessment

- 9 departures

Chapter 19 Appendices (cont'd)

19QA Fault Trees (Shutdown) *(IBR)*

19QB DHR Reliability Study

- 1 departure, RWCU design

19QC Review of Significant Shutdown Events: Electric Power and Decay Heat Removal

- 1 departure, 1 supplement for data source

19R Probabilistic Flooding Analysis

- 5 departures.
- External flood, RSW pump house flood, re-evaluate Control Building flood

Departures

- All STP 3&4 departures were evaluated for to determine whether the departure has a significant impact on the results of the Certification PRA
- Screening/evaluation process consistent with RG 1.206 C.III.I.19
  - Tier 1 – Thirteen
  - Tier 2* – One, Codes and Standards
  - Tier 2, Technical Specifications (TS) – Nine
  - Tier 2, Analysis Method – One
  - Tier 2 (not including TS editorial) – One-hundred twenty-seven
  - Site specific information change (UHS)
- Eleven departures and the information change did not pass initial screening
- No significant change to the PRA results presented in the DCD (SSAR)

Departures Requiring Further Review

- STD DEP T1 2.4-1, Residual Heat Removal System and Spent Fuel Pool Cooling – *No effect*
- STD DEP T1 2.4-3, Reactor Core Isolation Cooling (RCIC) Turbine/Pump – *Minor effect*
- STD DEP T1 3.4-1, Safety-Related I&C Architecture – *Text changes*
- STP DEP T1 5.0-1, Site Parameters – *Design Basis External Flood*
- STD DEP 5.4-1, Reactor Water Cleanup System – *No effect*
- STD DEP 6C-1, Containment Debris Protection of ECCS Strainers – *No effect*
- STD DEP 8.3-1, Plant Medium Voltage Electrical System Design – *Text changes, minor PRA effect*

Departures Requiring Further Review

- STD DEP 9.2-5, Reactor Service Water (RSW) System
  – *Control Building Flood*
- STD DEP 9.5-7, Fire Protection - House Boiler Area of the Turbine
  – *No effect*
- STD DEP 19.3-1, Evaluation of Common Cause Failures
  – *Modified Base PRA*
- STP DEP 19R-1, RSW Pump House Re-design
  – *Pump house flood*

<u>Information Change</u>

- Ultimate Heat Sink Design – Not “Significant Change”
  - Fans in Reliability Assurance Program

Site Specific Supplement

Ultimate Heat Sink (UHS) Design

- Cooling Tower for each Unit
  - Three normally operating trains, two fans/train
  - 30 day supply of water in UHS Basin
- Reactor Service Water Pump House
  - Three normally operating trains, two pumps/train
  - Pump rooms below UHS basin height, separated by flood doors and walls

Other Insights

- Main Cooling Reservoir Breach
  - Controls Design Basis Flood (DBF) Height
- Core Damage Frequency (CDF) for DBF same magnitude as internal CDF (screening assessment)
- Per ASME PRA Standard, screens (meets SRP criteria and CDF is low)
- Insights
  - External flood doors in Reliability Assurance Program
  - Main control room action to verify external flood doors closed

Other Insights (cont'd)

- Hurricane
  - STP is approximately 12 miles from Gulf of Mexico
  - Safety-related structures designed for tornado and high wind (SRP criteria met)
  - Non-safety Combustion Turbine Generators and Switchyard – 134 mph
- Core Damage Frequency (CDF) from hurricane order of magnitude less than internal CDF (conservative screening assessment)
- Per ASME PRA Standard, screens (meets SRP criteria and screening CDF is low)

COL License Information Items

Forty-one COL License Information Items in Section 19.9, and Appendices 19A and 19B:

19.1 Post Accident Recovery Procedure for Unisolated CUW Line Break

- Procedure development, Section 13.5, (COM 19.9-1)

19.2 Confirmation of CUW Operation Beyond the Design Basis

- Procedure development, Section 13.5, (COM 19.9-2)
- Evaluation, prior to fuel load (50.71(e)) (COM 19.9-28)

19.3 Event Specific Procedures for Severe External Flooding

- Procedure development, Section 13.5, (COM 19.9-3)

COL License Information Items (cont'd)

19.4 Confirmation of Seismic Capacities Beyond the Plant Design Bases

- HCLPF new plant specific equipment Sept 2010
- HCLPF comparison, prior to fuel load (50.71(e))
- Potential for seismic induced soil failure at 1.67 times the site-specific SSE, prior to fuel load (50.71(e))
- Walkdown, prior to fuel load (50.71(e))
- (COM 19.9-4)

19.5 Plant Walkdowns

- Procedure development, Section 13.5, (COM 19.9-5)

19.6 Confirmation of Loss of AC Power Event

- Included in application

COL License Information Items (cont'd)

19.7 Procedures and Training for Use of AC-Independent Water Addition System

- Procedure development, Section 13.5, Training, Section 13.2 (COM 19.9-6)

19.8 Action to Avoid Common-Cause Failures in the Essential Communications Function (ECF) and Other Common-Cause Failures

- Procedure development, Section 13.5 (COM 19.9-7)

19.9 Action to Mitigate Station Blackout Events

- Procedure development, Section 13.5, Calculations (50.71(e)) (COM 19.9-8)

COL License Information Items (cont'd)

19.10 Actions to Reduce Risk of Internal Flooding

- Procedure development, Section 13.5, Training, Section 13.2 (COM 19.9-9)

19.11 Actions to Avoid Loss of Decay Heat Removal and Minimize Shutdown Risk

- Procedure development, Section 13.5 (COM 19.9-10)

19.12 Procedures for Operation of RCIC from Outside the Control Room

- Procedure development, Section 13.5, Training, Section 13.2 (COM 19.9-11)

19.13 ECCS Test and Surveillance Intervals

- Procedure development, Section 13.5 (COM 19.9-12)

COL License Information Items (cont'd)

19.14 Accident Management

- Procedure development, Section 13.5; Training, Section 13.2 (COM 19.9-13)

19.15 Manual Operation of MOVs

- Procedure development, Section 13.5 (COM 19.9-14)

19.16 High Pressure Core Flooder Discharge Valve

- Procedure development, Section 13.5 (COM 19.9-15)

19.17 Capability of Containment Isolation Valves

- Prior to fuel load (50.71(e)) (COM 19.9-16)

COL License Information Items (cont'd)

19.18 Procedures to Ensure Sample Lines and Drywell Purge Lines Remain Closed During Operation

- Procedure development, Section 13.5 (COM 19.9-17)

19.19 Procedures for Combustion Turbine Generator to Supply Power to Condensate Pumps

- Procedure development, Section 13.5 (COM 19.9-18)

19.19a Actions to Assure Reliability of the Supporting RCW and Service Water Systems

- Procedure development, Section 13.5 (COM 19.9-19)

19.19b Housing of AICWA Equipment

- Prior to fuel load (50.71(e)) (COM 19.9-20)

COL License Information Items (cont'd)

19.19c Procedures to Assure SRV Operability During Station Blackout

- Procedure development, Section 13.5 (COM 19.9-21)

19.19d Procedures for Ensuring Integrity of Freeze Seals

- Procedure development, Section 13.5 (COM 19.9-22)

19.19e Procedures for Controlling Combustibles During Shutdown

- Procedure development, Section 13.5 (COM 19.9-23)

19.19f Outage Planning and Control

- Procedure development, Section 13.5 (COM 19.9-24)

19.19g Reactor Service Water Systems Definition

- Included in application

COL License Information Items (cont'd)

19.19h Capability of Vacuum Breakers

- Prior to fuel load (50.71(e)) (COM 19.9-25)

19.19i Capability of the Containment Atmosphere Monitoring System

- Prior to fuel load (50.71(e)) (COM 19.9-26)

19.19j Plant Specific Safety-Related Issues and Vendors Operating Guidance

- Procedure development, Section 13.5 (COM 19.9-27)

19.20 Long-Term Training Upgrade

- Section 18.8.8 Operator Training

19.21 Long-Term Program of Upgrading of Procedures

- Section 13.5.3.1.b

COL License Information Items (cont'd)

19.22 Purge System Reliability

- Sections 3.9 and 6.6.9.1

19.23 Licensing Emergency Support Facility

- Part 5 of the application

19.24 In-Plant Radiation Monitoring

- Sections 12.5.2, 12.5.3.1, and 12.3.5.2

19.25 Feedback of Operating, Design and Construction Experience

- Sections 13.2.3 and 13.5.3

19.26 Organization and Staffing to Oversee Design and Construction

- Section 13.1

COL License Information Items (cont'd)

19.27 Develop More Detailed QA Criteria

- STP Units 3 & 4 Quality Assurance Program Description

19.28 COL Applicant Safety Issues

- Chapter 1.9S, COM 19B-2 (GSI A-47)

19.28a Testing of Isolators

- Procedure, procedure development in Section 13.5, prior to fuel load (COM 19B-1)

COL License Information Items (cont'd)

19.29 Seismic Capacity

- HCLPF new plant specific equipment Sept 2010,
- HCLPF comparison, prior to fuel load (50.71(e))
- Potential for seismic induced soil failure at 1.67 times the site-specific SSE, prior to fuel load (50.71(e))
- Walkdown, prior to fuel load (50.71(e))
- (COM 19.9-4)

19.30 PRA Update

- Included in application

Additional Commitments

Section 19.4S added four additional commitments for the plant-specific PRA (10CFR50.71(h))

- Three procedures, prior to COL Issuance (50.71(e))
- ASME peer review, prior to fuel load

ITAAC

- There are no ITAAC for Chapter 19
  - There are ITAAC associated with several of the design features incorporated into ABWR as a result of the severe accident analyses described in Chapter 19 (e.g., basaltic concrete, vacuum breaker position switches, corium shield for containment sumps)
- There are ITAAC associated with risk-significant Structures, Systems, and Components in the Design Reliability Assurance Program (Chapter 17)

Chapter 19

Questions and Comments

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Presentation to the ACRS Subcommittee

South Texas Project Units 3 and 4 COL Application Review

SER/OI Chapter 19
Response To Severe Accident Policy Statement

June 8, 2010

STP COL Chapter 19 Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM
  - Rocky Foster, Chapter PM
- **Technical Staff**

PRA and Severe Accidents Branch

- John Lai, (former) Reliability & Risk Analyst
- Marie Pohida, Senior Reliability & Risk Analyst
- Ed Fuller, Senior Reliability & Risk Engineer
- Todd Hilsmeier, Reliability & Risk Analyst

Structural Engineering Branch

- David Jeng, Senior Structural Engineer

Presentation Outline

- Overview of STP Combined License Application Open Items
- Description of Open Items
- Review Approach
- Open Items of Interest
- Appendix 19K–PRA Based Reliability and Maintenance

Overview of STP Combined License Application

Chapter 19 – Response to Severe Accident Policy Statement		
SE Chapter	**Subject**	**Total Open Items / Unresolved OIs**
19	Response to Severe Accident Policy Statement	17 / 9
Total Number of RAIs = 63		

Description of SE Open Items

- Open Item 19-1, RAI 19.01-13, DEP T1 2.4-2

  Feedwater Line Break Mitigation: Open item is resolved.

- Open Item 19-2, RAI 19.01-22

  PRA Level 1 Results: STP updated Appendix 19K of the FSAR relative to the latest STP PRA model. Open item is resolved.

- Open Item 19-3, RAI 19.01-29, STD DEP 8.3-1

  Medium Voltage Electrical Design: Open item is resolved.

- Open Item 19-4, RAI 19.01-22, STD DEP 19.3-1

  Evaluation of Common Cause Failures: Open item is resolved.

Description of SE Open Items

- **<u>Open Item 19-5, RAI 19-5</u>**

  Steam Explosion Potential from Premature Opening of the Drywell Flooder

- **<u>Open Item 19-6, RAI 19-32</u>**

  Capability of Containment Isolation Valves: Staff issued RAI requesting applicant to describe the method and tracking mechanisms to address COL License Information Item 19.17 (Capability of Containment Isolation Valves). Staff reviewing RAI response.

- **<u>Open Item 19-7, RAI 19.01-25</u>**

  Resolution of COL Information Items: Staff requested applicant to address all other COL information items in Chapter 19 (e.g., Appendix 19A and 19B). Staff reviewing supplemental RAI response.

Description of SE Open Items

- **<u>Open Item 19-8, RAI 19-3, DEP T1 2.14-1</u>**

  Impact of Hydrogen Combustion During Shutdown: Impact on Level 2 (large release frequency) shutdown due to the shared common fire protection system when containment is de-inerted (hydrogen combustion). This open item is associated with Open Item 19-9.

- **<u>Open Item 19-9, RAI 19.01-31, STP DEP 1.1-2</u>**

  Shared Common Fire Protection System: Staff has questions on the impact of this departure on hurricane risk.

- <u>Open Item 19-10, RAI 19.01-23</u>

  Fire Risk Evaluation in Turbine Building: Open item is resolved.

Description of SE Open Items

- Open Item 19-11, RAI 19-16, STD DEP 7.7-1

  Flushing of RPV Water Level Instrumentation Lines in Modes 4 and 5: Open item is resolved.

- **Open Item 19-12, RAI 19-30**

  MCR Breach Evaluation: Staff has concerns with the MCR breach frequency calculation.

- **Open Item 19-13, RAI 19-1**

  MAAP and Fusible Plug: Staff performing confirmatory assessments.

- **Open Item 19-14, RAI 19-24 Supplement 1**

  Seismic Effect: Staff awaiting applicant’s RAI response.

Description of SE Open Items

- <u>Open Item 19-15, RAI 19-27 Supplement 1</u>

  SSCs in UHS/RSW: Open item is resolved.

- <u>Open Item 19-16, RAI 19-22</u>

  Housing of ACIWA Equipment: Open item is resolved.

- **<u>Open Item 19-17, RAI 19-31</u>**

  Demonstrate the Sequence and Plant-Level Seismic HCLPF Capacity: Staff issued RAI to applicant requesting clarification of items related to seismic sequence and plant-level HCLPFs. Staff awaiting response to this RAI.

Review Approach

- Reviewed design departures for impact on the PRA and risk insights
- STP did not provide any quantitative results (because the ∆CDF of the plant specific PRA model to the STP Revised MOR is less than 10%)
  - Held many telecons with the applicant on clarification of the model documents and RAIs
  - Frequently audited the PRA model documents (hard copies) provided by STP in the Westinghouse Twinbrook office
  - Held audit with STP staff and contractors (including review of electronic model on applicant’s PC) on September 22-23, 2009 (RAIs developed on accident sequences, success criteria, data analysis, system modeling, etc.)

Review Approach: Fires, Floods, Seismic and S/D

§ 52.79 – For applicants referencing a DC

- "In addition, the plant specific PRA information must use the PRA information for the design certification and must be updated to account for site-specific design information and any design changes or departures"
- PRA review limited to:
  - site specific features not bounded by ABWR site characteristics OR
  - site specific design features where there is PRA information to update OR
  - design departures where there is PRA information to update.

Open Item 19-9 RAI 19.01-31 STP DEP 1.1-2

Fire Water System Design Departure

- ABWR design- one diesel driven fire water pump per unit.
- STP DEP 1.1-2-one diesel driven fire water pump per site.
- Impact of departure on the hurricane CDF/LRF not evaluated.
  - ASME/ANS RA-Sa-2009, Subsection 6-2.3, criteria for screening external events other than fire and seismic.
  - Criteria (a) if it meets the criteria in the NRC's 1975 Standard Review Plan (SRP) or a later revision.
- Hurricane risk struck from revision 3 of Chapter 19 FSAR.
- Staff's estimate of hurricane LRF exceeds goals
  - Using hurricane return frequencies from NOAA OR
  - Coastal weather related LOOP frequencies during shutdown from NUREG 6890
- Following Public Meeting on April 27
  - STP to evaluate design departure.
  - STP to document compensatory measures in FSAR.

Open Item 19-12 RAI 19-30

External Flooding – MCR Breach

- Following breach
  - Security Personnel notify operators
  - Operator close three normally open doors:
    - watertight control room access door
    - two watertight doors in the Reactor Building Access Corridor
- Core damage assumed if one of three doors is left open.
- Control Building Flooded

Open Item 19-12 RAI 19-30 (cont.)

External Flooding – MCR Breach

- STP's breach frequency two orders of magnitude more optimistic than published dam failure data.
- Using published dam failure data * HEP for operators closing one of three doors in 30 minutes exceeds LRF goals.
- Defense in depth philosophy consistent with RG 1.174 not maintained.
  - "Over-reliance on programmatic activities to compensate for weakness in plant design"
- Following public meeting on April 27
  - STP committed to close the normally open water tight doors
  - STP to consider other options.

Open Item 19-5 RAI 19-5

COL License Information Item 19.14 Accident Management

- Information in Section 19.9.14 is insufficient to establish the technical basis for developing AM procedures.
  - Must address consequences of flooding the lower drywell (LDW).
  - Confirmatory assessment indicates that LDW temperatures may exceed 533 °K before vessel breach.
  - The staff believes that the AM strategies may have to consider the consequences of premature LDW flooding, including steam explosions.
- Path to resolution
  - STP intends to follow NEI 91-04 Revision 1.
  - Changes in the EPGs and SAGs (such as the containment flood strategy) will be included as inputs to the plant-specific technical guidelines.
- This approach is acceptable, provided that the technical basis for ABWR severe accident management is based on current understanding of severe accident progression in the ABWR.

Open Item 19-8 RAI 19-3
STD DEP T1 2.14-1
Hydrogen Recombiner Requirements Elimination

- The staff had concerns about startup and shutdown operations, when the containment would not be inerted.
  – Hydrogen combustion during severe accidents
  – Impacts on LRF and CCFP from low-power and shutdown scenarios.
- Subsequently, the staff issued RAI 19.01-31 (Open Item 19-9), related to the shared fire water system.
  – The staff also requested a description of the dominant sequences contributing to the shutdown and full power hurricane CDF and LRF estimates.
- Path to resolution
  – STP agreed that hydrogen combustion could not be prevented by during any severe accidents initiated during startup and shutdown operations.
  – **Open Item 19-8**, will be resolved when **Open Item 19-9** is resolved.

Open Item 19-13 RAI 19-1
Lower Drywell Fusible Plug Valve

- The LDW fusible plugs will melt at a temperature of 533 °K (500 °F), after molten core debris enters the lower drywell
  - Valves would remain open to allow water to flow through each flooder pipe into the LDW and cover the core debris.
- Debris coolability by an overlying water pool has not yet been conclusively demonstrated
  - The staff was concerned that the containment liner failure may not be averted for 24 hours after core damage, and decided to carry out a confirmatory assessment using the MELCOR 1.8.6 computer code.
- Path to resolution
  - There is no open RAI associated with this issue.
  - Open item will be closed following successful completion and documentation of confirmatory assessment.

Open Items 19-14 and 19-17

Seismic Margins Analysis

- **Open Item 19-14 - Seismic Effect**

  STD DEP T1 2.15-1 reclassified Radwaste Building from Seismic Category I to Non-Seismic. STP stated RW/B to be designed for no II/I interaction under a safe-shutdown earthquake (SSE) or tornado. The staff issued RAI 19-33 requesting STP to augment its response with analysis procedures equivalent to SRP Subsection 3.7.2.II.8 C and related ITAAC.

- **Open Item 19-17 - Sequence and Plant-Level Seismic HCLPF Capacity**

  STP COL license information item should include an update of the system model developed in the DCD to incorporate capacity reductions due to site-specific effects and site-specific SSC. STP should determine whether site-specific soil failures control the seismic HCLPF capacities of SSCs associated with the seismic accident sequences. STP should provide the sequence-level and plant-level seismic HCLPF capacity pursuant to 10 CFR 52.79(a)(46) and 10 CFR 52.79(d)(1).

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Appendix 19K–PRA Based Reliability and Maintenance

<u>Risk-Significant (RS) SSCs Within the Scope of the Reliability Assurance Program (RAP)</u>

- The initial identification of site-specific RS SSCs (i.e., RS SSCs) in preparation of the COL application incorporates by reference (with the appropriate departures and site-specific supplements) the list of RS SSCs in Appendix 19K of the certified and approved ABWR DCD

- STP committed to provide by September 2011 a comprehensive list of RS SSCs using the methodology described in STP FSAR Section 17.4S.1.4 (Commitment 17.4-1):
  - PRA (FV ≥ 0.005, RAW ≥ 2.0, consideration of risk insights and key assumptions)
  - Use of deterministic techniques and operating experience under the cognizance of a full expert panel to augment PRA techniques in the risk ranking of SSCs

- Staff plans to conduct an audit in third quarter of 2010 to confirm that the comprehensive list of RS SSCs is being developed in accordance with established RAP procedures (Confirmatory Item 17.04-8 of SER)

- Staff plans to conduct an inspection to verify that STP has met Commitment 17.4-1 and that the comprehensive list of RS SSCs is acceptable (expected to be performed in late 2011)

Overview of STP COL Chapter 19

Discussion/Committee Questions

Backup Slides

STP COL Chapter 19

- Regulatory Guidance
  - The Staff Requirements Memorandum (SRM) dated July 21, 1993 on SECY-93-087 provides direction about the treatment of external events in PRAs to support DC and COL applications.
    - The Commission approved the use of PRA insights to support a margins-type assessment of seismic events.
    - The Commission approved the use of simplified probabilistic methods, such as but not limited to the Electric Power Research Institute's Fire-Induced Vulnerability Evaluation (EPRI's FIVE) methodology, to evaluate fire risk.
    - The Commission approved the staff's position that advanced LWR vendors should perform bounding analyses of site-specific external events likely to be a challenge to the plant (such as river flooding, storm surge, tsunami, volcanism, high winds, and hurricanes). If the site is enveloped, the COL applicant need not perform further PRA evaluations for these external events. The COL applicant should perform site-specific PRA evaluations to address any site-specific hazards for which a bounding analysis was not performed or which are not enveloped by the bounding analyses to ensure that no vulnerabilities due to siting exist.

STP COL Chapter 19

- Regulatory Requirements
  - 10 CFR 52.79(a)(38) states that a COL application for a LWR design must contain an FSAR that includes a description and analysis of design features for the prevention and mitigation of severe accidents, for example, challenges to containment integrity caused by core-concrete interaction, steam explosion, high-pressure core melt ejection, hydrogen combustion, and containment bypass.
  - 10 CFR 52.79(a)(46) states that a COL application must contain an FSAR that includes a description of the plant-specific PRA and its results.
  - 10 CFR 52.79(d)(1) states that if a COL application references a DC, then the plant-specific PRA information must use the PRA information for the DC and must be updated to account for site-specific design information and any design changes or departures.
  - 10 CFR 50.71(h)(1) states that no later than the scheduled date for initial loading of fuel, each holder of a COL shall develop a level 1 and a level 2 PRA. The PRA must cover those initiating events and modes for which NRC-endorsed consensus standards on PRA exist one year prior to the scheduled date for initial loading of fuel

STP COL Chapter 19

- Regulatory Guidance
  - Standard Review Plan (SRP) , Section 19.0, “PRA and Severe Accident Evaluation for New Reactors”, Rev. 2, 2007
  - RG 1.206 , “Combined License Applications for Nuclear Power Plants” (LWR Edition), Section C, Part 1, Section C.I.19 and Part III, Section C.III.19
  - Interim Staff Guidance, ISG-3, provides clarification on RG 1.206
    - RG 1.206, Section C.III.1 addresses the COL applications that reference a DC. If there are any design changes or departures from the certified design, the staff expects COL applicants to submit the PRA numerical changes when the cumulative risk impact of the changes resulting from the COL departure is more than a 10% change.
    - Reviewers must determine that the quality of the PRA is sufficient to justify the specific results and risk insights that are used to support the DC or COL application. As discussed in RGs 1.174 and 1.200, the quality of a PRA is measured in terms of its appropriateness with respect to scope, level of detail, and technical adequacy.

Open Item 19-1 RAI 19.01-13 STP DEP T1 2.4-2 Feedwater Line Break Mitigation

- No automatic isolation of condensate system for feedwater line break event inside the containment was assumed in the original ABWR PRA model. This may create unacceptable response in the containment, therefore STP proposed to isolate of the condensate system for the feedwater line break event. The RAI asked the applicant to explain why this departure was not modeled in the STP plant specific PRA.

- It turned out that containment response is acceptable using the GOTHIC code for this event, therefore, no isolation of the condensate system is needed. STP still plans to maintain this mitigation function.

- This issue is resolved.

STP Plant Specific PRA Model

- **<u>Open item 19-3 RAI 19.01-29 STD DEP 8.3-1</u>**

  <u>Medium Voltage Electrical Design</u>

  Medium Voltage Electrical System (MVES) changed from one 6.9KV to two systems, 13.8KV and 4.16KV.

  – Additional breakers were added to the fault trees from the 13.8KV CTG to the 4.16KV class 1E buses and PIP buses.
  – No reported difference in failure data between distribution voltage designs, therefore the data in the original ABWR DCD(SSAR) was chosen to represent the updated MVES design.
  – Quantification of the fault trees in the STP plant specific PRA model showed insignificant changes compared to the STP base MOR.
  – STP will provide a list of new basic events and staff anticipates no further questions.

STP Plant Specific PRA Model

- STP has developed the screening criteria to only include those departures or design changes which are not screened out in the plant specific PRA model based on the description in RG 1.206 Section C.III.19. The screening process is controlled by the STP procedure, U7-P-RA02-001, “Screening Process for Plant Changes”.
- The staff reviewed the screen criteria and issued RAIs asking the applicant to address those screened-out departures which staff questioned.
- The staff issued RAIs on almost all the departures cited in Chapter 19.

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STP Plant Specific PRA Model

- **Open item 19-10 RAI 19.01-23**

  Fire Risk Evaluation in Turbine Building

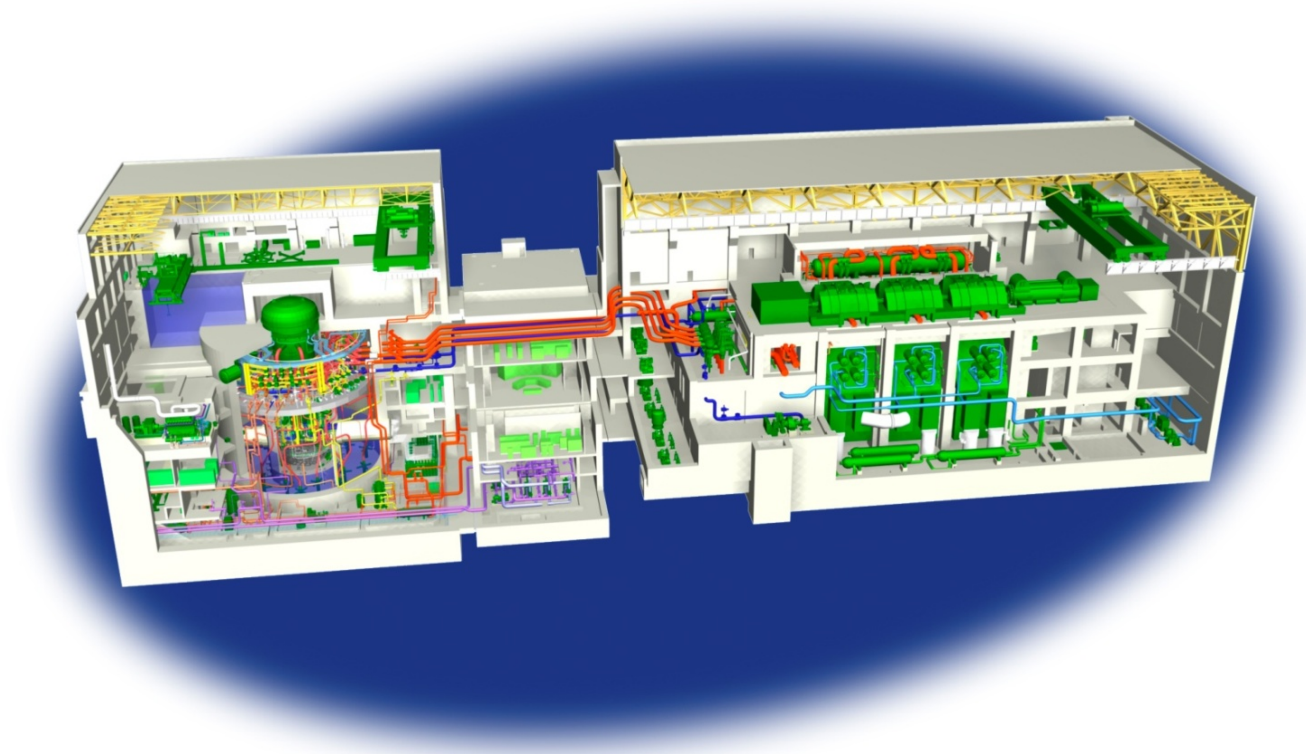
  New components and new locations of the equipment in the turbine building do not affect the ABWR DCD conclusion using the FIVE methodology.

  – No new equipment affects the safe-shutdown for the ABWR design.
  – CTG in the STP turbine building was screened from the analysis using the FIVE methodology because fire in this area do not directly lead to plant trip and do not affect offsite power distribution to the plant.

  This issue is resolved.

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
Brad Maurer	Manager, ABWR Licensing Westinghouse
Evans Heacock	Design Engineering Lead
Tom Daley	Mechanical Systems Supervisor
Coley Chappell	Licensing STP 3&4
Bill Stillwell	PRA Supervisor, 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** / 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**	**STP**
21	Rx vessel EOL fluence value and error band	*– Resolved 3/18*
22	Consistent use of a set of units (either English or Metric) in plant documents	STP
23	RCS leakage Tech Spec limits and instrument sensitivity	STP
24	**East transmission lines capacity**	**STP**
25	**Single or double closing coils on switchyard breakers**	**STP**
26	**Switchyard control system backup battery discharge time**	**STP**
27	**Switching logic under various electrical transients**	**STP**
28	SBO rule, operator actions, and CTG startup time within 10 minutes	NRO
29	**Qualification of submerged 345 KV cables**	**STP**
30	**D-RAP list and staff review**	**STP** / NRO
31	**RAT 4.16 kV winding capability**	**STP**
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	Apparent discrepancy between STD DEP 7.2-2 text and Figure 7.2-8	STP
35	Cyber Security ITAAC	NRO
36	Staff to provide FIV reports for ACRS review	NRO

Action Items for Discussion

- Part 21 issues that affect ABWR design
- East transmission line capacity
- Switchyard breakers closing coils
- Switchyard control system backup battery discharge time
- Qualification of submerged 345 KV cables
- Switching logic under various electrical transients
- RAT 4.16 kV winding capability to feed PIP and safety buses
- RCIC cycles during an 8 hour SBO event
- D-RAP list and staff review

Action Item

Part 21 issues that affect the ABWR design.

Response: STP reviewed Part 21 reports from 1995 to the present

- Identified a total of 45 reports filed with NRC (some were supplemental to the initial filing) related to BWR issues
- Performed a review to determine potential applicability to STP 3&4

Part 21 issues applicable to STP 3 & 4 are the application of Stability Option III and the calculation of SLMCPR.

These are currently known and addressed in the STP 3&4 COLA.

Action Item (cont'd)

Part 21 issues to be addressed for STP 3&4:

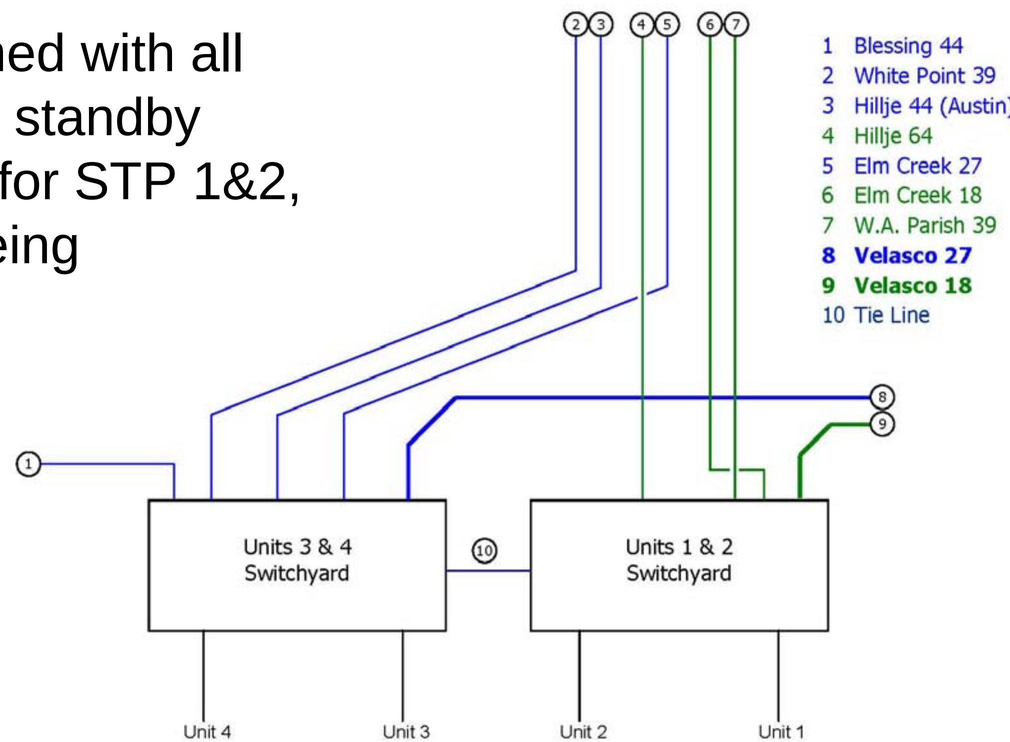
Topic / Feature	Applicable Part 21 reports	How addressed for STP 3&4
Stability Option III	2001-23, 2002-27, 2002-31, 2003-25	COLA Part 2 Section 4.4 provides a commitment (COM 4.4-3) to provide an updated Stability Option III analysis. Supporting documentation for this COM clearly notes the Part 21 issues.
SLMCPR	1996-47, 2004-20	COLA Part 2 Section 4.4 provides a commitment (COM 4.4-2) to provide an analysis to determine the thermal limits, which includes SLMCPR. The analysis methodology addresses the full range of flows at 100% power.

Action Item

Confirm that the east offsite transmission lines (Velasco) are capable of supplying power to all four units' safety loads when other lines are lost.

<u>Response</u>: The east offsite transmission lines (Velasco) can provide power to all four units.

The load analysis was performed with all four units offline and the entire standby switchyard load (60 MW each for STP 1&2, 100 MW each for STP 3&4) being supplied by the respective circuit of the Velasco line.



Action Item

State if there are single or double closing coils on switchyard breakers.

Response: The switchyard breakers have single closing coils.

Action Item

Provide switchyard control system backup battery discharge time.

<u>Response</u>: Regarding the capability of the switchyard controls to operate on the battery backup, the batteries are

- Sized to operate the switchyard DC loads for 10 hours
- Sized with a 25% aging margin and a 10% design margin
- Have an expected life of 15 to 20 years

The batteries are designed to supply 10 hours of load at the 15 year point, although the 10% design margin will allow them to last longer.

Action Item

Address qualification of submerged 345 KV cables.

Response: Lead sheath cable is designed for use in a wet environment.

Several industry standards and organizations acknowledge that cables with continuous metallic sheaths are impervious to water (IEEE 141, NEMA WC 71, NEMA WC 74, NFPA 70 (National Electric Code)).

For example, NEMA WC 71, 5.3.1 and NEMA WC 74 7.3.1 say:

"A lead or smooth aluminum sheath, with or without outer supplementary protection, shall be used when an impervious covering is required."

From discussion with a transmission service provider, underground lead sheath cable which has been in service for 40 years produced test results similar to a new cable.

Action Item

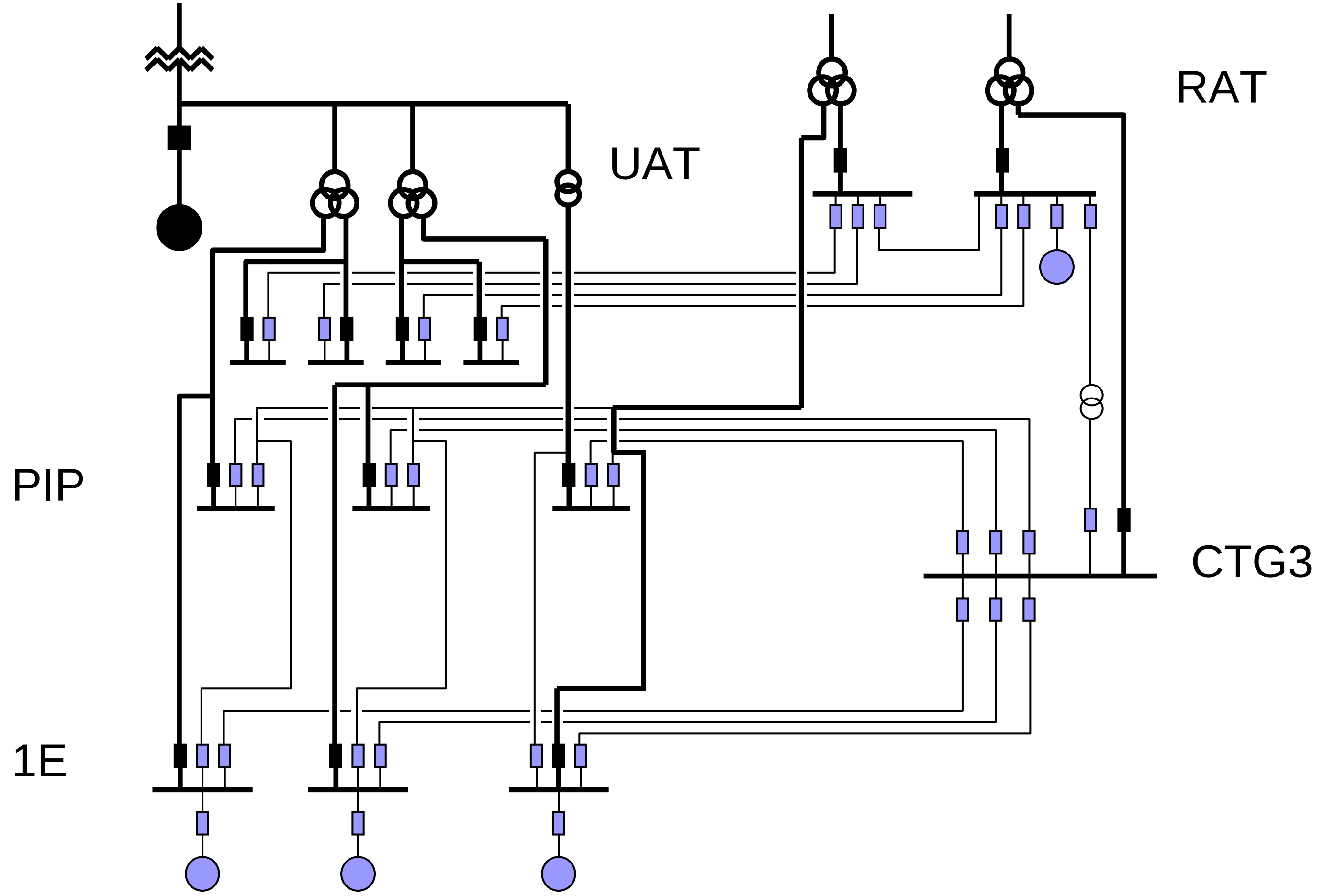
Performance of switching logic under various electrical transients.

Response: For the loss of a UAT:

- Generator breaker and switchyard breakers for the generator OPEN.
- Source breakers from UATs to all PG buses, all PIP buses, and the Division I and II Class 1E buses OPEN.
- DGs for Divisions 1 and II START on bus undervoltage and Divisions I and II CONNECT to their respective DGs.
- Division III Class 1E bus remains energized on RAT A.
- CTG starts on loss of power (undervoltage) to two PIP buses, CTG3 bus remains energized through RAT B.
- Two pre-selected PIP buses are powered upon transfer to bus CTG3.

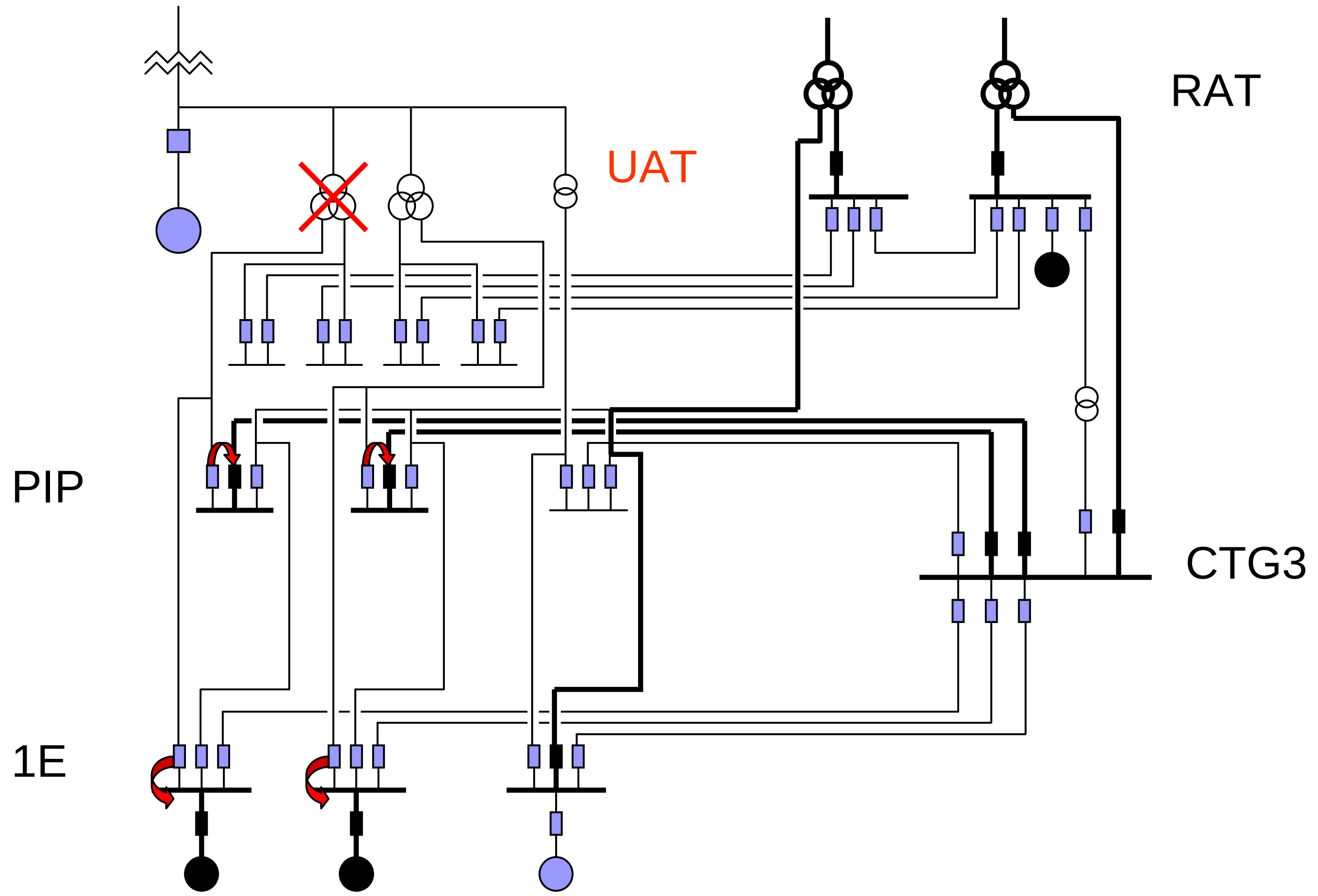
Action Item (cont'd)

Switching logic for the loss of a UAT electrical transient:



Action Item (cont'd)

Switching logic for the loss of a UAT electrical transient:



Action Item

RAT 4.16 kV winding capability to feed two PIP buses and one safety bus.

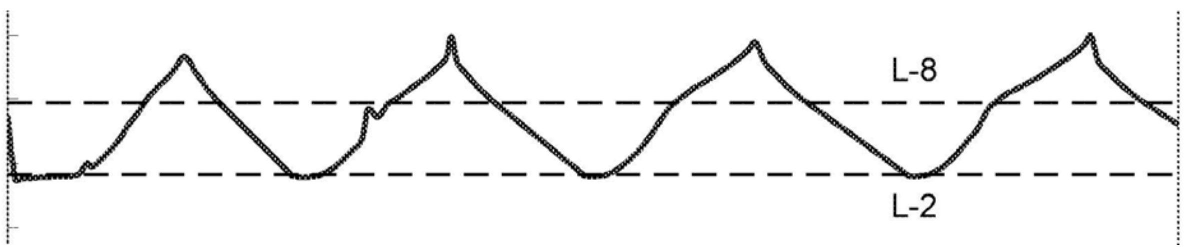
Response: Two PIP buses and one safety bus (1E) can be supplied from the 4.16 kV winding for RAT B directly connected to bus CTG3, as well as from the RAT A or B 13.8 kV winding via CTG1 to CTG3.

Action Item

Number of times RCIC is expected to cycle on and off during an 8 hour SBO event.

<u>Response</u>: Analysis performed shows that RCIC system is expected to cycle on and off (automatically, between Level 2 and Level 8) approximately four times during an 8 hour SBO event.

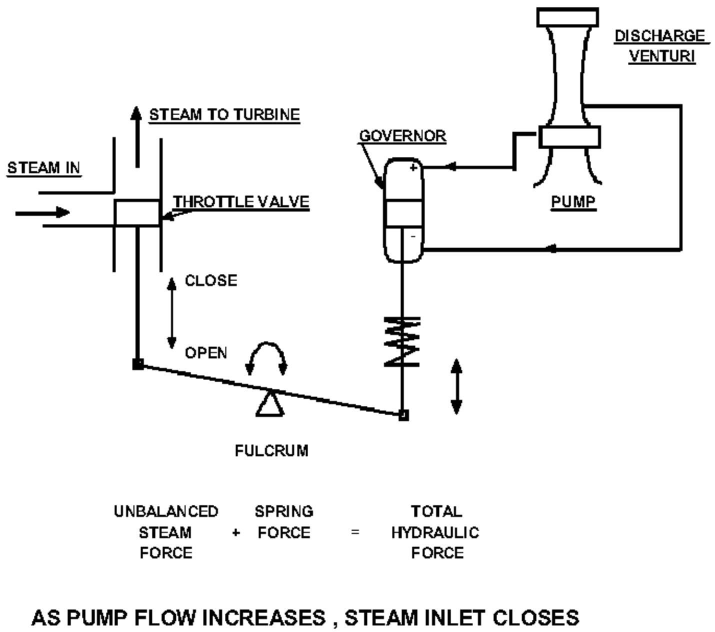
Reactor water level under SBO (8 hours):



RCIC pump is a Turbine Water Lubricated (TWL) Pump (STD DEP T1 2.4-3).

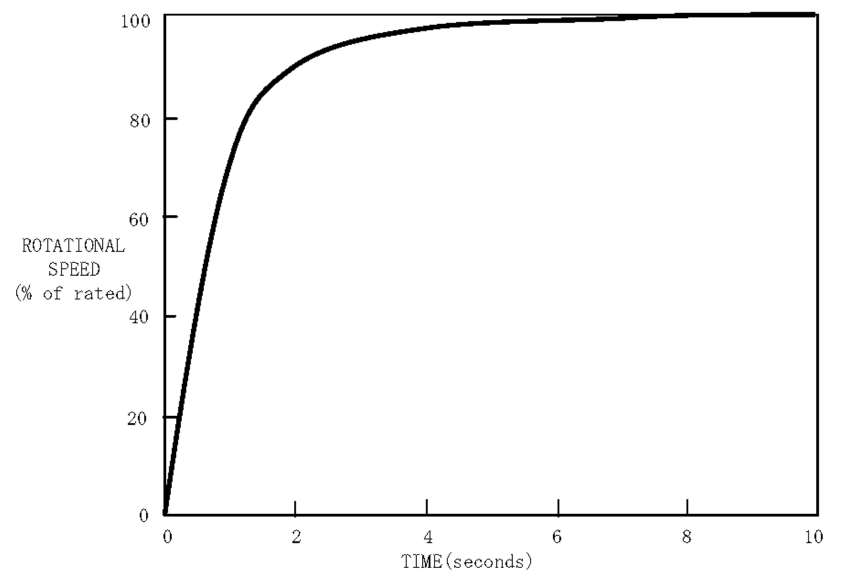
Action Item (cont'd)

The TWL governor directly senses pump flow and adjusts the throttle valve through a direct linkage.



TWL pump achieves a rapid (3-10 seconds), controlled startup with no over-speed.

Typical start transient :



Action Item

Address when D-RAP list will be effectively populated.

Response: From RAI 17.4-9 Response, Revision 2, dated 5/19/2010:

The PRA input to D-RAP is included in FSAR Tables 19K-1, 19K-2 and 19K-4.

Appropriate SSCs will be evaluated by the D-RAP Expert Panel using the process described in FSAR Section 17.4S.1.4 as detailed design progresses. Current schedule is to complete a majority of the system reviews by the end of 2010 and to complete all of the system reviews, provide a list of the set of D-RAP SSCs, and have the program elements in place to control future activities, by 3rd quarter of 2011. The FSAR will be updated (10CFR50.71(e)) to provide the Expert Panel Failure Modes and RAP activities recommendations for this set of risk-significant equipment. (Refer to COM 17.4-1.)

ACRS Action Items

Questions and Comments