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NUCLEAR REGULATORY COMMISSION

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567TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

OPEN SESSION

+ + + + +

THURSDAY

NOVEMBER 5, 2009

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. Mario Bonaca, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

MARIO V. BONACA, Chairman

SAID I. ABDEL-KHALIK, Vice Chairman

GEORGE E. APOSTOLAKIS

J. SAM ARMIJO

SANJOY BANERJEE

DENNIS C. BLEY

COMMITTEE MEMBERS PRESENT:

CHARLES H. BROWN, JR.

MICHAEL CORRADINI

OTTO L. MAYNARD

DANA A. POWERS

HAROLD B. RAY

MICHAEL T. RYAN

WILLIAM J. SHACK

JOHN D. SIEBER

JOHN W. STETKAR

NRC STAFF PRESENT:

MICHAEL LEE, Designated Federal Official

EILEEN McKENNA

FRANK AKSTULEWICZ

BILLY GLEAVES

SCOTT MORRIS

KARL STURZEBECHER

ERIC LEE

MARK TONACCI

GEORGE WUNDER

ALSO PRESENT:

ED CUMMINS

ROB SISK

MICHAEL SHINN

MARK McBURNETT

HIROSHI SAKAMOTO

COLEY CHAPPELL

MIKE MURRAY

HIROHIDE OIKAWA

BILL STILLWELL

A G E N D A

P R O C E E D I N G S

(8:30 a.m.)

CHAIR BONACA: Good morning. The meeting will now come to order. This is the first day of the 567th Meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following; Amendments to the AP1000 Design Control Document", Draft Final Regulatory Guide 5.71, "Cyber Security Program for Nuclear Facilities, Overview of the Advanced Boiling Water Reactor Design As Applied to the South Texas Project Combined License Application, NRC Staff's Plan for South Texas Project Combined License Application Review, and Preparation of ACRS Reports. Portions of the sessions related to Reg Guide 5.71 and the ABWR may be closed to discuss and protect safeguards information.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mike Lee is the Designated Federal Official for the initial portion of the meeting.

We have received no written comments, or requests for time to make oral statements from members of the public regarding today's sessions. There will be several people on the phone bridge line to listen to the discussion regarding the South Texas COL application. To preclude interruption of the meeting, the phone will be placed in a listening mode during presentations and Committee discussions.

A transcript of portions of the meeting is being kept, and it is requested that the speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can readily heard.

With that, we'll move to the first item on our agenda, and it has to do with the Amendments to the AP1000 Design Control Document, and Mr. Harold Ray will lead us through that presentation.

MEMBER RAY: Thank you, Mr. Chairman, and, Eileen, I guess.

MS. McKENNA: I can come up to the front.

MEMBER RAY: We're ready for you. Let me first make a few stage-setting comments.

We've asked for this presentation, as I think members will recall, and I'm responsible for the items that Eileen is being asked to address, so don't blame her if she doesn't cover the right information.

The Full Committee received a briefing on the AP1000 review back in May. The Subcommittee has since met twice, and we're mindful of the fact that there is, as I think Staff described in their original presentation, there are extensive changes that we're reviewing, both the Staff, and our ourselves. And we want that effort to be as efficient as possible, given the scheduled expectations, which are not entirely clear, and change, perhaps, as time goes on. But, nevertheless, we are mindful of the fact that there are expectations for the completion of our review. And this is a somewhat new experience for all of us, so we wanted to be as efficient as possible.

In the May presentation, it was clearly indicated that we would be proceeding with this review on a chapter-by-chapter basis, so it has gone forward. After the first meeting, we concluded it would be most efficient for the AP1000 review if we were to do it not in conjunction with, but ahead of the COL for the first plant, so, that's the way the second meeting was conducted. And I think it did go better for us, anyway, in terms of focusing our attention on anything important. But, nevertheless, we were asked, and I know Eileen will attempt to respond, to look at the overall picture, and help us identify the things that we need to focus individual member attention to, so everybody's interest is in play here. And, Eileen, I'm sure -- I'll turn this over to you now, but I'm sure you'll agree with me that we are learning how best to do something of this magnitude on this kind of schedule. Therefore, that learning experience is something we all need to -

MEMBER APOSTOLAKIS: Harold, if I may ask.

MEMBER RAY: Sure.

MEMBER APOSTOLAKIS: The magnitude, what is it that determines the magnitude of the problem? Is it the number of changes, or the way they're being implemented, or both?

MEMBER RAY: Well, the magnitude, to just pick on that word, George, would clearly be determined by the magnitude, but I would say also the nature of the changes. In terms of the second thing you mentioned, which is the process by which we're going through this, I think a lot of people intuitively would prefer to focus on the changes, rather than as modifications of individual chapter text, which is the way that the work has to get done, and the Staff, particularly. But from our standpoint, one of the things Sanjoy, I'm sorry he's not here, asked was to -- and I think Eileen will try and respond to this, identify the -- what are they called, Technical Reports, Eileen?

MS. McKENNA: Yes.

MEMBER RAY: Technical reports which

underlie and support many of the changes, which are then merely reflected in the text changes in the DCD. So, to get back to your question, George, part of the learning process is, I think, understanding that the Staff has to process this just because of the way they are organized, chapter-by-chapter, is that the best way for us to approach this problem? Is there another strategy that will better accomplish what needs to be done by the ACRS? Are we trying, somehow, to replicate what the Staff does, or are we doing something different? And if we're doing something different, how can we do that job best?

So, that's what I think is going on here, and I think we should all engage in this discussion with that in mind, that what we're trying to find is how is the best way for us to do our job, and to insure that we meet, as I say, as best possible the expectations.

CHAIR BONACA: And, by the way, I'd like to point out.

MEMBER RAY: Sure.

CHAIR BONACA: That is the subject of the retreat on Saturday.

MEMBER RAY: Yes, sir.

CHAIR BONACA: To discuss among ourselves way in which we can better serve, I think, the review.

MEMBER RAY: Yes. That will be, as I conceive it, anyway, a generic discussion. This is a case in point. There are, and will be others coming down the road, so I think we just want to be deliberate about the fact that we're not merely talking about well, here's a problem that we need to address, but how can we go about this, both specifically to this application, and, more generally, as Mario said, looking to the future.

So, with that long introduction, and, again, taking the responsibility for asking you to come here and talk about these particular things at this time, Eileen, please proceed.

MS. McKENNA: Thank you. My name is Eileen McKenna. I'm a Branch Chief in the Office of New Reactors, Division of New Reactor Licensing for AP1000 Projects Branch 2, NWE2. That's why you see that on the slide. With me today, also, is the Deputy Director for Licensing Operations, Frank Akstulewicz, sitting at the side table. And some of my PMs are also in the room, and I may call upon them, depending on some of the questions that the Committee may have on chapters that they have responsibility for.

(Off the record comments.)

MS. McKENNA: As my Subcommittee Chair has mentioned, the purpose is to provide the status of the AP1000 Design Certification Amendment. And, in response to some of the suggestions he provided, we're focusing on what is in part of the application, where we stand with the Staff review. And, of course, where do we stand with our interactions with the ACRS. At the end, we will have a short discussion on the reference COL, just to round out the picture. But the focus of the briefing will be on the Design Certification Amendment.

MEMBER APOSTOLAKIS: Eileen, is this the first time we are facing such an issue of a certified design, also for amendments.

MS. McKENNA: Yes, I would say -

MEMBER APOSTOLAKIS: Has any other design gone through this, maybe to a lesser extent?

MS. McKENNA: No. I think not to the same extent. You will, perhaps, in the future be seeing other amendments of more limited scope. For example, I believe in the ABWR -- Frank, do you want to speak to that?

MR. AKSTULEWICZ: Yes. This is Frank Akstulewicz. I think the closest we would get to what we're seeing on the AP1000 would be the STP ABWR submittal, where there is a large number, I won't use the term "substantial", but a large number of deviations from the currently certified design that they are proposing, but not as an amendment. They're proposing it on an individual plant basis for that particular site. But the technical issues would be the same. Right? It's just the process we're in is a little different here with the AP1000, versus the STP application.

MEMBER APOSTOLAKIS: Good. Thank you.

MS. McKENNA: I'll go through these next couple of slides very quickly, because I think most of you have seen them before in some form, but just, again, put us all on the same page with the AP1000 design recertified. It's Appendix D to Part 52, and that became -- that was based on Revision 15 of the Design Control Document, and it really became effective in 2006. The Safety Evaluation that was prepared by the Staff is NUREG-1793.

After the certification, I think while the COL application development was proceeding, we got a request from the NuStart organization to review various technical reports, as they were characterized, which was kind of early interaction on these possible departures, or what ultimately became things as part of the amendment, changes to the Design Control Document that were being sought to address certain issues, COL items or design changes that might have been desired as a result of the COL participation. So, we started getting these technical reports, and we would review them, but, as I said, in support of what would ultimately become Design Control Document changes.

MEMBER CORRADINI: May I just ask a question?

MS. McKENNA: Yes, of course.

MEMBER CORRADINI: Just to connect back to what Harold said at the beginning. So, are these the technical reports that Sanjoy was referring to, Harold?

MEMBER RAY: Yes.

MEMBER CORRADINI: Okay. And we have a list somewhere.

MS. McKENNA: I provided to Mike Lee a list of the accession numbers.

MEMBER CORRADINI: That's fine. I'm sure we've got them somewhere. I'm not going to worry about that. But the 100 -- are they all the same type; that is, they -- in terms of character? Are they of various magnitudes of changes to the design?

MS. McKENNA: They are various magnitudes of changes. There are some that are very small, and focused on one or two changes, just because there was like a Tier 1 change that they wanted to explain, and that would only be a few pages.

MEMBER CORRADINI: Okay.

MS. McKENNA: There's others that are quite large, that maybe have -- and, as I listed here at the bottom, in some cases, there were topics that had multiple technical reports to focus on different areas. Like the seismic area, we had a report on the base mat, a report on the shield building, we had a report -

MEMBER CORRADINI: Okay.

MS. McKENNA: It was a critical session, report on different aspects. Human Factors was another one, where we had multiple reports on different aspects of the Human Factors engineering, and I&C is another good case.

MEMBER APOSTOLAKIS: On Human Factors?

MS. McKENNA: Yes.

MEMBER APOSTOLAKIS: Is the number 100 something that should impress us, or is -

MS. McKENNA: Just to give you an order of magnitude, basically.

MEMBER APOSTOLAKIS: Order of magnitude?

MEMBER RAY: It could be two -

MS. McKENNA: I don't want to dwell on the number.

MEMBER APOSTOLAKIS: I didn't know what to be. I'm impressed now, myself. Gee, 100.

MS. McKENNA: Well, as I said, they vary in size and scope. But the RAL has the same purpose, which was to present proposed Design Control Document changes, and the reasons for those changes, so that the Staff could review them, and understand.

MEMBER CORRADINI: I know this is process, and we're only supposed to about technical, but I want to understand. So, is the Applicant required to have some sort of backup technical report if they're going in for some sort of Tier 1 or Tier 2 change? And, therefore, is the Staff required to review, and then issue an SER for each one of these things?

MS. McKENNA: Let me come at it slightly differently. If we're in the amendment process, the Staff has to issue a safety evaluation that approves the changes to the Design Control Document. How we get there is really a matter of -

MEMBER CORRADINI: It's up to you guys.

MS. McKENNA: -- what process -- we need

to understand what the changes are, why they're acceptable. Whether that's through correspondence, technical reports, RAIs.

MEMBER CORRADINI: Okay.

MS. McKENNA: Different ways it could be approached.

MEMBER CORRADINI: That's fine. Just one more clarification. Since you used ABWR as an example, where they would do it as a deviation in the first reference COL versus this, does the way you have to review it change, whether it be an amendment to the Design Control Document, or a deviation from the -

MR. AKSTULEWICZ: No. The answer is the technical criteria are going to stay the same for the acceptability. It's just how we document it, this being the design cert amendment. There'll be a separate license SER for STP that will cull out why these modifications are acceptable.

MEMBER CORRADINI: Okay. Fine. Thank you.

MEMBER ARMIJO: Eileen just before you leave that.

MS. McKENNA: Yes.

MEMBER ARMIJO: Now, these deviations, I think they're called departures.

MS. McKENNA: Departures is the official term.

MEMBER ARMIJO: Right. Now, do they -- you will not issue -- write up an SER for a departure, is the way I understand it.

MS. McKENNA: Okay. Let me -- let's go back, take the South Texas case, and the way Part 52 is structured. For departures, there is a mechanism by which an applicant can determine -- they do an evaluation to decide whether a particular departure is of such a nature that it requires approval, or is something that could be done without approval. And that's part of the process. And so the Staff in the case of South Texas would only be approving those departures that required approval. The other ones would be part of the application. They're for the Staff understanding. Staff could inspect the bases on which the applicant determined those departures do not require approval, but we don't have to actually approve them.

MEMBER ARMIJO: Those that you do review, the ones that they can't change totally on their own.

MS. McKENNA: Right.

MEMBER ARMIJO: Do you write an SER -

MS. McKENNA: Yes.

MEMBER ARMIJO: -- or something equivalent to that? You write an -

MS. McKENNA: Well, that's what Frank was referring to, the SER for the combined license would explain why those departures were acceptable, along with the explanation of all the other material in the application that wasn't related to the Design Control Document.

MEMBER ARMIJO: Okay. I understand. Thank you.

MR. AKSTULEWICZ: Excuse me. This is Frank, again. Eileen, I think the Committee is going to get a briefing on the ABWR STP soon, either this afternoon or tomorrow, so you'll have the opportunity to ask more specific questions about what's happening in that design later.

MS. McKENNA: Well, again, speaking more specifically about the amendment process, we received an application in May 2007 for an amendment to the Design Control Document, and that was based upon Revision 16 of the DCD. And using the part of the process in 52.63, that basically gives the criteria for considering amendments to design certifications. As part of the new process, we received Revision 17 of the DCD in September 2008. Our review has continued, and there's been some additional changes that have occurred as a result of back and forth with the Staff. And those changes will be folded up and provided in a future Rev 18 of the DCD.

MEMBER RAY: So that will be just conforming.

MS. McKENNA: Should be just conforming of all the changes that they've -- for example, when they send us an RAI response, they would say okay, based on your question we're going to clarify the DCD, or make this design change. And here's what the words would be in the DCD. When Rev 18 comes in, we're going to go look to see did all those words that we expected show up in there, the way we thought they were going to be, so we can confirm that it is -- everything is conforming. Yes.

MEMBER RAY: So, the amended certification will be based on Revision 18, as we envision -

MS. McKENNA: We hope it's Rev 18. I think it's -- there's always a timing question. If you bring Rev 18, and then we find some late issue, or the Committee raises something at the end, we have to deal with, it's possible there would be a Rev 19.

MEMBER RAY: Okay.

MS. McKENNA: But we'll cross that bridge when we get there.

How we're proceeding, I think you mentioned some of this. We're using the same kind of Six Phase review schedule that is being done for other design certification reviews, where we issue an SER with open items, have initial discussions with the Committee, prepared an advanced final, have a final round of discussion with the Committee, and then have a Final SER that we issue.

MEMBER RAY: Okay. Now, Eileen, on that point, maybe this is the appropriate point to -- have you compared the time for this review, Six Phase review in the case of this amendment with what was -- the time that was taken in the original certification review? What I'm trying to get at is, to what extent is there comparability between the amount of material being reviewed in the original certification, and the time that took, and the amount of material being reviewed for the amendment, and the time that is currently envisioned that that will take?

MS. McKENNA: That's a difficult question, partly, because I wasn't part of the process back then. I guess my sense, and maybe I might ask Westinghouse to comment on this, since they've lived through both processes. I think the original certification was longer, and of large scope. Part of the reason it's difficult to judge time, timing, is, for example, a period of time when we were reviewing like the technical reports, that wasn't, necessarily, full time. It was kind of a fill-in, when we were part of NRR, so we weren't, necessarily focused on trying to complete it in a given time frame.

MEMBER RAY: It's not a fair question, perhaps, too big. But, nevertheless, one has to try and figure out how -- we're talking about how much time we have to get this job done, have to look for some other references in terms of how long did it take to do something similar before.

MS. McKENNA: Right.

MEMBER RAY: And, is this similar? So, that's why I asked the question, so we won't pursue it further. But that is, nevertheless, something we need to be mindful of, is having some kind of benchmark for how long it takes to do something like this.

MS. McKENNA: Right. I think a lot of the very fundamental parts of the design were really covered before, the new features, we're seeing more enhancements, so maybe changes in, if you will, some of the more traditional parts of the plant. So, I think that the time and the scope is less, but -

MEMBER RAY: I'm sure the expectation would be that, but then that presumes that you're able, somehow, to sort -- when you're looking at something holistically de novo, the first time, you have to look at the whole thing. And if you're only changing parts of it, you assume well, it will take less time. But that's just an assumption we're making.

MS. McKENNA: Right.

MEMBER RAY: And it also assumes you can extract what's changed from what remains the same -

MS. McKENNA: Yes.

MEMBER RAY: -- in some systematic way. And I'm sort of belaboring this, because I think that's what we're trying to figure out here, is how can we extract from a large number of changes just those that deserve our attention.

MS. McKENNA: Right. And I agree. I think it's been complicated for all of us involved in the process. I think the technical staff has had challenges with trying to okay, look at this, and this, but not all the words in-between, you know, kind of thing. But you need to understand the words in-between to see whether these changes make sense. And I agree, that's probably more harder to do than just reviewing the whole chapter. Even writing it up sometimes is harder to just explain why did this number change from this to this, versus saying the number is X, and the system works in this way. And that's a lesson learned that you know is maybe not as easy as it looks. It's like doing 100 license amendments all in one big package.

MEMBER RAY: Thank you.

CHAIR BONACA: But it seems to me, both in the amendment of the process, and also the DCD review, we are really more of repeating the pattern of review that the staff is doing. I mean, we really are looking at each one of the individual changes and trying to determine what the big picture change is. I mean, what is the modification, et cetera? And, clearly, we are the least equipped to be able to do that, because we are just a few people, and it's a very inefficient process.

Typically, a review is supported by an SER, which has concluding statements. We can make a judgment on the concluding statements. Yes, I agree. No, I disagree with that. So, the way I see it -- I mean, I'm branching out for a way of using a different process than maybe giving us much more benefit, and make us able to contribute more than just simply repeating what the Staff has already done. And I believe at the last meeting, Westinghouse was present, we had some indication they could possibly provide information in a way that would be helpful to that. And I wonder if -- I believe this gentleman here mentioned that. Anyway, we may want to explore as we go forward.

MEMBER RAY: Well, I think, Mario, the technical reports that Eileen referred to is maybe a vehicle for us to use -

CHAIR BONACA: Yes.

MEMBER RAY: -- to focus on issues that are addressed by technical subject area, rather than changes in the text that Eileen and I were discussing in a particular chapter where some words are changed, some words are the same.

CHAIR BONACA: Okay.

MS. McKENNA: Okay. I think we're -

MEMBER BROWN: Can I give an example? For instance, there was stuff identified in the I&C world. Why is it difficult for the -- wrong question. It would be helpful if the Staff could identify what was the initial architecture it approved, and where, not all the little one line stuff that goes on in there, but where are the major architectural changes in that design, and how it interfaces with the rest of the plant. How many of them are there? Are there ten, are there fifty? If you can narrow the scope -- you try to read through some of the reports, they are expensive, and you find a little red highlight here, and a red highlight there, and you say well, what does that mean? And without a little bit of help, it's very difficult to say hey, are we missing something? To me, that's what I was looking for in terms of the discussion would have been floating around on how do we do this particular certification?

MS. McKENNA: I hope you got -- I had sent to the Staff, the ACRS Staff, a list of some of the technical reports that were specific to the I&C titles, and -

MEMBER BROWN: If we are missing something, I'll go ask for it.

MS. McKENNA: Okay. That was part of the intent, was to help, because that's coming in our meeting in two weeks.

MEMBER BROWN: I'm sweating that one.

MS. McKENNA: But I think we will be discussing what Staff sees as the major changes that have occurred in that area, and the Westinghouse presentation, I'm sure will also address what are the major evolutions, if you will, in the I&C area from when the Design Acceptance Criteria were approved in the certification to where we are now.

JUDGE ANTHONY: Okay. If you can -- it would be helpful if you can do that not in words, but in some type of a functional diagram that shows this is what it looked like before, this is what it looks like now, and this is the interface that changed.

MS. McKENNA: Okay.

MEMBER BROWN: Okay? And the nature of the change. That's all. Just a way to grab that piece of it, and say now we're not going to look at the rest. We'll look at that, and we'll hold our breath.

MS. McKENNA: Okay. Well, Westinghouse is listening, and I'm sure we'll be making sure their presentation speaks to that. And I will feed back to our Staff that we should be looking to do the same.

MEMBER BROWN: Thank you.

MS. McKENNA: I was at the point that several of us were just discussing in terms of looking at the changes to the DCD, rather than reviewing the entire DCD again. And, as was indicated, we are issuing individual chapters as the work comes to a point of closure with open items. And the intent is that the SERs on a per chapter basis will ultimately become a supplement to the NUREG, so it would supplement, not replace 1793, so that the material that wasn't changed was reviewed in 1793. The material that did change is being reviewed in this supplement. And, as was indicated, we have been making presentations on individual chapters at ACRS Subcommittee meetings.

MEMBER RAY: That seems the only way that's practical to do it, Eileen, but the result means then later on after the supplement is issued, one really needs to read both documents to get the whole picture.

MS. McKENNA: Yes, it could be, if you're interested in a particular topic area, to understand kind of how did it get to where it was in 15, and then how did it change as a result of the subsequent interactions.

MEMBER RAY: You can't just read the supplement and understand.

MS. McKENNA: Not if you want to understand how the whole design works. If you want to understand just what was changed, it will help you. But, yes, to understand completely how does the PCS system work, you would need to probably look at both documents. Hopefully, if you read the DCD from front to back it would be -- that's where you are. That's the final situation.

MEMBER RAY: Well, eventually, it would seem that that would result in a -- sort of like an encyclopedia with annual supplements. I mean, it gets too impractical to -- you have to issue a new encyclopedia after some point in time, because trying to read multiple supplements to the original SER in order to get a complete picture is going to be problematic. But that's not what we're looking at right now.

MS. McKENNA: That's not atypical of how it was done before. There would have been the NUREG for the license review, and then there would be some number of supplements to deal with issues that hadn't been completed in the original. So, yes, that's -

MEMBER RAY: It may be that there's good precedent for it, so, yes.

MS. McKENNA: So, one of the items that was asked about was RAIs. And we are kind of reducing our inventory of RAIs rapidly, since the chapters have gone out in most cases. We're down 40, they had 47 here. It kind of changes on a daily basis. And I indicated here that in some cases, we have RAIs that are really tied to open items, that they give more explanation. For example, in Chapter 18, we had - I forget the exact number - let's say eight open items, and we actually issued along with it, in essence, 22 more specific RAIs to explain in a little more detail what the big open item really referred to. And we are kind of working those issues off, so that's why you see, for example, we have a number of -- or labeled as RAIs that deal with areas where we've already issued the chapter. And those will be closing out and transitioning totally into open item space. And then we have, obviously, RAIs pending on chapters that we have not completed. For example, Chapter 3, Seismic area, we have ten open items - excuse me - RAIs outstanding. In Chapter 6, we have seven, and there are five others in miscellaneous chapters for various reasons.

MEMBER RAY: One of the things that I've been trying to figure out as Subcommittee Chairman is whether we're looking at these things with more outstanding RAIs than normal, would be the case. I won't ask you to comment on that, but you're certainly welcome to, if you wish.

MR. AKSTULEWICZ: This is Frank. I think the answer is, traditionally, these chapters are probably of the magnitude of open items that you're seeing, given my participation in previous licensing activities. So this is not an unusually large inventory, I should say, at this point in time in the review.

MS. McKENNA: Right.

MEMBER RAY: Frank, what is your -- maybe I kind of -- what point in time in the review are we at?

MR. AKSTULEWICZ: I would say we're probably about halfway through. So, I mean, we're finishing what would normally have been our Draft Safety Evaluation in the old lingo. Right? So, we would have substantial numbers of open items in the chapters that we would be closing out if we were in Part 50 process at this particular point in time.

MEMBER RAY: That's the point in time. Thank you. Because one of the issues that we've also struggled with was whether the chapters that have been presented to us were intended to be sufficiently complete that we didn't need to look at them again, or not? And it hasn't been clear to me what the expectation was in that regard.

MR. AKSTULEWICZ: The hope would be that the chapters that would have no open items would be ones that we would not have to revisit. But I fully expect that when we come back with the full safety evaluation and the final, what is the Advanced Safety Evaluation, that is the opportunity for the Committee to look across the design again in its totality, because we would have said this design is as complete as we understand it's going to be, and there aren't any open issues that are in front of us. And we would have understood all the inter-relationship of some of the challenges of some of the Digital I&C, or the sump, or the transient analysis, whatever those issues be, shield building, seismic. And this would be the opportunity to ask those types of questions of the Staff, as it would be ready to go through the process of its final licensing work. So, we'll have that opportunity, again, to visit all of these issues, theoretically, again.

MS. McKENNA: One of the other items that was specifically asked about was Design Acceptance Criteria. And in AP1000, there were DAC, DAC being a subset of ITAAC that includes certain elements of completion of design, and these were in three areas. One is the instrumentation and control. In particular, I've listed here the specific parts of the ITAAC which relate to what we call DAC, and they arise in both the Diverse Actuation System, and the Protection and Monitoring System for these parts, phases, if you will, of the development of the design, the design requirements, system definition, and hardware and software development. And, similarly, for the PMS system, these parts of the life cycle, if you will, have been referred to as DAC. They are not -- if you look in the ITAAC table, you won't see a little star next to them that says these are DAC, but if you look at the words of what they cover, and what the action is to resolve them, the DAC flavor becomes more clear, I think. Question?

MEMBER RAY: Question? No.

MS. McKENNA: Okay.

MEMBER RAY: On that. I mean, the idea of the DAC, as Eileen characterized it, are a flavor of ITAAC, something you have to do, we're going to talk about it, also.

MEMBER BLEY: I mean, by definition they are.

MS. McKENNA: That's correct.

MEMBER BLEY: We've just been dwelling on how they're eventually going to get closed.

MEMBER BROWN: Well, the issue is timing, isn't it? I mean, if the DAC are -- comparing the nature of the DAC, and the timing of those close outs, and who does it.

MEMBER BLEY: Well, most of the -- many of the DAC here are being closed now.

MS. McKENNA: Correct.

MEMBER BROWN: That's good. They ought to be done now, not later. And I thought that's how we kind of framed the issue before, as to who does that. And I'll try to provide it to -- this is not a regional inspector, for instance, who is not detailed involved in those designs.

MS. McKENNA: Yes. It's quite correct that part of this amendment process is intended to resolve as much as possible of these DAC. And, hopefully, we'll get all the way through, but that's the goal.

MEMBER RAY: But, by listing these here, you're not meaning that all of this scope will be, to the extent that they represent DAC, will be resolved in this amendment, just to the extent possible.

MS. McKENNA: To the extent possible. I think when we present them, which will be in a couple of weeks to talk about Chapter 7, you will hear that we aren't quite there yet with all parts of these DAC, that there's still information that we need in order for the Staff to agree that all of the parts could be closed. But that is still the intention, is to push through these sections and get there. It's just timing is really going to be what the size it is, can that work be done at the time the amendment wants to go forward.

MEMBER BLEY: Now, there was an issue that came up in the Subcommittee that we pursue, and that is, of the DAC that are getting closed, like the Human Factors Engineering ones, we have yet to, and I still have yet to look at those detailed technical reports that are the basis for saying that those -- many of those DAC have been resolved, and we need to look at that to see if we're convinced.

MS. McKENNA: And, again, I did provide some references that, hopefully, you'll have the opportunity to do that.

MEMBER BROWN: Another point on that. Thank you for reminding me, Dennis, that -- say you go through the reports, and you get it defined, and you say yes, we understand what it looks like. But it's still a Tier 2 document at that point, or is this a Tier 1 point, where that resolution now is locked in concrete so they cannot change that functional layout on their own without NRC approval?

MS. McKENNA: What will happen is if they get resolved, and they're not DAC any more, then there would be information in the DCD that explains this is now what the design or completion of those DAC is. Now, generally, that would be Tier 2 material, but I know in some cases -

MEMBER BROWN: I understand that, but one of the problems I had with the Tier 2, Tier 1, is that as it was explained to me, not lack of understanding, is that Tier 2 is not part of the rule or the -

MS. McKENNA: It's not certified as part of the rule.

MEMBER BROWN: Exactly.

MS. McKENNA: Yes.

MEMBER BROWN: So that it's not non-deviation, in other words. People can make changes to it.

MEMBER BLEY: They can make changes, but, as I understand it, maybe you guys can talk to this, there would be a process, nobody is living under this right now, but there will be a process, something like 50.59 to allow them to make changes, as long as they justify it's okay.

MEMBER BROWN: To whom?

MEMBER BLEY: To themselves, but approved by the NRC.

MEMBER MAYNARD: The criteria by which it will define which ones have to be approved by the NRC versus which ones could be -

MEMBER BROWN: That is -

MR. AKSTULEWICZ: This is Frank Akstulewicz. Let me try to shed some light on this process. I think, at the risk of getting too far into this, the process that we currently use under the existing licenses with the FSAR and the 50.59 process, is really similar to what a Tier 2 information control process would be like. So, the first part of that process would be that the licensee, at that particular point in time, who decided wanted to make a change, it would evaluate that change against the criteria that are written in the rule, itself, that identifies what should be something that the staff reviews. It will come to a conclusion, and it will either submit for review, or it won't. Those that won't be submitted are held as changes that could be examined as part of our inspection process, and P&IR inspections that we typically do at operating units would be the vehicle that the staff would go and look at, those design modifications that they didn't submit as part of a routine audit of that particular process. So, the -

MEMBER BROWN: Is that after the fact?

MR. AKSTULEWICZ: Yes. It's always -

MEMBER BROWN: The change is made, and they review it after the fact?

MR. AKSTULEWICZ: Well, yes, if it's not one that's reviewable, then that change is made, and the Staff has the opportunity to go back and look at it after it's been implemented. Yes.

MEMBER BROWN: But, Frank, the point is, some Tier 2 changes have to get prior NRC -

MS. McKENNA: Yes.

MR. AKSTULEWICZ: That's correct.

MEMBER BROWN: That's the important question.

MR. AKSTULEWICZ: That's correct.

MEMBER BROWN: That's what I'm trying to get a -

MS. McKENNA: Yes.

MEMBER BROWN: But I don't know how it gets done.

MS. McKENNA: Well, there's a couple -

MEMBER RAY: It gets done like the current Part 50.

MR. AKSTULEWICZ: 50.90.

MEMBER RAY: Yes.

MS. McKENNA: And, in some cases, I think some of these Human Factors documents are a case in point. I think you're familiar with the Tier 2* concept, where there was particular pieces of information, or methodologies, or reports, or criteria that the Staff felt were of sufficient import that they really wanted to make sure they had the prior approval. And they specifically designated these things as Tier 2*. And I know several of the Human Factors reports kind of fell in this category, where if they wanted to change them, you kind of just pass right through that. Could I do it without approval, because the answer has already been made for you, so the Staff would see those. And it would be, depending on, again, what the timing of when it happened. It would be part of a COL application that would be reviewed before the license is granted, or if the change was occurring, it would be a license amendment.

MEMBER RAY: But there is Tier 2 information you can't change without prior approval.

MS. McKENNA: Correct.

MEMBER RAY: Yes. And how you separate the stuff you can change, from what you can't change, as I understand it, is very similar to 50.59.

MS. McKENNA: Absolutely. It's laid out

in each appendix.

MEMBER RAY: 103 plants today.

MS. McKENNA: Right. The criteria are the same.

MEMBER RAY: Yes. It's a rule for what you can change without NRC approval, licensing basis. So, it's not Tier 1, Tier 2. That isn't the distinction. Tier 1, Tier 2 is another legal -

MS. McKENNA: Correct. Yes.

MEMBER BROWN: I understand that.

MEMBER RAY: Talk about that off line. I'm going to quit right now.

MEMBER BROWN: Okay. Not that I want to.

MS. McKENNA: Okay. The second area where there was DAC is in Human Factors Engineering, and it appears in this table in the ITAAC. And these are the elements that are considered part of this DAC. The integration of the Human Reliability Analysis with the Human Factors Engineering, task analysis performed in accordance with - I hope you pardon my abbreviation there - the Task Analysis Implementation Plan, Human System Interaction Design for the control room in accordance with the Implementation Plan, and the Program Validation and Verification Plan being developed in accordance with the programmatic level description of the Human Factors V&V. These are the parts of the DAC that, again, we're engaged in an effort to agree that they are complete, and, therefore, can be closed.

MEMBER BLEY: So, after this amendment, those will not be DAC.

MS. McKENNA: They will not be DAC. They will disappear from the Tier 1 table, and, instead, you would have information in Chapter 18 pointing to references or other information in the body of the DCD that explains how all these things occur, and you don't need the ITAAC DAC any more. Correct.

MEMBER BLEY: Great.

MEMBER APOSTOLAKIS: How does one integrate Human Reliability Analysis with Human Factors Engineering?

MS. McKENNA: I am not in the best position to answer that question.

MEMBER APOSTOLAKIS: Is anybody in the best position?

MS. McKENNA: I don't know if we have anybody in the room that can speak to that, because I think we have -- Rob, do you want to have -

MR. SISK: I couldn't hear the question.

MS. McKENNA: Oh. He was asking about the first bullet, of how do we do that, how do you integrate the Human Reliability Analysis with the Human Factors Engineering. I'm not sure I want to venture an answer, since it's not my area of expertise.

MR. CUMMINS: This is Ed Cummins. The Human Reliability gets analyzed by the PRA. The PRA identifies human actions required to achieve certain safety states, and also identifies the time that the operators have in order to do those things. And that becomes a factor related to human reliability, gets included in the PRA to estimate the effectiveness of operators.

MEMBER BLEY: Now, let me -- what I thought I heard at the last meeting, that I expect to see in some of the supporting technical reports, is that whatever those human actions are that are going to be analyzed in a HRA and be part of a PRA will also feed into the Human Factor Engineering Design Program, such that -

MS. McKENNA: Controls, and how -

MEMBER BLEY: They'll look very closely at how the operator interface works. And, perhaps, make -- perhaps, adjust it to improve the situation. All that's going on together, and that's why they call it integrated. That's my understanding.

MR. CUMMINS: Ed Cummins, again. That's correct. If, for example, in the Human Factors process, if you have 30 minutes, and it took you an hour to do it, then you would have to change the operator interface so that it was more efficient, and could be done in the available time by automating it, or by making the process easier to accomplish.

MEMBER APOSTOLAKIS: Is there a Technical Report on this?

MS. McKENNA: Yes, I believe there's a Technical Report on this. I would have to check which one.

MEMBER APOSTOLAKIS: I would like to see it. If there is one, I'd like to see it.

MEMBER CORRADINI: So, just a side note, just so I'm -- there was something given to us by Staff, or, actually, AP1000 applicant to you guys, and we got it in April of `07, which had a list of 105 technical-

MS. McKENNA: That's correct.

MEMBER CORRADINI: Same list?

MS. McKENNA: The list I'm giving -- I gave to Mike most recently had some updates to it. For example, that was the initial list -

MEMBER CORRADINI: But it's fundamentally the same.

MS. McKENNA: Yes, it's fundamentally the same list. In some cases, we got revisions in some of the reports, and then we had a couple of other reports of a similar nature.

MEMBER CORRADINI: Okay.

MS. McKENNA: But, more or less, the same list. Yes.

MEMBER CORRADINI: Thank you very much.

MEMBER APOSTOLAKIS: What is IAW?

MS. McKENNA: I'm sorry. That's was in accordance with. I didn't want to have too many words on the -

MEMBER APOSTOLAKIS: In accordance with.

MS. McKENNA: It's not International Auto Workers, or something.

(Laughter.)

MEMBER APOSTOLAKIS: How does one validate the Human Factors -

MS. McKENNA: I'm sorry? How does one find data?

MEMBER APOSTOLAKIS: How does one validate? I don't understand those things. Anyway, you -

MS. McKENNA: Again, I -

MEMBER APOSTOLAKIS: I understand -

MEMBER BROWN: George, you go to complete plant mockup with all the controls, and bring all the operators in, and then you run through all the evolutions.

MS. McKENNA: You're not far off.

MEMBER BROWN: That's the only way of doing it.

MS. McKENNA: I mean, that is -- Rob, do you want to speak to that?

MEMBER APOSTOLAKIS: Oh, you have unlimited resources, I assume.

MEMBER BROWN: Oh, very limited resources.

MS. McKENNA: I think if -- the SER does discuss that. Do you want to -

MR. SISK: This is Rob Sisk, Westinghouse, again. And just to kind of elaborate on how that takes place, we did -- we have a full-scale engineering development center, where operators can come in, and they actually perform the activities. And that testing feeds into those analysis, and that interaction.

MEMBER BROWN: That's largely a main control room -

MR. SISK: It is a main control room.

MEMBER BROWN: Okay.

(Simultaneous speech.)

MR. SISK: And we have operators come in that are plant operators going through the actions that they would do on a day-to-day basis. We provide some bases for the assumptions that go into the analysis.

MEMBER MAYNARD: I did want to point out that several months ago, the Subcommittee did go up to the Westinghouse facility, observed the simulator and talked to the Human Factors personnel up there. Again, it was limited to the control room activities there, but they did have a full-scale simulator, and they were using it. And they did talk about the operators coming in from the various plants -- pass that along, just we did visit that facility.

(Off the record comments.)

MS. McKENNA: Okay. Let me -- the last area that has DAC was in the area of the piping, and support design. And how this was implemented was, there's a table in the DCD that contains a list of analysis methods, codes, modeling assumptions, acceptance criteria for the AP1000 piping and pipe support design. There's some 27, 28 items, and that is also part of the background package that I sent to Mike, and he will get to you, the itemization of those particular items. And I can give you an example, a couple of examples just so you have an idea that seismic anchor motions, the design -- the pipe support criteria, codes, boundaries, baseplate anchor bolt design, use of ASME codes, use of square root, something squared to combine SSC and pipe rupture loads, component support using particular ASME section, using time history analysis to do the piping. Those are the nature of the things that appear in that table. And all of those items are in the DCD in more detail. This table just kind of summarizes that these are the key parts of how one would complete the design of the piping, and they are to be followed in that analysis.

And, again, the intention is to complete the piping analyses sufficiently that the Staff can perform an audit of how the design was actually implemented, such that we've concluded that the DAC have been satisfied. And as we discussed at our last meeting, we're not quite there yet. There -- a large number of packages were provided, but in some cases, there were parts that still had open items, if you will. And we felt that a little more work was needed before we were ready to conclude that the DAC was ready to be closed.

MEMBER CORRADINI: So, if I just might get -- so, I guess when I was looking at the change basis, is that the way it -

MS. McKENNA: Yes. Yes.

MEMBER CORRADINI: That thing that we got, that these are the three big ticket items that are substantially changed. And I didn't see anything outside of these three big areas of DAC where there'll be less DAC, and more specific design things that were substantial. Am I missing the area?

MS. McKENNA: Well, I think these were the only things that had DAC. So, therefore, we are translating from DAC to no DAC. And it's that other material in the upcoming slide, I have some other design and hardware changes that are part of the scope of the amendment review, that are not related to DAC.

MEMBER CORRADINI: But, I guess, I'm kind of asking -- I'm looking for a judgment from Staff at this point, which is, if it isn't in these three, which I was expecting to see substantially, what are the other substantive changes that you've been focusing on? And if it's in your slides -

MS. McKENNA: It is in the slides. It's

coming up in about -

MEMBER RAY: It's just these are the only three that had DAC.

MEMBER CORRADINI: Correct. I understand.

MS. McKENNA: Yes, that is part of the presentation. I will be getting to that in a couple of slides.

MEMBER ARMIJO: Eileen, which were the risk-significant piping systems that you -

MS. McKENNA: What we did was, we looked at all the piping lines, and what systems they appeared in. And then the Staff prepared a list of them. And we decided to include all the Class 1 piping, Class 2 and 3 piping in particular systems, such as, say the ADS line, and the pressurizer, and different parts of the system to give us a good sample of all the systems, and make sure that we included the major lines, and the ones that, obviously, of low significance. We did consult with our PRA folks to help us identify which were the most important systems from this perspective, and then looked at what piping packages that those systems would be analyzed in, and came up with, I think it was like 48, or some such number, of how the work is packaged by the analyst. Because it's not, necessarily, that they look at a system. They may look at this pipe connected to this pipe that's part of two or three different systems within a scope of anchorage, for example.

MEMBER APOSTOLAKIS: That's part of what is done in risk-informed ISI, isn't it?

MS. McKENNA: I think it's similar in that concept, but, yes, in terms of identifying what are the risk-significant things -

MEMBER APOSTOLAKIS: The consequences.

MS. McKENNA: And the consequences -

MEMBER ARMIJO: So, for these systems, the design will have proceeded to the extent that you're satisfied -

MS. McKENNA: Right.

MEMBER ARMIJO: -- that they don't need to be addressed with a DAC.

MS. McKENNA: Correct. I mean, this is -- again, this was the DAC part of it. They're still ITAAC in terms of getting all the reports done, and then later on the as-built verification. So, it's not the end of the piping story, but it's, hopefully, the end of the piping design story.

MEMBER ARMIJO: Okay. Great.

MS. McKENNA: Okay. I was asked about COL information items. And, again, there is a list that actually is in the DCD, as all of the COL items. It's on the order of 150, depending on which version you look at. And what I indicated here in the bullet, in some cases, as part of the amendment, what was done was to clarify whether the COL item is going to be fully addressed by the application for the COL, or whether there was some action that would have to be held over to be done post licensing, something that maybe require a walk-down, or development of procedures, or something where it was not really reasonable to expect that it could be included in the application, and that the NRC could agree to that, provided those actions were not necessary for us to reach our conclusions, but were more verification, and implementation activities. So, part of this review was to kind of clarify who was going to be doing what, so then when the COLs provide their applications, they would address the items that say COL applicant, and include information. And they would then, also, address how, as a licensee, they would plan to implement those COL holder items. So, this is just, again, to give an idea that the DC amendment for posing, I say closure/deletion of approximately 25 items, some cases being revised. And there actually were items that were added for various reasons, as issues were identified. A couple of examples, based on the 20.1406 interactions, there were a couple of new COL items on groundwater, and keeping records of things. So, those were some additions. There's one you'll see on having a monitoring program for the metamic coupons in the fuel pool, for example. Those are some additions to COL items that have arisen.

MEMBER RAY: Again, this was something we asked Eileen to provide us, as a measure of the change being made here, but under the amendment.

MS. McKENNA: Yes.

MEMBER RAY: I take responsibility for asking for these data.

MS. McKENNA: Yes. Some of the -- again, to come back to some of our chapter discussions, in some cases we found that there was duplication between a COL item, and an ITAAC, in which case we concluded we didn't need to have both. An ITAAC was more than sufficient, if they covered the same scope. And in a number of other cases, Westinghouse had provided the information that was being sought on the COL item, so it was actually being closed and completed in the design control document, rather than in the COL. I gave you a couple of examples. I have more, if you're interested, but the table has them all. I can move on.

Schedule. We have to talk schedule. Right? As we say, our last published schedule indicated we would complete the last chapter of our Safety Evaluation with open items in January. We're in the process of evaluating our schedule right now before Chapters 3 and 6, in particular, which are the ones that are yet to come, 15 is coming shortly, so it's on schedule. But 3 and 6, we have some challenges due to expectations for additional documents to be provided on the shield building, which is a significant part of Chapter 3, Section 3.8 that has not been completed, and we are expecting some additional submittals on the sump design and performance expecting in December, so we're going to have to look at what that does to our schedule, and try to complete that review, and then come back to the Committee and see when we can be in a position to discuss those chapters with the Subcommittee.

MEMBER RAY: The last chapter of the SER with open items, that leaves hanging the question of well, you guys, if there's a lot of open items, when are we really expecting to be done with those? And is that just something we don't yet have any way of forecasting?

MS. McKENNA: Well, I think we have a plan for the schedules -- the chapters that we've already issued, where we know what the open items are, and their scope. And we are looking at when those item open responses are coming; and, therefore, when the Staff can be in a position to review them, and prepare its final safety evaluation input. And that will be proceeding kind of on a chapter-by-chapter basis in parallel with trying to get these last chapters complete. And if we're -- we may even be able to get to the point of an SER with no open items on those chapters, rather than an intermediate step. We'll have to see. But we are laying out that work based on when we expect the responses, and what we see as the resources necessary to deal with the issues.

MEMBER RAY: Well, I guess all I'm saying is, one could say well, this lays out what -- this slide that you have here on the screen lays out the initial effort. But if one were to ask the question, well, how much effort is there beyond that, and by effort I'm looking at trying to bring people together, how many days to do the work, we don't know yet, or can we -- when are we going to get some more clarity around that? Do you have any idea?

MS. McKENNA: We are actively engaged in

that right now. We've had one initial meeting, and we have another one coming up the first of December. We're sitting down with Westinghouse and the COLs to go through what is the complete scope of work in front of us, when are they going to be delivering product to us so that we can then look at okay, we're getting this in December, and this is January. And, therefore, we think it's going to take us 100 hours to complete that particular task based on the number of open items.

MEMBER RAY: Okay. I understand. I don't mean to -

(Simultaneous speech.)

MEMBER RAY: But my only point is, this reflects the fact that as we look to the future, the piece that lies beyond the first round of chapter reviews with open items is still undefined.

MS. McKENNA: I think that's fair at this point, and we'll have to get back with you when the picture is a little clearer of when we think -

(Coughing.)

MS. McKENNA: -- with you.

MR. CUMMINS: This is Ed Cummins. I don't think I agree. I think that the open items are very clear. I mean, they're questions that we have to answer, and there is 100 or so of them, and she has a slide coming up to discuss them. And I think the -- those open items can be assessed by you, or the Staff, or Westinghouse, and you can determine by your assessment whether that's a significant open item, or not a significant one. And we're trying to schedule them all. And I think we're going to -- in my opinion, they're not -- it's not a huge barrier, but everybody can have their own opinion by just looking at what the open items are.

MEMBER RAY: All right. Let's just assume that we see in the open items some that we would think we need to review. Taking that assumption just to start with, and I don't know that it's true, but let's assume that for starters, what information would we rely on at this time, this Committee, as to when we might have the information that would then enable us to review the closure of that open item?

MR. CUMMINS: We would provide a schedule to the Staff when we would submit the response to the open item. The Staff would determine their review tie of that, and then you could have a schedule, really, of when you would have both the Staff and the Westinghouse response.

MEMBER RAY: Well, I guess that's what I

was asking Eileen about. You're imagining that we could go through and pick out a few, and then we could do that. But now let's assume we decide well, gee, we really would like to see the closure of all the open items. Then I'm just asking her when is that likely to occur, and I think she said there would be a meeting in December.

MS. McKENNA: But that's in terms of our meeting to figure out those dates, and not saying that December 1st we can turn around and give you a schedule.

MEMBER RAY: I understand nothing works like that. But sometime in early December, the Staff and Westinghouse will update your outlook for the closure of open items. We can then, sometime after that happens, figure out what it means to us.

MR. CUMMINS: That's correct.

MEMBER RAY: Fine.

MR. LEE: Eileen, do you have a date yet for that December meeting, or is that something that you're just -

MR. AKSTULEWICZ: This is Frank Akstulewicz. The meeting is December 1st and 2nd in Cranberry.

MR. LEE: Thank you.

MS. McKENNA: Cranberry is the new location for the Westinghouse headquarters.

MEMBER BLEY: North Pittsburgh.

MS. McKENNA: Okay. Open items. We have on the order of 120 open items at this point in time. The table gives you the breakdown, and I tried to give you a figure of merit here, that about -- we've got responses to about a third of them. In large part, that's because several of them have only recently been issued, so hasn't really been time for responses to come in. Here's the breakdown of which chapters they appear in.

I'll note that in a couple of cases, some of these open items are actually markers for the Staff. That, for example, Chapter 1, that's kind of -- let's go back and make sure that we tied up all of our -- everything is consistent, and that all the pieces fit together. There isn't really a specific response being sought on that one. A few cases might be the Staff booked an open item because they wanted to do an audit of something. Again, not a specific response expected. That's an action for the Staff to complete.

MEMBER RAY: Are you still keeping a count of contested and uncontested open items?

MS. McKENNA: You asked about that. We aren't really characterizing, at this point, anything as being contested. I mean, I think they -- until we get to closure, there is some level of either not a meeting of the minds on how much information, or what kind of information needs to be provided. They may disagree with some of our conclusions on certain things, but nothing that I wanted to characterize as disputed open items.

MEMBER RAY: You're not -

MS. McKENNA: Not at this point. I'm not saying we might not get there, but right now I would say no.

MEMBER RAY: How come your printed page said 124 -

MS. McKENNA: I knew somebody was going to catch that. What happened on this was, when we issued the chapters, there was 124. There were a couple of cases where we got an initial response, and we said not quite enough, so we issued a supplemental question, if you will. And that's what's reflected in the table, which is why you see 127 in the table. So, I noticed that when I was doing my final review of the slides -

MEMBER RAY: That's 127.

MS. McKENNA: Yes.

MEMBER RAY: This say Open Items of 124, and open are 102.

MS. McKENNA: Yes. Well, the difference here is which ones -- it's 127 between the two columns, 102 of them is still open either because we haven't received it yet, or we haven't finished our review, and 25, which we've concluded that the open item response is acceptable, so the 102 plus 25 is 127, which is meant to be the same as my 124, but it didn't reflect these three that I was mentioning, where there was -

MEMBER RAY: Okay. So, it' snot really open items. It's open and closed items.

MS. McKENNA: Yes.

MEMBER RAY: Okay.

MS. McKENNA: These were open in the safety evaluation.

MEMBER RAY: Left open.

MS. McKENNA: Yes. Yes. It's tough to explain, to characterize. Maybe I should just have column. I don't know. I just wanted to give you an idea.

This is the part that I think answers the questions of Dr. Corradini. Beyond the DAC, what are significant design and hardware changes? And, obviously, significance is in the eye of the beholder. And I've kind of combined design and hardware because in some cases, I couldn't decide which category it fit in better, in terms of whether it's hardware, or it's design, or it's analysis, or some combination of all three. So, I just listed here a whole set of things.

VICE CHAIR ABDEL-KHALIK: I was surprised that none of the open items pertain to Chapter 15.

MS. McKENNA: Well, Chapter 15 has not been issued yet, so if you look, it's not even in the table, because we haven't issued the chapter yet. Chapter 6 is not on the table for the same reason. These are only -- you only have an open item when you've issued an SER with open times.

MEMBER CORRADINI: So, let me take Said's question a bit further. So, with the design and hardware changes, is Staff seeing anything in those, or you want to wait to comment on that until it pops out? I guess, I'm trying to get an idea of with hardware changes, I don't know enough about Digital I&C, but with hardware changes, at least, and things such as head packages, pressurizer shape, et cetera, are there things about Chapter 6 and 15 through the safety analyses that are cropping up that give you pause?

MS. McKENNA: I don't know whether -- I mean, there are effects on the safety analysis from these changes. Whether they give us pause is -- I think we're almost trying to separate those questions. Those things -

MEMBER CORRADINI: That's fine. You don't have to answer my question. I -

MS. McKENNA: So, we do consider them. You'll see Chapter 15 soon, and you will see where some of that is reviewed. I know this has come up in sort of our Subcommittee meetings, the effect, for example, of the change in the pressurizer, the effect of adding the flow skirt, some of these design changes where there were questions about well, how did that affect the safety analyses. And we will be having those continuing discussions to make sure that those are all understood.

MEMBER CORRADINI: Okay. Thank you.

MS. McKENNA: Yes. Absolutely.

MR. AKSTULEWICZ: This is Frank Akstulewicz. I have just one more comment on that. I think the reason you haven't seen Chapters 15 and 6 yet is because of the interrelatedness of the design modifications on the analysis, long-term cooling, the relationship of the design modifications to the sump, containment performance, and they're all coupled. And that's why those chapters are running late, because one change here affects multiple tentacles of those particular analyses. So, when those chapters come over, you'll see the integrated Staff analyses of all those design modifications on the safety analysis.

MEMBER APOSTOLAKIS: Eileen.

MS. McKENNA: Yes, I'm sorry.

MEMBER SIEBER: The third bullet from the bottom, the last two words, baskets moved.

MS. McKENNA: Is for the irradiation specimens. They were relocated within the vessel just to a slightly different location.

MEMBER SIEBER: Oh, okay.

MEMBER RAY: I was going to ask, Eileen, could you -- I think we have time, if I'm not mistaken. Could you just say a few words about each one of these.

MS. McKENNA: Yes, sure.

MEMBER RAY: So that members can get a little more idea, and perhaps motivate them to -

MS. McKENNA: The first one was seismic analyses. I think one of the changes in this amendment was to broaden, if you will, the range of soil conditions that the plant could be sited at, so that required some re-analysis to confirm that the structural and equipment response spectra, and information was bounding that range of soil conditions. Then a generic issue with high-frequency in certain areas of the country, so there's been review of the effects of those high-frequency seismic response on equipment.

MEMBER SIEBER: Now, that includes not only structures, buildings, but also equipment qualification?

MS. McKENNA: Equipment, yes.

MEMBER SIEBER: The hangers, and supports.

MS. McKENNA: Yes.

MEMBER SIEBER: That's a huge job.

MS. McKENNA: Yes, and that was part of our Chapter 3 review. There are a couple of technical reports that dealt with high-frequency, so it is an area where the Staff has had a lot of interchange with Westinghouse.

MEMBER SIEBER: Now, when the Staff reviews that, do you review it to say you've used the right codes, and put in the right parameters, or do you look at the actual construction of structures, piping, testing of equipment to confirm that the calculations support the actual physical features of the plant? How far do you go?

MS. McKENNA: I'm not sure I can fully answer. I mean, I think the -- in general, not limited to high-frequency, but when the Staff is looking at the seismic analysis, they do consider what are the structures, what are the equipment, how do things get amplified up from down?

MEMBER SIEBER: Not, necessarily, the details of the applicant's analysis. Right?

MS. McKENNA: We do audits of analyses and calculations. I'm not sure I'm fully answering your question, but I'm also not sure -- I don't know. Billy, do you think there's anything you can add in terms of that? I know you've participated in a lot of the audits.

MR. GLEAVES: I think you captured it. This is Billy Gleaves. I think you captured what we do, Eileen, in that it's a sampling. We're going to look through the program from the top to the bottom, as it relates to these analyses for seismic. And that includes the computer analyses, you know, looking at the outputs, inputs, and the whole bit.

MEMBER SIEBER: For the original analysis, you already took into account the sloshing of the water in the tank -

MS. McKENNA: Correct.

MEMBER SIEBER: Those kinds of things.

MS. McKENNA: Ed, do you have a comment?

MR. CUMMINS: Yes. This is Ed Cummins. Certainly in the piping DAC that we talked about, all of the analysis is done with bounded spectra for all the sites. And that affects the design of the pipe, and the hangers for the lines selected for the piping DAC. In the cases of equipment, like reactor vessel internals and so forth, it's as Billy said, on a sample basis, the Staff comes, and they audit our stress analysis, and look to see that it covers the entire spectrum of -

MEMBER SIEBER: Yes, just one more minor question. Typically, designers, when they're doing pipe supports, will design supports for lines larger than maybe six inches, or something like that. Below that, they'll use a template that says for one inch line, steel line, put hanger every 20 feet. What is the cutoff where you quit doing analysis, and start applying the templates?

MR. CUMMINS: For the piping DAC, there is none of the lines that were selected in the piping DAC where we do any spacing table kinds of things. These are sophisticated Class 1, Class 2, or Class 3 lines, where all of the pipe supports are designed as engineered supports.

MEMBER SIEBER: Engineered as opposed to -

MR. CUMMINS: Right. On spacing tables is usually non-safety, usually cold, and non-thermal kinds of pipe systems. We do have some spacing tables.

MEMBER SIEBER: Yes. It's still two over one.

MR. CUMMINS: Oh, yes.

MS. McKENNA: Okay. The second item has to do with structural changes for aircraft-impact assessment. And in this category, I include the shield building, but there were other changes, and some of these are itemized, and some of the more detailed background information that I provided separately. The next bullet, there were some other enhancements to improve security, and ability to cope with loss of large areas. Again, I'm not going to dwell on those, but there is a little more information in the background material.

A very significant area, that we've, certainly, had a lot of discussion, and interchange with is for the containment sump to deal with the GSI-191, the debris, and chemical effects, downstream effects. There's been a lot of change in this area, a lot of analysis, testing that was done by Westinghouse. Some of that we'll be discussing at our next Subcommittee meeting. Staff has not finished its review. I think we've made a lot of progress. We understand pretty well how the sump performs with the geometry, the flows, the different break locations, so on. I think we're coming to the end of that road, but we're not there yet.

MR. AKSTULEWICZ: Eileen, may I -- this is Frank Akstulewicz, again. This is -- the sump changes are an example of the impacts on Chapter 6 and 15, because not only is it the sump screens, and the bypass flows that get the water to the sump, itself, and the screen characteristics of the sump screens, but also the downstream effects in terms of what's bypassing those screens, and the impact on the core downstream from that. So, this particular issue is a combination of both Chapter 15 and Chapter 6, combination, just to give you an example.

MEMBER RAY: November 19^{th} and 20^{th}, everybody come.

MS. McKENNA: That's right.

MEMBER SIEBER: Well, let me ask you a question about that. In the AP1000, the primary safety feature does not require the use of pumps from the sump. Is that correct?

MS. McKENNA: That's correct.

MEMBER SIEBER: So, what classification from a safety standpoint does the sump and its associated pumps and valves for recirculation, what classification does that fall into?

MR. CUMMINS: This is Ed Cummins from Westinghouse. The sump is still used. The sump is used by a gravity head from the level of the water in the containment. It has the same importance as it does in an active plant. It's not pumped, but it flows through the sump to the core to keep the core cooled and filled. So, it's -

MEMBER SIEBER: Well, it's usable, but in the fundamental way that it operates, it's just a collection vessel, is it not?

MEMBER CORRADINI: I think Jack's point is that the concerns you'd have with a forced flow system is not the same concerns you'd have here. That's what I -

MR. CUMMINS: The flow rates are lower because the flow rates are done by gravity head, rather than the -

MEMBER SIEBER: If you have no motor -- the sump is in the bottom of the containment. Right?

MR. CUMMINS: Right. And the water flows in it from a gravity head.

MEMBER SIEBER: Right. And if there is no flow out of the sump, if you do not rely on motor power, nothing flows through the sump.

MR. CUMMINS: Oh, yes, flow goes through the sump. It's a -- the flow from the containment flow in through the sump screen, and then goes into the core, and then goes out the ADS-4 valves, and then goes around and around. So, basically, heats up in the core, and -

MEMBER RAY: November 19th and 20th.

MEMBER BROWN: Oh, you're a good man.

MS. McKENNA: Okay. The next one listed here was changes to the control room ventilation. This is also in Chapter 6, so it's coming events for the Committee. Integrated Head Package, I think we've discussed this at some of the Subcommittee meetings.

MEMBER RAY: Well, my purpose, and maybe I was wrong in saying you have enough time, Eileen, was to try to solicit interest from members not at the Subcommittee meeting.

MS. McKENNA: Okay. That's fair. Trying to give you -- but, again, this is discussed in one of the -- this technical report, and show up in the -- a lot of it is reflected in Rev 17. Does have reduced number of penetrations in the head. It has some other advantages, in terms of dose, and timing for refueling, that kind of thing. As mentioned, there was a change in the pressurizer, make it shorter and fatter, in essence, retains the volume but includes capability for other concerns. Mentioned that flow skirt was added inside, and neutron panels in the vessel. This required a small change in the reactor vessel diameter, and the question being the location. I think because of the panels, where they had to go, the baskets that contain the radiation specimens -

MEMBER SHACK: Specimens.

MS. McKENNA: Yes, specimen holders.

MEMBER SHACK: I thought you were talking about the sump.

MS. McKENNA: Yes. No, no, sorry, not those baskets, the vessel. The next one I listed here was fuel storage racks. This was something that was not part of the original certification. There are new racks, both for the new and spent fuel, and there's an increase in the capacity of the pool, number of assembilies, so there's various design changes, and analysis changes associated with that.

And last, I just had a set of other changes, change in the voltage from 125 volts to 250 for the Class I-E DC power, second transformer, change in the turbine manufacturer, and the control system for the turbine, and some additional waste monitoring tanks. So, that's kind of a big picture of the more significant changes. If you look through, you'll see a lot of other smaller ones, but this was what I kind of pulled out as the more significant ones.

MEMBER CORRADINI: So, taking away the structural changes from the shield building and sump, which we have already gotten the preliminary PR on, all the other things have been discussed, or have been -- you guys have seen -- you've issued the open items, you've had responses. I'm trying to get a feel for where these are relative to -

MS. McKENNA: Well, I would say that we've had RAIs, and exchange on everything. We've had issuance of open items on most.

MEMBER CORRADINI: Okay.

MS. McKENNA: Ones that we haven't issued chapters yet are the ones that -- we said Chapter 6, which includes the sump and the control room.

MEMBER CORRADINI: Yes. Okay.

MS. McKENNA: And the racks we haven't issued the SER.

MEMBER CORRADINI: So, where I'm going with this is, from a technical standpoint, the things that you actually have interacted with the applicant on for the amendments, are there any things that -- I don't want to use his terminology of contested, but are there any things that look like big significant barriers, or are you in discussions, such that you see a way?

MS. McKENNA: Well, I think the one that you probably all are aware of is the shield building.

MEMBER CORRADINI: Right. Taking that one out.

MS. McKENNA: Okay. Leaving that one out, I don't think that there's anything I see as a barrier. I think it's just, we have to continue to work and get to closure on them.

MEMBER CORRADINI: And understand what the amendments are.

MS. McKENNA: Yes.

MEMBER CORRADINI: Okay.

MS. McKENNA: Yes.

MEMBER CORRADINI: All right. Thank you.

MS. McKENNA: There also was a specific question about materials, and I listed some here. Some were more significant than others, but just to give you a flavor of changes. In some cases, there's an update of the permanent record, and that resulted in some changes. In other cases, I think it was a matter of trying to procure components, and maybe some different new materials, or allowing for additional materials, that kind of thing. There's a change here on the main steam line to different material, flywheel, there was a change in the material. And I listed another example, where for the reactor vessel the change in the allowed copper limit, there's an increase in that value, again, I think to facilitate procurement of an appropriate vessel, adding some additional stainless steel, reactor vessel internals listed some of the types here, and there was some specification of particular components within the CRDMs, where maybe austenitic steel would be used for this and that, and that kind of information was included in the DCD.

MEMBER RAY: Eileen, could you just take a note that -

MS. McKENNA: Yes.

MEMBER RAY: -- we do want to have another further discussion on the Lessons Learned with regard to the inertia, the need to increase the flywheel inertia which caused the change in the material.

MS. McKENNA: Yes.

MEMBER RAY: There's an open question still among the Subcommittee members about well, what have we learned from that experience.

MS. McKENNA: Okay.

MEMBER RAY: It has to do with DAC, or -- I won't go any further now, but we just need to revisit that experience. This is a change, that I don't know that the change, itself, has any -- we've explored it somewhat, and are there open issues with regard to the change, other than what have we learned from the experience. Okay?

MS. McKENNA: Okay. I think that's on our list of our follow-up items from the meeting. Certainly, the flywheel, and the questions of inertia are there.

MEMBER RAY: Okay. Perhaps you captured it already then.

MS. McKENNA: Okay. You asked also specifically about changes in the fuel and core design arena, not a lot, beside the one we talked about when we had our Chapter 4 discussion, had to do with the gray rod control assemblies, the change of how many of these had the silver-indium-cadmium within them. There was language to allow borosilicate or wet annular absorbers, and there were some changes to methodology, if you will, of how, because of the changes in the internals, how that affected determining the total bypass flow, so that's more of the core design area, just to give you an idea. Again, some of the background material gives you a little more specific information on that.

VICE CHAIR ABDEL-KHALIK: Now, you have a list of hardware changes, material changes, and fuel and core design changes. Do you also have a list of changes in methods?

MS. McKENNA: I don't think I have it assembled in that fashion. Methods, obviously, it varies. For example, in some of the seismic areas, there might have been a change in method from, say, doing a time history, to a response spectra for various reasons. One particular one I can think of that's a change in method, you may be aware of, is the use of the ASTRUM for the uncertainty analysis, the 50.46 analysis. That's a change in method. The others that are not coming to mind, because I wasn't kind of doing a search for, but usually they were driven more by either some design change that needed to -- a method of analyzing it, for example, or the ASTRUM. We think we had talked about in the May meeting, even that it was a margin issue, I think, primarily, to use that methodology.

VICE CHAIR ABDEL-KHALIK: The reason for my question is that this may help us decide which other Subcommittees should look at a major change. If there is a big change in methods, perhaps you can refer it to the Thermal Hydraulics Subcommittee to look at it in a lot more detail.

MEMBER RAY: Absolutely. I agree. And, therefore, we might conclude on a generic basis that it facilitate this sort of thing if we had that up front, because those meetings have to be scheduled, the people have to be available, and so on.

MS. McKENNA: Okay. So, we will take an action to see if we can identify a list of what might be considered significant changes in methods. I tried to give a few examples of things that came to mind.

MEMBER RAY: You did very well, but see if you can come up with anything else.

MS. McKENNA: Yes. Okay. My next slide is to summarize kind of where we've been with the Committee. I characterized them as a orientation briefings. We had a Full Committee meeting back in October 2007, talked about AP1000 design, the design center approach, and where we saw ourselves going over the next few years. We had a further meeting this past May, we talked more specifically about the applications in front of us, and how we were proceeding, more detail with the R-COL/S-COL approach. We had our first Subcommittee meeting on AP1000 in July, and we covered -- it was a grueling couple of days. We covered ten chapters, and it was mentioned we also discussed the COL chapters in that same meeting, so there was a lot of ground covered at that time. Again, those chapters, perhaps, have fewer changes, fewer significant changes, so we were able to get through that, although, with some long -- certainly a long day involved there.

Had an additional meeting this past October, where we looked at, I call it three, it was kind of a large part of Chapter 3, and two other chapters, 8 and 18. We have a meeting coming up on the 19th and 20th.

MEMBER RAY: And we covered some of the items from the June meeting.

MS. McKENNA: That is correct, yes. That is absolutely correct.

MEMBER RAY: Go to long lunches and things, leave them in.

MS. McKENNA: Right. We have a meeting coming up the 19^{th} and 20^{th}. We'll be covering Chapter 9, which is auxiliary systems. It's got a wide range of topics from fuel pool, fuel handling, cooling water systems, a little bit on ventilation, a little bit on fire protection. Chapter 9 kind of covers a lot of territory.

We also be talking about Chapter 7, which is instrumentation and control. And we do have half a day scheduled for what I characterize as an information briefing on the sump testing. Westinghouse will be making a presentation of the work they've done to support their design, and the analyses that they've done for demonstrating the long-term cooling. And we also have some plans for taking on some of those other topics that the Committee was interested in.

For example, I know there was a question about how the gas accumulation in the lines was being handled, and that's one of the topics that's planned for this particular Subcommittee on the 19^{th}.

MEMBER RAY: We may need to make sure do something on one versus the other day.

MS. McKENNA: Yes, if that's -- I mean, I've given a proposed agenda to Mike, but if there is a need to make adjustments based on availability, certainly, we would try to accommodate that.

MR. LEE: Yes. I got the agenda last night, as well as the list that Eileen has referred to with all the technical reports. I declined to transmit that to the members yesterday, because I had the slides, and I didn't want to -- I'll get all that out when we finish today.

MS. McKENNA: And then we have on the calendar a Subcommittee meeting in January. And we would propose at that time, Chapter 15. We may have some other of these picking up any issues that you've had interest in in the past. And depending on where we are with the other chapters, we may be able to give you an update on some of those items.

MEMBER CORRADINI: So, just to move a little bit ahead. So, the plan in January is to do 15, and 6 is still questionable.

MS. McKENNA: Six is questionable. I don't think we will finish our sump review, but there may be other parts of 6 we might be prepared to discuss.

MEMBER CORRADINI: Okay. That's fine.

MS. McKENNA: Again, some of those other follow-on topics that -

MEMBER CORRADINI: I just wanted it clarified. That's all.

MS. McKENNA: Yes. As we get closer, we'll get more specific on that agenda. And that's what we had on the Design Certification. We have just a couple of slides on the COL. Most of my colleagues on the Branch responsible for the COL are not in the office today, so -- for various reasons, training, or travel, so I'm going to -- with Frank's assistance, I think I will try to push through with the COL discussion. And, hopefully, we can answer your questions.

A question was asked about the lead COL status. And, as you know, the reference or lead COL has changed over time. It was initially Bellefonte, and now we are moving towards Vogtle becoming the reference Col to be the first one through the process, and would carry the burden of responding to the standard content questions and issues. And we are, as indicated here, very close to completing that transition. We have issued chapters for Bellefonte with open items.

MEMBER RAY: Excuse me.

MS. McKENNA: Yes?

MEMBER RAY: The transition, will it retain Bellefonte as the reference?

MS. McKENNA: No, it will not. Vogtle will become the reference. The reason for the transition and the way we've addressed it, is that we're kind of dumping through dockets that as the reference, the standard material came in on the docket. We issued the questions to the Bellefonte docket for the standard content, and so that's kind of why Bellefonte was, at least for the SER with open items, stayed as the reference. What's going to happen now that the chapter goes out, is that Vogtle is now going to respond on their docket to the standard content open items.

MEMBER RAY: Well, I understand why the -

MS. McKENNA: So that we can then write the SER for Vogtle.

MEMBER RAY: -- agency needs to keep this legally precise, and proper. But I'm thinking, is there any reason for us, the ACRS Committee, to take cognizance of Bellefonte, actually?

MS. McKENNA: Not as a reference. I mean, ultimately, if we -

MEMBER RAY: We don't have to -

(Coughing.)

MEMBER RAY: -- Bellefonte to find the answer to something that applies to Vogtle.

MS. McKENNA: Moving forward, it will all be in the Vogtle SER. You would not need to go back to the Bellefonte.

MEMBER RAY: Great.

MEMBER MAYNARD: And that's a question I had, make sure that this transition, when it's all said and done, the subsequent COLs will just have one reference plant to reference back to. There won't be some things that will be Bellefonte, and some things that will be Vogtle. So, it will be one reference plant.

MS. McKENNA: The way it works is that they, in essence, in their application have the same material that was in either Bellefonte or Vogtle for the standard content, so they don't really reference back, other than the Staff's evaluation that we then -- we first issue it on the reference plant, saying we have evaluated this standard content, and found it acceptable for these reasons. Then when we get to the next SER, with that discussion, put it into the S-COL's SER, and say this is the information that's in their application. This is why it's acceptable. We don't perform an additional review, other than to satisfy ourselves that it was, indeed, standard, and appropriate, and then issue a complete safety evaluation to summarize an S-COL.

MEMBER BROWN: Can I ask that in a different way?

MS. McKENNA: Sure. Yes, I know it's a little confusing.

MEMBER BROWN: Vogtle FSER, will that be complete in itself, and will not reference back to any other documents on Bellefonte?

MS. McKENNA: Correct. Correct.

MEMBER BROWN: Also, Vogtle becomes the reference for subsequent S-COLs.

MS. McKENNA: Right. In the case of Vogtle, they have an early site permit, so you will see referencing back to that, but not that -

MEMBER BROWN: Now, when you do the Vogtle one, will that -- you say you're going to lift the Bellefonte SER material -

MS. McKENNA: Standard content.

MEMBER BROWN: Standard content.

MS. McKENNA: Correct.

MEMBER BROWN: And for those that aren't, you will then have to redo, reissue, re-evaluate, and recompose, but how are those, where there are some differences between Bellefonte and Vogtle, going to be?

MS. McKENNA: Yes. If there is site-specific differences, site-specific questions for Vogtle, they would have to be answered in the Vogtle SER. We don't anticipate a lot of those, because of the early site permit. Most of the site-related issues have already been evaluated and closed as part of the early site permit. But there could be some -- I guess there probably are some site-specific parts of the COL that Vogtle will have to answer for themselves, not on behalf of all the COLs.

MEMBER BROWN: So, those will be fresh evaluations -

MS. McKENNA: Yes.

MEMBER BROWN: -- relative to their -

MS. McKENNA: That's correct. And, similarly, when we get to any of the other S-COLs, we would look at the site-specific information.

MEMBER BROWN: There's a little mix there.

MS. McKENNA: There's a mix, just because -- in any one chapter, there's a mix, information that came out of the DCD, standard content information, and site-specific information. So, it makes the bookkeeping in the SER a little complicated, yes.

So, anyway, we are, hopefully, moving to the direction where all you will need to worry about in the near term would be Vogtle, and then shortly thereafter some of the other S-COLs, but you won't have to keep in your mind both Vogtle and Bellefonte at the same time.

So, most of the chapters are out, and the last couple, as indicated, they -- the COL SERs don't go ahead of the DC SERs. We need to make sure that, since they're referencing back to it, we need to make sure that they fit together, and are consistent. So, we do not issue the COL SERs until we've issued the comparable DC SER. Did you have a question? Okay. So, those are the last chapters that still need to be done on Bellefonte, to be the basis for the Vogtle.

So, Staff is preparing the Vogtle Advanced Final SER with no open items. SER with the standard content, the responses to those that come from Vogtle, the responses from Vogtle on their site-specific RAIs, and prepare Advanced Final SER with no open items.

This is the current schedule for Vogtle. Obviously, as I said, we can't get ahead of the DC, we'll need to look to see whether any adjustment is needed on this schedule, but we would anticipate that the interaction on Vogtle would be occurring in the fall of 2010 with the Committee.

The next slide is a proposal that's been offered by our COL colleagues to -- what's going to happen between now and next fall in terms of interaction with the Committee. And the proposal that's being put forward here is that over the next few months our Staff would meet with your staff to try to identify if there are particular items or issues, significant topics that the Committee is interested in related either to the standard content, or anything on site-specific, on Vogtle that hasn't been covered already, and try to identify what those are. As time permits, and over the course of the spring and summer, we propose having some informational briefings with the Subcommittee, so that those issues could be explored, such that when we came forward with the Final SER in the fall, that we wouldn't have any surprises, or problems that arose at that time. And seeking your feedback of whether you think this is a viable approach, other suggestions to offer of how we might proceed with Vogtle. And then, subsequently, we'll have other S-COLs that will be coming forward on site-specific content.

So, that's all I have. Frank, do you have anything to add?

MEMBER RAY: Great. Good job of responding to the laundry list of data inputs. Mr. Chairman, we've got time, if members want to pursue anything.

MEMBER BLEY: Yes. I'd like to revisit something I asked Staff about at our Subcommittee meeting. I've been thinking about it a little more. The existing Certified AP1000 has DAC. The amended certification will not have many of those DAC. What I'm wondering more about is, shouldn't there be some recognition in the SER of the clearance of those DAC, that they were there for a reason, at least some statement that that reason has been fulfilled, and how it had been fulfilled. I'd asked if people looked at the DAC, and looked at those acceptance criteria as they were doing their reviews to see if the acceptance criteria would have been sufficient to generate the depth of questioning that they had raised in their review. And they acknowledged they hadn't thought about doing that. But the other side of it is, shouldn't there, at least, be some accounting for the DAC, and that they're completed?

MEMBER CORRADINI: So, can I -- I was listening to your question. So, you're saying you can almost use the fact that you got an amendment for a change to see if the DAC actually performed any useful function, that what they put in, essentially, satisfied the DAC. That's what I think you just said.

MEMBER BLEY: Well, that's half of it. That's what I asked at the Subcommittee, and I was saying this is kind of a test bed to see if those acceptance criteria really would work. The other half is, when you issue an amendment to a license that -- to a certification that had DAC, shouldn't the SER acknowledge those DAC were there, and describe explicitly how they were cleared?

MS. McKENNA: Yes. And we agree with you on the second point, that the SER should speak to -- because one of the things that the SER is saying is that those DAC no longer remain in Tier 1.

MEMBER BLEY: It's not doing that explicitly now, I don't think.

MS. McKENNA: Okay. Then maybe that's an improvement we need to make in our Final SER, partly, I think because at the time -

MEMBER BLEY: That would also facilitate our review.

MS. McKENNA: Yes. I think part of the reason I think that it may not have been as explicit, is that in both Chapter 18, and Chapter 7, we're not, as of this day, prepared to say everything as of right now is fully complete, so our SER was a little more couched in terms of, we've gotten this far. There's this gap to overcome, and then we can close everything out. So, I think that looking forward to the Final SER, that's where we want to be, but I think that's why we're not -- you're not seeing it as explicitly right now. But, yes, I totally agree that that's where we need to be when we're done.

MEMBER CORRADINI: What about his first question? What about my interpretation of his first point, which is, isn't this a good test bed to see that the things that you agreed were sufficient enough to leave as a DAC actually turned out to correspond to what they chose to do?

MEMBER BLEY: There were a fair number of RAIs that were generated during this review.

MS. McKENNA: Yes.

MEMBER BLEY: How would they have arisen under the DAC process?

MEMBER RAY: That's a difficult proposition, Mike. Why don't we pick it up at the retreat?

MEMBER CORRADINI: Okay.

MEMBER BLEY: I think it's more for Staff to think about. I mean, that's -

MEMBER CORRADINI: I mean, I'm not even sure if I want to document it. I'm just simply saying if you guys are comfortable going in, that you certified it with all these DACs, and now they're coming and they're amending it with all these things that have been unDAC'd, is there some correlation so that you learn something so the next, I might pick a plant, another applicant with a DAC, you've learned from it, so you can better identify them, if they're not completed, if they're not detailed enough that they stay as DAC through the COLA stage. I guess that's what I'm trying to get at. It seems the Staff's got to learn from this in some manner.

(Simultaneous speech.)

MEMBER BLEY: But there is actually a Staff Working Group now that's trying to lay out a process for closing those.

MEMBER RAY: I'm just saying the mere fact that you found something that was satisfactory, and so you removed the DAC, I don't think, necessarily, says anything about the adequacy of the DAC to begin with. And that's really the question you're asking. Or if it does say something, it's a different analysis than the one that needs to be done to okay the thing that replaced the DAC.

MEMBER CORRADINI: Sure, but in some sense, that's process. I want to know that the Staff is recognizing this, and learning from it somehow.

MR. AKSTULEWICZ: This is Frank Akstulewicz. Let me try to speak to that, but I'm not going to get all the way to the answer. I sat in on a couple of meetings this week with the Human Factor folks, and one of the things that has been clear from those discussions is, they now recognize that the DAC that they were originally using as part of the original certifications isn't rigorous enough, and they're making changes in the DAC requirements for some of the plants, like AREVA.

MEMBER CORRADINI: You don't have to name names. I just want to make sure -

MR. AKSTULEWICZ: No, but I'm just saying, I'm using that as an example, where the original DAC that may have been present is not going to be the DAC that they're going to move forward with in the future, because of what they have learned as part of the reviews on plants that have tried to close the DAC as part of the regular licensing process.

MEMBER CORRADINI: Okay.

MR. AKSTULEWICZ: So, we are learning. I think that's the message.

MEMBER CORRADINI: That helps. Thank you so much.

MR. AKSTULEWICZ: Okay.

MEMBER BROWN: I don't want to lose sight of Dennis' second point, though, going from no DAC -- from DAC to resolved DAC. You do want to have -- I totally agree with you. I'd like to see how those got resolved, how they were closed out, and what things were looked at, and what was the depth relative to the requirements in the -- for the various design -- parts of the design.

MR. AKSTULEWICZ: This is Frank, again. I think that's a fair expectation, and we'll take that back and talk among ourselves.

MEMBER RAY: We are done, I think, Eileen. Do you have anything more?

MS. McKENNA: No, that's all I have for the meeting.

MEMBER BROWN: I have one comment. The November meeting can be very productive if we get some -- on the I&C part of it, if we get some of these differences, highlight what did it look like, what does it look like now, what were the major changes, and how are they reflected in the design so that you can how they operate functionally. And talk to the I&C architecture, not necessarily each of the contacts, and switches, and logic diagrams, but the fundamental architecture relative to what I would call the four pillars of independence, redunancy, determinacy, and defense-in-depth.

MS. McKENNA: What was your third statement?

MEMBER BROWN: Determinacy.

MS. McKENNA: Determinacy. Thank you.

MEMBER BROWN: And then defense-in-depth, which kind of define the bulwark or the pillars of reliability for I&C. And that's not really clear from the diagrams we see. We brought that up in the last meeting.

MS. McKENNA: Yes.

MEMBER BROWN: It's been hammered several times, so I'll just repeat it again.

MS. McKENNA: Okay. We'll be having discussions of -- we'll see what we can provide in advance, and, certainly, at the meeting.

MEMBER BROWN: Thank you.

MS. McKENNA: Yes.

CHAIR BONACA: Any further questions or

comments?

MEMBER ARMIJO: I had a couple of things.

CHAIR BONACA: Yes.

MEMBER ARMIJO: First of all, I appreciate these -- preparing these summaries of the significant changes in hardware and design materials, fuel and core, providing methods needs to be added to that list, that would help us plan our work, and, possibly, and this is for Harold, that we could structure the meetings based on this, hardware changes, and physical things, as opposed to chapter-by-chapter, because some of these things are -- clearly, the sump is going to take a focus, but you could group some of these other changes for reviews by Subcommittee, so you get them off the table. For example, all the material stuff could probably be handled in one Subcommittee, rather than piecemeal as part of several chapters. So, I'm just thinking out loud, that's something that we might want to think about.

CHAIR BONACA: We will discuss that on Saturday morning.

MEMBER ARMIJO: Yes. Anyway, I think that's very helpful.

MS. McKENNA: Okay. Thank you.

CHAIR BONACA: Any other comments? If

not, we'll take a break until 10:45.

(Whereupon, the proceedings went off the record at 10:21 a.m., and went back on the record at 10:46 a.m.)

CHAIR BONACA: All right, let's get back into session.

The next item on the agenda is the Regulatory Guide 5.71, Cyber Security Programs for Nuclear Facilities. And Dr. Apostolakis is going to take us through the presentation.

DRAFT FINAL REGULATORY GUIDE 5.71, CYBER SECURITY PROGRAMS FOR NUCLEAR FACILITIES

MEMBER APOSTOLAKIS: Mr. Chairman, the subcommittee had a meeting with the staff on October 23rd. It was a very good meeting I thought. We understood better where the stuff is coming from. At the end of the meeting we went around the table and expressed impressions and all that. Some people felt that we were making good progress. Others felt that this is too generic, we need to have more specifics especially on the nuclear reactor part. Because it's based on a number of reports and standards that have been issued by the National Institute of Science and Technology which are not nuclear reactor specific, they are more general.

So one of the things we would like to understand better today is how can -- what is the level of specificity, plant specificity, and of course, what the whole regulatory guide is about. So without further ado we'll go back to the staff.

Scott, want to say something first?

MR. MORRIS: Well, I'm going to kick it off. So if you are ready Mr. Chairman?

CHAIR BONACA: Sure.

MR. MORRIS: Well, thank you, I am Scott Morris. I'm the deputy director for reactor security in the Office of Nuclear Security and Incident Response. We don't - our office doesn't get many opportunities to come and engage with the ACRS to talk about things that are security related, so this is somewhat unique in that regard. So we appreciate the opportunity and hopefully by the end of our presentation you will have a better understanding of the document that we have produced; how it's evolved since the last time we met to discuss it.

I want to spend five or 10 minutes just kind of, before I turn it over to Karl, Eric and Mike to go through the document - and I recognize we only have an hour and a half, so I'm going to be very brief. But I feel it important to at least give you some of the background, the context associated with the how and the why of the way we created the document that we did.

So with that, I'm going to start by saying - and I should also point out that in the meeting notice we indicated that parts of this meeting may wind up needing to be closed. I'm hopefully that we won't need to do that. We are going to try to keep this at a level where this is not necessary. But if we sense that we are going there, we will have to call a time out.

So with that, what I wanted to start by saying, suggesting, is that particularly in the NRC, and us as engineers, scientists, we trying to solve problems through design measures; and that's a good thing. The problem with security though is that you simply can't solve all things security through the application or implementation of design measures. And that's been proven over time and history.

And the way we've constructed this reg guide is consistent with that opening premise. Basically what I'm saying to you is that there are - unlike the way we view safety-system designs that are grounded on a basic set of failures that we are trying to preclude or prevent, like double E and the guillotine breaks of the largest single - or prevent, like the double E and guillotine breaks of the largest single reactor coolant system pipe, or drop rods, or whatever, things that we analyze and try to design features at the plant to prevent or maintain the site of the plant within its design basis.

Much much more challenging in the security space, largely because there is no definitive set of attack records that we can, you know, conceive of every possible combination of ways that something can be attacked or compromised. And with the design basis accident, and the analyses we talk about there, we talk about, again, a set of operational events that we don't want to, and try to put designs it to prevent. But with security we are talking about an intelligent malicious actor, an intelligent malicious adversaries who learn. And they are knowledgeable. And they take time to figure things out before they initiate their deeds. And so the security realm, it becomes more challenging to come up with some design that is going to be in and of itself sufficient to preclude bad things from happening.

So the other part of that, and what potentially exacerbates the problem when we talk about cybersecurity, is that we are dealing with digital instrumentation controls; we are dealing with networks, and information technology, that runs on hardware and software. And as you probably know through other briefings with the Digital I&C Steering Committee subgroups and working groups, that we had a real hard time figuring out how to model the failure modes and Digital I&C and the application of risk. And basically we just don't do it. We basically say the state the art doesn't support it, so we just aren't going there yet, and we are approaching that whole problem from a different angle.

So we combined the intelligent malicious learning adversary with the nature of Digital I&C and network IT hardware and software. What you wind up with is a conclusion that says, I can't simply design a piece of hardware, a Digital I&C asset, that I can assure myself for all time that will be protected from cyber attack. I cannot do that in the security space.

So what do I do instead? Well, first of all, let me say that trying to do that isn't a bad thing; in fact we encourage that particularly with the new reactor vendors and others in which they retrofit older systems with newer digital platforms, is that we should - based on what I just said we should not try to develop system designs that aren't inherently resilient to attacks and vulnerabilities. But what I'm saying to you today is that that is only one leg of the stool. There has to be defense in depth. Because of the uncertainties that I've just spoken about. And essentially, and this is entirely consistent with how we managed this problem in the physical security space, we relied on performance based programmatic requirements that do a couple of things.

Number one, that ensure that the assets that need to be protected are identified and well understood - how they are connected, how they are physically located, how they operate. So that is really step one. What are the things I need to protect?

Number two, once I understand what those things are, I need to apply a comprehensive set of controls, technical controls, operational controls, management controls, to - and apply those controls to each of those things I'm trying to protect. And that's where the NIST piece comes in, and these folks will talk more about that.

The other thing is this idea of defense in depth. It's acknowledged in security space that irrespective of how you design your perimeter security and your intruder detection, the first, second, and maybe even third barrier to radiological sabotage which is the endgame for the adversary may be breached. It doesn't matter, I may design a vehicle barrier, but at the end of the day the bad guy is going to figure out how to defeat it. The problem is, the goal is that there is another barrier, and additional levels of defense in depth that there is high assurance that the site of a licensee can adequately protect against that adversarial result before radiological sabotage occurs.

So that is in essence how we regulate and establish our requirement and guidance associated with security in general, and you will see cyber security specifically today as these folks walk you through the reg guide in its current state.

The basically security model that is employed, both physical security and the one that you will see here today, is deterrence, detection, delay, assess, respond and recover. So the model that we are talking about today for cyber is consistent with that. You want sufficiently robust systems in place, and measures in place, to deter the bad guy, but even if he comes at you, you want to be able to detect him, delay his progress in achieving his radiological sabotage goal, assess what he is trying to do, hopefully in near real-time, and be able to respond to those attacks effectively before radiological sabotage occurs, which again is the ultimate performance objective for all things security at nuclear power reactors.

Now before I yield to these gentlemen, there has been a lot of discussion and I touched on it earlier about the use of risk assessment, and risk pools and vulnerability analyses, to try to figure out what is it I need to protect. And in fact the first iteration of our reg guide was exactly built on that premise: how can we leverage the couple of decades of experience that we have accrued in understanding how nuclear plants work and what their failure modes are, leverage that knowledge and experience to build a regulatory guide that is focused not only on protecting those systems that are particularly significantly significant from a risk standpoint, and then another level of sophistication, to say okay, once they've figured out those, how can I use risk to try to identify what the appropriate set of security controls I need to put in place for this.

And what I'm telling you today, and what you are going to hear today, is that we have abandoned that approach, and for good reasons. Because number one, our expert elicitation, unfortunately, some of our experts - one of which is not here today because he has the swine flu, but he was at the subcommittee meeting - had taught us a valuable lesson. And it's actually a lesson we already knew, but we just kind of missed it. We didn't adequately translate that lesson in physical security into cyber security.

And that is that the use of risk methodologies to try to get in not only get in the minds of bad guys but then to try to understand what are all the vulnerabilities and risks associated with hardware and software and connectivity and network design is incredibly difficult, laborious, painstaking task, that at the end of the day the professional literature says hasn't been done or proven to be effective to any degree. And our experts, which our experts have subsequently confirmed. But also that the risk by applying those types of measures, using risk-based tools to try to establish a program and figure out what controls to put in place at the end of the day would require not only an enormous amount of analysis but an enormous amount of documentation, and that documentation would prove to the independent oversight organization, namely the NRC in this case, through inspection or licensing or whatever, would be very difficult to have all - when you think about particularly new reactors, which are going to be almost exclusively digital, the amount of analysis and paperwork and documents it would be pretty extreme.

And so one of the ways we deal with that, again, is we have evolved our reg guide to be more consistent with the methodologies and protocols established by the National Institute of Science and Technology, and specifically with two key special publications, in this case it happens to be 800-53, and 800-82, in which they have used their consensus-based standards process, established a broad set of technical, operational, and management security controls that should be applied to digital assets that need to be protected. But they also say, NIST that is, that these controls should be tailored for their particular application. And that is precisely what my team has done in collaboration with the industry is to start out with a set of NIST standards, security controls; boil them down to those that are essential to the nuclear facility application.

And that is what you will find in Appendix B and Appendix C of Reg Guide 5.71, basically a derived set of security controls that are based on the

NIST product.

One thing I would also say is, this is precisely what we do in the federal government. Federal Information Security Management Act, or you may hear it referred to as FISMA, is a mandate placed on every federal agency to be in compliance with. And not surprisingly, the NIST standards that I refer to form a basis for federal government demonstrations that they are meeting their requirements of FISMA.

And so we are not really asking - we are basically leveraging success here is what I'm telling you. We are not inventing a new wheel. We are not creating something that hasn't been created before and hasn't been proven. We are leveraging success.

Just to sort of wrap up. A few other key points. As I've said we've evolved the document rather substantially since March, in addition to the use of NIST controls and certain protocols, we've had extensive industry involved particularly in the discussion of the types of controls that I'm talking about.

We've also included a new part of the document which you will see, Appendix A, which is a generic cyber security plan template that licensees and applicants can use as a basis to develop their site-specific security plan; that the cyber security regulations, 73.54, requires each licensee to submit to NRC for review and approval by November 23rd of this year.

So we've basically said, look, if the licensee requirements of the rule say you've got to - you, Mr. Licensee, have to explain to us, NRC, how you are going to implement your program at your site? What is your plan for implementation?

We have given them - we have given them a straw man, that if they simply follow that will make that job, that licensing job, much much easier. So that is appendix A of the document. So that is new. You didn't see that in your earlier version.

In addition I mentioned that we've had extensive engagement on the part of the external industry expertise, and unfortunately we weren't able to have some of those folks here with us today. But suffice it to say this thing has been poked and prodded and looked at and examined from multiple different angles with multiple different people, and we have tried to incorporate their comments.

But generally speaking their comments have been, this is great. This is exactly what you guys - how the NIST document should be utilized. And NIST encourages that we take their documents and you tailor it to your specific need, whether you are a bank or you are a pharmaceutical company or a nuclear plant. So we've tried to do that, again, tried to leverage success.

Quick, last thoughts. Reg Guide 5.71 is written for an audience that is not your typical - well, let me say it in a more positive way. The Reg Guide is written - assuming that the reader has cyber security knowledge and expertise. So you may read the document and not fully grasp some of the nuances or concepts that are built into the document. And that is because there is an underlying assumption that it is written for cyber security professionals from the start.

Number two, the vulnerability analysis I touched on earlier, there was a fair amount of discussion about vulnerability analysis, and it's use or potentially lack of use at the subcommittee meeting, and I wanted to hit that head on here. Vulnerability analysis is a good thing - we recognize that. And in fact it is incorporated into this document. But it's not incorporated in a way that you might traditionally think about it. Specifically when you think about doing a vulnerability analysis first, and then saying, okay, what did that tell me? What are the holes that I have to fill? What are the things that I need to do to mitigate what the vulnerability analysis is telling me.

And that's not how it's used in the context of Reg Guide 5.71. Rather, vulnerability analysis in the context of this particular reg guide is to say, look, we start by applying the derived security controls from NIST. Then you use tools such as vulnerability analysis tools, some of which are automated tools, some of which are hand-over-hand table top evaluations. But you then do your vulnerability analysis to examine how effective are these controls that I just put in.

So vulnerability analysis is captured, but it's done in a slightly different way than you might ordinarily think about it.

Lastly, we ought to think about security, not only cyber security but physical security, information security, personnel security. We like to think about all the requirements and controls and programs and regulations and guidance, and all that we do is security space as fundamentally being a couple of things. Perhaps the most important is, ensure that all these assumptions we make, all the designs that we build, all the things that we do to ensure that the safety side works, we - the security program is there to preserve all those assumptions; it's there to preserve those designs such that they are utilized and respond in ways that they were designed to respond.

The minute your - they are not designed in ways that consider malicious activity which the general design criteria of Appendix A to Part 50 does not include malicious attacks as part of your thinking when you are doing design work. So everything in Part 33 is about preserving what we try to accomplish in the application of the requirements in Part 50.

I wanted to leave you with that thought. It's important, because again, it goes to this idea of failure modes that are a result of equipment failures, or human errors, or potentially environmental events, but none of which are malicious. All the malicious stuff is handled through the security programs, which I've already said, can't be done exclusively through design. It has to be done - design is a piece of it, certainly, but it's not the whole story.

So with that, the team again, and you've indulged me for over 15 minutes now, and I do appreciate it, the team has developed a brief overview of the construct of the reg guide, especially some of the principles that are embodied in there, and will embellish on some of the things that I brought up.

Most importantly they are going to walk you through a real example of how the document and the guidance that's in the document would be applied to a real system.

So with that let me introduce Eric Lee, Karl Sturzebecher and Michael Shinn, who have been the principal authors and architects of this process. Take it away.

MEMBER SIEBER: Well, let me comment a little bit. The reg guide as you have it now is very general in nature as I read it. And I think in my own opinion I think that is appropriate, because if it were to be more specific, that would be a perfect guideline --

MR. MORRIS: A roadmap to success for an adversary.

MEMBER SIEBER: That's right. And that would unnecessarily focus the utility on certain aspects of the design to the neglect of other aspects of the design. I have taken the time to talk to a few people who are in this business, and discuss the kinds of things you are proposing and said, if you had this set of rules, what would you establish as your practice. And they basically said, these rules don't tell me how to practice my trade, because it's like a chess game. You have the licensee on the one hand, versus another person with mal intent who is determined to in. And they probe various avenues until they are successful.

If you have an inflexible program you can't respond to that, as I see it. And I've been told that way. And my first impression was, you are not specific enough in your reg guide to tell people what to do, and what you expect from them. But others who work in this trade tell me that once you build this framework of what it is we are supposed to do, that reveals to everyone else where the vulnerabilities may exist.

And another suggestion that has come up from time to time is the use of a pilot program before you establish this as a rule across the industry. It's not clear to me, in random situations that occur which are intentional but may not occur through the pilot plan, what that would actually show you. And if you could as you go through your presentation keep your thoughts in mind, and tell me whether these thoughts are the right thoughts or not the right thoughts, I would appreciate that. That would clarify it for all of us.

MR. MORRIS: You are absolutely right. And I'm not going to take much time at all, but simply to say that with security you are never done; you are always dealing with intelligent, malicious adversaries, who in spite of what you do is going to find another way what you've done. And that I think is the essence of what you are saying.

MEMBER SIEBER: It's a chess game that never ends, and there will be a winner and a loser.

MEMBER BROWN: I've got - I can't resist. Sorry I was not at the meeting, because I was just recovering from being in the air. I just got back from 13-hour time zones, so unfortunately I missed the meeting on Friday. But I did read the reg guide last couple of days. And the comment about the maliciousness, I totally - I don't disagree with that, external, internal, whatever it is. But fundamentally I don't group nuclear power plants in the same category as I do banks, credit card companies, all others who want information who throughout the world under any circumstances have customers come in and be able to change do whatever they want. They are totally different. You don't have to have information flow outside of the nuclear power plant, of the power plant, on this same basis.

And you've got, obviously you want communications within the plant. And there are certain systems where the basic protection against malicious intent is isolation. You don't let it get out, and you don't let --

MR. MORRIS: That is my favorite one.

MEMBER BROWN: If you don't let it in, then that's - then all you have to deal with fundamentally is internal, an operator or somebody has a malicious thought process, and if they turn a switch they do - and there are other design things that you put in - if you bypass a system an alarm light goes off, or red warning light or something like that. And you may miss a few, but you will find those as you go through your operational status.

So isolation is a major tenet of this. So where you break - and there are tons of procedures, processes, reviews, controls, and I'm just looking at this from the paperwork burden, of managing this, for the operators, from the utility standpoint, there is a lot of good stuff in here. I'm not disagreeing with a lot of the detail. It's the level to which we go. And I would look more to a framework to be developed such that fundamentally you look at what are your really critical systems, you isolate them. Then your configuration management, and then you have access controls. There are three fundamental I call them pillars of protecting data and information in systems.

So that's what I miss when I look in here. It was process, process, paperwork, reviews, method, method, paperwork, more paperwork, and on and on, and there is a lot of it in there.

MEMBER APOSTOLAKIS: There is one hour left.

MEMBER BROWN: I will stop now.

MR. MORRIS: If we can't answer those issues by the end of today then we will have failed. Because I can assure you what you are mentioning is in there. Now whether it's clear on first read that is arguable.

MEMBER BROWN: Well, I just wanted to give you a calibration of what I was thinking, that's all.

MR. MORRIS: All right, Eric, Karl.

MR. STURZEBECHER: All right, we are going to go through just as quickly as possible, we are going to review the enhancements that we made to the reg guide since the last time.

Here's the overview of the Reg Guide 5.71, and do an actual example to show you why the security controls and the strategy we are talking about.

The guide has a new framework. It's basically to establish and maintain, when you read through it. It's simple, it's linear, it also has the deterministic methodology that we are using from NIST, and we adopted 18 families from NIST, and another family from DHS, and we are using those as countermeasures in the application of whatever CDA or critical digital asset that you have that you are trying to protect.

The third bullet is to provide full spectrum security controls. And what that means is that you have three ways of applying specifically the technical controls. If you can't apply it you have to find another countermeasure that is equal or better. And the other, finally, is if you don't need it you explain why. And that's part of the process for that. So it's self tailoring.

The fourth bullet, it details guidance and examples to meet rules. From the ACRS letter, we followed that instruction and added more into the guide to try to show how you go through the stages of establishing your cyber security program.

We have addressed the difference between the digital instrumentation controls and the IT systems. The controls we've taken, that we have adopted, we've sat down with industry and gone through and nuclearized them, quote unquote. So they are adapted for nuclear sites and facilities.

The defensive architecture now has a new section in Appendix C with more details, how you set that up. And we have security lifecycle enhancement, and that is basically when you are maintaining your program, you have to constantly monitor and approve what is going on in your security baseline to make sure that whatever security assets you have in there that they are up to par and meeting with the constant changing adversary.

And finally there is a security template, and as Scott explained before, that's where the licensing act goes.

I'll briefly go through the steps that the guide takes you through. You form your cyber security team. Everybody has to have a sponsor, and it's a diverse group of people, from the site. And then you go through and you identify your critical digital assets, and as you saw in the guide there is a flow chart where you take all your systems and you step through that flow chart, how about your critical systems, and then pass through again to find out what your CDAs are.

And then finally there is the defense in depth protective strategies. There are three basic strategies. These are conceptually, they are integrated together.

The first one is after you've selected your CDAs, or realize what they are, you drop them into the boundaries, and we have - the guide shows a Level 4 to a Level 0. And you drop it into Level 4. And then we have a second strategy --

MR. LEE: One point that I would make, Dr. Brown, is that you mentioned --

MEMBER BROWN: Thanks for the doctor on that? I'll take it, go ahead.

MR. LEE: Is that you have mentioned about the isolation.

MEMBER BROWN: I saw your diagram at Level 4, 3, 2 1, 0. I know what he is talking about.

MR. LEE: This is where we talk about that isolation. And we absolutely agree with you, everything you said. And some of the elements that you just talked about, about the access control. The one thing that may not be very clear about this document is that in order to make this document short and sweet, what was did was, all those concerns that you mentioned about access control and things of that nature, we moved that to Appendix B and C.

MEMBER BROWN: I saw that.

MR. LEE: So it does address access control, meaning that Section 3.1.6 says that apply all security control, meaning to address all the security controls. So they have to look at the security controls. And one of the elements out of 145, over 145 security controls, is that.

MEMBER BROWN: You said the magic word, 145 security controls that you apply.

MR. MORRIS: Hold on, Erik, let me take that on.

MEMBER BROWN: It's a lot.

MR. MORRIS: It is, however, in order - what we are asking for in terms of documentation - and you mentioned paperwork - what we are saying is, by adopting these controls there is a minimum amount of paperwork. You just say yea, barely, they are adopted, period. If you want to do something different, take credit for some design feature, take credit for some site specific, I mean whatever, that is where the documentation begins to say, well, you know, I don't want to put that control in, and here is my justification. We are okay with that.

The converse is, to start with a vulnerability attack vector kind of analysis, you are going to have to document all of that.

MEMBER BROWN: No, I'm not talking about the vulnerability.

MR. MORRIS: Well, you mentioned paperwork and the volume of paperwork. I'm simply saying that by this methodology we'll minimize - I'm not saying it's a trivial amount of documentation, but it is far, far less than what we would expect under the alternative approach.

MR. LEE: My point that I would like to make is that what we are talking about, 145 security controls, these are like per system, systemic, root cause for I guess system compromise. So what we are saying if that you think about these. So just like what you have mentioned about isolation, some of these root causes may be addressed by like access controls, all the system isolations, and the way we are allowed them to address in this document, and we have gone through this, with industry, I guess over a month period. We talked with technical folks; we talked with the licensing folks; and we again talked with the licensing and technical folks. And throughout the last six months period. And we talked about implementation, documentation, how they could address some of these issues.

MR. STURZEBECHER: There is an inherence aspects, that if you are behind a particular boundary you can inherit that protection. The other side is, I know you're saying it's a lot of documentation, and maybe not necessarily; but it's also an incentive that says that you should be isolated. But the other aspects when you look at the problem it's very complex. I could walk into this, plug in, and don't even know it, and I got the slammer work on a high level system.

MEMBER BROWN: But that's access control.

MR. STURZEBECHER: It's access control by policy.

MEMBER BROWN: Will it be covered, when you design a system, a digital system, you can control access control electronically as well, or you can alert somebody if somebody makes access to it. It's not all that hard to do. If you are bringing in a new digital system, if it's an existing one, it's more difficult to back fit, because you got software changes, blah blah, all that other stuff. If you are putting in a new system, as most of the plants are trying to do today, those - I don't disagree, the aspects are, you want to start at the beginning and design it so that you don't have those types of problems, and that - I'll stop.

MEMBER APOSTOLAKIS: Is there a place where you are investigating whether licensees expected to document what the impact on safety might be of all these security controls?

MR. SHINN: Yes, in two ways, Dr. Apostolakis. There are two elements. The first one is the safety element. There is a requirement that when you look at a control you have to consider what the impact will be by implementing that control on the safety, security and emergency preparedness function. So there is a requirement that the implementation of a control not have an adverse impact. So that is number one.

Number two is that you have to actually measure the impact of the vulnerabilities, whatever they may be, in your program, even once the controls are implemented. So there is two sides to that. That's I think the way the industry put it. Don't be maliciously compliant, don't implement the controls in a way that disrupts the safety program.

MR. MORRIS: Let's take it out of the

abstract. You're in a control room. You've got a digital based control system. And if you implement every control that is in our reg guide that wouldn't necessarily make you put, after X amount of minutes go by, that locks you out of your system, and now you got to enter a password to -- I can't scram, because I got to enter my password first. That's absurd; you don't want that. That's what we're talking about.

(Simultaneous speakers.)

MR. LEE: Actually we created that particular one in there, and we actually went through each and every single one of these items and talked with the I guess the practitioner, licensee, technical folks that were down here one week. And we went through every single one of them and how they could be implemented.

So just like Scott has stated, originally Scott nuclearized the NIST standard, then we met with the industry folks, the technical folks and see if they can do this, or how they apply. So we implemented these, that they mentioned various systems, and because of these systems we have to do it this way, that way, so we tailored it just like Appendix I of the NIST standard specifically said that for an industrial control system you need to tailor it.

So we even actually met with Dr. Abrams to look at the document. And we talked to him, and he was very excited that we did it right.

MEMBER APOSTOLAKIS: Okay, let's go on.

MEMBER POWERS: I can't completely understand how anyone of these strategies you listed up here constitutes defense in depth.

MR. MORRIS: We haven't got there yet. We are going to walk you through how that works.

MR. STURZEBECHER: So the second strategy listed up here is about applying these security controls, these over 145, and that is also coupled with the physicals, because sometimes you do share either one or both.

And then third is maintain your cyber security program which is a strategy in itself to keep the system up.

So what I'm going to show here is an example, and it's an application of the first two strategies. And I have a fictitious reactor protection system here. An Ethernet to a switch, it goes out to the plant's data network and is connected to an HMI, an engineering work station, human-machine interface.

So the team gets together and first determines what the critical systems are, and the CDAs, they use the flow chart and step through, and the RPS comes up as performing what you call a safety or security or emergency preparedness function.

You do it again, you follow through with the system using the flow chart, and you come up with the other two particular assets here. And the switch falls into the second diamond, which is, it has a pathway effect on this particular critical system.

The HMI, the engineering work station, comes up as an importance to safety, it communicates with the RPS.

MEMBER BROWN: A non-safety related one communicates with the RPS?

MR. STURZEBECHER: That is actually what we've heard from the industry. They will call that a non-safety related item. We overstep every bound. We don't really care what you call it; we look at everything.

MEMBER BROWN: Well, I understand that, but they are actually saying we are going to have these non-safety related things communicate back to the RPS. That is non-one-way communication, so that is actually up in Level 2 in your diagram.

MR. SHINN: That is a great question. Thank you for asking, because that is Karl's next theme.

MR. STURZEBECHER: If you apply the defensive strategies that we have, and you deploy how you are going to put this in a logical architecture, you are going to put this entire highway, into Level 4.

MR. SHINN: And you put the one-way diode in place to isolate the assets.

MEMBER BROWN: So where would their one-way part go?

MR. SHINN: The little diode diagram that you see there?

MEMBER BROWN: I just turn the page, thank you.

MR. LEE: The equipment part, Mr. Brown, is that the switch and the importance to safety function is that the man-machine interface is a Critical Digital Asset per our definitions. Because that HMI, our understanding is that it provides set points and things of that nature so that it could, it is important to the safety system for performing its function properly.

So it provides two things. First you see it provides a pathway to the safety system, or it could adversely impact those functions. So that's why there is an other than non-safety systems in our view, they are critical systems.

MEMBER BROWN: Oh, so their comment was that that should be set points for their protection systems that are in the HMI in the engineering stations as opposed to reactor protection system?

MR. STURZEBECHER: It is where you upload them.

MEMBER BROWN: So they want to use the main control room to download stuff down to their cabinets that are sitting wherever they are within the plants. That's what they are doing.

MR. STURZEBECHER: That's possible, depending on --

MEMBER BROWN: As opposed to carrying a laptop down where you've got a secure access control, non -

(Simultaneous speakers.)

MEMBER BROWN: The only point I'm making is about plant design for critical safety systems. Just because you can do it doesn't mean you should do it.

(Simultaneous speakers.)

MEMBER BROWN: We're telling them, if they're going to do it what they have to do. That's fine. I don't have any problem with that. I guess one of my hot spots, and maybe I'm off base, because I'm always off base, is that why is the NRC people implementing these things that way where you have a possibility of compromising critical safe guards and protection systems, allowing these types of connected systems to compromise you. Because you are not allowed to tell them how to do it, is probably the answer you are going to give me.

MR. MORRIS: At the end of the day the performance standard is prevention of radiological sabotage. And if there is a way the licensee can demonstrate that they have high assurance that they can adequately protect against that -

(Simultaneous speakers.)

MEMBER BROWN: They're going to put little guys at the gate to look at the information going back and forth.

MR. MORRIS: I personally happen to agree with you. Don't even connect it to anything.

MEMBER BROWN: I'm fine, I understand what you are talking about.

MR. SHINN: And we do say that in the reg guide. We do say that isolation that is completely disconnectible asset, is preferred.

MEMBER BROWN: All right.

(Simultaneous speakers.)

MEMBER BROWN: We got to get through this, so why don't you go on.

MEMBER POWERS: What is totally opaque to me, would you go back and explain the diagram to me. Let me warn you that any letter that comes out of here has to have the vote of all the committee members. And you can speak to all of us. Because I guarantee you right now you're going to get a no vote on me on this part of it.

MR. STURZEBECHER: What questions do you have?

MEMBER POWERS: A totally opaque diagram. What are you trying to communicate with this diagram? We're looking at 6A as I recall.

MR. STURZEBECHER: Well, okay, I apologize for the printout on that.

MEMBER APOSTOLAKIS: Can you go back to the previous?

MR. STURZEBECHER: I'll go the slide that shows the four levels first.

MR. LEE: Back up a slide.

MR. MORRIS: What Karl was trying to illustrate here is that everything you see in the example so far is Level 4, and when you look at one of the --

MEMBER POWERS: Levels of what?

MR. STURZEBECHER: A logical level of protection.

MR. MORRIS: This is entirely consistent with - I mean this is the same diagram that was used in the previous version of our reg guide. It's something that has been adopted by the industry reaching all the way back to 2004. And what they are trying to illustrate on this diagram is that you've got multiple levels or multiple barriers of protection. Level 0 would be your Internet, the cloud, things that you have absolutely no control over what goes on.

Level 1 you may be talking about your initial corporate network that is linking to the network.

Level 2 may be your site-based local area network that is just available to people at that particular site.

Level 3 is another ring of defense in which you might have non-safety related instrumentation and control systems.

Level 4 is where we would like to see most if not all of the things that we have defined as regulation as critical digital assets. And if you look at the large white arrows on there, what we are trying to illustrate if that if you are going to connect something that is a Critical Digital Asset in Level 4 to something in Level 3, some convenient operator display, perhaps not safety related but available to operators or maintenance technicians or the system engineer out in the engineering building, you want to have real time information about the status of that particular device or asset. There is going to have to be some kind of connection.

So what this model and the architecture is saying, to the extent you are going to have that connection, it better doggone well be a one-way connection. And that is why what Paul is trying to illustrate, and now I'll go back to the other, is that data diode is how you enforce that access or one-way communication. And what I heard Mr. Brown say - I almost called you doctor - is, well, wouldn't it be better to just simply isolate that? And the way I try to answer that --

MEMBER BROWN: No, I didn't say that. I

understand you are going to have to send data out to the next level.

MEMBER APOSTOLAKIS: Let's put something out here. Is this example in the guide?

MR. STURZEBECHER: No, it's not.

MEMBER APOSTOLAKIS: The main problem that I think some of us have with the way that it is written is that I think Charlie put it in a different way, but it asks for plans and processes. All over the place. And there is no - there is no guidance that I can see to the inspector that says, yes, this process is acceptable. The inspector will have to decide what is acceptable. I don't have any question in my mind that you gentlemen can pick a problem, an example of this, and work through it, but what does that prove? I mean yes, you can do things and so on, but the regulatory guide essentially asks for give me a plan, give me a process, a policy, give me this, make sure you have this team. And then it's real similar to a problem we had a number of years back when we were talking about digital I&C. Where the staff came back, and I fully agreed with them on the state of the art, I mean we are not asking you to perform miracles here. And they said, all we can do is control the process of production of the digital system, and then we hope that it will be highly reliable. Because there are some tests and so on.

So here too it seems the fundamental assumption is that if you have all these policies and processes you have adequate protection, and I'm having a problem with that. I think it's a jump. Give me one example, just demonstrate that you know how to do things. What would the poor inspector do?

MR. MORRIS: This isn't going to be satisfying to you, but this is precisely how we do it in physical security space. We don't dictate to the licensees how to build their vehicle barriers. We don't dictate to the licensee how their intruder detection system should be designed and implemented. Rather, we say, that the vehicle barrier must be able to stop a vehicle at a certain rate, carrying a certain payload, traveling at a certain speed with a certain ground clearance. You, Mr. Licensee, have to prove to me that when I come at you with that that your barrier is sufficiently robust, it's located in a proper location so that if the bomb goes off in that location, the over-pressure that results won't impact safety-related systems. It's just the model that is utilized, and it's entirely consistent with that.

MR. LEE: And also, the way we have

written this regulatory guide is that because we wanted to make it short and sweet, the way we wrote it was that the main body of the regulatory guide provides I guess a process for implementing secure controls provided in B and C. So we can't just look at the regulatory guide as just the front end part. You have to include the whole body including our policies.

MEMBER APOSTOLAKIS: I don't understand your statement. You think I just read the front part? Why do you say that? I read the whole thing. And in fact, there is some specific advice, I don't doubt that. But if you look at the main thrust of the document it says, give me a policy, give me a plan. Now if this is a standard practice in this field, then maybe --

MR. MORRIS: With all due respect it's more than that. It's not just give me a policy, give me a plan. The policy has to be based on established principles, established standards that we know work. Then when the inspector comes out, and there is a firm commitment in the licensing document that says, this is how I'm going to do it. This is the criteria I'm going to use to make that determination. And when your inspector shows up at the site, I'm going to be able to produce documentation and real evidence and show you how it's constructed that proves that I built it exactly consistent with my commitments in the plan that you, Mr. NRC, approved. And it's up to the inspector at that point, the burden is on us to say it doesn't work. And that is performance based.

MEMBER APOSTOLAKIS: Aren't you placing a lot of burden on the inspector that way? What is it that guarantees that you are going to have some consistency from plant to plant and inspector to inspector?

MEMBER BROWN: Maybe an IT expert.

MR. MORRIS: Well, I can speak to the inspection criteria, because we actually do have a detailed inspection criteria in the federal government to do this. It's three, four, maybe even 500 pages long now. It actually describes specifically, because of the issue you just brought up, Mr. Brown, the question is, how do you know you'll have consistency.

MEMBER CORRADINI: Let me make another comment. Much of the discussion today it seems to me has been a continuation of the subcommittee meeting. And I think that's a disservice to the members that were not at the committee meeting. So therefore we have listened to the end point of a presentation that we never had. I would suggest that we just pick up and continue the presentation, and then these issues can be raised in a form at the end so that we can all participate in that.

MR. LEE: Actually I would like to comment. I didn't mean it that way. Sometimes it's difficult to - so I apologize.

MEMBER APOSTOLAKIS: Okay, well, I think you have to use your judgment. You can't go over every -

(Comments off the record.)

MEMBER APOSTOLAKIS: Okay, keep going.

MR. SHINN: So after y0ou have deployed the CDAs in this defensive architecture, this logical defense architecture that we are talking about, I didn't show level three because of the slide, but for this application, this example, I'm just showing Level 4. You go to the next step in the guide where you apply all the operation and management security controls, and then you go to addressing the technical security controls for each CDA.

And in this process we are back to the idea of the self tailoring, where we are going to use an example of authentication like user name, passwords, for the RPS. The authentication if you could apply it on the RPS you're done. If not, you've got to go to the next step where you need to look at items within this particular system apply to the authentication. In this case we are showing an example here where you put the user name authentication on that, important to safety, HMI, and you also may use physical security to protect the entire battery.

If you cannot - well, you don't have to use the - on this case it's authentication applicable, but in other cases you may not use the security control. You don't apply it at all.

Addressing all security controls for each CDA, you test the vulnerabilities and ensure effectiveness. You go through and scan.

MEMBER APOSTOLAKIS: Now let me ask you something. This is really very important. Because the issue of a pilot application was raised earlier by Mr. Sieber. Wouldn't the regulatory guide benefit by taking what you have now, try it on a number of plants for a year and a half, two years, get examples like this from the licensees, then draw some conclusions, and put them into the guide. I mean it seems to me that would be very beneficial, because you are doing it this way in this particular example, maybe other people would do it in a different way. And then you would start gaining insights as to how these policies and plans could be implemented. And again the intent here is not to ask you to advance the state of the art. We can't do that. We recognize that. We are trying to find ways of doing the best job we can right now. So it seems to me that would be very beneficial.

Now Mr. Sieber said that you may not have attacks on these pilots. That's not the intent of a pilot. It's not to actually see whether they attack me and I protected myself; the intent is to see the implementation of these plans that we're demanding.

I think we should have two or three difference licensees do analyses like this, try to implement it. You would probably benefit and gain some insights that would make the regulatory guide stronger. That's all I'm saying.

MR. MORRIS: If I could respond, I think that might have - I don't deny that that might be beneficial. But the hand that we've been dealt, like it or not, is that on November 23rd of this year by regulation there is a requirement that all licensees submit to us a plan for how they are going to implement this rule. I can't maneuver around that.

So what we have done is come up with, working the most collaborative way, engage the best people we could find, and put all the best minds together, to come up with the best most efficient least amount of burden process to make it work.

And unfortunately that's where we are. I'm not disagreeing with your suggestion. It's just, I hate to say it, but that ship sailed.

MEMBER BROWN: So this is what they are using right now to prepare the November 23rd, by law, of regulations, whatever the rule is.

MEMBER APOSTOLAKIS: First of all November 23rd I'm not sure it constrains us. And I appreciate that you have a problem. Would you revise the guide a year from now?

MR. SHINN: Sure.

MR. MORRIS: In fact we don't pretend that this thing is perfect by any stretch. I mean we think it's adequate. We think it's appropriate.

MEMBER APOSTOLAKIS: Okay, let's keep going. Let's keep going, because I think you answered my questions.

Who said November 23, the Commission?

MEMBER BROWN: This is regulation and not a law , is that correct? Is that a rule?

MR. MORRIS: Actually they effectively are the same, because Congress elevated the NRC to the ability to make laws for nuclear safety.

MEMBER APOSTOLAKIS: No, but it's a direction from the Commission. It's not part of the rule.

MR. MORRIS: It is not in the guide. It's part of the regulations. It's in the rule.

MEMBER APOSTOLAKIS: It is in the rule?

MR. SHINN: It's hardwired into the rule.

MR. STURZEBECHER: All right, so the next step is to complete documentation for inspections. Then you go to maintaining the cyber security program.

MR. MORRIS: So defense in depth, back to Dr. Powers question, the defense in depth - we want to remove the opacity here. The first level of defense in depth again is this idea that you are - I want to make sure I'm using the same words.

(Comments off the record.)

MR. MORRIS: The first strategy is this model, adopt this model. You've got layered defenses to start with. The second layer is the application, once you've built this model and you've populated the model with your digital assets, that need to be protected, is to apply the security controls that are in appendix B and C of the reg guide, of course tailoring to your specific application. You know, don't put passwords on scram buttons and stuff.

And third is what Karl is about to talk about, now that we've built this model and I've implemented all these controls, you're going to want to maintain it through the lifecycle, and that is the rest of the lifecycle approach to configuration control and QA and all these other things.

MEMBER POWERS: How is that defense in depth? It sounds like defense.

MR. STURZEBECHER: Well it really is a security defense in depth type approach.

MR. MORRIS: It is a security paradigm.

MR. STURZEBECHER: You have layers, those boundaries we were talking about before. If an attacker or hacker is coming through you are going to have different boundaries. Maybe the first couple of boundaries may be a firewall with some sort of way of detecting that the adversary is coming through. And it should automatically, at the speed of light, so you are going to have something, one of these technical controls takes down that adversary, stops it form getting any further, alerts you. You don't want any further path. You need to know when you're being perturbed or being moved into, because that is typically the approach.

The other security controls that are applied to each CDA, they provide that other level of defense when like we used at dedication - I am trying to think of a good --

MR. SHINN: Yes, if the poles are overlapping and Karl mentioned address 19 families of root causes that lead to cyber compromises, so those cover everything from adequate training to the dedication to various technical controls to incident response, contingency plans. So that is another strategy, another part of defense in depth.

MR. MORRIS: It is slightly more than that, because as I tried to indicate at the outset, is that you can't just design a system, implement controls and then walk away from it and assume that forever and ever it's going to be able to defeat everything new that comes out. If that were possible we wouldn't have Microsoft issuing patches for their software every Tuesday. We wouldn't have - so as a consequence that third level of defense so to speak in this security paradigm is to be this active monitoring, aggressive, forward leaning maintenance of all these things, both from a threat evaluation, vulnerability assessment. Do my security controls still work today? Is it ongoing?

So we think of that in security paradigm as a level of defense. It's not clearly tied into the way we think about it as safety space, so to speak.

MEMBER POWERS: Well, it appears to me --

(Off-mic comment.)

-- between Level 0 and Level 1. And associated with that firewall is some way so you can detect when somebody is probing you. First level of defense. The next level of defense is one of increasing conservatism, but I don't know what it is. You haven't told me what it is. It could be the corporate -- from the next level.

MR. LEE: That is beyond the scope of our evaluation.

MEMBER POWERS: Somewhere we are going to get into your scope, because otherwise you don't have a defense in depth.

MR. SHINN: Layers 3 and level 4 --

MEMBER POWERS: Okay, what's at Level 3? A more conservative barrier.

MR. SHINN: Yes, so you are right, it does get more conservative. So the boundary between 3 and 2 uses deterministic one-way technology. So now we go from a firewall to something like a diode, which is fundamentally more conservative, as you put it. And like I said it's a deterministic technology, and we spell that out in the guide, that once you get into these higher levels, we expect the technology could change, and to provide a higher level of certainty that the data flow will be maintained in the direction as illustrated.

MEMBER POWERS: When we go from three to two, is there another barrier between four and three?

MR. SHINN: Yes.

MR. MORRIS: And again, that is also one way.

MEMBER POWERS: That's what it says. Is it diverse?

MR. SHINN: Yes, that's also a requirement. Diversity is a requirement.

MEMBER POWERS: So you said the 4-3 boundary is not the same as the 3-2 boundary?

MR. SHINN: By utilizing diversity, yes, it should be some different method of achieving that.

MEMBER BROWN: Now I understand your defense in depth strategy. There are a couple of ways to achieve that diode function. I'm just saying you got to be aware that when they do this and somebody inspects for it, it's not always obvious. Some have used what I call software-based diode, in other words they look at the stuff and determine if this is good, bad, so it's a data evaluation process.

MEMBER POWERS: I asked them about a strategy.

(Simultaneous speakers.)

MEMBER BROWN: Let me finish, I understand that. The second point is the hardware output, it's output only and it's a hardware deal. You literally can't come back and you can't change it unless you change the hardware. That's all I'm telling you.

MEMBER ARMIJO: Does that diode between 4 and 3 constitute or meet the isolation goal or principle that Charlie talked about?

MEMBER BROWN: Yes, I don't have any problem with that if it's done the right way. If it's -- I don't like them, because that can be compromised by a good hacker. If it's a hardware based output-only communication device, that's okay, not an I/O device which can be fuddled with by software.

CHAIR BONACA: I have a question regarding the sharing of information. The point that

Mr. Morris made is very important, is everyday you have a new challenge, maybe new approaches to try to get in. Do you have a process by which you disseminate information within the community of nuclear power plants?

MR. MORRIS: In fact yes we do. But in addition to the normal process that we have had for some time, as new threats arise that we become aware of and our ability to share that information through a number of vehicles including safeguards advisories, threat advisories. In addition to that we have recently issued an information notice, like two or three weeks ago, which pointed out, reminded our licensees that there are other sources of real time information that they should be monitoring on 24/7 basis, or a routine basis, such as the DHS' US-CERT website. There are a number of outlets that provide, you know, information about newly discovered vulnerabilities, newly discovered threat vectors. And what the information notice says is, hey guys, if you licensees are sitting around with your hands in your pockets waiting for the NRC to tell you every time there is a new problem you are making a huge mistake. You need to be out there hitting these other websites, talking to each other, in addition to anything we might provide you. So yes, that's very much so.

VICE CHAIR ABDEL-KHALIK: How does this architecture protect against Trojan horses in Level 4?

MR. SHINN: Yes, the defensive layers themselves essentially there are two scenarios in which that Trojan data could enter, one is directly through connections. The architecture by being one way prevents that. The other way is it could be carried into the environment or it could be built into the product. There are actually controls in there that deal with acquisition, but there are for lack of a better words essentially quality control requirements, and testing requirements that test the technologies to determine to the extent possible that those things don't exist, and that there are controls in there to ensure that data that is moved cleanly to that boundary is also checked and tested to ensure that its integrity is intact and that there aren't Trojans and what not.

And finally there are monitoring intrusion detection requirements within each boundary as well to detect these things, so if it ends up in the environment it will be detected. And then of course there are incident response requirements to deal with it, if it were to occur, and contingency plan requirements, should the worst case scenario occur.

MR. MORRIS: The most insidious attack would be one in which there's something built into the hardware or software that is acquired from a vendor, and we spend about two or three pages, I think of Section C(12) going through the processes which the licensees should go through as they interact with their vendors, and the folks that they are acquiring these products and services from, to try to root out as much of that problem as you can. I mean you are never going to achieve protection, but again it's a question of adequacy, it's a question of adequate protection, not perfect protection.

So we feel those controls are appropriate when you add them with all the other things we are doing in the defensive model that gives us assurance that we are looking for.

MEMBER BROWN: On that part of it, that's been another configuration control of the equipment and systems you have at the plant. And I saw the part on the vendor part of it, but to me there are two pieces of this, and correct me if I'm wrong. Number one, the guy is developing something, designing something, you're going to take it and put it in.

You got to make sure it comes out of this plant okay.

The second part is managing the configuration of the stuff in the plant itself. You said there's a separate methodology, a separate different - you have to address it. I didn't see the implant where it was clearly - maybe it's in there.

MR. MORRIS: It's a big document. It is in there.

MR. SHINN: Yes, your point is right on. The second bullet there is change controls is a major --

MEMBER BROWN: That's what you mean. That's at the plant level.

CHAIR BONACA: How do you assure that the software in the - inaccessible software is maintained? What I'm trying to say is, the example was made of our programs being routinely upgraded by Microsoft automatically. And there, even at the commercial level, you have a need for continuous protection. Since you have the isolation of your hardware, where you have the inner circle, I will call it, how do you maintain that software?

MR. SHINN: So if I understood you correctly -- please correct me if I didn't -- the issue of essentially remediating flaws.

CHAIR BONACA: Actually, the issue of updating to make it more robust and more defensive of information.

MR. SHINN: Yes, that is covered in the plan as well. And because there is a great deal of acceptable scenarios. We have a number of different controls to address this based on different scenarios that may occur in the plant. For example you may have a system that has older software on it, but it is appropriately isolated such that it doesn't need to be patched for these particular vulnerabilities because they are mitigated through other security controls.

But there may be another system where those patches have to be installed. And there is a requirement that those patches be properly tested, not only to ensure that they mitigate the security issue, but that they don't adversely impact the safety, security, emergency preparedness functions.

MEMBER APOSTOLAKIS: Let me intervene here. Karl, you are not going to go through all your slides. Can you speak to the ones you want and go over them, so we make sure at least at the end - if you're done, you're done.

MR. STURZEBECHER: We're almost to the end.

MR. MORRIS: I think we're done.

MEMBER APOSTOLAKIS: Okay.

MR. MORRIS: I don't think we should spend any time on the template itself. The template is essentially what we are asking for in licensing space. And then the specifics --

MR. STURZEBECHER: And that is the summary. So this is what the guy does and addresses this adversary we've been talking about.

MEMBER APOSTOLAKIS: Right. I have some - this really creates a lot of headaches. What is it, 70.54?

MR. STURZEBECHER: That's right.

MEMBER APOSTOLAKIS: It says the licensees as I recall should have a cyber security program up through the design basis threat. Now what is the design basis threat got to do with cyber security?

MR. MORRIS: It is the basis upon which the entire protective strategy is grounded on.

MEMBER APOSTOLAKIS: But is the DBD really addressing physical security?

MR. SHINN: Absolutely.

MR. MORRIS: But it included - the design basis threats, and I'll be careful not to get into anything that is not publicly available, is basically a set of adversary characteristics which include number of adversaries with knowledge and skills that they have; the tactics that they can employ; the kind of equipment and weaponry that they can use; the vehicles that they can use. In order to do - to try to create a radiological sabotage event. And 73.1, which this language is a part of, essentially say s, okay, here's all the stuff the bad guy can do to you, and here is your plant. You better put something between the bad guy and the plant to make sure that this guy can't create radiological sabotage, and that includes information security controls, personnel security controls, physical security controls, and now, cyber security controls. So it's the whole set.

MEMBER SIEBER: But 73.1, the only mention of cyber security is to use the words at the end of that list. It doesn't tell you any thing.

MR. MORRIS: And it's for the reason you mentioned earlier, because if you give any more detail than that you are basically telling the bad guys precisely what it is if they have a work around, or you just do one more thing around that and the licensee is not going to be able to deal with.

MEMBER APOSTOLAKIS: I can see a

definition of a design basis threat when it comes to physical stuff. Cyber security, I don't know. Yes, you can have a smart kid in Malaysia doing a hell of a lot of damage.

MEMBER SIEBER: If this were an engineering issue, it would be solved. But it's not; it's a human malevolent issue.

MEMBER BROWN: That is correct. That's it.

MEMBER MAYNARD: You mentioned some of your interaction with the industry. Are there any hard stops with this reg guide that remain between --

MR. MORRIS: In terms of the security controls, I would suggest largely no. In terms of the process by which critical systems and critical digital assets are identified and incorporated as part of the scope of the program, I would say no.

As far as how the security controls are applied and some of the nuances of the defensive architecture itself, I would say there are some hard spots. We are working through those, but again the alternatives aren't very attractive. Trying to work through attack vector analyses assumes that you know what all the attack vectors are to begin with, and that is simply not possible. So it gets very difficult. I would be lying to you if I said that industry is completely on board, and understands every thing, and just smiling and happy. I mean security is very difficult in and of itself, simply because we are dealing with a malicious intelligent adversary, and you are never done. I mean you are just never done. For that reason security will forever be a challenge, particularly in an industry where they are trying to make money. And so cyber is I would argue an order of magnitude more difficult because we are dealing with an area in which there isn't a lot - there isn't a vast population of people who understand digital I&C network security . Our reliance on folks like Michael - and it is a challenge, and there are a lot of unknowns. And it is more difficult, it really is, and it makes our job more difficult to explain not only to the public, but also to ensure that the industry understands what we're looking for to achieve high assurance of adequate protection.

MEMBER CORRADINI: So I had a question, just to interject, maybe you said it when I was out of the room for a few minutes. So the inspection process for this new added - are the same set of inspectors, or an addition to a team of inspectors that go - the one thing in the back of my mind I guess that you had brought up awhile ago was consistency. So if I go from plant to plant with the current plans, how does one ensure consistency? So my curiosity is, is there a small team that goes around and tries to consistently apply their observations to the plans and procedures you are requesting of them?

MR. MORRIS: Let me first start by saying that the inspection program that is being built to provide the oversight piece of our regulatory mission is still very much in the conceptual stages. So don't take anything I'm about to say as being written in stone, because it isn't.

Consistency is nice, but at the end of the day it's protection against radiological sabotage that we care about. I'm not asking for everybody to have their system exactly the same way and exactly the same color. What I'm asking for, rather, is that they all can achieve the same end result.

Now the practical implications of that are challenging, because if you are not going to get that site-specific detail in licensing space, as Dr. Apostolakis pointed out, you wind up not fairly appreciating the site-specific details until you actually send your guys out into the field and start looking at it. So then the question is, isn't that a large burden on the inspector. And I would say it a little differently. It's a large burden on the licensee, okay, and it's - the inspector is there to try to poke holes in what the licensee has done, and certainly we need to arm our inspectors with sufficient amount of knowledge, scale and ability in inspection techniques to be able to do that job effectively, so that when they walk away, they, A, understand that the licensee did in fact implement the guiding principles of the reg guide and the rule; but also that it actually works. And it's going to be performance based.

My vision is, and again it's conceptual, my vision is that the first set of inspections that gets done after the licensing work is done would be largely what I'll call programmatic, which we tended to get away from in every other avenue of regulations, because they don't tell us much. We tend to go to performance based inspections. But they are risk-informed performance based inspections. I think he first out of the docks inspection that we do at every site will be largely programmatic. Did the licensee fully appreciate what the rule said, and have they actually done what they committed to do in their plan? And do we have a sense that it actually is going to work?

And we'll do that by what I would envision being sort of vertical slice inspections. Let me pick this system, this system, and this system, and then I'm going to do a full blown, soup to nuts, how do they determine it was a critical system? How did they determine what are critical digital assets within that system? How did they apply the security controls? Where did they populate it? And does all this stuff make sense?

So I envision a series of vertical slices. But after that and we have confidence that the program is built and implemented appropriately, that we will move to a performance-based more risk-informed process. Because not all critical digital assets have equal risk significance. Not all things that we look at. So we will wait, as we do in everything else, for small problems to pop up. We will ensure that the licensee does a thorough job of understanding what the root of the problem was, that they have taken corrective action, and then if they have we sort of walk away. And if it happens again, well, then we dig in a little harder. And if it happens again or it looks generic we dig in harder. And that's how I envision this thing going down.

MEMBER CORRADINI: So let me ask one other follow up. So how are you going to involve the industry so that they understand as you visit the course three volunteers - do the other ones in the industry appreciate how you are going to do it? Are the people from the industry going to join in this to observe and interact on this? Or is it going to be strictly staff and inspectors?

MR. MORRIS: Again, I had an opportunity to be part of the formative stages of what is now the reactor oversight process - it's been completely revamped since the 1990s. And I suspect, if I have anything to do with it, it's going to go down in a similar manner. It's going to be a series of workshops. It's going to be bringing in outside stakeholders, get good ideas, bat them around, figure out - and it's going to be collaborative. We will probably run a series of pilots that will be evaluated, and we'll probably have the opportunity to visit with you all again to see how it's going and make adjustments.

Only after that will we have a firm --

MEMBER APOSTOLAKIS: I'm sorry, Mike.

MEMBER RYAN: Scott, I appreciate the description you gave of kind of a process to work through this, but at some point you got to test it. So how about the three gentlemen to your left or other colleagues like them, are there people who are going to actually attack the system and see what they can do? Are they going to test all these protocols and see if we could actually get inside something or not?

MR. MORRIS: I don't think we'll get any volunteers to let us do that, but that doesn't mean we couldn't. But what I would say about that is, first of all, that type of thing is done. You've probably heard of penetration testing and other red teaming kind of things that get done. We're in very much of a crawl-walk-run, we're crawling.

MEMBER RYAN: Well, the proof's in the pudding at some point There's got to be a malevolent unknown factor, or at least a benevolent unknown factor, to test that. Otherwise how do you know it's working?

MEMBER APOSTOLAKIS: At some point in the future, maybe.

MEMBER RYAN: Down the line. But that to me is important to think about as part of the planning process of this thing.

MR. MORRIS: There are things in security control as these folks will tell you as part of the management and maintenance of the program, to talk about things like effectiveness reviews and vulnerability assessments.

MEMBER RYAN: That's inside, looking inside. I'm talking about somebody unknown from the outside.

MR. MORRIS: I understand, but it's a similar idea, right, you are challenging the controls in place.

MEMBER RAY: But without the people who own the controls knowing it.

MR. SHINN: As Scott said, those things are done. I think as Scott said --

MEMBER APOSTOLAKIS: Okay, let's move on, Sam.

MEMBER ARMIJO: Yes, I have just one question I missed from the presentation. The focus of the presentation seemed to be on external threats coming in electronically. But I didn't see anything about the internal threat, the insider. Which of these strategies deal with that?

MR. MORRIS: Let me first say that the insider is very much - first of all the insider is an element of design-basis threat, and if you look at the safeguards document, the underpinning of that public language is very specific about the things that we attribute to the insider, specifically with cyber tech. There are a variety of controls in the document that are there to deal with insiders.

But even beyond that, there is an overriding program with a series of controls in it that help guard against malevolent insiders. The insider mitigation program is already captured as part of the physical security effort, which includes behavior observation, fitness for duty testing, access authorization, background checks, periodic security controls looking for tampering, and on and on and on and on. So there is an overarching insider mitigation program. But even in addition to that there is a variety of additional controls which these folks can enumerate better than I can.

MEMBER ARMIJO: But that would not be a public presentation to discuss that, I suppose?

MR. MORRIS: In general terms, we could.

MEMBER APOSTOLAKIS: One last comment, during the subcommittee meeting one of our consultants raised the issue of supply chain, and as I recall, Scott, you said, that's why the DBT comes to my mind, you said that it was not - the rule says after the

DBT. And it's not clear to me how the DBT gets into this business without claiming by the way that you should have done it. Let's not argue about that.

So it's not clear to me how you decide that certain things are beyond the call of duty and certain other things aren't. Again, you don't have to answer it now.

MR. MORRIS: Well, let me make sure I understand the question. I think what you are suggesting is that what we are offering is that the supply chain attack vector is not specifically enumerated.

MEMBER APOSTOLAKIS: That's correct.

MR. MORRIS: And yet there are a series of controls in here that deal precisely with that problem. That's an interesting point, frankly, I hadn't considered before.

MEMBER APOSTOLAKIS: Frankly, I'm sure a lot of these controls deal with a lot of things, because they are simply - because they're depth based. But I thought your answer was interesting, that this goes beyond what you are expected to do, and I really don't understand why. I mean the DBT really doesn't say anything about these things.

Now another thing I think you said was

that this is now going beyond the responsibility of any individual activity, that it is sort of a national problem. And again that is not clear to me either.

But anyway I don't want to start a whole discussion on this. But is - are there any other questions from the members?

Okay, well, thank you very much, and I guess we will talk about it this afternoon, sometime.

CHAIR BONACA: Thank you for your presentation. And it looks like lunch, we'll get back up here at 1:15.

(Whereupon, the above-entitled matter went off the record at 12:19 p.m. and resumed at 1:15 p.m.)

CHAIR BONACA: Okay, let's get back into session.

The next item on the agenda is the overview of the Advanced Boiling Water Reactor Design as Applied to the South Texas Project Combined License Application, and Dr. Abdel-Khalik will begin the presentation.

OVERVIEW OF THE ADVANCED BOILING WATER REACTOR (ABWR) DESIGN AS APPLIED TO THE SOUTH TEXAS PROJECT (STP) COMBINED LICENSE APPLICATION (COLA)

VICE CHAIR ABDEL-KHALIK: The ACRS was briefed about the ABWR in December of 2007 after South

Texas Project Nuclear Operating Company had submitted the first license application in September of that year for two ABWR units at the current STP site.

Since then STP has made some changes in their plans for building their ABWR units including the replacement of the engineering, procurement and construction vendor. The NRC staff review has now come to a point where they want to bring the draft safety evaluation report in parts to ACRS for review starting early next year.

We have tentatively scheduled several ABWR subcommittee meetings in March and May of 2010.

However, before the ACRS begins reviewing the draft SER we thought that an information briefing regarding the major aspects of the ABWR design as it is being implemented by STP will be helpful to the committee.

We also wanted to learn about the anticipated DCD amendment, a major departure STP is taking from the ABWR design which was certified in 1997.

So two back-to-back presentations are scheduled for this afternoon. The first deals with the ABWR design overview and the DCD amendment, while the second deals with significant departures as well as other areas of interest including staff qualification of the alternate vendor.

The first half of the briefing was listed in the Federal Register as open slash closed. Part of that briefing may need to be closed to the public since it includes a discussion of the DCD amendment for the implementation of the aircraft-impact rule, in which security-related information may be discussed.

I'm asking the staff to let us know when the meeting needs to be closed before we enter into such discussions, and to verify that only people with the required clearance and need to know are present.

Please note that information above the level of security-related may not be discussed in this arrangement.

As a reminder we request that participants in this meeting use the microphones located through this meeting in addressing the committee. Participants should first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We will now proceed with the meeting, and I call on Mr. Mark McBurnett of STP to begin the presentation. Mark.

MR. McBURNETT: It's a pleasure to have

the opportunity here today to discuss the ABWR and our plans for moving forward, and the status of the departures, and so forth. It's indeed a good thing.

I'll start off with just reviewing slide #3. I'll go through some introductions in a minute. Let's start on slide #4. Just overall, the purpose that we are here today as we said is to provide an opportunity to overview for the ACRS on the background of the application of the U.S. certified ABWR in South Texas by Toshiba. And the agenda on page five as it's laid out goes through the same material you just spoke to. I'm going to go through the introduction, and turn it over to Sakamotosan to my right will do a bit briefing on Toshiba and Toshiba's background and qualifications as well as some of the comparisons of the ABWR to the more traditional boiling water reactors that are in operation currently and understand what makes an advanced boiling water reactor.

Then we will have a plan breakout and do the aircraft impact discussion regarding the closed portion of the meeting. And it was put in the middle of the session like that based on your direction to us.

Then we'll switch, and I'll start talking about STP specific, how we got to choosing the ABWR and some site information, details on the departures, significant departures.

And a couple of items at the end, we'll discuss fuel design, and licensing strategy.

I wanted to introduce my - we've got a number of our folks in the back of the room, so I've got quite a bit of backup for answering questions, so I'll call on them if they're needed. But at the front table, we have assembled a strong team for the building of the ABWR in South Texas. We've selected Toshiba as the contractor, the engineering procurement construction contractor for the contract. Toshiba comes with a very strong background in building reactors in Japan, a long history there, including designing and building advanced boiling water reactors.

To my right is Sakamotosan. He is the vice president of Toshiba America Nuclear Energy, responsible for business development and strategic planning. He'll go through the details of Toshiba's background, and the comparison of the ABWR to the BWR.

To his right Bob Hooks is with Sargent & Lundy. We've selected Sargent & Lundy as the reactor building designer. Sargent & Lundy is responsible, a full scope architect engineer, very experienced in building reactors in the U.S., has the responsibility for the reactor island design, and basically taking the design that is in Japan and putting it, Americanizing it, bringing it into American codes and standards and analysis, and putting it in a design that can then be implemented in the field.

On my left Bob Schrauder is the vice president of licensing for TANE. TANE is Toshiba America Nuclear Energy. That is the American entity of Toshiba.

And there's Bob Quinn from Westinghouse. Toshiba has Westinghouse under contract for providing safety analysis and fuel design, and aircraft impact analysis, a few other things, drawing on the depth and breadth of Westinghouse. Westinghouse supplies BWR fuel, so it had the analysis capability for BWR fuel. We'll talk about that at the end. They are the supplier for the safety analysis portion of the plant.

And I didn't bring to the table with us, but Fluor is selected as the constructor and designer of the turbine island and the balance of the plant. I didn't know we'd have any particular for them, so I didn't bring them to the table.

So that's again how we are set up. And

again I have some gentlemen and ladies in the back of the room to answer any other questions that may come up that are beyond me.

MEMBER ARMIJO: What is the scope of MPR?

MR. McBURNETT: Oh, I should have mentioned, thank you for asking. MPR is assisting TANE, Toshiba America Nuclear Energy, in really transitioning into the U.S. and providing U.S.-based expertise in project management, in engineering and technical areas. We are just helping them make that transition into the U.S. market, U.S. organization.

MEMBER CORRADINI: In terms of standards? I'm trying to understand.

MR. McBURNETT: Well, in terms of, just in terms of Japanese coming into the U.S. market and understanding how processes work and organizations, and how to understand the details of regulations and how you do things, is primarily I think a fair characterization. You may, Sakamotosan, be able to give more clarity to that. In fact, I'll turn it over to Sakamotosan now, and let him go from there.

MR. SAKAMOTO: Thank you, Mark.

My name Hiroshi Sakamoto. I am from Toshiba Corporation. I work for the Toshiba Nuclear Power Division for 28 years background in nuclear engineering, and now I'm a senior vice president of Toshiba American Nuclear Energy, and also a position in Japan too.

So here I'm here to explain about the overview of Toshiba's experience and roles, and also the overview of the ABWR that Toshiba provides for the STP.

I just wanted to touch upon very simply about our experience. Toshiba started nuclear construction or nuclear engineering back in the early 1960s. They started the construction in Japan mostly the BWRs since 1966 continuously up to now. We have constructed 22 plants, BWRs, ABWRs, 17 as a prime contractor, 5 as a sub. When we say sub, this is sometimes providing the turbines, or sometimes providing sort of a supportive - not supportive, generally it was very early stages, when GE brought in the first BWR we were sort of subcontractor, but actually that was only for the very first couple of weeks.

And then Toshiba currently has about 32 percent in the megawatt-space of Japanese BWR and also was the active acquisition of the Westinghouse in 2006. We also cover the Westinghouse part, which is small, but 7 percent in Japan. So we are the largest nuclear supplier in Japan up to now.

We have --

MEMBER CORRADINI: Just one point, I think I know, but just in case. You have this plot of your various projects. Is it Kashiwazaki 6 and 7 that are the ABWRs?

MR. SAKAMOTO: That's right.

MEMBER CORRADINI: Are those the two? Or are there more than that?

MR. SAKAMOTO: Kashiwazaki 6 and 7 are the first two ABWRs, and Hamaoka 5 and also Shika 2 -- this only shows the Toshiba construction stuff. So it does not include the --

MEMBER CORRADINI: Six and seven are ABWRs?

MR. SAKAMOTO: Yes, and also Hamaoka 5.

MEMBER CORRADINI: Okay, thank you so much.

MR. SAKAMOTO: And Toshiba's role that they played in the Japanese construction is, first we design, engineer and supply the equipment. Our equipment is mostly the nuclear reactor in general, essentially key components like major internal pumps or CRDs, and electrical systems, control systems. But one major difference compared to the supplier is, we also do the construction management.

In the case of the construction, during the construction we have our preferred engineers dispatched to the site and do the construction management of the plant throughout the entire duration.

About 20 to 30 proper Toshiba engineers stay constantly at the site before the start up testing. After the start up testing there will be 100 or more people. And also that is only Toshiba's direct proper people. We also cover many of the indirect technical advisers and things like that.

So I think generally speaking, during the construction period and outage, I'd say about one-third, 30 percent, 20 to 30 percent, of people Toshiba's group supplies in the construction. So that is how we manage the construction throughout the period, and also get the feedback of the construction to the further, next generation of construction.

MEMBER ARMIJO: Let me ask a question. You have the Lungmen manufacturers in your chart. I understand that is GE-supplied. What is the Toshiba scope?

MR. SAKAMOTO: Yes, in Lungmen, we only supply the equipment, in that case, my explanation about the construction, taking part in the construction, does not apply to them.

MEMBER ARMIJO: So Lungmen is just equipment, supplies?

MR. SAKAMOTO: Yes, reactor pressure vessel and reactor in general, reactor internal pumps and FMCRD. Those are the limited scope that we have. Actually we supply it to GE, and GE supplies to the turbine power.

MEMBER ARMIJO: We understand.

MR. SAKAMOTO: On the next page talking about the ABWR itself, again the Kashiwazaki 6 and 7 that was the first ABWR or the first ABWR design and constructed. Kashiwazaki 6 turned commercial operation in 1996. Actually it was the first, but at the same time for the construction, we maintained the shortest construction period of 37 months from the first complete boring to the fuel loading. And that was Kashiwazaki 6. Kashiwazaki 7 also followed one year, like one year later. And for Toshiba Hamaoka 5 was another, the next generation evolved version. This turned to commercial operation in 2005.

And Shika 2 was Hitachi's construction and also Lungmen 1 and 2, this is the GE's ongoing project.

And also from the Kashiwazaki 6 and 7, I will come back again, this is the basis of the U.S. ABWR DCD design. And this was done in parallel. And then from the U.S. ABWR DCD is the current STP three-four project actually is design based on the DCD, the departures from which we will mark, and other key member will explain.

Next page I would like to just briefly explain the history or the background of the ABWRs and our involvement. The ABWR actually is in reality a BWR with advanced equipment and systems. So it is a part of the BWR family, and its conceptual designs or at least these ideas have been discussed for a long time, at least since the `70s to the `80s. But in reality the real engineering work started in 1980, very early 1980, I think it was 1981, under the contract of TEPCO, the Japanese utility. And five other Japanese utilities being suppliers, the client, and Toshiba, Hitachi and GE forming a consortium to develop the ABWR, the test of the actual design of the ABWR specific equipment, and the engineering.

The basic contract, it does actually specify the IP rights and all things to the utility, the client. But after the five years after this study finishes, which I thought it was back in 1987, the consortium members have equal rights to all the studies which have been done on the ABWR, so we all have the equal rights all over the world under ABWR.

And actually going back in the history, after this joint construction study or the work, Toshiba and Hitachi concentrated on the development and the actual construction of K-6 and K-7. The thing is that all the design documents had to be prepared, and manufacturing done, and basically this is the construction in Japan with Japanese customers, so it is written in Japanese, and the Japanese unit. So this is what we had been doing.

And in parallel, GE focused on with the same design focused on bringing it to the U.S., and preparing for the design certification.

So the major part of the K-6 and 7 really shares the common engineering of the ABWR.

And in Japan, after the K6 and 7 for us the Hamaoka 5 was really the next project, so we entered immediately into it, and interestingly, Toshiba also started to work more diligently with U.S. companies in the U.S. market back in 2001. Actually that was when I was first assigned to the U.S. We have entered into this NP 2010 DOE study with the TVA on the Bellefonte ABWR. That was also based on the

Japanese design, but for Americanization. This was really back in 2004 and `5, and so they are going through the process of transferring two things. One was to revisit the evolved version of the Japanese ABWR design and compare with the DCD, that was first done. There were significant departures, so we have looked into and eliminated unnecessary divergence to come back to the DCD to identify. And of course all the cause and standard and those differences we have clearly identified.

Actually going back to the question about the MPRs, and their involvement, MPR has been involved and is Toshiba, before this STP project, since during this TVA study, and actually identifying all the differences between U.S. and Japan. And this is the current ABWR status, and also the DCD.

MEMBER CORRADINI: Again, just for clarification. So the way you have it graphically, it seems that the U.S. ABWR has emerged out of Kashiwazaki, and in parallel with Hamaoka. Are Hamaoka and what will be the design for South Texas identical at least within some degree, or is there some evolutionary difference between them?

MR. SAKAMOTO: In that sense Kashiwazaki will be more basis. Kashiwazaki is also the basis of the DCD. Hamaoka has a very special - it is constructed in a very seismic - specially in seismically severe condition, so it is a very special plan.

MEMBER CORRADINI: Okay.

MR. SAKAMOTO: So Hamaoka did adapt some of the new technologies that we are also adapting for the new ones. But the basis is Kashiwazaki.

MEMBER CORRADINI: Okay, thank you.

MR. SAKAMOTO: Through this process we have come to talk with the STP for the realization of the U.S. ABWR discussion. And these are the backgrounds where we came from on the STP three four project.

On the next slide, as a summary ABWR was developed in Japan under the cooperation of Toshiba, Hitachi and GE, and supported by TEPCO and other Japanese BWR utilities. Toshiba has a complete set of ABWR design documents through the development of it, and the actual construction experiences in Japan.

So that is sort of a very short introduction of Toshiba's background in ABWR.

Next I wanted to touch upon the ABWR to BWR comparisons, and touch upon the major functions or features of the ABWR. Here I will touch on the technical part, and if there is any further questions I will ask my special assistants to answer. But I will go ahead with the overview.

ABWR again, as you can see here, basically is a BWR, and with some specific features on the equipment. What all the features run is the reactor internal pumps, which is sort of the replacement of the recirculation pump. And that is the RPV, fine motion control drive. This is saying that the control rev drive itself is the same, but it has more refined motion which helps the reliability and the control, but has the same safety functions as before.

ECCS with the use of the PSA, we have, you know, have more sophisticated ECCS system three separations, and enhancement of the ECCS. I'll come back to that again.

And one, from the reactor pressure perspective, reactor pressure vessel and core really, itself, it has become bigger and more efficient. But it is still the same BWR core.

And the RCCV, instead of the steel containment vessel, we now have this concrete, reinforced concrete containment vessel with the steel liner, so it's about six feet of the concrete, reinforced concrete, of the major structure to withhold the pressure, and also internally it is lined by the liner with the steel to enclose the gas and the materials inside.

And due to the elimination of the recirc pipelines and stuff like that, the reactor building itself has become a bit smaller and more compact, about 77 percent compared to the traditional PWR 5 type of reactors, and still the dosage, the radiation exposure, those things are significantly reduced.

It also has the advanced main control room design, the ABWR is fully digitalized, and the control room also, digital control systems are adopted, and also the man-machine features.

Turbine generators, it's basically the same except we adopted the larger more efficient turbines. So the basic structure of the reactor and turbine this is the same as the BWR as usual.

I will go into no detail about the main features of the comparisons. First of all this shows several - before going into this I want to mention that the reactor itself and the thermal hydraulics and neutronics, neutron physics, and those behaviors, is exactly the same as the conventional BWRs. Of course the size is different, so some of the detail minor is different. But it still is operated under the flow control, the control - the power is controlled based on the controlling of the recirculation flow, and also the control rod.

And regarding the recirculation flow, the conventional BWRs had two external recirculation large 28 - 30 inch pipe going out in the pond, and circed back with the jet pumps. And well generally speaking the control was done by the MG set or the variable recirc pumps or the flow control valves.

The ABWR uses 10 internal recirc pumps. It's directly attached to the reactor vessel, and the shaft inserted - the inflow will actually directly force the water to recirculate in the reactor pressure vessel.

It is controlled by the inverter, so it has a variable frequency drive control.

MEMBER RAY: Are the motors subjected to the reactor pressure, or are they cam-levered?

MR. SAKAMOTO: This is -- what -- yes.

MEMBER CORRADINI: Just so I -- from the standpoint of the evolutions of these 10 internal RIPs, the RIPs --

MR. SAKAMOTO: The RIPS, yes.

MEMBER CORRADINI: Are the same as Kashiwazaki?

MR. SAKAMOTO: Yes, Kashiwazaki.

MEMBER CORRADINI: All right, thanks.

MR. SAKAMOTO: The ABWRs, one of the major features is this RIPs. So Kashiwazaki, Hamaoka, yes, all have this one. And due to this the entire recirc loop, the pipes and loops, are completely eliminated. So one of the major features which I will come back to again but below the top of the active field there is only about two inch pipes - you know sort of - there is no longer any big diameter pipes under the active field levels.

So this has a significant advantage on the safety side, and also the loop - also the recirc loop was one of the major sources of exposure to the radiation for the workers, and they have significantly reduced the dosage of the operation - operators.

Another function is the control rod guide. In the conventional BWR it is a completely hydraulically operated control rods with single rod operations working the notches and always the water pressure. The ABWR uses fine motion control rod drives, which is sort of two functions. The strong function is the same as the conventional BWR. It has accumulators, and scrams with the high pressure water. So on the safety side it is the same as the conventional.

But for the normal operations it uses an electrical motor which rotates and sort of screws in the rod so that - screws in the shaft, I would say, the rod would just go up in fine motion which gives very good functions in controlling the power in a very detailed fashion.

Also since all the control rods has its own independent motors, we also adopted the group our GAN control capability, which is under the circumstance insert different multiple rods at the same time.

And those are the two major functions to control the power of the reactor. And going into more of the safety design, the LOCA design, the major difference as I mentioned, due to the elimination of the recirc piping, under the transients, or the transient -- the reactor pressure vessel water level post-blowdown will maintain above the top of the active fuel level, and which is different from the BWR, and those cases with the large break LOCA, we have to consider above two-thirds of the core height is the LOCA level, the spray cooling.

So this has contributed significantly again to the enhancement of the safety. And the next page, yes, the ECCS case, the conventional BWRs have one division of the high pressure ECCS, and also two division of coarse spray and low pressure flooding. ABWRs have three independent divisions which each have one high pressure and one low pressure, so it has three independent ECCS systems which each of them has the capacity to cool down the system emergency.

And also one other feature is the ATWS mitigation, and the stated transients without scram. For this mitigation features, there are a couple of designs which are adopted.

One thing before touching upon the ATWS mitigation itself is not required as - defined as a regulation in Japanese regulations. But ATWS it was designed, was the common engineering, from the beginning it was the U.S. regulations in mind; it fully complies with the ATWS requirements of the U.S. and has the capabilities to mitigate these. One is the alternate rod insertion, I mentioned about the rod mechanism insertion is the scram, and also the fine motion motor drive. It also has the capability of pushing up the rod and the water pressure level also.

And so in case of the failure this has another alternative rod insertion. Recirc pump trip was stopping the recirculation flows would reduce the power. And also standby with good control system initiations, the boron injection, and fine motion control rod drive autorun, this is another alternative where actually we don't use the - the scram actually the water pressure, but at the same time if it is not inserted old motors would react and insert the rod with the electrical power also.

And also the feedwater pump run back which will remain, restrict the water level, and lower in the vessel, and actually restricts the natural recirculation.

These are the ATWS mitigation features.

VICE CHAIR ABDEL-KHALIK: How about stability considerations comparison between ABWR and BWR?

MR. SAKAMOTO: I think the stability consideration, of course ABWR also has the BWR, so it's the area of the instability, or the stability. But I think it was the larger core, the design has much more stable - if I could ask Nirmal Jain.

MR. JAIN: My name is Nirmal Jain from Westinghouse. The stability analysis is ongoing. But basically it is similar. And at this point it depends on the design of the core. But at this point it's more likely to be more stable. But it's not fundamentally any different than BWR. It's the same, the protective system, OPRM, that's what the stability in ABWR is about. VICE CHAIR ABDEL-KHALIK: Do any of the Japanese plants have an OPRM detect and suppress system at all?

MR. SAKAMOTO: Japan does not adapt OPRM .

VICE CHAIR ABDEL-KHALIK: But this is going to be adopted here?

MR. SAKAMOTO: Yes.

MR. JAIN: It is being adopted here. We are developing the topical reports to confirm that.

MR. SAKAMOTO: So actually there are some differences between how it's implemented in Japan and here, so there needs to be the so-called Americanization or the design changes that we have gone through since 2002 before the DOE study.

Next I want to touch upon again also about the ABWR, the severe accident mitigation features. Many of - some of the components, I know the functions, the features - are the same as the BWR. But first it has the inerted containment, and it has the lower drywell flooding capability, lower drywell special concrete and sump protections, suppression code, fission products scrubbing and retention function; containment; overpressure protection function; drywell sumps; corium shield; and AC independent water additions.

The major configurations of the APWR are within the RCCD is shown on the right figure.

MEMBER CORRADINI: So if I might answer the question since I unfortunately only remember a newer version of a BWR. So there is no isolation condenser, and there is no containment, passive containment cooling feature; is that correct?

MR. SAKAMOTO: Yes. If there are any further question I can call on my specialists on that.

MR. JAIN: That is correct. It is not an isolation condenser.

MEMBER CORRADINI: Okay, and then my other question is, for the features that you identified qualitatively here, if memory serves me these are similar to what are in the current approved DCD.

MR. JAIN: That is correct, sir.

MEMBER CORRADINI: There is nothing different in this regard that I recognize.

MR. McBURNETT: No, nothing in here is different from the current certified --

MEMBER CORRADINI: Okay, thank you.

MR. SAKAMOTO: Okay, next. As a result from the calculations of core damage frequency of the ABWR the STP three-four case, is maintained as two times 10 minus seven, which is significantly lower than the conventional ones.

Next page, this is the last one. But also I have not gone in detail about the advanced control room. But in May there is another ACRS review of the design for this control RNC and control room, so I will leave that more in that part.

But this is a picture of the Hamaoka 5 control room. As I mentioned the Hamaoka 5 has a different configuration, actually because it's more of the seismic, the reactor buildings are different, but the control rooms are exactly the same. And this is going to be very much likely that STP three-four control rooms. And it has a very user friendly control room, which in the background has a large mimics of the displays and simplified annunciators and those things, and on front it has the operation consoles. And also it's a fully digital control system. However the design comes with digital common mode failure by incorporate of diverse hardwired features, which means that some of the front panels and the operation nodes have the conventional hardwired operations for the essential systems for shut down of operations. So in case there is a common mode failure in the digital you can still shut down in conventional hard-wired mode the plant.

We are also planning to bring some of the simplified annuciator into our facility in the U.S. and start testing here, and I think by the time you have this next ACRS meeting we can also review the electronic testing here, and be able to invite you to that system to see the actual operation of that too.

That sort of concludes my brief summary of the overview of the ABWR. VICE CHAIR ABDEL-KHALIK: When does STP plan to begin hiring and training operators?

MR. McBURNETT: I didn't bring that schedule with me. We have it all laid out in a pretty detailed plan, our ramp up for staffing operators. We currently have, we're staffing with training instructors, developing training lesson plans and procedures. And having that in place and hiring operators, and I'll have to get back to you on a --

MEMBER BLEY: You said that you actually already have the training staff?

MR. McBURNETT: Yes, we have four or five training instructors we've hired. We have sent them to the training center at Kashiwazaki, where they have been through simulator training. And we basically have also taken the procedures from Kashiwazaki 6 and 7, we are using that as a starting place. They are not quite what we need as far as our impost certified systematic approach, but we are taking as a great starting place for us to move to where we need it to be.

MEMBER BLEY: Do you have plans to have a simulator in place?

MR. McBURNETT: We've got the - simulators are one of those - there are three critical paths for this project, and the simulator is one of them. So we've got a simulator scheduled coming in just in time to qualify operators and train them. So we'd like to have it sooner, but it's really between - the simulator depends on the design of this control room and the systems. The simulator will be in place the same time we're developing the training instructions and training instructors and processes of training operators. And the other critical path is overall engineering design and licensing were the three big critical paths.

But I told you, I can't give you a date off the top of my head.

MR. CHAPPELL: My name is Coley Chappell of STP licensing. Current schedule, 2012 and 2013 are the rough dates, and that is to support licensed operator training so that we would have complete crews in time prior to fuel.

MR. McBURNETT: Crews in 2012 or starting?

CHAIR BONACA: That's when we start the classes.

MR. McBURNETT: Start the classes.

MEMBER ARMIJO: Could you tell us a little bit about the fuel and fuel experience with ABWRs? If it's going to be a different fuel suppliers than the initial ones, and the ones in Japan, and the ones in Taiwan, so if you could just summarize that for us.

MR. SAKAMOTO: Maybe you can help? Well, first of all for the Japanese ABWRs we have we are supplying it through the GNF, and you know the fuel, and we are now also designing the fuel based with the Westinghouse analysis.

MEMBER CORRADINI: But let me just repeat what you just said so I understand it. So for the current operating plants in Japan, Global Nuclear Fuels is essentially the fuel supplier currently?

MR. SAKAMOTO: In Japan, yes.

MR. McBURNETT: And we're planning our supplier will be Westinghouse.

MR. JAIN: And maybe I could add a few words about the Westinghouse background in BWR. We have been supplying fuel to right now to four reactors in the U.S., and previously we had supplied fuel to two other sites. It's the same fuel design which is considered for STPs, and there is a fair amount of experience in this country as well.

MEMBER ARMIJO: Has any of that fuel been used in ABWRs either in Japan or elsewhere?

MR. JAIN: No.

MEMBER ARMIJO: So you haven't taken some of that Westinghouse fuel and put it into your ABWRs in Japan to get some experience or anything like that?

MR. SAKAMOTO: Not yet.

MR. JAIN: Not yet, but there is some of the Swedish reactors have very similar designed reactor internal pumps. Either they are not ABWR, they are designed from that perspective, it's very similar, and there the same fuel is being used. So there is some experience in ABWRs.

MR. McBURNETT: Any other questions.

The next segment was to talk about

aircraft impact assessment.

VICE CHAIR ABDEL-KHALIK: All right, at this time I'd like to call on the staff to verify that only people with the required clearance and need to know are present.

MR. McBURNETT: I'm going to ask my staff that are not directly involved in aircraft to step out also.

(Whereupon at 2:00 p.m. the open proceeding adjourned, to resume in closed proceedings at 2:02 p.m.)

O-P-E-N S-E-S-S-I-O-N

(2:45 p.m.)

VICE CHAIR ABDEL-KHALIK: Okay, so the meeting is now reopened, and we will go to the open session that deals with the departures from the certified design overview.

And at this time I guess we can let people come back in.

(General audience returns to the hearing room.)

We are back in open session, and I guess we will go back to the original handout, and that's page 20 of the original handout.

OVERVIEW OF THE ADVANCED BOILING WATER REACTOR (ABWR) DESIGN AS APPLIED TO THE SOUTH TEXT PROJECT (STP) COMBINED LICENSE APPLICATION (COLA)

MR. McBURNETT: Okay, #21 please. We'll talk a little bit about the background on South Texas and the plant, and then I'll move into discussion of the departures.

Just a general familiarization with south Texas, the STP site is 90 miles south of Houston. It's on the Texas Gulf Coast. It's located, the actual reactor plants are about 13 miles inland from the Gulf of Mexico.

We are a very large site, 12,200 acres, has a 7,000 acre reservoir, actually it's sized for four units. We currently have two units on it, two large Westinghouse specialized water reactors. It was - it's an off channel above grade man-made structure. It serves both the purpose of storing water - we pump water out of the Colorado River when the river has water flowing in it, store the water, use it for cooling, and then make that from the river.

The - we have infrastructure in place for building the units. We have roads and rail access, barge access. The Colorado River is a navigable waterway. In fact in the last some years back we brought in new steam generators for units #1 and #2 on barges on the river, so we have the access and the capability to get the heavy equipment in, and so forth.

We have the transmission corridors. South Texas is located with one of the major hubs within the distribution system in Texas. And we have - there are eight 345 kV transmission lines going out. We don't need any additional corridors, we don't need any additional lines. We will reconduct a couple of those lines to larger sized conductors.

It's a low population density. We are located in a single county. In fact the whole population of the country is only 39,000, but the actual 10-mile emergency planning zone has under 3,00 people in it.

If you look at the picture you see South Texas, one of the predominant features, and what people notice when they come to South Texas, is that it's flat. There just is not - there is no real elevation changes in the area.

We have existing state, county, emergency plans. Strong community support in Texas. There is a small population in the county. We are the largest entity in that county, the major tax payer, and a good corporate citizen and neighbor and well appreciated. So it's a really good place. So we've got the cooling, we've got the reservoir, we've got the water rights to be able to provide the new unit. So that is the strong advantages of it.

MEMBER STETKAR: Let me interrupt. In that photograph it looks like there are two plumes. What is that?

MR. McBURNETT: Yes, when this photograph was taken they were burning fields. And the Texas Gulf Coast back in many many years ago, where it was -

before we came in, it was basically a prairie. It was all grass. The grass was maintained by burning, by grass fires.

MEMBER CORRADINI: That's a common thing in the Southwest.

MR. McBURNETT: Common thing. So what you see, particularly in the wildlife refuges around the area, they will periodically burn it to maintain the ecosystem, and I suspect that was what was going on that day when the photograph was taken. That is actually be hind the golf range.

(Comments off the record.)

MR. McBURNETT: By the way you are looking from north to south. The southernmost boundary of the property is basically the edge of the main cooling reservoir. So in the background, the back of the main cooling reservoir is the back boundary of the property.

So that fire is probably 10 miles away from the reactor. But that is not uncommon to see that in our area.

I would mention the technology selection, what led us to the Advanced Boiling Water Reactor. Two primary things: one is the design was certified by NRC; and the other is, there are four units in operation in Japan, proven construction record and a proven operating record. What that did for us was lowers licensing risk, lowers construction risk, it gives us really what we thought we could implement as soon as possible. And that was the mission from our owners, what can we put in the field with the least risk as soon as on our schedule as soon as possible. That led us to the ABWR.

MEMBER STETKAR: Let me interrupt. You mentioned that the only amendment to the DCD is related to the --

MR. McBURNETT: Yes, sir.

MEMBER STETKAR: I have no historical experience myself with the original design certification. I assume that because of its history it came with design acceptance criteria for digital instrumentation control systems. Will those be resolved as part of your COL application? Are you going to talk about that in your next session?

MR. McBURNETT: We can - Mike, why don't you -

(Simultaneous speakers.)

MR. McBURNETT: That was the overall idea going in was to minimize departures. We knew the more departures we put into it, we increase the licensing risk over the life and duration, the amount of review that the staff had to do. So our goal was, while not doing anything dumb, by trying that strategy, but be very smart and very selected about what we picked as departures. And we will go through the list. But that was the strategy going into it was not to grab everything we could, but to real strategically pick the right departures and put those into play.

And before I get to departures I will do a couple of things. I also wanted to mention, while we have selected Toshiba as the supplier, we have a contract with Toshiba American Nuclear Energy as the engineering construction contractor to basically deliver this plant.

In selecting Toshiba, we are selecting a vendor that wasn't the original provider of the certified designs. We had to satisfy ourselves that Toshiba did have the capability to deliver the certified design in the U.S. We started off in that process asking Toshiba and actually MPR and Toshiba to perform a capabilities assessment. Caroline Schlaseman was the lead on that effort, but we had something like 40,000 man hours of activity going to the task of Caroline assembled industry experts and folks form Toshiba to go through their design and their information, and identify any gaps. We were really looking for anything they didn't have that would create an insurmountable problem for us in being able to implement that design in the U.S.

They implemented that work, and we came after it with due diligence effort, we came in with our own staff plus some outside industry experts that we brought in to help us and do the due diligence oversight of that process, and go through it and assure ourselves - and actually we went into that pretty skeptical. We were going into it fairly not believing that we were going to be able to do it. Myself and the engineering manager, we were both of the same mind that this is -- there is no way this can be done.

But after going through that process, we were both then just thoroughly impressed with the level of technical expertise and the amount of information that Toshiba does have, and has access to the joint efforts at K-6 and 7 as well as the designing their own plants in Hamaoka 5.

We basically - just an anecdotal story - but we went through and we opened up the DCD, and we'd go pick out a reference in DCD, and show us this. And sure enough, Toshiba would send the engineer off and a little while later he'd came back with the document, here it is. And not only here it is, but here is the guy that can explain it to you. These were guys that were thoroughly versed in that calculation and can do it. We'd open that document up, and we'd go through it, and we'd look for references. Can you show us this one? And later here the guys come with that one.

So we played that kind of an effort with them, and in every case we tried, they were, here it is.

VICE CHAIR ABDEL-KHALIK: But was the documentation in Japanese or in English?

MR. McBURNETT: A lot of it was in Japanese, and was completed by Toshiba engineers in Japanese.

MEMBER ARMIJO: Would you have translation issues?

MR. McBURNETT: The design basis for South Texas will be created in English. So yes, that is part of the Americanization in producing this plant. The necessary record for South Texas. But as I say it impressed us. And we came to the conclusion, we did identify some gaps. I mean there are some things that Toshiba did not have, and that we made arrangements for - as I mentioned we had Westinghouse in for safety analysis. There are some fuel design through Westinghouse. There are some pieces that we have other means to go obtain, and that is part of the process.

(Simultaneous speakers.)

MR. McBURNETT: So that was part of the selection. And since that actually - on several occasions since then, the NRC staff has had an opportunity to meet with Toshiba in looking at things like containment analysis and sump designs and some of the other activities, as well as they performed an independent vendor inspection in July. And they will brief you on their conclusions later. But they basically reached similar conclusions in their report.

MEMBER ARMIJO: I just want to make sure, now you have identified, you have worked out all the things that are proprietary to GE that you are either going to have to create on your own, using Toshiba's background.

MR. McBURNETT: Toshiba has access to that information. And has the capability to use it.

MEMBER CORRADINI: So I guess I want to just follow up. Because then the discussion of the overview, your colleague had mentioned the original arrangement in '87 was that all parties concerned had essentially equal access to the basic technology; is that correct?

MR. McBURNETT: Correct.

MEMBER ARMIJO: I am talking about licensing topical reports. Are there any things like that that you cannot use?

MR. McBURNETT: The licensing of the original application was submitted referencing I believe there were like 13 topical reports. And when we revise the application to move to Toshiba, we did not use any of the topical reports, but the information we needed to put into the actual application itself as opposed to handling the topicals. It was easier that way for us at that point in time.

VICE CHAIR ABDEL-KHALIK: That makes it easier for us to review as well.

MR. McBURNETT: Yes, and the original application, it made sense to break it up that way when we revised it but Toshiba did not. It didn't make sense to try to do that again.

All right, slide #24 is just the overall schedule. I won't read all these to you. We submitted it in 2007, and we're basically at the point now where NRC has completed phase one, of the safety review, and is writing the draft SER. I think we are all probably up to speed on everything on that slide.

VICE CHAIR ABDEL-KHALIK: We can actually continue, since we are presumably on the same topic, we can continue until the scheduled break time of 3:15.

MR. McBURNETT: All right then.

As I mentioned to start with our goal was to minimize departures. We have 23 Tier 1 departures, and one Tier 2* departure. And there are Tier 2 departures in the application. The Tier 2 ones do not require NRC approval, so they are under our control. And we consider the departures of importance the ones that are driving NRC review, which will be the Tier 1s and Tier 2*s.

Slide #27 is a summary, and I will go through each type of slide on each one of these in a minute.

The really - this shows kind of the grouping, and we had a couple related to essentially new technology. We had about three of them that are related to site parameters, a couple of corrections, some enhancements, and then just some kind of miscellaneous things we picked up that needed to be either incorporated or addressed.

So that is what the overall list is. I'll head off to slide #28. The first one I'll talk about, and this will get into the DAC question that was asked a minute ago, safety related I&C architecture. Currently the design certification was finalized in 1997, so I&C has moved a long way since then.

We really revised it to replace the obsolete technology. We have changed the description, the actual descriptions in the DC was hardware based. We basically described the function based on what the hardware did. We changed it to describe the function of the hardware.

And then we've eliminated some unnecessary logic, the activation logic.

I guess what I'd like Mike Murray, is my STP and nuclear operating company's I&C manager responsible for the I&C on this project, and I'd like him to pick up the DAC question that was asked earlier.

MR. MURRAY: Mike Murray. The DAC question that was asked earlier, as I understood it was, if it part of COL or is it post-COL. Our plans are in the DAC process will be inspection process, and it will not be a part of the COL. We are working with - there is a pilot plant for the DAC process, and we will be working with the Office Of New Reactors to work through that process and develop it.

MEMBER SHACK: So your exception will be to provide new updated DAC which you will then resolve later? Is that the process?

MR. McBURNETT: Not new DAC.

MR. MURRAY: No, we're not adding new DAC. What we've done is, what we are doing, is developing the implementation of processes and procedures to implement that DAC, and have completed some of those and have those available for review. So for an example, we have a project level software process plan that the vendors can come in, any vendor that provides it has to follow the software plan which has all the aspects of design on a verification validation and that's our process.

MEMBER BROWN: But that is not all there is to the substitution of the digital equipment for the analog. I presume you are talking the analog hardware base.

MR. McBURNETT: Actually the DC is digital.

MEMBER BROWN: Digital?

MR. MURRAY: It was an early version that was entirely digital. The original design, the DCD was a digital platform. The actual platform, I can't tell you what that is.

MEMBER BROWN: That's okay. But I mean is there a functional description that is going to be provided as part of this?

MR. McBURNETT: Yes, there is.

MEMBER BROWN: So there will be some effort with pictures and diagrams to show independent redundancy.

MR. McBURNETT: Yes, that's in there.

MEMBER BROWN: And you'll talk about how you implement it in the larger diagrams, and how you implement whatever the DCD requires. All that will be in there.

MR. MURRAY: That is correct. The design functionality will implement the functionality as described in the DCD.

MEMBER BROWN: Just to give you a heads up, one of the things, since I am supposed to look at this stuff, I will be looking at the independence of those divisions, for both the safeguards and the digital I&C applications. I had no idea what it looked like before. I just want to see what it looks like now, and how that divisional independence is maintained. It's very important. Independence is independence by the way; nobody talks to the other one. I don't know what they are doing, but I'm just giving you a heads up.

MR. McBURNETT: Mike, you want to comment on that?

MR. MURRAY: Yes, I understand. There will be an opportunity to go through that in detail as we go through the chapter reviews. And that would be a good time for you to ask your questions on it.

MEMBER BROWN: That's fine.

MR. MURRAY: But we have - I'll say we have improved the independence of the platforms with the selection of hardware that we are going to implement. You will be able to see that better when we get to this chapter section.

MEMBER BLEY: We heard earlier you had staff on board for operator training. Do you have the schedule for this - do you have a schedule for this pilot post-COL DAC closure process that you are going to do? When is that going to get started, and when do you expect to finish with respect to the field load date, how far before that?

MR. MURRAY: The - our moving targets are the first quarter of next year we will start that process. And it'll be a continuous process as we go through the design and development process of the implementation of the process.

MEMBER BLEY: Thank you.

MEMBER BROWN: Unnecessary redundant actuation losses, hopefully that will be clear when you get the paperwork why it was unnecessary.

MR. McBURNETT: Yes.

MR. MURRAY: Yes, sir.

VICE CHAIR ABDEL-KHALIK: I guess I am trying to understand something you said earlier, that you were relying on the inspection process to verify the acceptance of whatever design you ultimately end up with that meets the DAC requirements. Now if you are going to - based on your timeline, this has to be done fairly early for you to have a real simulator.

MR. McBURNETT: The design has to be done before the simulator. But the DAC closure doesn't.

VICE CHAIR ABDEL-KHALIK: All the details have to be in place prior to this inspection process for you to have a simulator that is a realistic simulator. And is that information that you were talking to Mr. Brown about in terms of providing adequate details, for him to look at it in a lot of detail.

MR. MURRAY: Yes, sir, let me explain the process, and it aligns with what your question is. We are doing the detailed design on the platforms as we are doing the process for the simulator. Those to come together where we would be able to simulate those processes in the simulator, to where they will have the fidelity required to train operators.

In our schedule we have that brought together, and coming together. As we go through that process, with the pilot program, our intent is that we will have as each let of the design is being implemented, we will look for opportunities for those inspections, or what we expect to see in a pilot, and we haven't got total agreement on the pilot, because that is what we are working towards with that. And that gives us the opportunity, and the inspectors the opportunity, to watch the design as it is being developed and built.

MEMBER BROWN: Just remember, this is not just software. You've got the division - we have real hardware that has to execute software, and that is one of the focal points. We want to see how it's done.

MR. MURRAY: And we certainly appreciate the heads up and we'll be prepared to discuss that.

VICE CHAIR ABDEL-KHALIK: Please continue.

MR. McBURNETT: All right, the next step, a departure, also an enhancement is, we found a design for a reactor core isolation cooling turbine-driven pump that is substantially more simple and robust than the traditional Terry Turbine pumps that we use in most of that application in this country. It's a monoblock design that has the pump and the turbine all on one shaft all in one block. It eliminates the seal leakage. It's water lubricated. The reason it ends up being Tier 1 is that it also eliminates the barometric condenser which was necessary to the seal leak off. That's what - the only reason it gets into this category.

VICE CHAIR ABDEL-KHALIK: Now as I recall there was a topical report dealing with this.

MR. McBURNETT: There was.

VICE CHAIR ABDEL-KHALIK: Was this just sort of carried over?

MR. McBURNETT: It carried over, and now instead of the topical reports, the same material is in the application, or similar material, I should say. So developed by the Toshiba team to replace that, the other material.

So we have - next slide, the - on the site parameter, site-specific parameters, there were three different things here. The minimum sheer weight velocity, the VC specified 1,000 feet per second minimum shear wave. There are some isolated areas underneath the site that have less than 1,000 feet per second, not particular significant from an overall design standpoint, but it is different than what the envelope is in the design certifications. That's being addressed as departure.

Flood elevation, which is why we have the above grade reservoir on site, we do have a flood potential. The certified design does not include an above-grade flood, so we've added added features to protect it from flooding. As well as we're just slightly outside the envelope, the DC, on maximum precipitation and humidity. So those have been addressed as a departure. Next slide.

This one falls into the category of a correction. The feedwater line break analysis in the certified design assumes that feedwater flow is terminated. However, the design does not include any features which terminate auxiliary feedwater flow. So in addressing that issue we perhaps provided a safety-related trip of the main feed pumps in order to terminate feedwater flow. And now we're re-completing the feedwater line break analysis, and the containment analysis, based actually on revising that, including that in the analysis.

What the - just to be clear - we also have operator actions for 30 minutes to terminate feedwater flows. So the actual analysis assumes a 30-minute operator action time for when feedwater flows. So it's conservative, it says 30 minutes when it actually should be tripped much sooner by the automatic system.

But that is the -- so what that does is, that causes redoing the feedline break analysis, redoing containment analysis. Now there are a couple of Tier 2 departures that sort of all out of that. We have - normally Tier 2's don't require NRC approval, but since we are changing methodologies, there are also some changes in the tech specs on containment analysis, we end up with a couple of Tier 2 departures that require NRC approval.

In particular the containment analysis, we're reflecting the feedwater line break, and we are also requesting a change in the decay heat curves. We're in the DC, we're non-conservative on a long term basis.

And then we changed the containment analysis. We changed the containment special response. And all that impacts fuel-swell analysis.

So that kind of all goes together, as two Tier 2s that fall out of that correction of Tier 1 issue.

MEMBER STETKAR: Mark, I might have not been listening clearly enough. You said -- I thought you said safety-related trip of the feedwater pumps.

MR. McBURNETT: Yes.

MEMBER STETKAR: The slide says, safety-related trip of the condensate pumps.

MR. McBURNETT: I'm sorry.

MEMBER STETKAR: It is the condensate?

MR. McBURNETT: It's the condensate; I misspoke.

MEMBER STETKAR: You don't have a feedwater tank? Some plants have a large -- between the condensate pumps and the feedwater pumps there is a feedwater unit. Well, they give it different names. The aerator tank, the feedwater tank. Does the condensate pumps directly feed the feed pumps on this design?

I'm thinking about inventory. You shut off the feedwater pumps, you have no flow. You shut off the condensate pumps, if there is a feedwater tank in between, you still have flow.

MR. OIKAWA: My name is Hirohide Oikawa. I am from Toshiba. As for the feedwater pump, it is tripped by low suction head, so we have no concern about the continuous feedwater operation. But for the condensate pump, we've got to assure the safety of the logic, the protection logic. That is the difference of the responses of the feedwater pump and the condensate pump.

MEMBER STETKAR: I guess I still don't quite understand.

MR. JAIN: Let me -- I could actually -- when we calculated the total feedwater flow coming from the BOP side, we did take into account the inventory stored in that feedwater piping, the feedwater heater. But as far as I know there is not a separate tank.

MEMBER STETKAR: That's all I was asking for. I am familiar with some plants that have a real big feedwater tank.

MEMBER ARMIJO: I am still trying to understand, what is being corrected? Was there a deficiency in the existing DCD that you detected?

MR. McBURNETT: What is being corrected is the analysis that's in the DC, assume feedwater flow stopped. There wasn't any thing in the DC that stopped feedwater flow. And as soon as that comes in, in Japan they use turbine-driven pumps. We are using motor-driven pumps. That probably sets the stage for how that occurs in the original design. That's a little speculative.

VICE CHAIR ABDEL-KHALIK: Is there a logical point to stop for a break.

MR. McBURNETT: This is a good one.

VICE CHAIR ABDEL-KHALIK: At this time we'll take a beak for 15 minutes.

(Whereupon at 3:15 p.m. the proceeding in the above-entitled matter went off the record to return on the record at 3:30 p.m.)

VICE CHAIR ABDEL-KHALIK: We are back in session.

Mr. McBurnett, would you please continue.

MR. McBURNETT: Yes, go on to slide #31.

Other correction that we have included in the Tier 1 departures in the application, the certified design lists a diesel generator engine room temperature limit of 50 degrees C. And it just has the diesel engine, the actual controls in separate areas. So what the design, the HVAC that's in the design isn't capable of maintaining the 50 degrees in worst case conditions, so we addressed that with adjusting the temperature up a little bit. WE say all the equipment that is environmentally sensitive is in another area. This is really just the engine itself.

VICE CHAIR ABDEL-KHALIK: Within site guidance on working in high temperature areas, 60 degree suits? I mean this - I mean there is - you have to get some high level -

(Simultaneous speakers.)

MR. McBURNETT: It's the scenario, the worst case scenarios, and the running in accident conditions, that you end up with those kinds of numbers. So it's an area that doesn't have to have access to it.

VICE CHAIR ABDEL-KHALIK: I mean when people go into a high temperature areas, they have to acquire approval if the temperature exceeds a certain limit. I think it's what 140 F? Under no circumstances they can go in.

MR. McBURNETT: Normally it's not going to be anywhere near that, normal operations it's not going to be anywhere near that temperature. This is the scenario where the engine has been running for seven days, and it's the hottest time of the year, and all these things have built up to give you that maximum temperature. Normally it shouldn't operate there.

VICE CHAIR ABDEL-KHALIK: Okay.

MR. McBURNETT: I don't know if Scott, if we have anybody else that is more versed than that on the team. The controls and everything are in a different area. We don't have to go into that. Coley, do you have any additional --

MR. CHAPPELL: My name is Coley Chappell. Just an experience, with this is the diesel generator engine room, and the 140 degrees is consistent, in line with, about the temperature of other types of equipment spaces. It would not operate at that temperature, and that would be the upper limit that's approved by the manufacturer for that particular equipment. But that would be an upper limit. That would not be a normal operating temperature.

MR. McBURNETT: Then moving into the list of enhancements, the - on the - there are four divisions of instrument controls, and there are three divisions of sector related diesels, there are three trains, three divisions. And there is a fourth that is an I&C division. When one of those other trains has on it a regulating transformer that provides for the maintenance power to the system, and if you have the UPS interrupt for the power supply out of service for some reason. For some reason they did not include that on the fourth division. Our suspicion is it was an oversight in the detail in the certified design. It doesn't really affect safety or safety issues, but it provides maintenance capability to the system.

So we've added the regulating transformer on the fourth division similar to what is on the other three divisions for I&C.

MEMBER STETKAR: Did the original design have four divisions?

MR. McBURNETT: Yes. It has four divisions, each division has its own --

MEMBER STETKAR: Okay, so this didn't add a complete fourth division.

MR. McBURNETT: It just added a regulating transformer. You have to take the UPS out of service for batteries of the inverter, so you have a way to keep the channel powered.

MEMBER BROWN: Let me phrase that one other way. You have four channels. Three have regulating transformers; one did not. And all you've done is add --

MR. McBURNETT: That's all we've done.

(Simultaneous speakers.)

MEMBER BROWN: I thought it was a real upgrade, not an enhancement.

MEMBER STETKAR: We're getting into a

list of things that aren't quite as interesting as the first couple.

On top of slide #32, the residual heat removal system, in the DC two of the RHR trains provide spent fuel pool cooling. The third train did not. And we've added so that the third train also provides spent fuel pool cooling. That is just for versatility during outages to give you the capability to not have to schedule the trains as tightly when you are in an outage condition to maintain spent fuel cooling.

We've eliminated the hydrogen recombiners consistent with 50.44. The - we have deleted main steam isolation valve closure on scram, for high radiation. This has been done by every BWR plant in the country. It was a spurious trip activation. It's not used in any safety analysis. Call it a spurious trip. And it's all been eliminated, now we're eliminating it from the ABWR as well.

And on 33, the - the reactor pressure, the reactor internal pump motor casing, the certified design says there is no cladding inside the motor casing for the RIP pumps. But indeed every RIP pump that has been built for K-6/7 and all the other plants has some areas inside of it that does have some stainless steel cladding on it. So we addressed that to reflect what is actually in the design and intended to add to the description of the cladding.

The rad waste building substructure has been reclassified as non-seismic. This is the consistent with the current version, Rev. 2, of Reg Guide 1.143. Apparently that was in some state of flux back in the mid-`90s when this was originated, so we basically brought it up to the current Reg Guide revision.

And on control system inputs testing hardware we've clarified some of the safety testing of the rod control power supplies.

On 34, there is some changes we made in the breaker fuse coordination, clarifying how the breaker fuse coordination works in the design, as well as there is a requirement in for testing in the plant at minimum voltages, which we really can't do as installed in the plant. Minimum voltage testing has to be done in the shop, or in the vendor's shop. So that is reflected in the change.

MEMBER BROWN: When you show these, or when you present these, are you going to show what it was, and then what it is now, so that the change is understandable, as opposed to just seeing what it is not and trying to figure out what it was before?

MR. McBURNETT: Yes, go to the chapter reviews, certainly. What you see when you - the application, is line-in and line-out markups. So you can see what was taken out.

MEMBER RAY: That is a little bit different than what you are addressing.

MEMBER BROWN: I know.

MR. McBURNETT: He is looking for a little bit clearer comparison.

MEMBER RAY: Here is the issue. At you looking at changes, or are you looking at prescription of design changes? And the second thing is what we are looking for - the first thing is what we get, okay. And we probably should leave it there for now. We have to figure it out when you are given textual changes what the design change was. This presentation I think we should leave it. I think he's got the point.

VICE CHAIR ABDEL-KHALIK: We'll see on Saturday as to what is the optimal way for us to review these modifications.

MEMBER RAY: It's easy to say what's optimal. What's achievable is a different thing.

MR. McBURNETT: All right, slide #35. We

did have one Tier 2* departure. Like I said, we didn't go -o- we're trying to minimize the number of departures, so we haven't done a lot of wholesale changes to codes and standards. We did go through and strategically determine where we needed to address codes to a later code revision. And so that's what we have here as Tier 2* change that goes through a number of changes to reference the revision numbers of codes and standards, in each case changes to a later approved revision. And so that's what have as Tier 2* changes. It goes through a number of changes to reference just a revision number for codes and standards, in each case coming to an existing approved version.

And also departures in technical specifications, really there are nine of those that fall out of some of the Tier 2 changes. We talked about containment analysis earlier; that was one of them. We've also changed the plant voltage distribution system. The certified design has --

VICE CHAIR ABDEL-KHALIK: Has the GOTHIC code been approved, been reviewed and approved by the staff?

MR. JAIN: The GOTHIC code has been approved for Mark 1 containments and we have submitted a topical to expand this application to ABWR containment design. And that is under review right now.

MEMBER CORRADINI: Just, could you repeat?

MR. JAIN: Currently we have approval for Mark 1.

VICE CHAIR ABDEL-KHALIK: Mark 1, okay.

MR. McBURNETT: Actually, the plant medium, the project system, the certified design has a single voltage system, 6.9 kV. We've changed it what is much more typical in the U.S., a dual voltage, a 13.8 and a 41.16, just makes it easier for us on motors and pumps and motors and valves and wires and things.

That reflects a Tier 2 change but it reflects in the tech specs. That's where it comes in as a tech spec change that has to be approved.

VICE CHAIR ABDEL-KHALIK: How far are the switchyards for the new units from the existing units?

MR. McBURNETT: The new units do have their own switchyard, and it is - this is an estimate, but it is probably 500 feet west. Does that sound about right, guys, Scott? How far? How far the switchyards are apart, the existing switchyard from unit #1 from u nit #2 from units #3 and #4.

MR. MORRIS: This is Scott. And Ed, I'm sorry, I don't know how to answer that question. It's a long way.

MR. McBURNETT: The plants are about 1,000 feet apart. So the switchyards, that's an estimate. Not miles, and not real close.

MR. HEAD: There's actually - don't we have a picture at the end of the presentation?

MR. McBURNETT: It doesn't show the switch yard on it. We can get that information.

The other technical specification changes, a number of editorial changes in the technical specifications, really don't change any of the intent.

Thirty seven, there are some other notable Tier 2 departures. A couple have already been mentioned. One I kind of lump altogether here, on rad waste, liquid, solid and gas as rad waste, the certified design basically reflected technology that was back in the `80s vintage, evaporators and concentrators and incinerators and things that we just don't install in plants now. We don't use them. Instead we go to modulate systems, and the rad waste system, we take a Tier 2 departure, to upgrade all that to the current technology. It's the same rad waste building that you are going to see in other applications, or very very similar in concept.

And then on the slide #39, ECCS section strainers, we have, recognizing strainer technology has changed significantly since 1997, we have upgraded the strainer design, and have a commitment to meet the latest revision of reg guide 102.

That kind of concludes all my discussion of departures. Any other departure-related question. Clearly they will all be gone over in much more detail, and we will work to provide information in a way that works better for the individual chapter reviews.

The last item on our list, steel design and licensing. And Bob Quinn from Westinghouse is going to present this.

I did want to do a little bit introduction for it. The - we are going to talk about our strategy on fuel. From the very beginning when we first submitted, we had realized that the fuel design that is in the certified design dates back to 1997. We realized that if we changed the fuel design at that point, we in all likelihood by the time we bought fuel in the 2013 timeframe, we'd be changing the design a second time.

We looked at it and said, that's two steps. Why do we need to do it twice? We'll do it once, we'll do it after COL. We talked to the staff about that, and we don't spend your resources, we don't spend our resources, we can do this more effectively just doing it one time, one submittal, one review. And all agreed that that was the best answer.

So our strategy has been for licensing based on this fuel design, this insert by design. We will submit a fuel amendment shortly after COL that will hopefully put the fuel design that we would plan to use in the first cycle.

MEMBER ARMIJO: Now that is an amendment to what?

MR. McBURNETT: To the COL.

MEMBER ARMIJO: To the COL.

MR. McBURNETT: That's the strategy for handling that, and it continues even as we have changed vendors being the right strategy for us. Now at this point we have Westinghouse set up to do that analysis and provide that fuel design and develop analytical tools or modify their analytical tools to be able to support that. And I'll ask Bob to go through the process that they are going to - and we've also agreed with the staff and had - have scheduled for getting to that point.

MR. QUINN: Yes, I wanted to touch on it briefly, slide #42 in the package talks about the status and schedule for our path forward on fuel for STP three and four. As Mark mentioned, Westinghouse will be providing that fuel, and will be providing the supporting evaluation and analysis for that. So Westinghouse has a number of topical reports that we are planning to submit; a couple we've already submitted. IN order to expand our safety analysis methodology to cover the BWR designs. There is a total of 11 topicals that are being submitted. Two of them are new topical reports, one on transients, and one on facility analysis. There is one topical that we are revising; that's on the reload methodology. That's to cover ABWR. And then there is a total of eight supplements to topical reports that are already reviewed and approved by NRC for various applications for Westinghouse. Those cover basically the rest of the analytical area, the transients, LOCA containment, and the control rod blade design.

So we've come in, met with NRC staff in January, went through the list of topical reports. We have submitted two of those already. They are both supplements, one in September, one in October. Then next year the bow wave comes if you will. We have one topical that will be coming in in April; four more in June; four more in September. In our meeting with staff we talked about the schedule and our need for reviews of those topicals. And I think we have a schedule that we can work with, in terms of getting our submittals done next year and having the reviews done in time and approvals in place to support the development of the fuel amendment to the COL sometime in the 21st century. So that is our current plan. Any questions?

VICE CHAIR ABDEL-KHALIK: Are there any questions for STP or Westinghouse?

MEMBER ARMIJO: I don't know what's customary, but is it Westinghouse's or South Texas' expectation that these LTRs will be reviewed by ACRS?

MR. McBURNETT: Whatever your process is.

VICE CHAIR ABDEL-KHALIK: It is up to us to decide.

Any other questions?

Well, at this time we are ready to hear from the staff. And I guess the focus of this presentation --

MR. HEAD: We note the conclusion slide does have two switchyards on it. And just for reference, the buildings down there at the bottom, those are larger than a football field, and the distance is around 600 feet. So while I can't give you the exact perspective, you can see it there.

VICE CHAIR ABDEL-KHALIK: Thank you.

So at this time we will hear from the staff. The first group will be on the qualification of offerors, vendor, and if possible on the timeline that we will use.

(Comments off the record.)

NRC STAFF'S PLAN FOR STP COLA REVIEW

MR. TONACCI: Okay, well, I am Mark Tonacci. I am the branch chief of the ESBWR/ABWR projects two branch. Relatively new in that role. But George Wunder is the lead project manager, and has been with this project since the beginning.

We will talk briefly about the timeline and the work that is coming out way, and by correlation, to you, and then George gets the more interesting part, which is talking about the alternate vendor, and work we did looking at the alternate vendor qualifications.

So with that, I will talk briefly here about the work that is ongoing, licensing work. We have been talking predominantly about the COL safety review, and you can see the dates there. We received the application in September of '07. We've gone through phase one, and we're in the midst of the review of phase two which will wrap up in April of next year. We are closing down the chapters now, and trying to close out questions on open items. The chapters will be coming to ACRS for review in March. There are a number of presentations already scheduled in March of next year, one in May, and then we hope to wrap up in June. And we hope to exit phase three, which is the safety-related SERs with Open Items by August. And then roll into phase four, five and six.

We also were talking about the design certification aircraft impact amendment to the DC. We received that some months back; we have not yet approved the schedule. We have it. We've gone through the docketing review, but we have not published a formal schedule for that, but we are very close. As a matter of fact the letter is in concurrence now.

We do have coming to us next week a request for a limited work authorization to do some work, and STP is trying to get a head start on some work they can do that does not need our approval. There is a question about a retaining wall and whether or not it can or cannot be left there. They are going to formally submit that work authorization to us, and we will take a look at it and see if it needs our approval, and if we have go through the reviews, or if it doesn't meet our approval, in which case they are allowed to go on and never pursue any further. So obviously we have not developed a schedule for that work yet.

We just talked about the fuel topical reports. We have a couple; the rest will be coming in next year. Clearly you want to get those done over the next couple of years and completed before the formal license amendment, which will be coming to us tentatively planned in 2013. So the idea is to get the fuel topical reports reviewed, and then when we receive the license amendment in 2013, we'll work our way through that. Obviously that schedule is not developed either.

MEMBER SHACK: When are they going to submit the updated PRA? Is that going to be part of the COL?

MR. TONACCI: George, do you have anything on that?

MR. STILLWELL: I'm Bill Stillwell. I'm the PRA supervisor for South Texas Units #3 and #4. Are you talking about the PRA that we have to update to support the COL, or the PRA that we have to have to support operation over 60 years? Exactly two different PRAs.

MEMBER SHACK: Both.

(Laughter.)

MR. STILLWELL: -- is in fact complete, and we are using it now to support DRAP activities as detailed design moves forward.

MEMBER SHACK: This meets all applicable standards?

MR. STILLWELL: No, this is in accordance with Reg. Guide 1.206. This is an approved PRA. If I have significant design changes, or changes to plant design, then there is a question whether I have to meet current closing standards, but we got through that with no significant changes. So in accordance with Reg Guide 1.206 And C3.119, as long as there is no significant changes, the PRA doesn't have to be modified, but I have to incorporate the design changes into the plan-specific PRA. So there were no significant design changes in accordance with the ASME standard, so I have a PRA to support total licensing that was done in the late `80s, early `90s. It looks like an IPE plus a little bit. So if you think back to the early `90s, this was a pretty good IPE, plus a pretty good discussion of low power shut down, a pretty good discussion of some of the external events. They used five as a screening methodology for fires. They did separate margins analysis, because that is the stage of design and that was the most efficient way to look at seismic events.

But that is the PRA we have to support COL. Once we have the application, once we have the application approved, we have to have a PRA that meets current codes and standards that the NRC approves at fuel load with standards one year prior to fuel load. That PRA has actually started. We started that work in May. By next year, the end of next year, or the early part of 2011, we will have completed the level one/level two almost some external events PRA, and we'll go through - we're setting ourselves up to go through peer review. So peer review will actually start for us in 2011, and we'll go through the peer review, and incorporate facts and observations from the peer review, 2011, early 2012. At that point we get a code, and then we get to come back and talk to you about all the exciting stuff.

MEMBER APOSTOLAKIS: So the peer review is the NEI peer review?

MR. STILLWELL: It's the ASME peer

review. The ASME standard peer review. Which is NEI-plus. But yes. It's the ASME requirements --

MEMBER APOSTOLAKIS: That's a PRA that you can keep in your headquarters, and if anybody wants to look at if they have to come there.

MR. STILLWELL: Yes. Except the results will be summarized and be part of the FSAR, Final Safety Analysis Report.

VICE CHAIR ABDEL-KHALIK: Thank you.

MEMBER APOSTOLAKIS: What is the logic of using PRA or for lesser quality for the COL? And then jump up to a much higher standard? I can understand why you need the PRA for the 60-year operation. But it seems there is a huge gap there. Is it just a matter of convenience.

MR. STILLWELL: It is a matter of timing. When was this design certified? What existed when the design was certified, how the rules evolved, and in effect this is what we have.

MEMBER APOSTOLAKIS: Okay.

(Comments off the record.)

VICE CHAIR ABDEL-KHALIK: Continue.

MR. TONACCI: That concludes this portion of my presentation, and we will go to the ultimate vendor qualification with George.

MR. WUNDER: Thank you. Good afternoon, Mr. Chairman. Thank you very much for the invitation. We are very grateful to be here to talk with you this afternoon.

Our original plan was to have to have the individual chapter PMs talk to the subcommittee about their chapters and talk to you about the technical challenges they had and about the focus of the staff's effort. Our schedule got a little bit rearranged so we are here talking to you on a day when most of the chapter PMs are in training.

The good thing is that we have the opportunity to talk to the entire committee. Unfortunately I cannot address the individual chapters in the depth that could do them justice, as could the individual chapter PMs. So with that in mind we ask and South Texas graciously agreed to give a little more in depth presentation on their departures.

As you have probably already concluded, much of the staff's review effort will be on the departures and the supplementary information that has been proposed by South Texas, because the certified design itself, it has finality and it is not open to staff review.

We hope, and I think because of the

questions you were asking the applicant, that the present that STP gave of their technical departures has provided you with some of the insights into where the staff will be focusing its review efforts.

What I'd like to talk to you about is an overview of the staff's alternate vendor qualification review, and I would also like to give you our proposed schedule for presenting the staff's SER to you.

You learned from the applicant's presentation that the design for what was the General Electric advanced boiling water reactor will be supplied to South Texas by Toshiba. That makes Toshiba what we call an alternate vendor, and the rule allows for an alternate vendor to supply a certified design provided that they are demonstrated as qualified to do so.

This is the first time we have had to exercise this particular provision in the rule, so we had to decide amongst ourselves on the staff, what does it mean to demonstrate qualified. Well, we knew that the applicant was going to do a due diligence, so we said to ourselves, let's ask them to submit a summary of that effort for formal staff review, and then once we have reviewed that we will be better informed as to what additional information we might need, as well as to what types of inspections, audits, requests for additional information, we may need to send out.

MEMBER ARMIJO: Let me just ask one quick question. When the new certification is issue, or amended certification is issue, now what is the status of that? Can any facility reference that, whether it's applied by Toshiba or anyone else?

MR. WUNDER: Can they reference it?

MEMBER ARMIJO: Yes, who --

MR. WUNDER: The design is owned by the people.

MEMBER ARMIJO: All right, so any supplier could take that existing amended certified design and market it. Separate from business issues, I'm just talking regulatory.

MR. WUNDER: If they are qualified.

MEMBER ARMIJO: So let's say GE had a customer, and they came in and said, hey look, we really like this amended design here . We're going to reference that and our customer is going to buy it from us. Is that a problem for the NRC?

MR. WUNDER: No.

MEMBER ARMIJO: Okay.

It may be a business problem, I don't know that. But not from a regulatory standpoint.

MR. WUNDER: It's allowed in the rules for anyone who is being qualified to provide the design.

MEMBER CORRADINI: So the issue is the qualification of a third party?

MR. WUNDER: Yes, sir.

(Comments off the record.)

MR. WUNDER: We also, what we did when we were trying to think of what does it mean to be qualified, we came up with a list of fundamental questions that we decided to ask ourselves during the course of our review. And these are things like, what information might be necessary to supply a design that might be proprietary, copyright protected, patented, or otherwise unavailable to the alternate vendor? How does the applicant propose to fill any design basis gaps that might result from this information not being available? What has South Texas done to assess the alternate vendor's ability to reconstitute necessary information? Has South Texas done an adequate job of scoping, that is, have they done an adequate job of looking around to determine what information is in fact necessary? Have they circumscribed that properly?

Then we looked at the alternate vendor itself. And we asked questions like, can they assume the duties normally assigned by a plant vendor? Can they manage design changes and support the licensing process? And can they address the differences between the designs they have already made and built, and the U.S.-certified ABWR?

So there were basically two parts to the staff review, the review of due diligence documentation, and the audits and inspections.

So we did our review of the applicant's due diligence, and we decided that we would like to look deeper into some areas regarding alternate vendor qualifications. The SER isn't public yet, so I don't want to touch on things that are pre-decisional, but I think I can safely point out some of the things that we identified.

We identified some questions in the area of pressure-temperature limit methodology and fluence, and our questions and the applicants' responses in this area are going to be detailed in Chapter 5 of our SER. We identified some issues in containment analytical model and hydrodynamic loads, as you might well have guesses, and the resolution of these are going to be detailed in Chapter 6 of our SER, and of course there are always issues with instrumentation and control, which will be discussed in Chapter 7 of our SER.

And both instrumentation and control and quality assurance are parts of the staff's alternate vendor inspection.

So armed with this information, informed by our review of the due diligence summary, we sent a team in Japan in July to help with our independent assessments of the basis for South Texas' determination of vendor qualifications. The team consisted of nine people, they were there for a week. We looked at Toshiba's Part 21 program, their Appendix B program. We looked at how they do design controls, their procurement of a document control program. We looked at control of purchased materials, corrective action program, training and qualification programs, and the initial test program.

And in instrumentation and control we took a look at how Toshiba intends to design and integrate several safety and non-safety related digital I&C systems.

So in our alternate vendor qualification effort we conducted document reviews as well as audit - yes,sir.

MEMBER BROWN: How many people did you send on this team?

MR. WUNDER: There were nine on the team.

So we conducted document reviews, as well as audits and inspections. The staff's alternate vendor qualification effort will be discussed in Chapter 1 of our SER. Technical issues that arose during our review may be addressed in various chapters of the SER, 6 and 7, 5; that's all that I can think of right now. And the at results of the staff's inspections are available. The inspection report can be found in ADAMS at a section number ML 09237079.

MEMBER ARMIJO: Since so many of the documents were in Japanese, what exactly were you reviewing when you did a document review?

MR. WUNDER: We were -- a lot of it - we weren't reviewing Japanese documents. We were reviewing American documents, General Electric documents. Largely what we were trying to do was to look at things that were proprietary or formed the design basis for the ABWR and determine which of those may not be available to the alternate vendor. And then when we had a question there we would determine whether or not they add access to it or they could reconstitute it, or how they were going to get around the problem that that posed.

Okay, the final subject, we have been working with the staff, and our plan is to present our SER to the ABWR subcommittee over the course of five meetings between early March and late May. If anyone has presented anything here today that has piqued your interest and led you to think that additional subcommittee meetings may be necessary, we will be more than happy to work with your staff to support anything that you would like in that area.

I guess our plan is that the next time we will meet with you gentlemen altogether is going to be in June, if all goes well.

VICE CHAIR ABDEL-KHALIK: Are there any questions for either Mark or George?

MEMBER ARMIJO: I don't know if we've received it, but I'd like a list of all the licensing topical reports in the fuel area.

VICE CHAIR ABDEL-KHALIK: We'll get that for you.

MR. TONACCI: Many of those we haven't received yet.

MS. BANERJEE: Not all of them are submitted yet.

MEMBER ARMIJO: At least we know the

titles. We should know the titles by now.

MR. WUNDER: We do have a list of anticipated and a schedule for when they are supposed to finish.

MEMBER RAY: Let me just piggyback on that. It's interesting that these are referred to as topical reports, and they are confined to the fuels area. In other contexts we are familiar with technical reports that are submitted in support of licensing -- I don't know where that name comes from precisely. But in any event --

MR. WUNDER: I think it is probably important to note that the COL review and the granting of the COL review and the fuel amendment are separate and independent entities.

MEMBER RAY: That's a good point, that is a relevant distinction in terms of the terminology. But I think it might be the case that if there are these technical reports that you are talking about submitted to the board of licensing that we have them also listed and available so that they can be requested by members to review in the very same way that the topical reports are. That's all I'm saying.

MR. WUNDER: And we can do that, and I believe the - for example in the area of containment, for the COL itself, those are in fact technical reports that are submitted, and they are submitted on the docket and become a part of the application, which is different than a topical report which under our procedures is treated very very differently.

MEMBER RAY: I do understand that, and I just wanted to add technical reports, because ultimately what we are looking for is the opportunity to recognize areas of technical review that we can be efficient in focusing attention to, and the technical report as opposed to the COL itself is often a way of recognizing here is an area where this thermal hydraulics or whatever it happens to be, structural mechanics, would that be identified for review.

MR. WUNDER: Yes, sir.

MEMBER BROWN: You said you plan to present to the full committee in June, 2010. Is that the ultimate vendor qualification?

MR. WUNDER: No, sir, that will be the staff's SER for the COL. SER with open items. That will be part of it.

MEMBER BROWN: Okay, that is the phase two?

MR. WUNDER: That is the phase two product.

MEMBER BROWN: You said June, are there some other dates in the --

MR. WUNDER: Yes, sir, I'm sorry, the Phase 2 product we intend to present to you gentlemen in June.

MEMBER BROWN: This thing says August.

MR. WUNDER: That is the completion of Phase 3, sir. Phase 3 is done after we receive your letter and respond to it, I think.

MEMBER BROWN: Okay, I got you.

VICE CHAIR ABDEL-KHALIK: Are there any other questions from the committee to either the staff or STP?

MEMBER MAYNARD: Since we have a little bit of time here for the staff, the revision to the DCD, now does the previous board - is it still valid, or does this replace the previous DCD, approved DCD? If another applicant came in later, could they reference either?

MR. WUNDER: I am going - I don't want to get in trouble on this. I know there is talk of doing things differently. This will be I believe revision five to the DCD, and I believe that what will happen is, it will replace entirely revision four. So the only thing that changes in the rule is in Appendix A there is a revision number. Currently it reads revision four, and it will read revision five. So that will replace the existing rule.

VICE CHAIR ABDEL-KHALIK: It may happen naturally. There is a 15-year limit.

MEMBER MAYNARD: Yes, that runs out in 2012. It really has nothing to do with our review. But it just seems interesting to me that somebody can get an approved design, somebody else could come in and ask for a change to that, and then if somebody wanted to come - the original supplier wanted to do the original job, they'd have to come in and get that revised again?

MEMBER ARMIJO: No, I think I - that was my question. I think it's an existing amended DCD that anyone who is a qualified vendor could reference.

MEMBER CORRADINI: But Otto's point is well taken. It just turns out that the way this is very revised under DCD is simply for aircraft impact, right? So that is minimal. But somebody could, based on your logic, somebody could come in and say, I want to change major portions of this to a new rev, and the old one would disappear, and you would have to go and change the new one.

VICE CHAIR ABDEL-KHALIK: It is a non-issue in this case. We are subject to a 15-year limit.

Are there any other questions for either the staff or STP?

MEMBER BROWN: Yes, I just thought of one if you don't mind. And it's probably because I just didn't quite understand.

When you made the comment relative to the translation issue, and you answered, no, we reviewed GE documents that were going to be able to Toshiba, Toshiba, for their work design, whatever. I didn't hear anything about evaluating Toshiba relative to their actual capabilities themselves, other than - all you did is talk about you reviewed for vendor qualification just the GE documents that they would have available for you.

MR. WUNDER: Right, there are two parts to our evaluation, and I shouldn't have just said GE; I should have said design basis documents.

MEMBER BROWN: But those are GE documents.

MR. WUNDER: Yes, many of them are; probably most of them are.

MEMBER BROWN: But you didn't translate from Japanese?

MR. WUNDER: No, no, we had two parts to our evaluation. Basically it breaks down like this. In order to determine that an entity is qualified, we said, well, let's think about this in basic terms. What does that mean? Well, first off, they've got to have the information that is necessary to provide the design. And then given the information they have to be able, they have to have the ability, to take the information to turn it into a design. And that, those abilities were assessed in our inspection in Japan and documented in that inspection report. That's where our - the majority of our work toward assessing Toshiba's capabilities were.

MEMBER BROWN: So all that list of eight items were in Japanese?

MR. WUNDER: No, sir. No, sir, those are areas that we identified when we were doing our review of the design basis documentation. We looked at it. We said, in what areas might there be issues with South Texas and their chosen alternate vendor not being able to provide the design because the information is not there, or they have decided to change their approach or something like that. So we identified these areas. We identified pressure-temperature limits. We identified hyperdynamic loads.

We identified I&C. All these things where we wanted to either assess further Toshiba's capabilities, or determine for ourselves that South Texas-Toshiba, their contractors, were able to obtain the necessary or information or reconstitute it.

MEMBER BROWN: These items were their capability, not GE documents?

MR. WUNDER: Part 20 - no, no, excuse me, the list that you are showing me now, those are the major areas of our inspection in Japan of Toshiba.

MEMBER BROWN: Of capabilities?

MR. WUNDER: Yes,sir.

MEMBER BROWN: Okay, not the GE documents? Their capabilities?

MR. WUNDER: Yes, sir.

MEMBER BROWN: Okay. I didn't get the separation.

MR. WUNDER: I probably didn't explain it well.

MEMBER BROWN: I doubt that.

VICE CHAIR ABDEL-KHALIK: At this time the schedule calls for committee discussion. Yes, sir?

MR. HEAD: Just standing; sorry.

(Laughter.)

VICE CHAIR ABDEL-KHALIK: We can go around the table, if people would like to offer any remarks on either of the two sections at this time. Jack?

MEMBER SIEBER: I have no remarks.

VICE CHAIR ABDEL-KHALIK: John?

MEMBER STETKAR: No.

VICE CHAIR ABDEL-KHALIK: Dennis?

MEMBER BLEY: Yes, I really appreciated the briefing. I am really please to see the several areas they are moving ahead very aggressively on.

VICE CHAIR ABDEL-KHALIK: Dana.

MEMBER POWERS: I will probably have extensive remarks on this session on Saturday.

VICE CHAIR ABDEL-KHALIK: Bill, Sam? Mike? Harold?

MEMBER BROWN: I made my points.

VICE CHAIR ABDEL-KHALIK: Mike?

MEMBER CORRADINI: No, I just appreciate the presentations by Toshiba and the staff.

VICE CHAIR ABDEL-KHALIK: George?

Well, thank you very much. At this time I would like to express our appreciation to STP and the staff for a very informative presentation.

I will turn it back to Mr. Chairman almost an hour ahead of time.

CHAIR BONACA: So we will take a 30 minute break, until 20 of 5:00, and then resume the meeting then.

(Whereupon, the above-entitled matter went off the record at 4:21 p.m.)

Amendment to the AP1000 Design Control Document (DCD) Presentation to the ACRS

Eileen McKenna

NRO/DNRL/NWE2, Chief

November 5, 2009

Briefing Purpose and Agenda

- Status briefing regarding proposed AP1000 design certification amendment (DCA)
  - application
  - staff review
  - Committee presentations
- Update on reference combined license (RCOL) application

AP1000 Design Certification Amendment

- Current AP1000 Design Certification - Appendix D to 10 CFR Part 52 (Revision 15 to the AP1000 Design Control Document (DCD)) – effective 2006
- Safety Evaluation Report – NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Design”
- Post-certification Activities
  - NuStart Submittal of over 100 Technical Reports (TRs) beginning in 2006(list of TRs provided separately)
  - Staff Review of TRs – which address aspects of AP1000 Design and COL information items (in support of specific DCD changes)
  - Topics with multiple TRs include seismic, HFE, I&C, components

Application for Design Certification Amendment

- Application of May 26, 2007 based upon Revision 16 to the AP1000 DCD
- Reference to 10 CFR Part 52, Section 52.63 – Finality of Standard Design Certifications
- Submittal of Revision 17 of the AP1000 DCD – September 22, 2008
- RAI responses leading to DCD changes
- Revision 18

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Review of the AP1000 DCA

- Six phase review schedule
- Review is focused on changes proposed by Westinghouse, using SRP-based review
- Issuance of Individual Chapters in Phase 2 (SER with Open Items [SER/OIs]) to become a supplement to NUREG-1793
- Presentation of chapters at ACRS meetings

Requests for Additional Information

- Presently about 47 RAIs pending
- Some RAIs amplify on open items (e.g., seven RAIs on HFE, nine on I&C, nine for chapter 9)
- Chapter 3 has ten, chapter 6 has seven, and there are five others

I&C Design Acceptance Criteria (DAC)

- Instrumentation and control
  - Diverse Actuation System (Table 2.5.1-4 commitment 4)
    - -- Design requirements
    - -- System Definition
    - -- hardware and software development
  - Protection and Monitoring System (Table 2.5.2-8 commitment 11)
    - -- Design requirements
    - -- System Definition
    - -- hardware and software development (design and implementation)

DAC – Human Factors Engineering Table 3.2-1 of Tier 1

- Integration of Human Reliability Analysis with Human Factors Engineering design
- Task analysis (TA) performed IAW TA implementation plan
- Human systems interaction design for control room IAW implementation plan
- HFE program Validation and Verification plan developed IAW programmatic level description of HFE V&V plan

Piping DAC

- Table 1-2 in introduction to DCD contains list of analysis methods, Codes, modeling assumptions, and acceptance criteria for AP1000 piping and pipe support design
- Revision 17 proposes removal of DAC on basis of completion of risk-significant set of piping packages
- Staff review continuing

COL Information Items

- Table 1.8-2 of Tier 2 of the DCD contains all the COL information items.
- DCA added information about whether action needed by COL applicant or holder
- DCA proposes closure/deletion of 25 items, revision of 12 items, addition of 9 items
- Examples of COL items

Current DCA Review Schedule

- Published schedule had last chapter of SER w/OI issued in January
- Schedule for chapters 3 and 6 being re-evaluated due to additional submittals expected on shield building and sump

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Open Item Status

- 124 Open items
- Attached table shows chapter breakdown
- Responses received for about one-third of items to date

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Safety Evaluation Reports (SERs) with Open Items (OIs)

SERs w/Open Items by Chapter	OIs Open	OIs Closed
1	2	--
2	6	--
3	35	--
4	--	1
5	2	2
7	22	--
8	5	--
9	11	--
10	1	4
11	--	1
12	4	1
13	1	--
14	1	2
16	5	5
17	--	3
18	5	2
19	2	4
Total	**102**	**25**

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Significant Design/Hardware Changes

- Seismic analyses (soils, high frequency)
- Structural changes for AIA (shield building and others)
- Enhancements for security, loss of large areas
- Containment Sump changes
- Control Room Ventilation System revision
- Integrated Head Package
- Pressurizer shape change
- Flow skirt and neutron panels added; RV diameter change, baskets moved
- Fuel storage racks – change in capacity, associated design changes
- Class 1E dc voltage now 250 V, second reserve aux transformer (and fast transfer), turbine and control system, additional waste monitor tanks

Changes in Materials

- Changes for ASME code of record, procurement
- Main steam line change to SA-335 Grade P11 alloy
- RCP flywheel change to bimetallic with tungsten alloy inserts. Alloy 625 for flywheel enclosure
- RV change to copper limit
- Add additional SS types for RV internals (304,304H,304L)
- CRDM components materials

Fuel and core design changes

- Gray rod control assemblies (from 4 to 12 with Ag-In-Cd)
- Use of borosilicate or wet annular burnable absorbers
- Changes to internals affect on method for determining total design bypass flow

Committee Interactions

- Orientation briefings in October 2007 and May 2009
- SC meeting July 23-24,2009 (10 chapters)
- Subcommittee meeting Oct 6-7,2009 (3 chapters)
- SC meeting Nov 19-20, 2009 (2 chapters and info brief on sump testing)
- January 13-14,2010 SC briefing scheduled (chapter 15, other topics of interest)

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Status for AP1000 Reference Combined License Application

DNRL

November 5, 2009

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AP1000 Lead COL Status

- Transition from Bellefonte to Vogtle as the AP1000 reference COL is nearly complete:
  - Staff issued Bellefonte SER with Open Items for Chapters 1, 2, 3 (except 3.7/3.8), 4, 5, 7, 8, 10, 11, 12, 13 (except 13.6/13.7), 14, 16, 17, 18, 19
  - Bellefonte SER with Open Items Chapters 6, 9, and 15 will be issued on a schedule that comports with AP1000 DCD SER with Open Items schedule
- Staff preparing Vogtle's Advanced Final Safety Evaluation Report with no Open Items (Advanced FSER).
  - The current schedule for completion of the Advanced FSER is late summer/early fall 2010.
  - ACRS interactions on the Advanced FSER in fall 2010.

Proposal for upcoming ACRS Interactions

November 2009 to February 2010

- Interact with ACRS staff to identify “issues of interest” to ACRS subcommittee members
  - Related to standard content
  - Related to site-specific content

Spring and Summer 2010

- Conduct ACRS subcommittee informational briefings on “issues of interest”

Fall 2010

- Conduct ACRS subcommittee and full committee briefings on Vogtle and Summer Advanced FSERs

Regulatory Guide RG 5.71 Cyber Security Programs for Nuclear Facilities

Presented to: Advisory Committee on Reactor Safeguards

Karl Sturzebecher & Eric Lee
US Nuclear Regulatory Commission
November 5, 2009

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Purpose of the Meeting

- Review enhancements to RG 5.71
- Overview of RG 5.71
- Request letter with feedback

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Enhancements

- New framework
- Deterministic methodology using NIST standards
- Provided self tailoring full spectrum security controls
- Detailed guidance & examples to meet the rule
- Addresses the differences between DI&C and IT systems
- Defensive architecture
- Security lifecycle enhancements
- Security Plan Template - Submittal

Overview of RG 5.71

Cyber Security Program

- Form a Cyber Security Team (CST)
- Identify Critical Systems (CS’s) and Critical Digital Assets (CDAs)
- Defense-in-Depth Protective Strategies

Overview of RG 5.71

Defense-in-Depth Protective Strategies

Strategy 1 - Incorporate protective security boundaries for timely detection and response against a cyber attack

Strategy 2 - The application of security controls coupled with the physical program to detect, deter, respond and recover from a cyber attack

Strategy 3 - Maintain the Cyber Security Program, which includes improving the program

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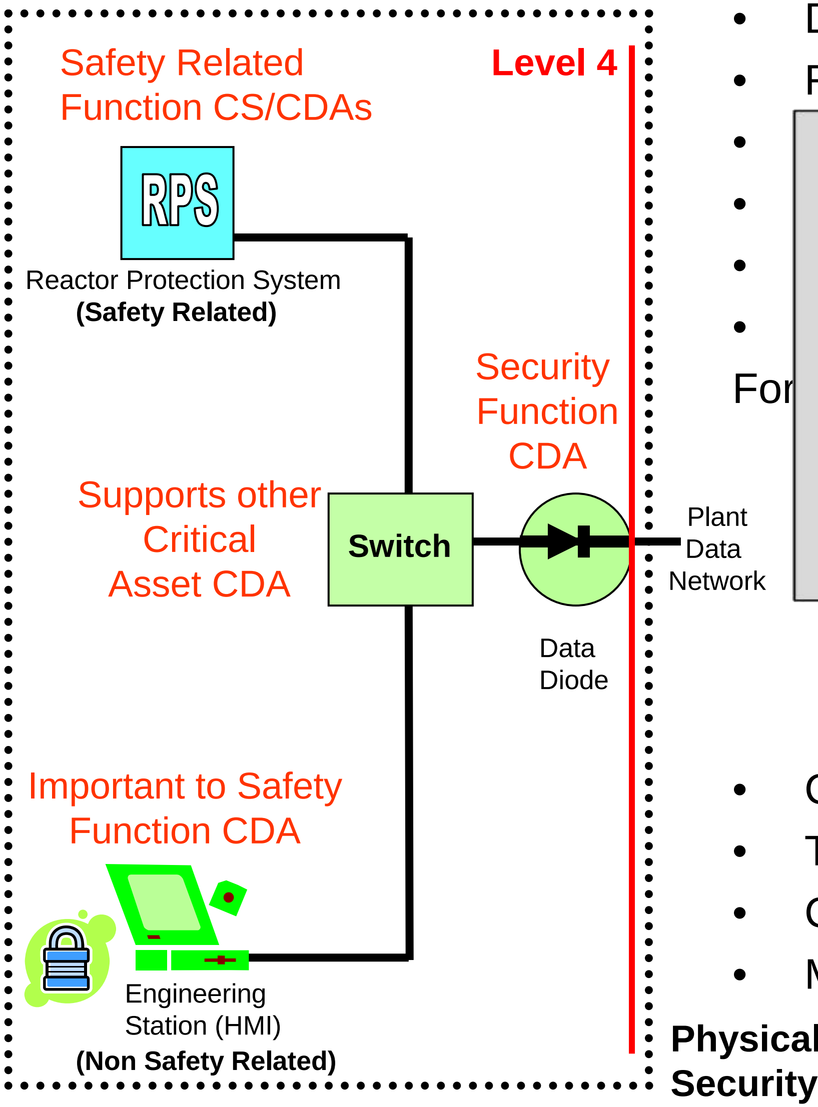
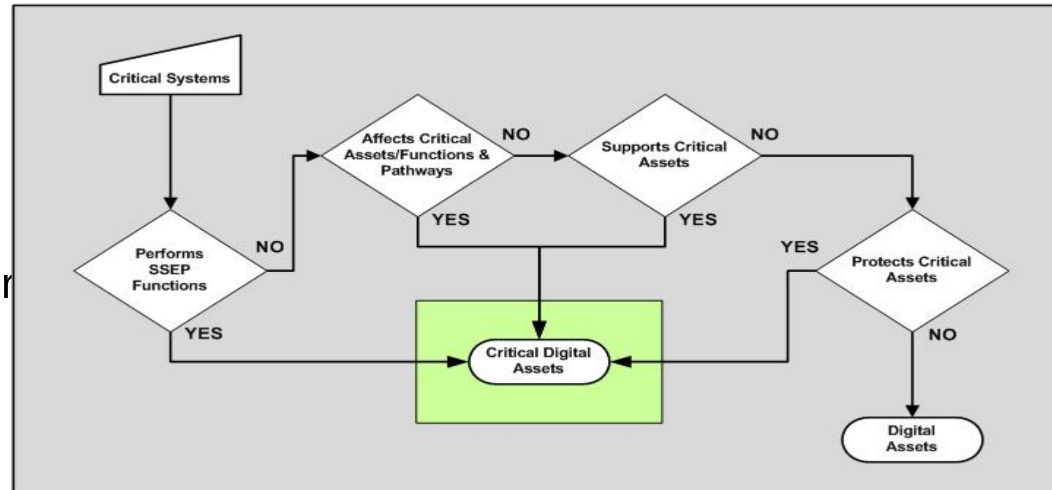
Application of Strategy 1&2



The Steps:

- Determine CSs and CDAs
- Review and validate
-
-
- ls
-

For ol



however alternately applied at the HMI along with Physical Security

C: Authentication is applicable, do A or B

- Complete addressing for all security controls per CDA
- Test for vulnerabilities and ensure effectiveness
- Complete sufficient documentation for NRC inspection
- Maintain the Cyber Security Program

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Application of Strategy 3

Maintaining the Cyber Security Program

- Actively monitor and update cyber security
- Change control
- Review as part of the physical security program
- Retain records and documents

Overview of RG 5.71

Cyber Security Plan Template

- Describe Cyber Security Team qualifications
- Describe how CDAs are identified
- Describe the defensive architecture
- Describe how all cyber security controls in RG 5.71 Appendices B&C are addressed and applied
- Document commitment to have sufficient documentation available for review upon inspection
- Describe how cyber security program will be maintained

Appendix A

Summary of RG 5.71

- Addresses an intelligent, malicious adversary
- Based on experience and expertise for defending similar or greater threats
- Peer reviewed on widely accepted standards

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Enhancements Backup #1

March 2009 Version

Cyber Security Plan
Cyber Security Program
Analyze
Incorporate in Physical
Attack Vectors
Apply Security Controls
Protective Strategies
Policies & Procedures
Roles & Responsibilities
Review Program
Record Retention

November 2009 Version

Cyber Security Plan
Establish Program
Analyze
Cyber Security Team
Identify CSs & CDAs
Review & Validate
Protective Strategies
Defensive Architecture
Address Security Controls
Incorporate in Physical
Policies & Procedures
Maintain Program
Continuous Monitoring
Effectiveness Analysis
Vulnerability Assessment
Change Control
Security Impact Review
Program Review
Record Retention

Technical Controls
Operational Controls
Management Controls

Template

Methodology Backup #2

March 2009 Version

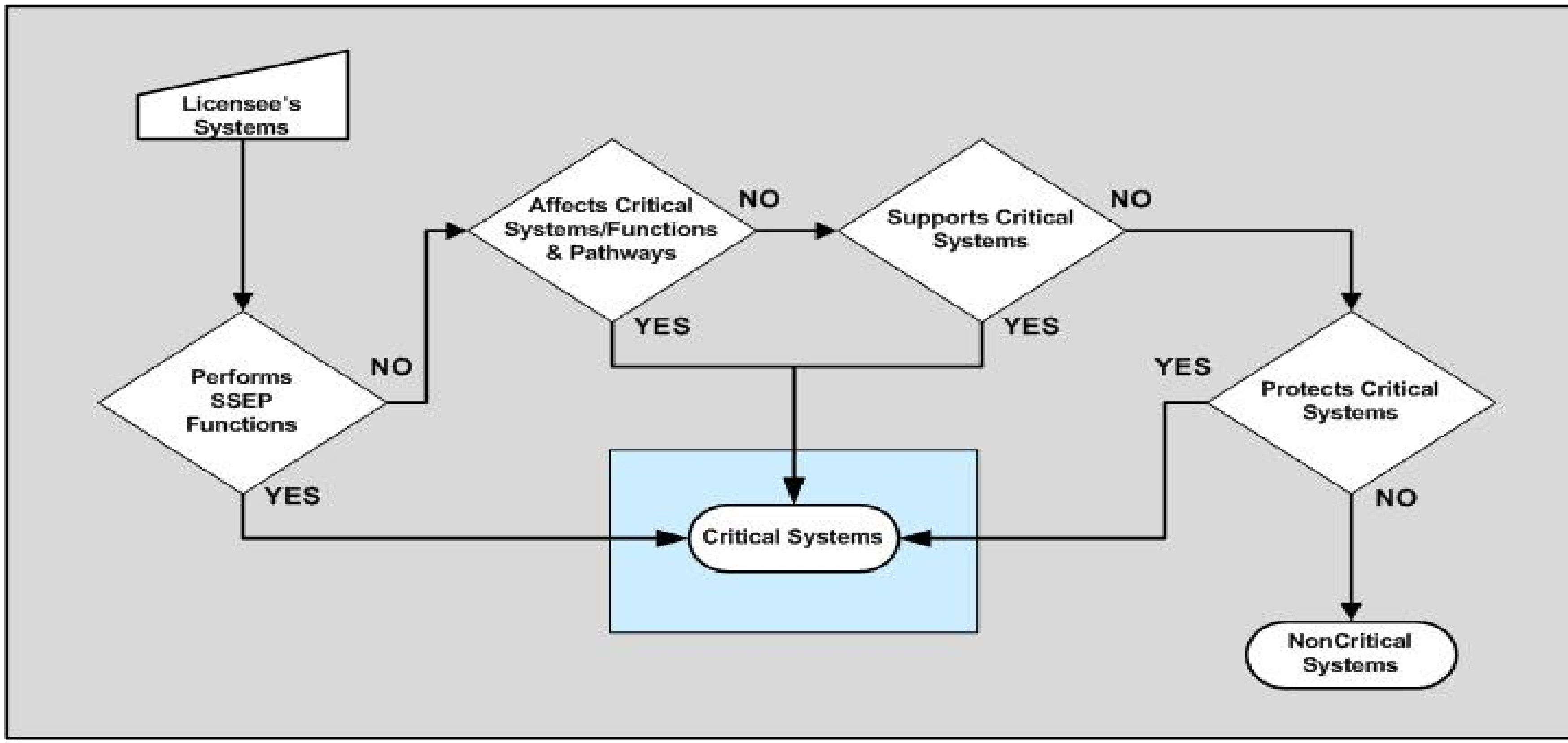
- Risk based methodology
- Use attack vector analysis to prove need
- Apply security controls
- Bottom up approach

November 2009 Version

- Deterministic methodology using NIST security controls
- Self tailoring technical security controls
- Vulnerability assessment & effectiveness analysis confirm protection
- Top down approach

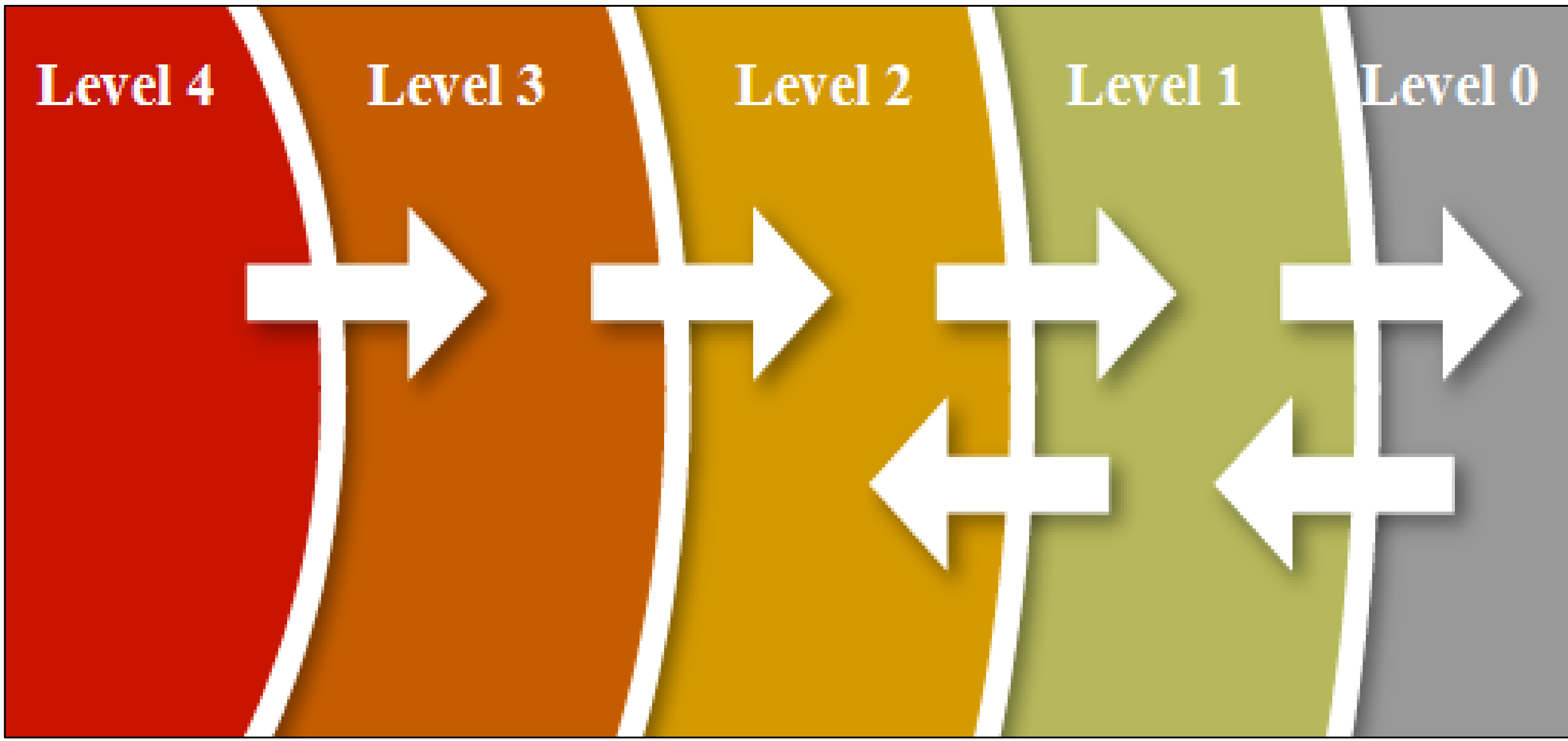
Flow Chart Backup #3

Identify Critical Systems (CSs) & Critical Digital Assets (CDAs)



Strategy 1 - Backup #4

Deploy Defensive Architecture



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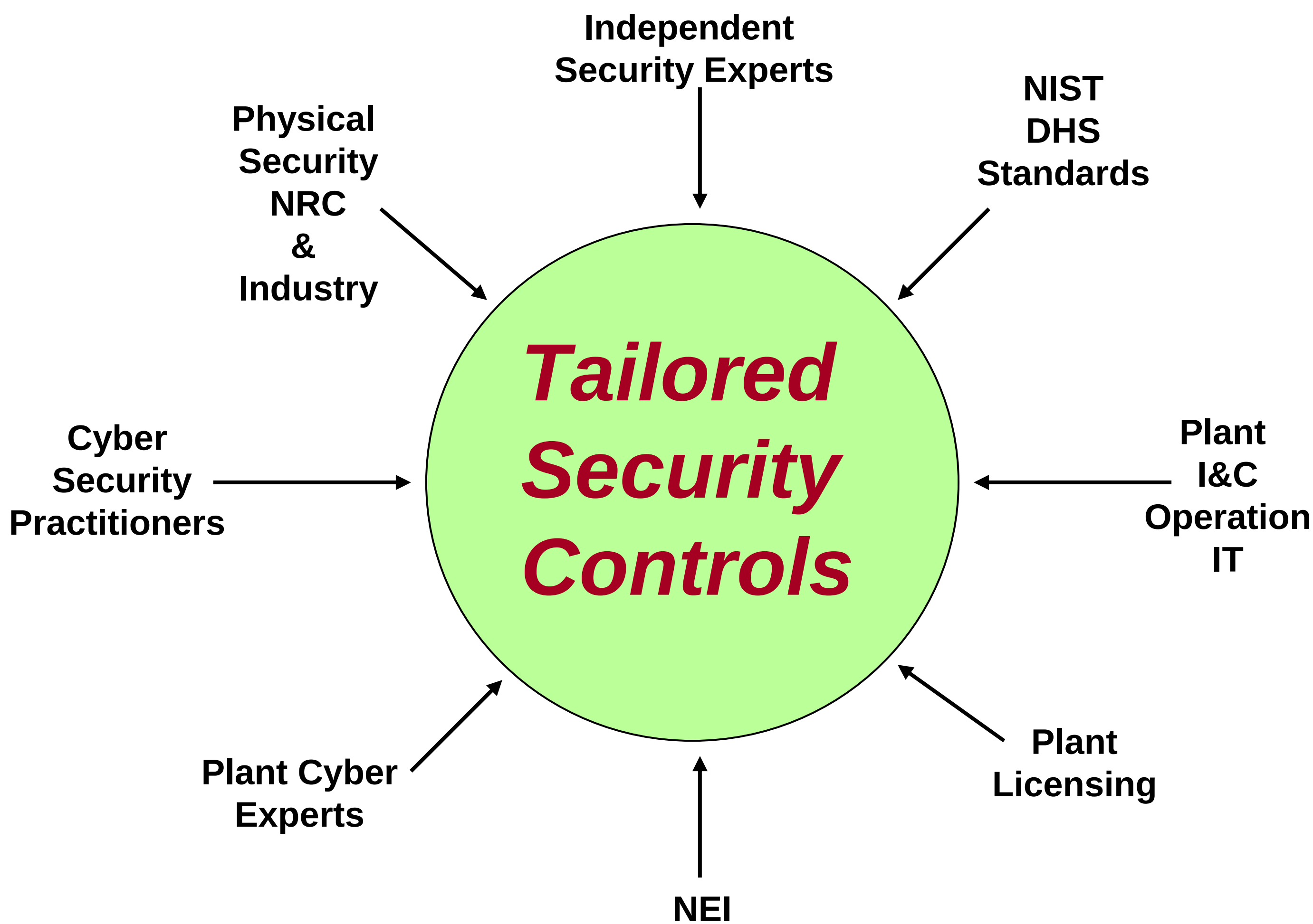
Strategy 2 - Backup #5



Strategy 2 - Backup #6

The three ways to address technical security controls

A: Apply security control to CDA

B: If security control can not be implemented then use alternative controls or countermeasures with same degree of protection

C: If the security issue does not exist, then the security control is not applicable

References:

NIST SP 800-53, Rev. 3, "Recommended Security Controls for Federal Information Systems," National Institute of Standards and Technology, Gaithersburg, MD, August 2009.

NIST SP 800-30, "Risk Management Guide for IT Systems," National Institute of Standards and Technology, Gaithersburg, MD,

NIST SP 800-37, "Guide to Certification and Accreditation of Federal Information Systems," National Institute of Standards and Technology, Gaithersburg, MD, May 2004.

NIST SP 800-82, "Guide to Industrial Control Systems Security," National Institute of Standards and Technology, Gaithersburg, MD, September 29, 2008.

DHS, "Catalog of control systems Security: Recommendations for Standards Developers," Department of Homeland Security, Washington, DC, September 2008.

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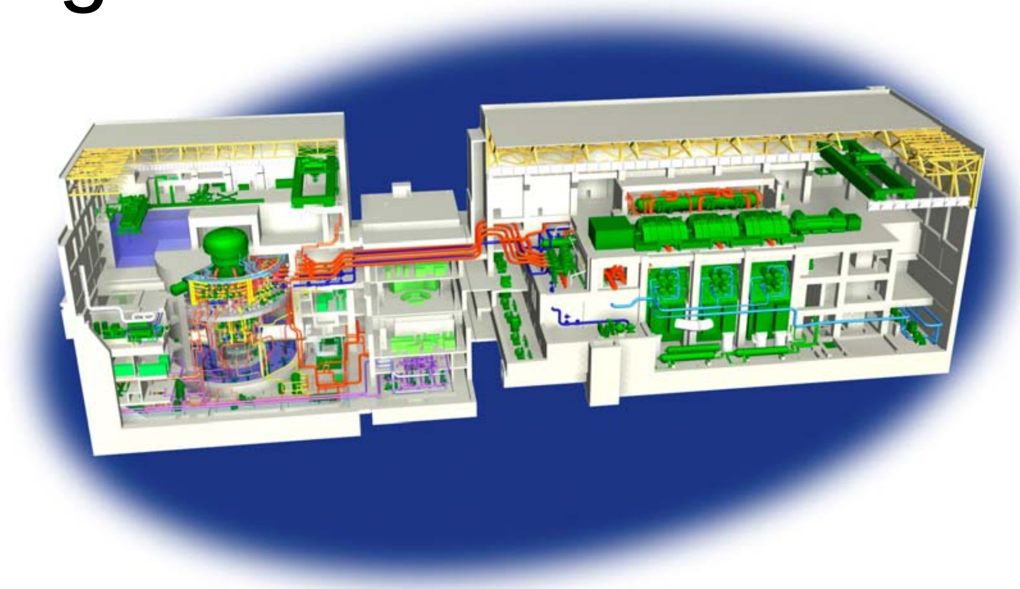
Advisory Committee on Reactor Safeguards



Overview
Advanced Boiling Water Reactor (ABWR) South Texas Project (STP) Units 3 & 4

November 5, 2009
(Open/Closed)

Introductions

Attendees

STPNOC
Mark McBurnett
Scott Head
Bill Stillwell
Jim Tomkins
Coley Chappell
Mike Murray
Kyle Dittman

TANE
Hiroshi Sakamoto
Fumihiko Ishibashi
Bob Schrauder

Toshiba
Hirohide Oikawa

Westinghouse
Bob Quinn
Brad Maurer
Nirmal Jain

Sargent & Lundy
Bob Hooks

MPR
Caroline Schlaseman

Desired Outcome

Provide an overview to ACRS on the background of the certified U.S. Advanced Boiling Water Reactor (ABWR) to be provided by Toshiba for South Texas Project Units 3 and 4

Agenda

- Introduction – Mark McBurnett
- ABWR Overview – Hiroshi Sakamoto
- ABWR Technology & Comparison to BWR – Hiroshi Sakamoto
- Aircraft Impact (CLOSED) – Bob Quinn
- History of STP Units 3 & 4 COL Application – Mark McBurnett
- Departures from the ABWR DCD – Mark McBurnett
- Fuel Design and Licensing – Bob Quinn
- Conclusion

Engineering, Procurement, and Construction (EPC) Team

- **Prime Contractor:**
  Toshiba through Toshiba America Nuclear Energy
- **Sub Contractors:**
  - **Fluor**
  - **Sargent & Lundy**
  - **Westinghouse**
  - **MPR**

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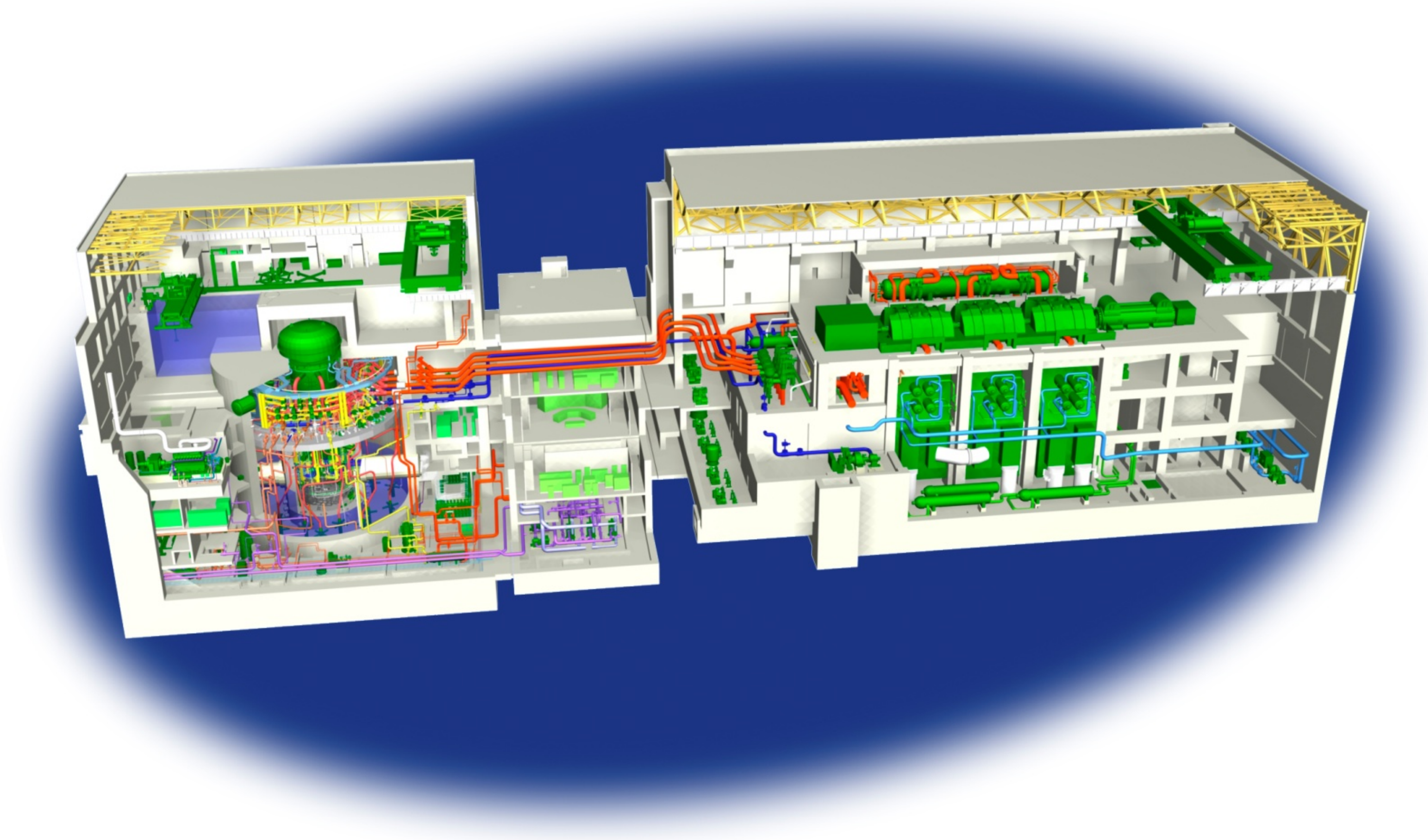
Overview
Advanced Boiling Water Reactor (ABWR)



Toshiba Experience

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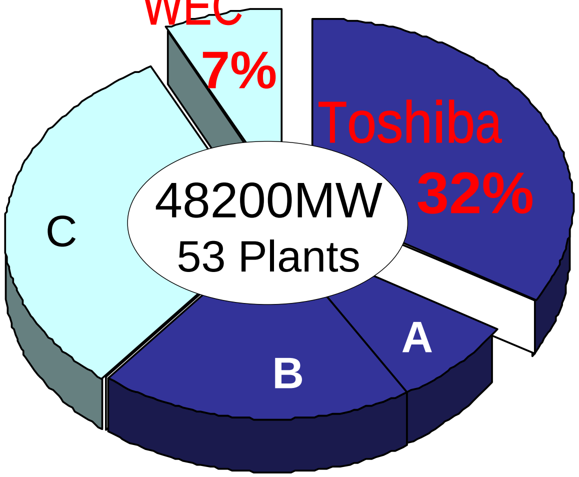
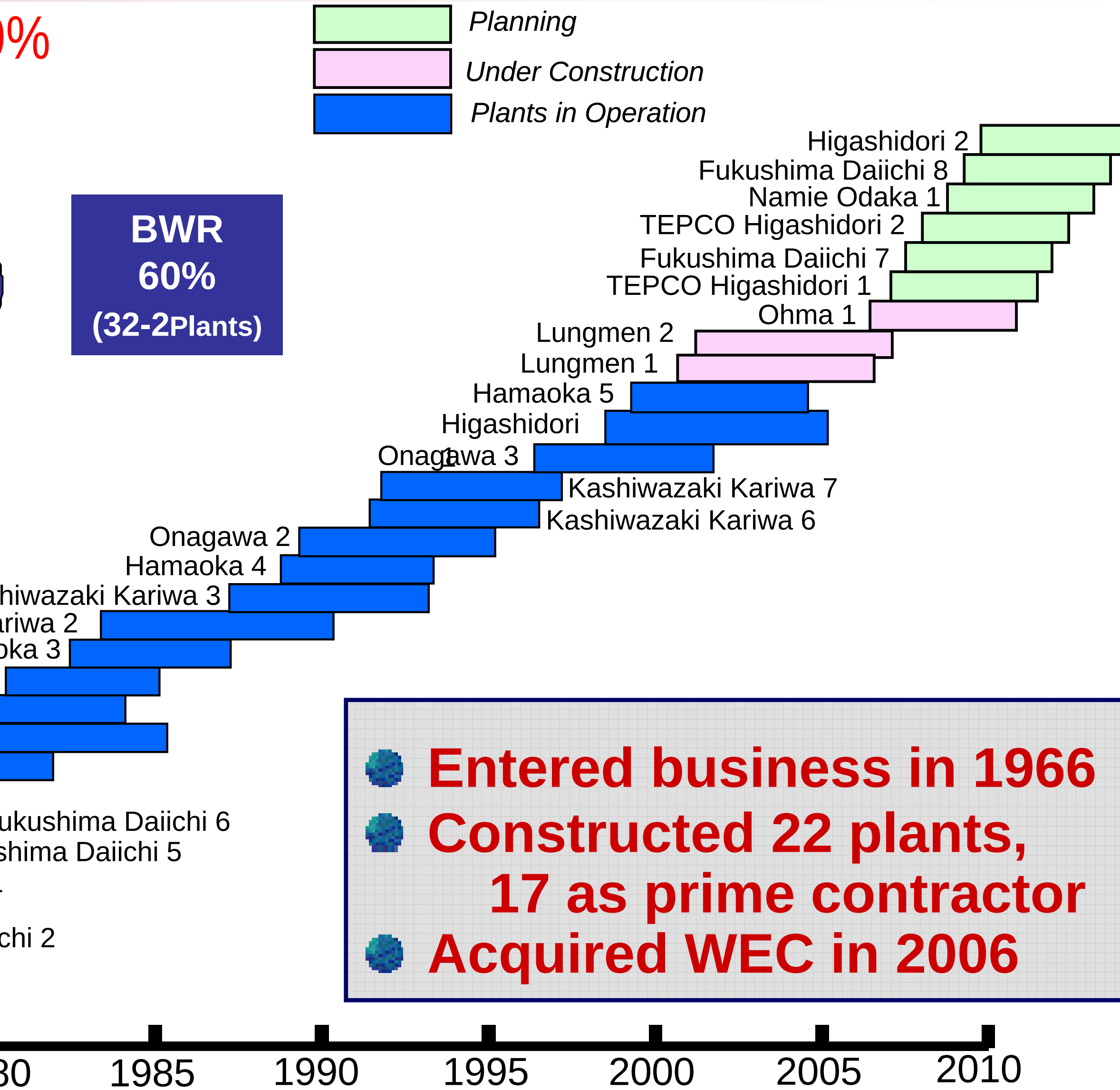
Toshiba Group:39%



PWR
40%
(23 Plants)

BWR
60%
(32-2Plants)

Market Share of Light Water Reactors in Japan
(installed capacity)(Operating)



- **Entered business in 1966**
- **Constructed 22 plants, 17 as prime contractor**
- **Acquired WEC in 2006**

Continuous Construction Experience

ABWR Progression

STP 3,4

Hamaoka 5

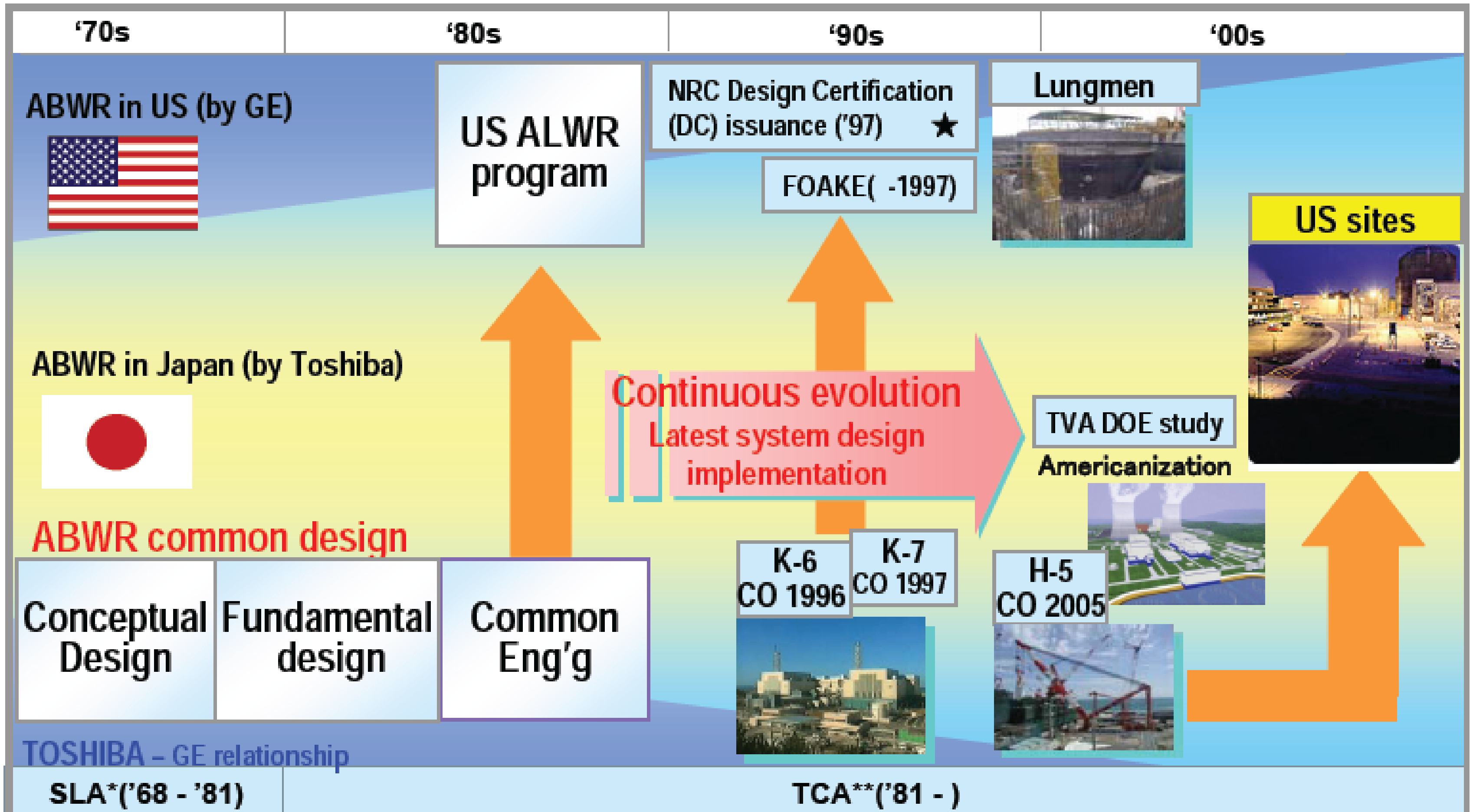
Shika 2

Lungmen 1,2

US ABWR
DCD

Kashiwazaki 6,7

ABWR was Jointly Developed in Japan



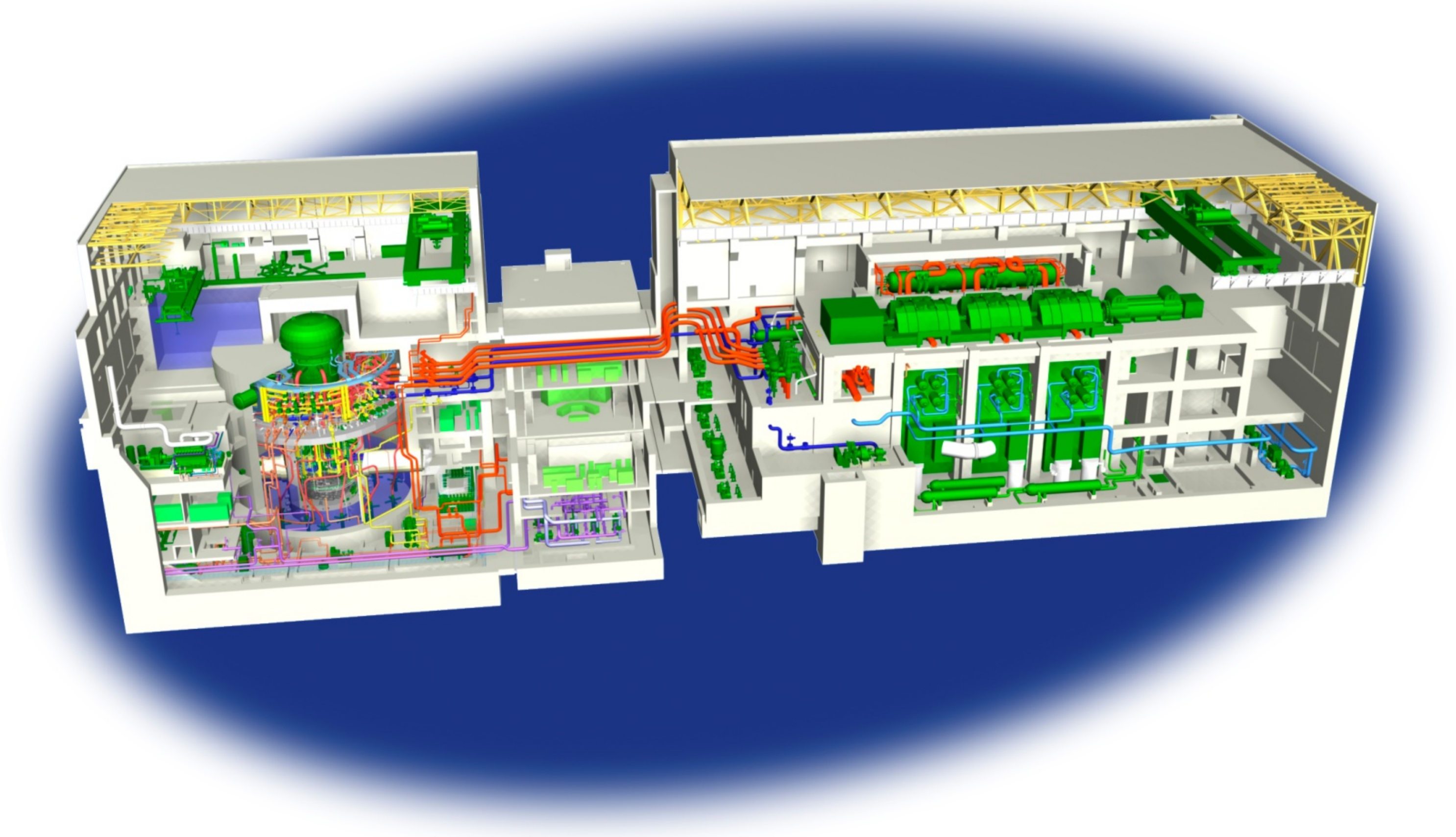
* System License Agreement ** Technical Cooperation Agreement

Toshiba ABWR Experience

Development of the ABWR Design:

- ABWR was developed in Japan, under the cooperation of Toshiba, Hitachi, and GE and was supported by TEPCO and other utilities
- Toshiba has a complete set of ABWR design documents through the development of the above and actual construction in Japan

ABWR to BWR Comparisons



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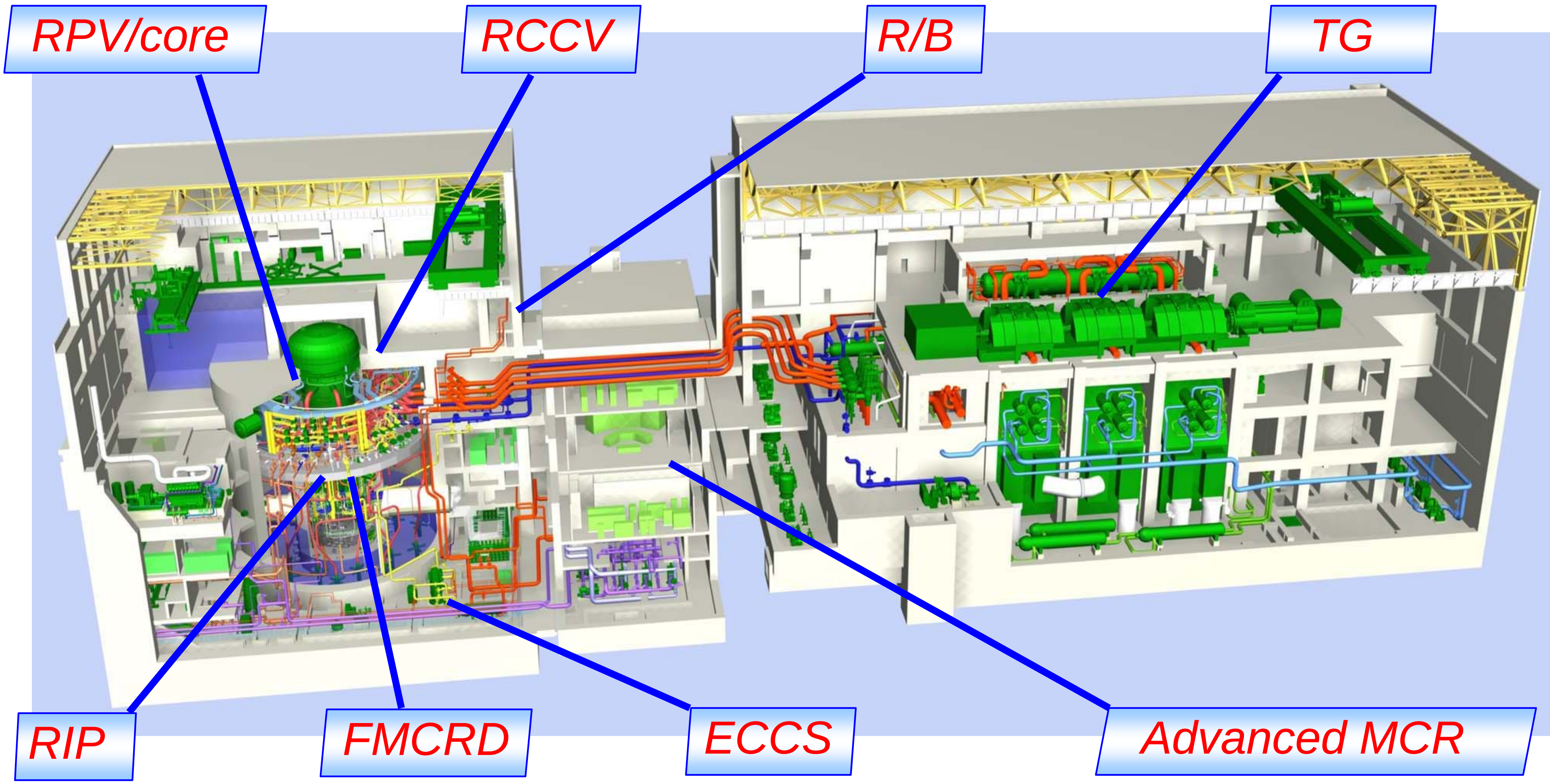
Overview of ABWR

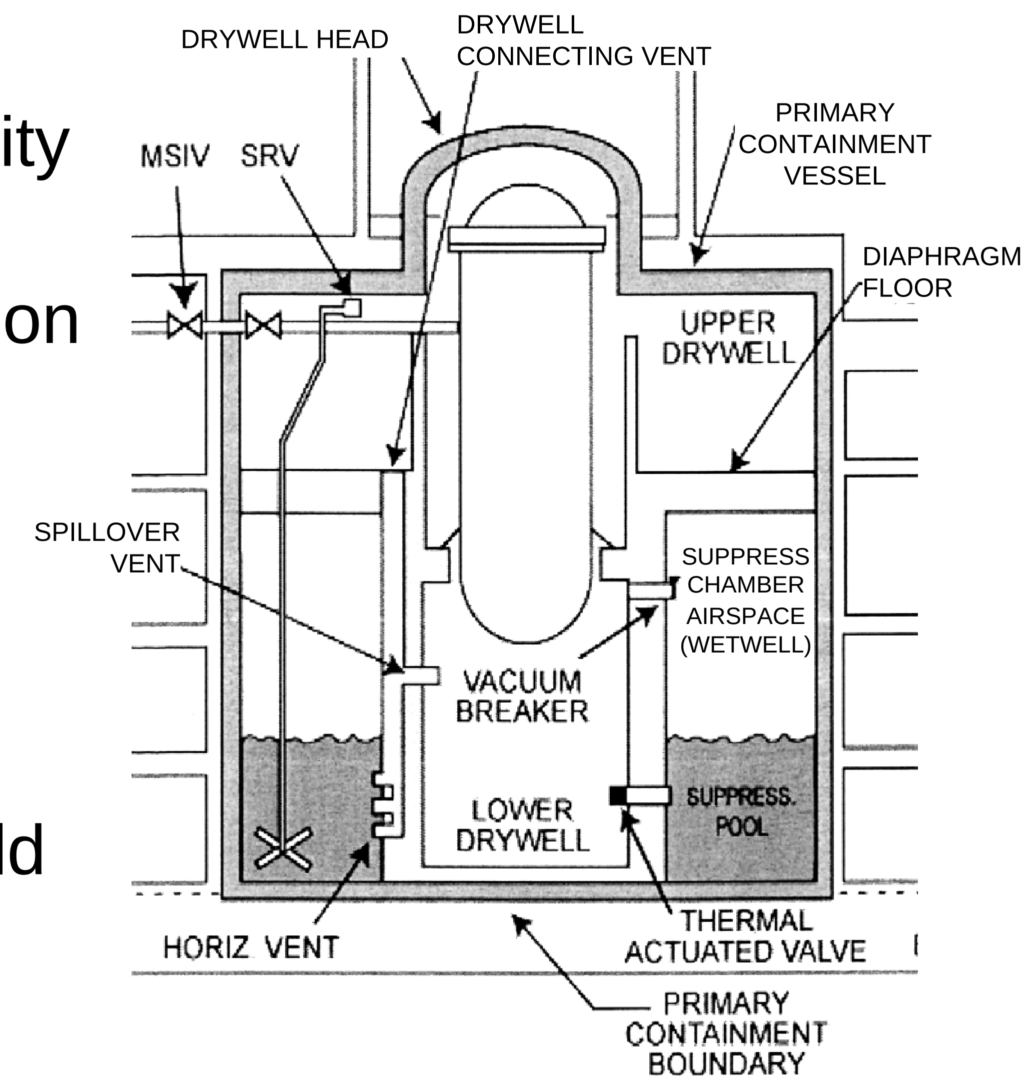


	ABWR	BWR
Recirc Flow	10 Internal recirc pumps (RIPs)	2 External recirc loops – Variable recirc pumps – Flow control valves
Control Rod Drive	Fine motion control rod drives –Group or “gang” control capability –Electrical fine motion drive, hydraulically scrammed	Hydraulically operated control rods with single rod operation
LOCA Design	RPV water level post-blowdown <u>above</u> top of active fuel (TAF)	RPV water level post-blowdown 2/3 core height with spray cooling

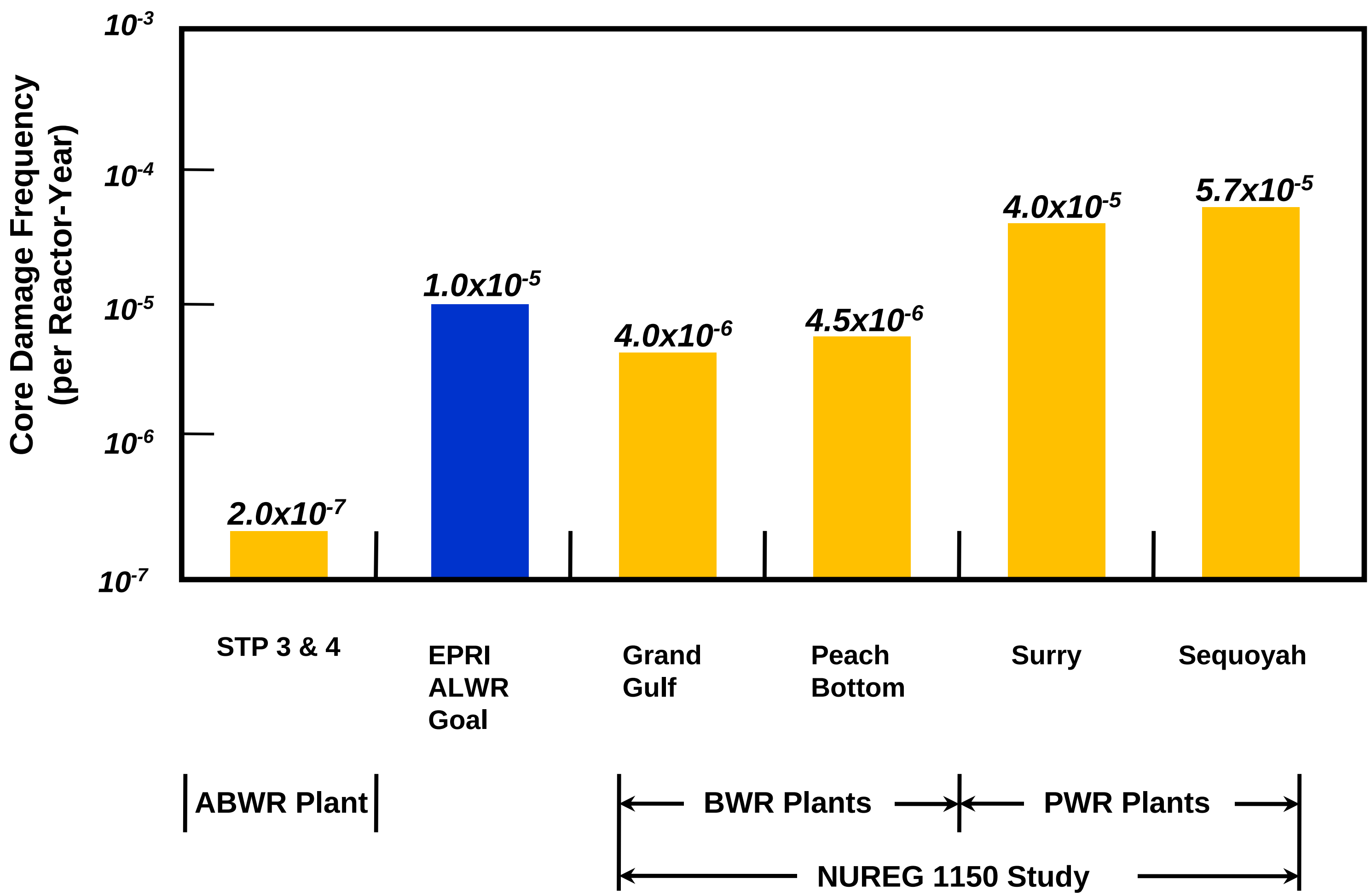
	ABWR	BWR
ECCS	3 divisions high pressure + 3 divisions low pressure flooding	1 division high pressure + 2 divisions core spray and low pressure flooding
ATWS Mitigation Features	Advanced design: – Alternate Rod Insertion (ARI) – Recirc Pump Trip (RPT) – Auto Standby Liquid Control (SLCS) initiation – Fine Motion Control Rod Drive auto run-in – Auto feedwater pump runback	10 CFR 50.62 required RPT, ARI and SLCS

ABWR Severe Accident Mitigation Features

- Inerted containment
- Lower drywell flood capability
- Lower drywell special concrete and sump protection
- Suppression pool - fission products scrubbing and retention
- Containment overpressure protection (COPS)
- Drywell sumps corium shield
- AC Independent Water Addition (ACIWA)



Core Damage Frequency - Internal Events



Advanced Control Room

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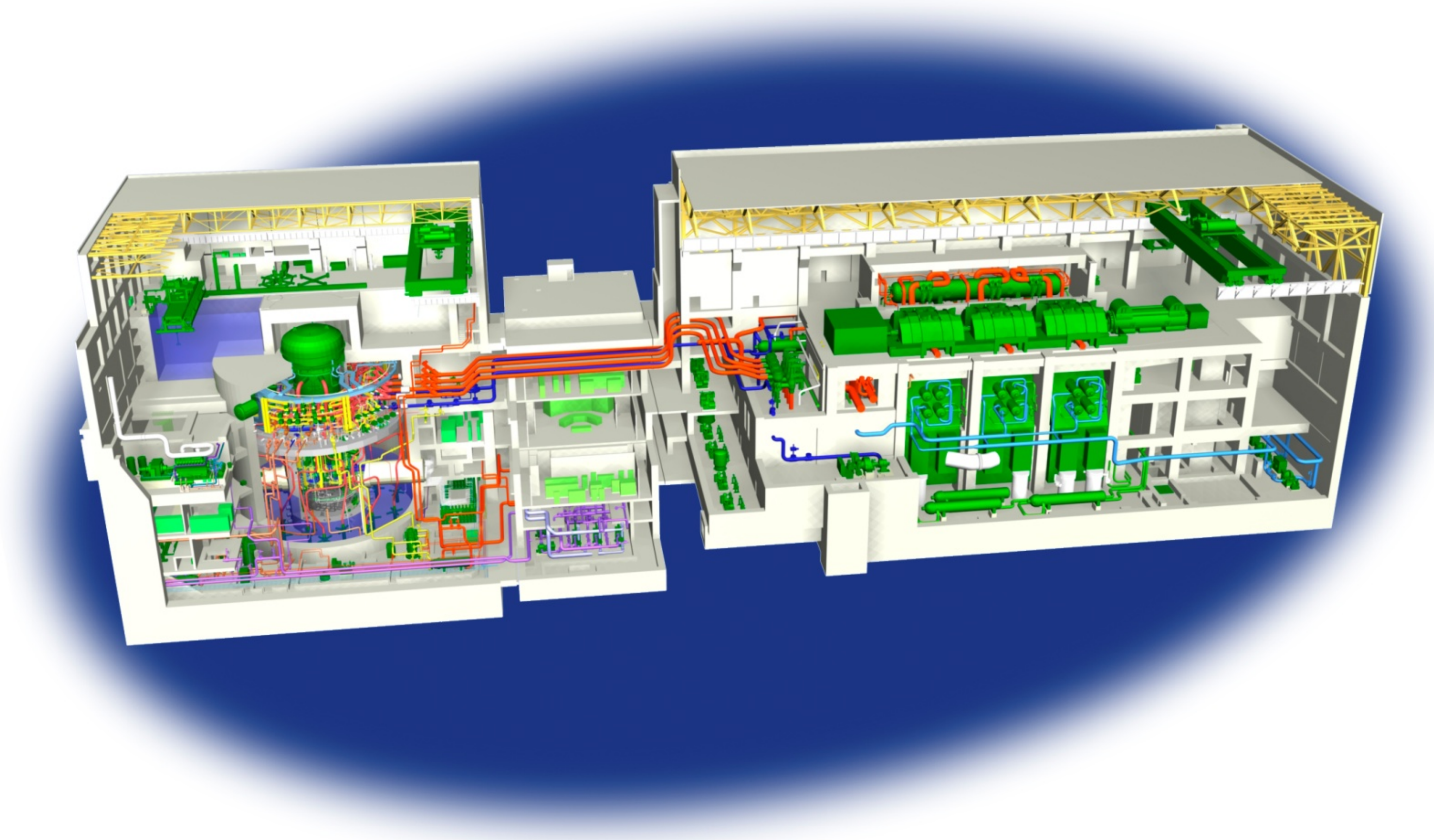
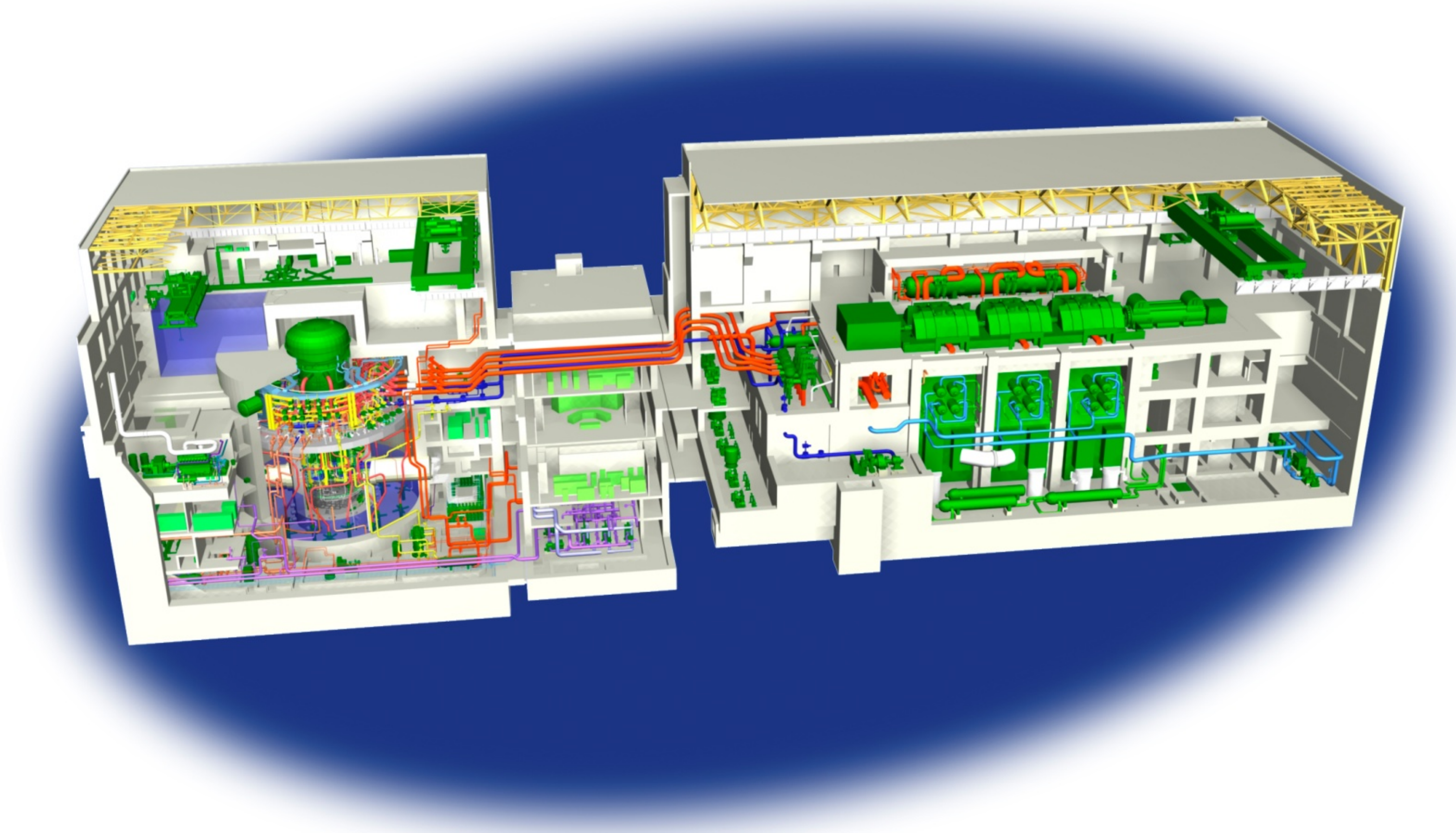
Aircraft Impact Assessment
(Closed)



History of STP Units 3 and 4 COLA



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Site Characteristics

- Large site – 12,200 acres
- Large Main Cooling Reservoir – 7,000 acres sized for 4 units
- Infrastructure in place
  - Road, rail and barge access
  - Transmission corridor
- Low population density nearby
- Existing State, County and Site Emergency Plans
- Strong community support

Technology Selection

ABWR is proven reactor technology

- Design Certification issued
- Four Units in Operation

Objectives

- Least licensing risk
- Predictable construction schedule
- Generation online as soon as possible
- Take advantage of advanced state of ABWR design and engineering
- Maximize use of existing plant design
- Minimize departures from Certified Design

Alternate Vendor Capabilities

STP Due Diligence review was performed:

- Objectives
  - Toshiba Capability Assessment Oversight
  - Independent Assessment
- Conclusions
  - STP Concluded Toshiba is qualified to supply the U.S. ABWR
  - Confidence in the ability of the EPC Team to build the Certified ABWR Design and support the STP COLA
  - Project risks and impacts have been addressed and found acceptable

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History of the STP Units 3 and 4 COLA

09/20/07	COLA submitted referencing 10 CFR 52, Appendix A, ABWR Design Certification
11/29/07	NRC accepted COLA for docketing (52-012 and 52-013)
08/18/08	STP letter to NRC regarding Due Diligence Report finding Toshiba is qualified as Alternate Vendor
09/24/08	COLA Revision 2 submitted to NRC
08/28/09	NRC completed independent assessment that finds Toshiba qualified as Alternate Vendor
09/16/09	COLA Revision 3 submitted to NRC
09/17/09	NRC completed COLA Safety Review Phase I (RAIs Issued)

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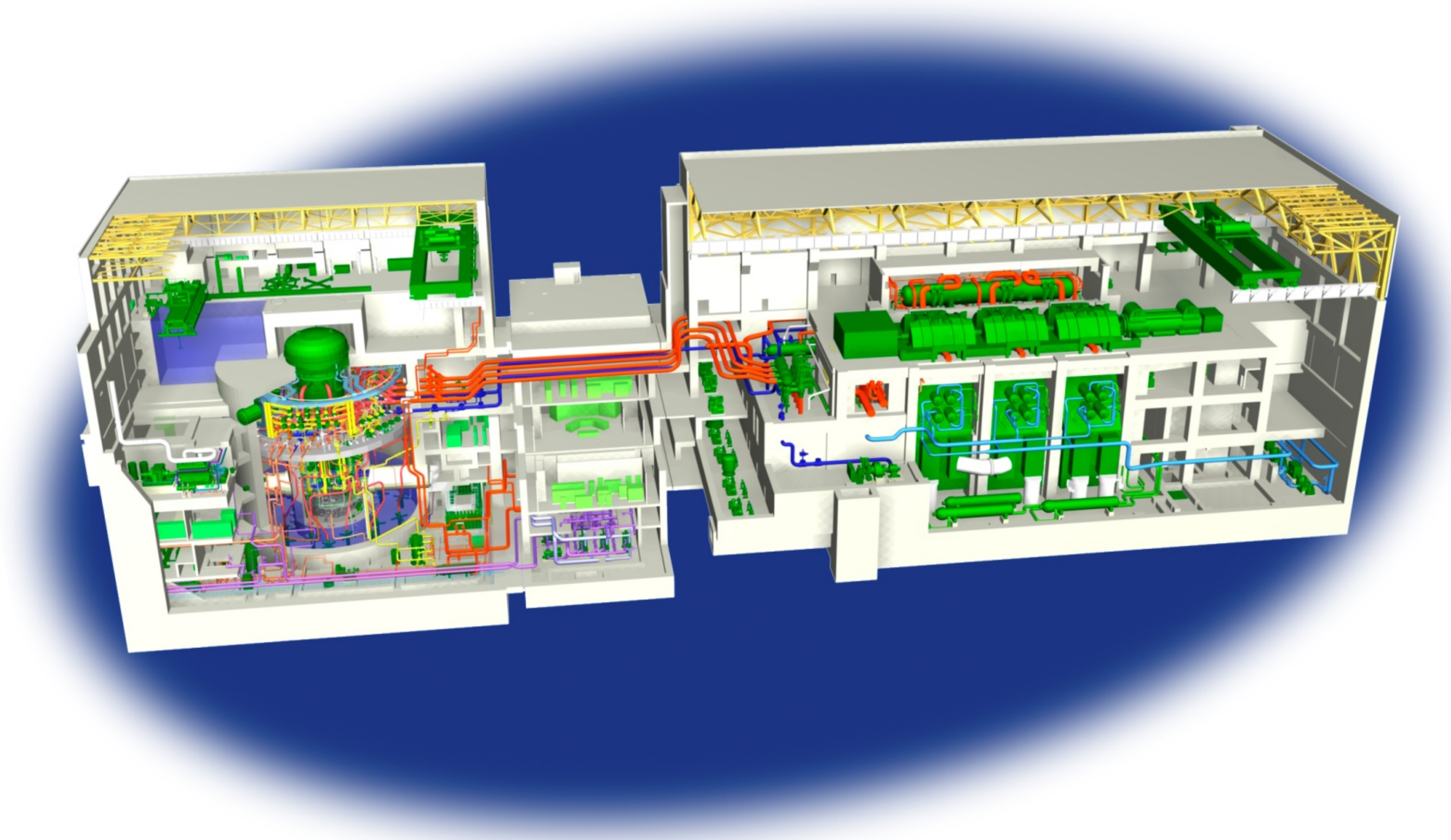
Departures from the ABWR DCD Tier 1, Tier 2*, Technical Specifications, and Notable Tier 2



Departures from the ABWR Design Control Document (DCD)

- STP 3 & 4 is basically identical to the U.S. ABWR Certified Design
- Limited number of Tier 1 Departures (13)
- One Tier 2* Departure

Tier 1 Departures

New Technology	• Safety-Related I&C Architecture • RCIC Turbine/Pump
Site Specific	• Site Parameters
Corrections	• Feedwater Line Break Mitigation • Reactor Building Safety-Related DG HVAC
Enhancements	• I&C Power Divisions (4th Division I&C) • RHR System and Spent Fuel Pool Cooling • Hydrogen Recombiner Elimination • Delete High Radiation MSIV Closure and Scram
Miscellaneous	• RPV System RIP Motor Casing Cladding • Re-classification of RW Bldg to Non-Seismic • Control Systems Inputs, Tests, and Hardware • Breaker/Fuse Coordination and Low Voltage Testing

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Tier 1 Departures

New Technology

- Safety-Related I&C Architecture (STD DEP T1 3.4-1)
  - Separate and independent system level data communication capabilities replace obsolete technology
  - Functional (vs. hardware) design of digital controls platforms
  - Eliminated unnecessary redundant actuation logic
- RCIC Turbine/Pump (STD DEP T1 2.4-3)
  - Simplified monoblock design (integral turbine and pump)
  - Installed and operating in international applications

Tier 1 Departures

Site Specific

- Site Parameters (STP DEP T1 5.0-1)
  - STP 3 & 4 site requires departures from the reference ABWR DCD site parameters selected to bound most potential U.S. sites:
    - Minimum shear wave velocity
    - Design basis flood level (increased ~7 feet) due to main cooling reservoir failure as a design basis event
    - Maximum design precipitation rate (rainfall) and maximum wet-bulb temperatures (humidity)

Tier 1 Departures

Corrections

- Feedwater Line Break Mitigation (STD DEP T1 2.4-2)
  - Safety-related trip of condensate pumps after Feedwater Line Break (FWLB) in containment, to limit mass flow
  - Related Tier 2 Departures requiring NRC approval:

  Containment Analysis (STD DEP 6.2-2) updates modeling using GOTHIC (WCAP-17058), for feedwater flow into the drywell (FWLB), drywell connecting vents, and decay heat curves (non-conservative for long-term analysis)

  Revised Pool Swell Analysis (STD DEP 3B-2) incorporates new pool swell method to address containment response as described in STD DEP 6.2-2

Tier 1 Departures

Corrections

- Reactor Building Safety-Related Diesel Generator HVAC (STD DEP T1 2.15-2)
  - Diesel Generator (DG) engine room temperature limit during operation is below 60°C vice 50°C
  - No impact to environment for DG controls

Enhancements

- I&C Power Divisions (STD DEP T1 2.12-2)
  - Adds 4th safety-related division to Class 1E I&C Power Supply System

Tier 1 Departures

Enhancements

- RHR System and Spent Fuel Pool Cooling
  (STD DEP T1 2.4-1)
  - Adds RHR A capability so that any of the three RHR loops can supply fuel pool cooling or makeup
  - Increases flexibility to coordinate division outages
- H2 Recombiner Requirements Elimination
  (STD DEP T1 2.14-1)
  - Complies with 10 CFR 50.44, amended after Certification
- Deletion of MSIV Closure and Scram on High Radiation
  (STD DEP T1 2.3-1)
  - Existing regulatory and BWR industry initiative to eliminate spurious trips

Tier 1 Departures

Miscellaneous

- RPV System Reactor Internal Pump (RIP) Motor Casing Cladding (STD DEP T1 2.1-2)
  - Consistent with design in use for operating ABWRs
- Re-classification of Radwaste Building Substructure to Non-Seismic (STD DEP T1 2.15-1)
  - Commits to Regulatory Guide 1.143 rev. 2 for the design of radwaste processing SSCs
- Control Systems Changes to Inputs, Tests, and Hardware (STD DEP T1 2.2-1)
  - Test clarification for Rod Control and Information System (RCIS) non-Class 1E uninterruptible power supplies, such that either will maintain both RCIS channels operational

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Tier 1 Departures

Miscellaneous

- Breaker/Fuse Coordination and Low Voltage Testing (STD DEP T1 2.12-1)
  - Modifies interruption device coordination to conform with acceptable industry practices, and codes and standards (e.g., IEEE 141, IEEE 242, etc.), and to coordinate to the maximum extent possible
  - Allows for as-built performance type voltage testing and analyses at the manufacturer's shop, and comparison of pre-operational tests against system voltage analyses

Tier 2* Departure

Tier 2* Departure

- Codes, Standards, and Regulatory Guide Edition Changes (STD DEP 1.8-1)
  - Updates compliance to more current revisions/editions of selected applicable NRC Regulatory Guides and Industry Codes and Standards which have been approved or endorsed by the NRC
  - Ensures more recent industry design and construction practices are used, updates requirements in fields that have advanced considerably since certification, and deletes obsolete requirements

Departures from the Generic Technical Specifications

- Tier 2 design changes that require conforming changes (9)
  Examples:
  - **Containment Analysis** (STD DEP 6.2-2) as previously noted
  - **Plant Medium Voltage Electrical System** (STD DEP 8.3-1) changes to a dual voltage (13.8 kV and 4.16 kV) design, increases DG and Combustion Turbine Generator (CTG) ratings, and revises CTG required start time to comply with RG 1.155 for Station Blackout (SBO) alternate AC
- Other changes to the Tech Specs (7)
- Editorial changes that do not change intent

Tier 2 Departures

- Except as previously noted, changes to Tier 2 information do not require an exemption or prior NRC approval
  - Screened/evaluated according to Part 52 App A, VIII.B.5
  - Changes are site-specific (e.g., Turbine Generator design), regulatory-related (e.g., dual units), corrections, updates, and clarifications
- Radwaste changes are considered notable for their scope:
  - **Liquid Radwaste Process Equipment** (STD DEP 11.2-1)
    - Modular components and reduced system complexity, no fundamentally new equipment or processes
    - Removes Concentrators (Evaporators), and changes number/capacities of installed tanks and pumps

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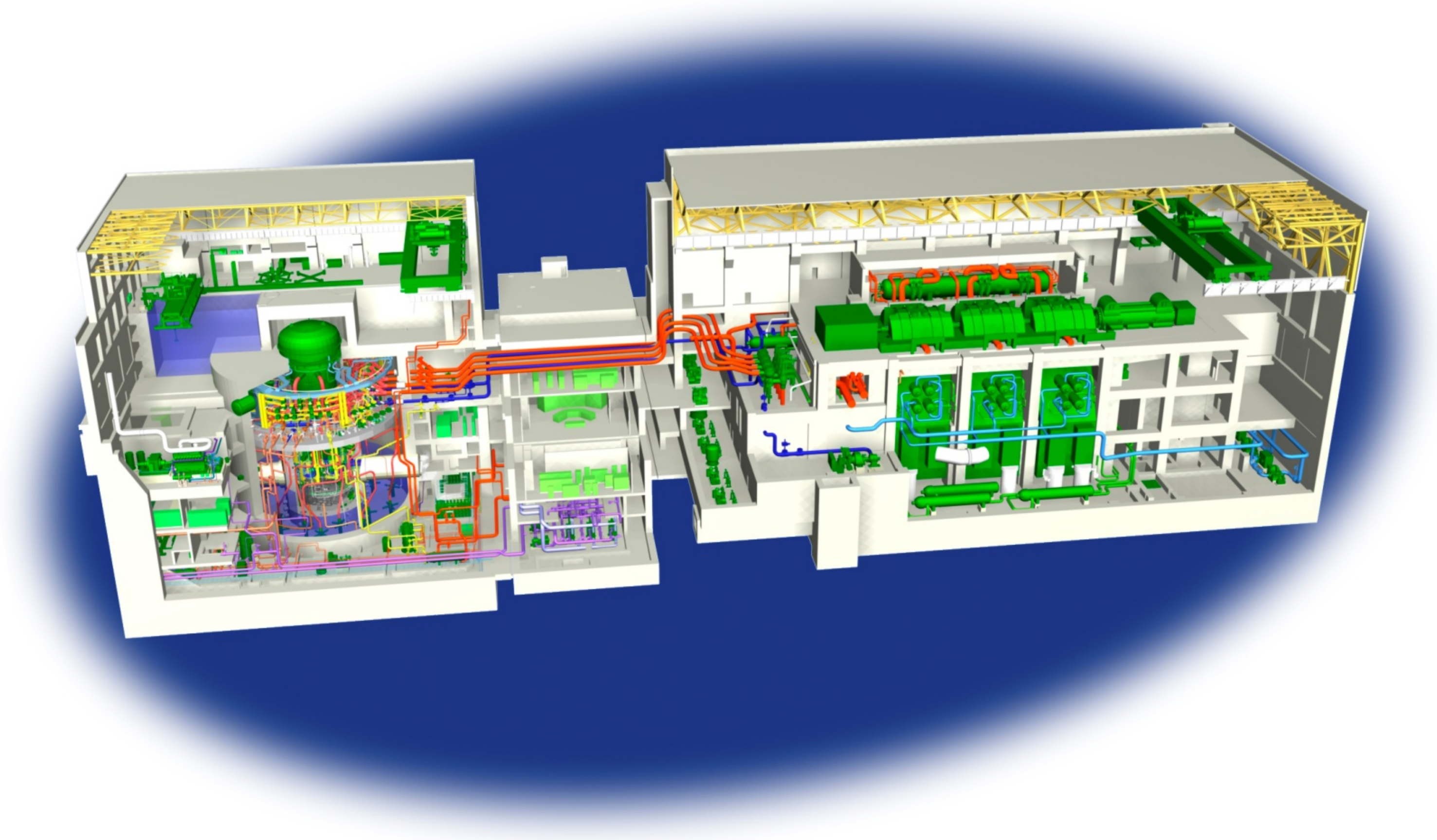
Tier 2 Departures

- **Gaseous Waste Management System** (STD DEP 11.3-1)
  - Recombiner train with proven operational experience
  - Changes number, arrangement and vessel size of charcoal adsorbers (total mass unchanged)
  - Adds offgas evacuation system and revises charcoal adsorber vault temperature to optimize performance with no changes to design basis or function
- **Radioactive Solid Waste Update** (STD DEP 11.4-1)
  - Modular components and reduced system complexity, no fundamentally new equipment or processes
  - Deletes Incinerator and Compactor, and changes number/capacities of tanks and pumps

Tier 2 Departures

- **ECCS Suction Strainers** (STD DEP 6C-1)
  - – Upgrades strainers to state-of-the-art cassette type
  - – Meets latest regulatory guidance in RG 1.82 Rev. 3

Fuel Design and Licensing



Fuel Background and Overview

- STP 3&4 COLA does not depart from the certified fuel design
- COL amendment to be submitted ~ 2 years prior to fuel load

STP 3&4 Fuel Status and Schedule

- Westinghouse Licensing Topical Reports (LTRs) are being submitted to expand the safety analysis methodology to ABWR design
  - 2 new LTRs (transient and stability analyses)
  - 1 revision (reload methodology)
  - 8 supplements (transient, LOCA, containment, and control rod blades)
- Schedule of LTR submittals
  - 2 completed in September and October 2009
  - 1 planned for April 2010, 4 in June 2010, and 4 in September 2010
- LTR submittal schedule and expected NRC review supports STP 3&4 fuel amendment submittal in 2013

Conclusion