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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARD

(ACRS)

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SUBCOMMITTEE ON ADVANCED BOILING WATER REACTORS

(ABWR)

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MEETING ON THE SOUTH TEXAS PROJECT COMBINED

LICENSING APPLICATION (STP COLA)

+ + + + +

TUESDAY

MARCH 2, 2010

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Said Abdel-Khalik, Chairman, presiding.

ACRS MEMBERS:

SAID ABDEL-KHALIK, Subcommittee Chair

J. SAM ARMIJO, Vice Chair

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR., Member

MARIO V. BONACA, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

JOHN W. STETKAR, Member

A-G-E-N-D-A

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

8:31 a.m.

CHAIRMAN ABDEL-KHALIK: The meeting will now come to order. This is a meeting of the ABWR subcommittee of the Advisory Committee on Reactor Safeguards. I'm Said Abdel-Khalik, chairman of the subcommittee. ACRS members in attendance today are Jack Sieber, Bill Shack, Mike Ryan, Sam Armijo, John Stetkar, Dennis Bley, Charlie Brown and Mario Bonaca. Ms. Maitri Banerjee is the designated federal official for this meeting.

An information briefing was given to ACRS in November 2009 to familiarize the members with the proposed design for South Texas Project Units 3 and 4, the combined license application, the departures from the certified ABWR design taken by the applicant, qualifications of the alternate vendor Toshiba, and the amendment to the ABWR design certification that the applicant submitted to comply with the aircraft impact assessment rule.

Since that time the staff review of the COLA has come to a point where they wish to bring the safety evaluation report with open items in part to

ACRS for review. This is the first such meeting to discuss the COLA FSAR and the corresponding SER with open items for Chapters 1, 4, 11, 12, 15 and 18. We have scheduled additional ABWR subcommittee meetings in March through May followed by a meeting of the full committee in mid-year. Although the agenda goes chapter by chapter, I expect today's discussion to be issue-centered related to the technical issues in the COLA and SER chapters.

The rules for participation in today's meeting were announced in the Federal Register on February 22, 2010. Parts of this meeting may need to be closed to the public to protect proprietary information. I'm asking the NRC staff and the applicant to let us know when there is a need to close the meeting before we enter into such discussion and to verify that only people with the required clearance and need to know are present.

We have a telephone bridge line for the public and stakeholders to hear the deliberations. To minimize disturbance the line will be kept in listen-only mode until the last 10 minutes of the meeting. At that time we will provide an opportunity to members of the public joining us through this bridge line who would like to make a statement or provide comments.

As the meeting is being transcribed I request that participants in this meeting use the microphones located throughout this room when addressing the subcommittee. Participants should first identify themselves and speak with sufficient clarity and volume so that they can be readily heard. We will now proceed with the meeting and I call on Mark Tonacci of NRO to begin the presentation. Mark?

MR. TONACCI: Thank you. I am Mark Tonacci. I am the branch chief of Projects Branch 2 in the Office of New Reactors. Projects Branch 2 has the responsibility for project management of the South Texas Units 3 and 4 combined license application. I'd like to introduce George Wunder, our lead project manager sitting beside me. Other members of the staff will introduce themselves as they come up for their presentation. Today the applicant's presentations will focus on the application of STP Units 3 and 4. The staff's presentations will focus on the safety evaluation report that you already have.

Prior to this meeting Dr. Abdel-Khalik and I met to discuss the strategy to be used in these presentations and he asked me to ensure that we do not bore you with administrative information, but rather focus on the substantive presentations that will hold your interest and we have endeavored to achieve that today. We reviewed each of the chapters to be presented for the key technically weighty issues that were focused on in the safety evaluations. Those are the issues that will be presented today. We do not intend to cover every single departure, or every open item, or every request for additional information that's in the SER.

Accordingly, we have expanded the presentation time for those chapters that do need thorough discussion, particularly Chapters 11 and 12 where there are significant departures that should be discussed here today. However, some of the chapters have large sections that are incorporated by reference or there just wasn't much technically challenging information in the chapter. In many cases there are departures that are very significant.

In, for example, Chapter 8 it received extensive evaluations there. But the technicals of these departures were administrative or had no technical depth in other chapters such as 4, 15 and 18 that you're going to hear about today. Therefore, the presentation for those chapters without a lot of key topics have been minimized in an effort to allow the staff, the applicant and the committee to focus on substantive topics in the other chapters. However, even for the condensed chapter presentations we will have the technical staff present should you have questions. I look forward to a positive and constructive dialogue today that will add value to our work to ensure the health and safety of the public. Now, let me turn this over to George Wunder, the lead project manager.

MR. WUNDER: Good morning, thank you. We had the - before I turn it over to South Texas to make their first presentation, we had the opportunity to talk to you about alternate vendor qualification back in November. At that time we gave you a status of our review. Things have changed a little bit since then. We ran into some technical issues on Chapters 2 and 3 that turned out to be a little bit thornier than we had anticipated, so the dates on these chapters are going to slip.

Phase II will be completed on schedule with the exception of Chapters 2 and 3. We'll be making presentations to the subcommittee on the remaining chapters between now and May 20. When we have a clear path to resolving the technical issues on Chapters 2 and 3 we're going to propose dates for presenting those to the subcommittee as well as proposing a date for presentation of the overall SER to the full committee. And that's the status of our review as it stands. I'd now like to turn it over to South Texas, please.

MEMBER RYAN: George, I might ask that you not whack the microphones with your papers and stuff. Our recorder gets a jolt when that happens.

MR. WUNDER: Thank you, sir.

MR. HEAD: Good morning. My name is Scott Head. I'm the regulatory affairs manager at Units 3 and 4. I've been in that position for about 18 months. Prior to that, for the previous 10 years I was the licensing manager at Units 1 and 2 of South Texas. I've been at the site since 1985. I was involved in the original licensing and construction - initial licensing of Units 1 and 2. I have a nuclear engineering degree from Texas A&M University and a master's and MBA from the University of Houston.

My last opportunity to visit with the ACRS was during risk-managed tech specs that you had licensed back in the 2007 timeframe. With me this morning is Coley Chappell from our licensing organization and Steve Thomas from our design engineering manager. We have a significant team here today to cover these six chapters. I would like to note that in the audience we have and will be presenting later on today Mike Murray, our I&C manager for Units 3 and 4. Later this afternoon Jay Phelps, our operations manager, will be with us. We have our lead - a lead health physics individual from Units 1 and 2 and our lead rad waste engineer for 3 and 4 are here today also with us.

Here's the proposed agenda today. I understand we can agree with what Mark had said. We want to be able to focus on some of the - on the big issues. We're going to just do a quick summary from our November meeting. I realize we don't want to repeat all of what we covered in November. We'll just ask to see if there's any questions from that timeframe, get a recent history of the status of the review. I'm going to give Steve Thomas an opportunity to talk about the alternate vendor process to see if there are any other questions about that. That to us is probably the crucial part of the Chapter 1 review for the NRC and we certainly want to provide you an opportunity to provide a perspective with that. We'll go over the departures again, just a general discussion, then we'll dive into Chapter 1 and see if there's any topics there that we need to discuss. Okay?

CHAIRMAN ABDEL-KHALIK: Before we get started I have sort of a conceptual question.

MR. HEAD: Sure.

CHAIRMAN ABDEL-KHALIK: Many of the departures - you had designated many of the departures as standard departures, right? Now, I understand this is sort of an unusual process, but what gives STP the authority to make standard departures which are binding to future applicants who may reference the ABWR DCD?

MR. HEAD: Well, I think the standard is really our attempt to say this should be available moving forward for future COLA applicants. I don't believe there's a binding aspect to those departures. There certainly - we're hoping once we've gone through this effort to license those departures at this point that future applicants would find them to be useful, appropriate and had already gone through the process of licensing them.

CHAIRMAN ABDEL-KHALIK: But should they disagree with these departures, they are, you know, fully within their rights to change these departures if they so wish?

MR. HEAD: Absolutely.

MR. TONACCI: That is correct. This is

Mark Tonacci. They do - whoever is the subsequent COL doesn't have to abide by their - what South Texas has designated the standard, but it makes life a lot easier for subsequent ones when it's already been reviewed to just sign on to the same departure with the same changes. Right now there is no subsequent applicant at this point.

CHAIRMAN ABDEL-KHALIK: Okay, thank you.

MR. HEAD: Yes. We're hoping at some point that there will be subsequent applicants for the ABWR and at that point in time a lot of the work will have been done for them if they choose to use those departures.

CHAIRMAN ABDEL-KHALIK: Okay.

MR. HEAD: And Steve will allude to - or discuss some of those with respect to why we find them beneficial at this point in time to move forward with those departures.

CHAIRMAN ABDEL-KHALIK: Okay.

MR. HEAD: We'll talk about that in a minute.

CHAIRMAN ABDEL-KHALIK: Let's proceed.

MR. HEAD: Okay. This is the team that will be discussing or available to discuss this portion of our presentation. This is the picture we showed before and we put it up there again just to reinforce the major feature of the South Texas Project which is our main cooling reservoir that's in fact sized for four units and is one of the reasons, main reasons that South Texas was chosen for Units 3 and 4. Other aspects there including the infrastructure, the low population density, existing state and community plans, strong support, strong community support all led us to the decision to move forward with licensing Units 3 and 4 which we have done and now we show you just a schedule of where we are.

In September of 2007 we submitted the application. We've had - it has been docketed. We've had three revisions since then. Rev. 3 was submitted last September. Phase I of the NRC review has been completed and we're now in the middle of Phase II. I'll turn your attention to COLA Revision 2 in September of `08. That was an important revision for us because that's where we transitioned to Toshiba as being the supplier of the ABWR. And with that intro I'm going to turn it over to Steve Thomas to give you some more perspective on that process that we went through.

MR. THOMAS: All right, thank you, Scott. Good morning. I'm Steve Thomas. I'm the engineering manager for STP Units 3 and 4. I'm a registered professional engineer and I hold a Bachelor of Science in mechanical engineering from Georgia Tech. I've held various positions in engineering over the past 40 years beginning with the U.S. Navy Nuclear Submarine program, Tennessee Valley Authority, Mississippi Power & Light, now Entergy, Holtec International and Houston Lighting & Power, now STP Nuclear Operating Company. I've been with the South Texas Project for a little over 16 years as the design engineering manager and other engineering management positions, and I've been the STP Units 3 and 4 engineering manager since the beginning of the project.

Early in 2008 shortly after we transitioned the project to a Toshiba-supplied ABWR STP commissioned a study which we've called the Toshiba Capability Assessment Program, or TCAP, to investigate Toshiba's capability to independently supply the design and engineering basis, design basis for the ABWR in the United States. In parallel, STP Nuclear Operating Company performed a due diligence study with about 16 STP employees and outside contractors to oversee the capability assessment of Toshiba and to independently evaluate some of the technical areas that we wanted to take a look at.

We were aware of course that the ABWR design had been jointly developed in Japan by General Electric, Toshiba and Hitachi, and of course the ABWR design goes back a little further than that to some of the plants in Europe, Sweden in particular where some of the first ABWR technological changes were developed such as the fine motion control rod drive mechanisms and internal reactor pumps by ASEA-ATOM which then became Westinghouse and interestingly enough now is Toshiba.

The U.S. ABWR-certified design, however, is based on the joint effort in Japan for Kashiwazaki-Kariwa Units 6 and 7. We did not at that time have a very good understanding of Toshiba's ability to independently perform these design and engineering functions, and we had a lot of questions about what documentation they had in-house to support this effort. In fact, we were skeptical. I know Tom Bailey's here. We really kind of went over there with a lot of questions in mind and were anticipating that there would be a lot of technical issues and holes in the design basis that would have to be filled. We really did not know what to expect at that time. I will tell you now that we were wrong. In the end we were extremely impressed with Toshiba's firsthand experience, their extensive documentation and their firsthand working knowledge of the ABF ABWR technology.

One of the things I did on one of the teams that I was on was really a search for documentation. I started with the design certification document and pretty much at random just picked a document and said show me this document and somebody would scurry out of the room and come back in about 20 minutes with a handful of papers and present them to me and I would look at that document. Typically I would go to the reference section of that document and pick another document, go get me this. This went on for the better part of the first day that we were there.

After awhile I think they got tired of running out and going to the technical library and making copies of these documents. They asked if it would be acceptable to bring a computer into the room and fetch these things electronically which they did. It sped the process up considerably. I went through the same thing. We'd get the document, I'd go to a reference, find me this, find me that. I know in my particular case - in fact I lost a small wager on this issue - Toshiba was able to completely get 100 percent of the documents that we requested. There were some other teams that had a couple of holes they had to look at, but we were very impressed with their ability to retrieve these documents in a very sophisticated records management system and basically produce everything that we asked for.

Again, we really didn't know exactly what to expect. We did hire some interpreters to go with us on this first trip. We had one of the interpreters in-house as a STPNOC employee and we hired some additional interpreters from Tokyo to go with us to Sogo and assist us in interpreting these documents and making our requests known. I found it kind of interesting on a number of the calculations that we looked at at that time, some of the calculations were in Japanese and I'm not quite sure what I was expecting, maybe that they would be in English, but many of the calculations that had been developed for K6 and K7 were in fact developed by Toshiba by in-house personnel.

As an engineering manager I will tell you again I was very impressed with the quality of the calculations, so impressed that the calculations were expressed so logically with very little interpretation. I was actually able to follow the flow of the calculation in Japanese. When you looked at the units and the numbers and things you could see what the calculation was. They were very well documented, assumptions were documented, very well laid out, and I have to admit I was somewhat jealous of the quality of those calculations. We didn't need the interpreters very much. They pretty much sat on the side of the room most of the time. All in all we discovered that there is a set of design basis documents that's - about 800 or so documents that are referred to as the common engineering documents that are jointly owned by GE, Toshiba and Hitachi that form the design basis for K6 and K7 and then subsequently are the design basis documents for Hamaoka 5 in the case of the Toshiba plant that's built in Japan, Shika 2 for the Hitachi plant that's built in Japan. Lungmen Units 1 and 2 were developed by General Electric and these 800 common engineering documents were also the basis for the U.S. certified ABWR design.

So again, we walked away probably completely 180 from our attitude going into this assessment to when we came out of it. We were very impressed with their capabilities. Looking back at this capability assessment program two years later, now I'd have to say that the conclusions that we reached - and why don't we go to the next slide - are valid today, and that is that Toshiba is eminently qualified to supply the U.S. ABWR design. They have a detailed working knowledge of the design basis documents. In many cases while we were there it was refreshing to see that the people who had signed these calculations, who had approved and who had done them were there, and that's not the case in the U.S. nuclear industry sometimes today. You find that many of the developers of those documents, they've retired and moved out of the industry. In the case of Toshiba they were there. I remember one instance where one of the managers started going to the board and writing some equations and explaining these calculations to us. Their knowledge of these documents is very deep.

We have the utmost confidence in their ability, Toshiba and the EPC team which consists of Westinghouse, Sargent & Lundy, and Lafleur to build, to design and build the certified design in the United States. There were some areas that we identified as low-risk areas, some issues that we wanted to follow up on. Those were identified. Those impacts have been addressed. Action plans were developed to deal with those and we basically did not find any critical areas were showstoppers that would keep us from going forward with the design.

One of the issues is in the general characterization of Americanization. Of course the design documents were developed for the Japanese fleet. In many cases some of those characteristics of the K6 and K7 design were included in the certified design documentation. I guess the classic example are the radioactive waste processing systems and basically in the United States we just do that differently. And so I think you're going to see that most of the departures that we talked about - and this really addresses the question you asked earlier - are the types of things that we felt would be appropriate for a market in the United States that were consistent both with U.S. operating experience and methodology in this chapter that we felt these changes were necessary to make the plant consistent with the U.S. fleet of nuclear reactors. And so you'll see that we have made a number of departures along those lines, and our thought process was that if we felt that this was a generic type of a change that we felt was appropriate for the U.S. market we're really right now a design-centered working group of one since there are no other ABWR applicants at this time, that we would make those standard changes to the certified design. In some cases you'll see there were some site-specific cases that are primarily submitted to deal with issues that are unique to the South Texas Project and I guess a typical example of that would be something we call "tropicalization" - building this plant in a warmer climate.

So again, our conclusion two years ago and our conclusion today is that Toshiba and the EPC team is eminently qualified to develop the design basis and design for this plant in the United States. Are there any questions?

VICE CHAIRMAN ARMIJO: Yes. The DCD was developed for U.S. applications.

MR. THOMAS: Yes.

VICE CHAIRMAN ARMIJO: Now, why do you take departures based on - you said there were differences in Japan on rad waste.

MR. THOMAS: Yes, sir.

VICE CHAIRMAN ARMIJO: But, you know, what are you departing from, the DCD or Japanese practice or both?

MR. THOMAS: It's departure from the certified design document in particular. I'll go back to the rad waste example.

VICE CHAIRMAN ARMIJO: I've gone through the departures report and somewhere along the line, Mr. Chairman, I think the committee would benefit by really understanding the various departures, because I think that's where the meat is in this review. Those are the changes to an already certified design. Without that, there's no need for us to even be here. So it's the changes that really I'm interested in. I think that's - trying to understand what you're changing.

MR. THOMAS: Okay. That's coming up next in our presentation so we can - we will be able to discuss that in our next presentation.

VICE CHAIRMAN ARMIJO: Okay.

MEMBER SIEBER: I have a minor question. It seems to me Toshiba owns Westinghouse, is that correct? They're affiliated?

MR. THOMAS: I think Westinghouse is a subsidiary of Toshiba is the technical.

MEMBER SIEBER: All right. Now, so there is a body of knowledge about nuclear reactors that resides in Westinghouse -

MR. THOMAS: Absolutely.

MEMBER SIEBER: - including codes, applications, calculations, designs. To what extent does Toshiba rely on Westinghouse codes for application to the BWR? And I, in reviewing all this I did note that that has been an issue from time to time and therefore there's qualification codes that have to be made to these applications. Could you spend a minute or two giving us a summary of -

MR. THOMAS: And you're exactly correct. Even though we have the 800 common engineering documents, I guess it's worthwhile to point out that a complete new set of design basis documentation is being developed for the STP plant. There may be a containment analysis for example, it would be the Westinghouse example as a basis for the design certification. We're going to independently develop with Westinghouse using Westinghouse codes containment analyses that are specific to the STP 3 and 4 project. And that's a good example I guess what we typically call the Chapter 15 accident analyses are being done by Westinghouse to support this plan in addition to other analyses related to fuel design and fuel performance and accident response characteristics of the plant.

MEMBER SIEBER: Okay. Now, as far as reactor operation and safety codes, Westinghouse's expertise is in the PWR technology. Where do you derive the BWR code expertise to do the actual rim core analysis and the accident analysis?

MR. THOMAS: That's a good question. That's one that we asked ourselves and interestingly enough I put a little seed in my comments here that Westinghouse was involved with the ABWR design in Europe, Sweden in particular.

MEMBER SIEBER: Right.

MR. THOMAS: Westinghouse through their Swedish affiliates are currently supplying boiling water reactor fuel to the European plants and several U.S. plants and have full in-house capability to do the analysis associated with those fuel designs. So Westinghouse has extensive BWR experience that's current in the industry today.

MEMBER SIEBER: Now, it's my understanding also that there are currently operating ABWRs in the world, right?

MR. THOMAS: Yes, sir. There are I think four - is that right, four - current ABWRs operating in Japan, two additional under construction, Lungmen under construction. And then there are the operating ABWRs in Sweden, Forsmark 1, 2 and 3 and one other one.

MEMBER SIEBER: Okay. So this is not a

new adventure.

MR. THOMAS: It really is not new, and that's one of the reasons why South Texas Project selected the ABWR for our project and one of the first plants in the United States. And we fully intend to take advantage of the engineering experience and operating experience primarily of the Japanese fleets, but we were recently working with some of the Swedish plants through the boiling water reactor's owners group as well.

MEMBER SIEBER: Yes, I figured that's why you did what you did. Okay, thank you very much. Appreciate it.

MR. THOMAS: Yes, sir.

CHAIRMAN ABDEL-KHALIK: I guess I'd like to just follow up on a comment you made earlier, that the DCD, the certified DCD contains some characteristics that were applicable to the K6 and K7 designs and the example you gave was the rad waste building and that's why you're sort of saying that perhaps with the U.S. market we don't need a seismically qualified rad waste building. Is that the logic?

MR. THOMAS: That's one of the logics. The rad waste building is a seismically designed structure. It's not a seismic Category 1 structure in accordance with our departure, but it is being designed consistent with the practice in the United States. And that's an excellent example of why we submitted that departure because typically in the U.S. plants the rad waste structure is not a seismic Category 1 structure even though it is designed to withstand certain seismic events for obvious reasons. But it's being designed consistent with current U.S. practice which is why we made this particular departure. Another example is that the certified design contained a feature with a rad waste evaporator, and I don't know of any plant in the United States that's operating a rad waste evaporator today. I know most plants have abandoned them in place or taken them out of their systems and gone to other processing technologies that are currently in practice in the United States. And that just made most sense to retain that feature from the certified design into the first U.S. plant.

CHAIRMAN ABDEL-KHALIK: Let's proceed.

MR. HEAD: Okay. I'm going to ask Coley to go into Chapter 1.

MR. CHAPPELL: My name is Coley Chappell. I've been with STP Nuclear Operating Company for two years and STP licensing, specifically STP 3 and 4 licensing COLA support. I am a graduate of the U.S. Naval Academy with a BS in physics. I spent time in the Nuclear Navy and I also earned an MS in applied physics from the University of Texas. I was an STA, shift technical advisor and former shift supervisor of BWR 5 and also spent some time in engineering at BWR 5. And I've been able to use those experiences in this application and supporting some of the technical issues as we come across them.

What I'm going to do is proceed with the introduction to the COLA as a whole and touch on some of the topics. The no-new-adventure concept as well as the Americanization concept are here. The overall structure of the COLA is in Tier 1 certified design material and what we'll show is that there are a limited number of changes to the certified design material. This of course is changes that require exemption. Most of these changes except for the tropicalization or the site-specific parameters departure are considered standard departures. And as we are the STP 3 and 4 reference COLA, they're intended to be incorporated by or suitable for incorporation by subsequent COLAs. The Tier 2 information, some of it is specially designated as

Tier 2-star which requires prior approval to take a departure from, but other methods are acceptable and we do have one example of that within this presentation. This is our only Tier 2-star departure. The Tier 2 information in the DCD is largely incorporated by reference. In some cases, particularly Chapter 11 as an example, we had done a change-out of some of the material and done an evaluation and provided detailed design.

The information that is in the DCD is not complete. It is an outline of the general plan. It has all of the characteristics of a reactor, but there are specific information items that need to be provided by a COL applicant, specifically interface requirements for example with some of the service water systems, circulating water systems specific to heat sink, sanitary systems, things of that nature. All of these information items are addressed in the application as well as specific COL items that deal with particular points that came up in review of the certified design to ensure the applicant would provide the necessary information to make a safety determination.

The number of Tier 1 departures is limited considering the scope. Part of the no-new-adventure concept is that the DCD was certified many years ago and since then there have been changes in the industry, developments in the industry, improvements to improve reliability and also to minimize things such as dose requirements. This is part of the Americanization effort.

So at this point as an overview of the COLA I will go through briefly the Tier 1 departures, the limited number of Tier 1 departures and in some cases they're very limited in scope, and the information that's provided is most of the information that we have available to explain why we're taking this departure. And in some cases we'll make pointers to specific chapters where these departures are more prevalent and will be discussed in more detail. In the first example for this departure for the reactor internal pump casing cladding there is a simple description of this in Tier 1 and a reference is corrected to show that it's a stainless steel cladding where none was indicated in the DCD. This is consistent with operating experience of the ABWR and we consider no additional information is needed other than what's provided in the application.

MR. HEAD: I'm just going to ask you, is that an example of the discussion you have?

VICE CHAIRMAN ARMIJO: Yes. That was very clear, very simple to understand. There's some areas that I think you're taking huge departures you don't even talk about and that's in the fuel area. Because the DCD talks about a fuel that is ancient history and there's no clear description of what fuel you're going to use in the South Texas Project COLA.

MR. HEAD: Note that we're not taking a departure at this point, but -

VICE CHAIRMAN ARMIJO: You're not taking a departure, but you're not going to use an 8x8 fuel assembly in the next plant.

MR. HEAD: Correct.

VICE CHAIRMAN ARMIJO: So someday we'll see what you're actually going to use.

MR. HEAD: Yes, sir.

VICE CHAIRMAN ARMIJO: Okay.

MR. HEAD: And we'll be happy to discuss that strategy. We're doing Chapter 4 today and we'd be happy to discuss that strategy then if you'd like to.

VICE CHAIRMAN ARMIJO: All right. Thank you.

MR. CHAPPELL: As you'll see, I understand the emphasis is on issues, but part of the reason to cover this is to provide understanding that there may or may not be an issue for some of these items. The next departure contains a description again in Tier 1 discussing the testing of channels, of the Rod Control and Information System so that when we do maintenance on the power supply we can maintain both channels operable. Again, a minor change and this information would be sufficient - a good termination. This is an example of a departure that has impacts on different sections in the COLA, but it's a BWR industry initiative to eliminate spurious isolations of MSIVs and scrams due to N-16. We've adopted those measures and changed the - we've eliminated the trip and changed the classification from safety to non-safety.

VICE CHAIRMAN ARMIJO: Yes. On this one here the question is why did the designer of record of the DCD include that requirement? I don't know whether they did it on their own or whether NRC staff encouraged them to have that requirement, but so you're removing what some people might see as a safety function or feature because the control rod drop accident presumably can't happen in an ABWR. Is that your logic?

MR. CHAPPELL: That is correct.

VICE CHAIRMAN ARMIJO: Has that

requirement been removed on the Japanese ABWRs currently operating? Is that feature -

MR. HEAD: Has that feature been removed or never existed on the?

MR. IWASAKI: This is Ryuji Iwasaki, Toshiba Licensing. I worked for Toshiba for 20 years. I was a safety analysis engineer for past 10 years. My company assigned me as U.S. licensing in 2000 past. So this question, we have the scram system. We understand that old U.S. BWR system, BWR has additional scram system and that after that, in 1980 or something BWRs owners group decided this scram system should be deleted. Still in Japan our ABWR has this scram system.

VICE CHAIRMAN ARMIJO: Well, that's getting to something that's confusing me, I need a little help here, is that the designer of record put in this system. Why they did it, they're not here to say, but it's in the DCD, it was implemented in the K6 and K7 plants in Japan, perhaps the other plants, maybe Hamaoka, I don't know. Maybe you folks know. But so it's a system there and it - but you're proposing to eliminate it. And I guess my question goes to the staff of how hard do you scrub that decision since you don't - different design teams can take different views on whether something is needed or not needed, and GE is not here to say whether they agree with you. You probably wouldn't want to ask them. So how does the staff conclude that that's okay to take that system out when it has been incorporated and is part of the experience base of the operating ABWRs? You know, why are you happy?

MR. THOMAS: That's a good question. Most all BWRs originally had this design feature, including the domestic plants here in the United States, and I think I would say that, without them being here, that GE has supported the removal of this feature in the domestic plants from the standpoint of plant reliability. And I think you're going to see as we go through some of these things too two areas where the Japanese plants and particularly the Japanese operating and maintenance philosophy differs greatly from the United States. The Japanese typically run 12-month operating cycles and have long refueling outages, whereas in the United States over the last 10-15 years we've really placed a lot of emphasis on doing online maintenance safely and running short refueling outages to improve the operating capacity factors of our plants. And this is typical, one of those features where we felt like with documentation that the risk associated with this, deleting this particular feature was small compared to the improvement in plant reliability from inadvertent actuation of this feature.

VICE CHAIRMAN ARMIJO: Well, I understand that. Perhaps maybe when the staff is ready they can comment on why they're comfortable with this departure.

MR. WILSON: This is Jerry Wilson, Office of New Reactors. Let me speak to this more generically. I don't know if there's a particular staff reviewer on this, but as we look at these departures two factors are in our minds. First of all, is the departure in conformance with the regulations, number one, and number two, it's that underlying concern about standardization. One of the goals of the design certification is we'd have standard plants. So now this is the first deployment in the United States and we recognize that there are a number of issues that need to be considered that South Texas representatives have been talking about, but every plant that comes along that references the ABWR, makes a variety of different departures, then there really is no benefit from standardization. So that's part of the weighting that we have as we look at these things and so the staff should look carefully at each of these departures from that perspective. But on the other hand, standardization is a goal, it's not a requirement. If they are meeting the regulations, we believe it's safe, at the end of the day we're probably going to find it acceptable. So that's kind of the weighting factors the staff is considering as we look at these kinds of questions. I don't know if you want to -

CHAIRMAN ABDEL-KHALIK: To follow up, part of the logic for removal of the scram was the concern about spurious trips, and the question then is have the Japanese plants experienced any spurious trips in ABWRs as a result of the inclusion of this scram?

MR. THOMAS: I don't know the answer to that question. We'll confer back here and see.

MR. IWASAKI: In the experience to Okara, but in Japan we don't have any negative event on this system. Then we don't have - we did not make any design change from the old Japanese BWR. This is a means - in Japan we have this system.

CHAIRMAN ABDEL-KHALIK: Wouldn't that be the more appropriate sort of experience base to make this decision?

MR. THOMAS: Well, not necessarily. I

think also, as a matter of record this change was recommended to us by GE so just we might make that point. You were asking about their involvement. I think that again, the United States experience is different. For example, the Japanese plants do not employ hydrogen water chemistry as a matter of practice whereas in the United States from mitigation for stress corrosion cracking issues we have employed that, and that's caused quite a bit of variation throughout the industry on the nitrogen 16 levels that the plants have experienced under operation which is a contributing factor to this. So I think again, it's not really necessarily appropriate to compare the Japanese operating experience in this regard with the operating experience in the U.S. fleet. This has consistently been employed throughout the U.S. fleet and it was recommended to us as a standard design change for the U.S. fleet of ABWRs.

VICE CHAIRMAN ARMIJO: Look, this feature may in fact be belt and suspenders and you know, that may be the case, but it just seems to me that the experience in, you know, the standard ABWRs are the ones operating in Japan because they're the ones that have been built and are operating and they have these features, they're added safety features. We proposed removing them because of N-16 and perhaps because you were going to use hydrogen water chemistry, I don't know that.

MR. THOMAS: We are.

VICE CHAIRMAN ARMIJO: So, but in the final analysis I just want to make sure that the staff has really gone through all this reasoning and made a judgment that the benefit of removing the system doesn't significantly affect the safety of the system. I understand the N-16 issue with hydrogen water chemistry, but that could be resolved by set point, any number of ways to resolve that, but you've chosen to take this approach and I'm just waiting to hear what the staff has to say.

MR. HEAD: Okay. This is good discussion.

MEMBER BROWN: You might comment when you do that on why - what is it during your online maintenance that leads to the potential for spurious actuations. That could you see anything that gave you any hint?

MR. THOMAS: I don't think this would necessarily be an online maintenance issue, but -

MEMBER BROWN: That's what you said contributed to liability for at least -

MR. THOMAS: That was a generic statement, I'm sorry. I didn't mean to mislead you with this particular departure. That's a generic difference between the U.S. and Japanese operating and maintenance philosophies.

MEMBER BROWN: Okay, not that there's necessarily a configuration that leads to a likely - the likelihood of spurious actuations.

MR. THOMAS: Not from a maintenance standpoint.

MEMBER BROWN: So there's no - it's just somebody recommended it so you're doing it? That's what I took out of the discussion.

MR. HEAD: Well, we recommended and we evaluated it and based on domestic experience and our desires to minimize trips and I think our perspective on risk mitigation over the years that this is a trip that we felt should be -

MEMBER BROWN: I hear you - on trips, but you said it was recommended for the existing U.S. fleet of BWRs. Are they actively deleting this trip now?

MR. HEAD: Yes.

MEMBER BROWN: Okay.

MR. HEAD: Does it exist at your plant?

MR. CHAPPELL: It did not. It was

deleted. It was installed and removed. What's important to note is that this is to eliminate spurious trips. The monitoring radiation in the steam lines is still a part of the control room aspect and will be incorporated in a normal operating procedure for operators to take action.

VICE CHAIRMAN ARMIJO: On this subject, I've just got - I read your departure report. I think it was an excellent report. I think - I wish - seen this in other applications, but the -

MR. CHAPPELL: Maybe in the next COLA.

VICE CHAIRMAN ARMIJO: Possibly, but you have a statement on this particular issue that this deletion, this design change represents an improvement related to safety, and I think that's a stretch. In other changes you've made it's clear that they really are improvements in safety, but this one is just an improvement in operation.

MR. HEAD: The spurious trips are severe transient to the plant, to have a spurious trip of this nature.

VICE CHAIRMAN ARMIJO: That's your argument. Okay.

MR. HEAD: Yes, sir.

VICE CHAIRMAN ARMIJO: Okay. I missed

that. That wasn't really spelled out.

MR. HEAD: I'm sure that - was intended by that, but Unit 1 and 2's history and our PRA perspective would say a spurious trip is something that we've done. We've removed trips on 1 and 2 that were spurious in nature and had little safety or no safety benefit. So it's - we believe it's an enhancement.

VICE CHAIRMAN ARMIJO: Okay. Thank you.

MR. CHAPPELL: I'll move on. Any other questions? All right. This departure adds a third RHR loop for spent fuel pool cooling. This is just in outage performance and also provide additional cooling and maintenance capabilities. Fuelwater line break mitigation during the analysis of the containment. It was determined that adding a safety-related trip to the condensate pumps would provide a margin to limits and this was incorporated in the design and will be discussed further in Chapter 6.

CHAIRMAN ABDEL-KHALIK: I know we're not covering Chapter 6 today.

MR. CHAPPELL: No, sir.

CHAIRMAN ABDEL-KHALIK: But in the discussion related to Departure 6.2-2 which is related to this particular issue for the changes in tech specs, there's an indication that the assumptions made in the analysis for the feedwater line break, therefore assumptions listed in that justification, were judged to be non-conservative. And the question is if that is the case why wasn't that reflected in your Chapter 15 discussions?

MR. CHAPPELL: When this analysis was performed we went back and did a confirmatory calculation, a confirmatory analysis using the GOTHIC. If we want to get into more additional -

CHAIRMAN ABDEL-KHALIK: Maybe when we get to Chapter 15 we can talk about this? We don't want to lose it.

MR. HEAD: Yes. We'll be prepared in Chapter 15, and clearly again we believe that the meat of the discussion will be in Chapter 6 later on. But we'll certainly be able to address Chapter 15 today.

CHAIRMAN ABDEL-KHALIK: Okay. Thank you.

VICE CHAIRMAN ARMIJO: So you're going to save that for more discussion later?

CHAIRMAN ABDEL-KHALIK: Right.

VICE CHAIRMAN ARMIJO: Okay.

CHAIRMAN ABDEL-KHALIK: Thank you.

MR. CHAPPELL: We took a Tier 1 departure to the reactor core isolation cooling turbine design, the Terry turbine commonly in use in the U.S. and went to a Weir/Clyde pump. This is a single casing turbine pump design and it's simplified. It has water cooling instead of oil cooling and this will be discussed further in Chapter 5.

VICE CHAIRMAN ARMIJO: Is this pump used in the Japanese ABWRs?

MR. THOMAS: It's not. It's employed in the Lungmen design.

VICE CHAIRMAN ARMIJO: It's in the Lungmen?

MR. THOMAS: Yes, sir.

CHAIRMAN ABDEL-KHALIK: There's a topical report on this particular -

MR. THOMAS: Yes, there is.

CHAIRMAN ABDEL-KHALIK: - design change.

VICE CHAIRMAN ARMIJO: A technical report?

CHAIRMAN ABDEL-KHALIK: We'll distinguish that later. There is a report.

MR. THOMAS: There is a report. Agreed.

MR. CHAPPELL: This Tier 1 departure discusses protection device coordination in low-voltage conditions. This is to the maximum extent practical for testing. This is just different voltages in different systems have limitations. It also provides changes to ITAAC so that it allows pipe testing by the manufacturer being incorporated in pre-op testing, and then all that information is put together and analyzed for systems and components. This departure impacts things like vital AC and DC, other aspects that are covered in the Tier 1 section. We wanted a fourth division of power to I&C. This is primarily to facilitate maintenance. There's not much more to add here, but it will be discussed further in Chapter 8.

The hydrogen recombiner requirements elimination. This is another example of Americanization. This is an example of changes that have happened in the United States, in BWRs with respect to 10 CFR 50.44 changes. We would also maintain the monitoring systems as required. The rad waste building classification was alluded to earlier connected to Reg Guide 1.143 and that change will be addressed further in Chapter 3, other structures.

The diesel generator HVAC room was analyzed. Part of this was site-specific because of the loading in our system, and we evaluated that we had to change the room design limit upwards 10 degrees Celsius in order to accommodate the margin. This was evaluated and found to be acceptable for the DG components and it is noted that it's separate from the controls. So specific components on the DG were looked at. We'll discuss -

CHAIRMAN ABDEL-KHALIK: I was surprised by this particular departure. Sixty degrees C, that's 150F. That's 140F. That's - I mean, what conditions are you asking the people who may be present in that room to operate under? Why take this rather than changing the slats on the HVAC system, for example?

MR. CHAPPELL: Well, what I would like to do is when we get to Chapter 9 make sure we address all of those concerns and questions.

VICE CHAIRMAN ARMIJO: Yes, and the other question that's going to be my recurring question is what's the limit for the Japanese plants in operation today and is it 50 degrees or 60 degrees.

MR. THOMAS: I believe that it's 50.

VICE CHAIRMAN ARMIJO: It's 50 and somehow the flow is consistent with that? I guess I don't understand why there's a problem here to meet the original limit.

MR. THOMAS: Well, it says an extremely conservative analysis, and when you follow all the rules and look at the maximum ambient temperatures that you might experience in a plant at the South

Texas location -

VICE CHAIRMAN ARMIJO: Big difference is the Texas ambient temperature in this case?

MR. THOMAS: Yes. Yes. In looking at this there were a couple of options and one was to basically put an air conditioning system for the diesel generator. We quite frankly didn't think that made a lot of sense. It added a lot of additional safety-related equipment that would have to be maintained and operated under a set of circumstances that quite frankly we don't ever anticipate will occur, but nevertheless that's the design process. And so we felt that the appropriate avenue to take here was to take an approach with the ambient temperatures and ventilation flow rates that we see consistent with STP 1 and 2. When you do that analysis with the assumed heat loads or a larger diesel generator in this plant this is the number you come up with. And the question then was can we qualify the equipment for that temperature.

VICE CHAIRMAN ARMIJO: The qualification will be based on a 60 degree -

MR. THOMAS: That's correct.

VICE CHAIRMAN ARMIJO: - sustained temperature or peak temperature, something like that?

MEMBER BLEY: With respect to Professor Khalik's question, on your existing plants have you ever seen temperatures of this sort and do they have some standard practices for temporarily ventilating these rooms if the temperatures go up?

MR. THOMAS: We don't have temporary ventilation supply. It would be the normal safety-related ventilation systems for the rooms is the answer to your second question. The answer to your first question is we have never seen the temperatures that are assumed in this analysis, but if you look at the historical records and meteorological conditions and make the assumption that these things all happen at the same time and that becomes a required design basis for designing the equipment for this room.

MR. CHAPPELL: The normal operating conditions for surveillance, for example, would be much lower.

MEMBER BROWN: Do you have any other equipment, or controls equipment that's been designed for 140 degrees? Did you ask? I've done a lot of stuff at 122 because that's where I came from from the Nuclear Navy and it's - you really stress the heck out of this stuff when you push it to those numbers. The fact is, if you operate at those numbers for any reasonable period of time the stuff fails. I mean, capacitors, other type stuff in your systems don't like those. You've got to really be careful. So I just - depending on the length of time that these things could be operating, this is a very -

MR. THOMAS: It is.

MEMBER BROWN: Semiconductors are nicer than the old stuff we had back in the `70s, but even there you've got - you're pushing the limits, you're pushing it up to the higher, far more expensive semiconductors, the power semiconductors particularly for exciters and other voltage regulator and governor-type systems. I just throw that out. It just seems 140 degrees -

MR. THOMAS: There's not much equipment involved with this. Tom, you have to help me here. Or Mike?

MR. MURRAY: I'm Mike Murray. I'm the I&C manager. I've been at South Texas Project since `85, startup of both units and Units 1 and 2, and then manager of I&C maintenance. I've been manager of maintenance engineering, systems engineering. Currently I&C manager at 3 and 4 for the last year. I've been trying to help with that question. The controls were in a separate area of the diesel building that has an air conditioning system.

MEMBER BROWN: And it's not direct mounted or anything like that?

MR. MURRAY: That's correct.

MEMBER BROWN: Due to lack of space we put ours right on the machines.

MR. THOMAS: We're talking about relatively -

MEMBER BROWN: You've answered my question. I go away happy. Thank you.

MR. CHAPPELL: This departure of course will bear further discussion in Chapter 7. This is our safety-related I&C departure. We have upgraded some obsolete ideas that were provided in the DCD and gone to a functional description.

MEMBER BROWN: Before you leave that, I wanted to ask one question relative to that. By the way, I wanted to echo my colleague's comments on the departure report. That was very, very useful, made it - I won't say easy, but at least achievable to find out what you guys were doing. And it looks to me like you've made a major change in the architecture for the reactor protection system and the engineered, whatever the ELCS is now, engineer safeguards logic control system. But I got the impression that you have now two different layouts. You talked about the Common Q platform was going to be used for one of the systems. Is that correct? The ELCS? But you didn't make any comment relative to the reactor protection systems. Is that going to stay with the old FTDI multiplexed stuff? And I didn't get that out of what I saw of the editorials in a number of areas.

MR. THOMAS: Our I&C manager again.

MR. MURRAY: Yes, Mike Murray again. We'll discuss that a lot in Chapter -

MEMBER BROWN: Yes, I understand, I was just trying to get my input.

MR. MURRAY: In perspective for that, yes, the ESF logic system is Common Q-based. We're using an FPGA base Toshiba design for both the neutron monitoring system and the reactor protection system.

MEMBER BROWN: Okay. I didn't get that out - I got that out of the staff's SER where they talked about the FPGA. I didn't see that. I just wanted to make sure. Okay.

MR. MURRAY: Does that answer your question?

MEMBER BROWN: Yes. I presume you'll - that'll be in Chapter 7 as well?

MR. MURRAY: We plan to go through that in detail.

MEMBER BROWN: Okay. You will talk about the operation, the way you're using the FPGAs in terms of the communications and -

MR. MURRAY: We'll discuss -

MEMBER BROWN: - of FPGAs you're thinking - different flavors.

MR. MURRAY: Yes sir, we'll be prepared for that.

MEMBER BROWN: Okay, thank you.

MEMBER STETKAR: One quick question while you're up there. I noticed several places you've emphasized the fact that this departure goes to a functional description of the I&C. That to me says less detail than was in the previous DCD. I understand the reasons for the need for a change. However, it's somewhat curious that as we're now closer to an actual design and in fact mimicking designs that are probably in operation that we now have to know less about that design than we did 15 years ago?

MEMBER BROWN: Can I elaborate on your question? Because I looked at the existing DCD chapter and the discussion and the architecture, and it - if I can be - I don't want to be pejorative, but it was inadequate. You could not derive any idea of how the communications outside of the basic multiplex bus which I'm glad you abandoned. That was a great idea to leave that alone.

CHAIRMAN ABDEL-KHALIK: Charlie, I guess I have to interrupt here. We will get to Chapter 7 -

MEMBER BROWN: I understand that, I just - if I could only elaborate from the standpoint - I know I am going to look for a lot more detail in terms of the inter-channel communications and all that other stuff that is not in the DCD today for the existing. It's very, very difficult to tell what the nature of those communications are. And the determinacy.

MR. HEAD: We appreciate those comments.

MEMBER BROWN: Thank you.

MR. CHAPPELL: This is the last of the Tier 1 departures. This is a site-specific based on site parameters, so based on historical temperatures, also the design of the site within the cooling reservoir. We had to revise some flood levels and take the appropriate changes to structures and systems, and these will be discussed in detail in Chapter 2.

MEMBER RYAN: Can I ask a question? If I read this right you've increased the flood level, you've increased precipitation, you've increased temperature.

MR. CHAPPELL: The ABWR site envelope had limits.

MEMBER RYAN: Does that have any effect on Units 1 and 2?

MR. HEAD: No, that's - well part of that is, two of those are Texas and the other is that reservoir you see.

MEMBER RYAN: So it's your own fault.

(Laughter)

MEMBER RYAN: But you're going to address those changes?

MR. HEAD: You've got to address those, yes sir.

MEMBER RYAN: All right, thank you.

MR. CHAPPELL: The other piece, and I don't have the reference on this slide is the minimum sheer wave velocity which will be discussed in Chapter 3 for structure.

MR. HEAD: Which is also Texas.

MR. CHAPPELL: Right, it's also Texas. Here's the - this is a Chapter 1, Tier 2-star departure that is again for all the reg guides and codes and standards changes that are discussed at appropriate level in the technical sections, the other chapters. This is just where they're administratively maintained. So that is an overview of the departures that are exemption or a Tier 2-star chain without going into too much detail on them.

VICE CHAIRMAN ARMIJO: Okay, and all of the other departures in your report, your departures report, they're Tier 2, not Tier 2-star or Tier 1, but they're Tier 2? For example, there was one on containment analysis that you had in there that seemed pretty important to me, but when will we discuss that?

MR. CHAPPELL: We'll discuss the containment analysis in Chapter 6.

VICE CHAIRMAN ARMIJO: Six?

MR. CHAPPELL: Yes. That is a Tier 2 change that isn't only a Tier 2 change, it's a Tier 2 change that did not screen and will require approval due to a change in methodology. There are a number of Tier 2 changes that are simply reflected in the sections of the FSAR and there are a number of Tier 2 changes that impacted the tech specs and are in the tech specs section as well as a number of administrative tech spec changes.

So Chapter 1 gives a roadmap to where information is in the COLA. We have incorporated by reference some historical information, clean comparison tables. It gives you an idea of what the ABWR is compared to other BWRs. Where pointers are to other information, for example, drawings, COL license information for particular sections, chapters. We also have some site-specific information to show performance, regulatory guides and also the completion of conceptual information that was called for in the DCD and where the site-specific information is provided. For example, ultimate heat sink design in Chapter 9. We also have a section to the impacts of 1 and 2 that's provided in this section. There are several appendices in Chapter 1 just because at the point where the DCD was put together. The blackout considerations are in Chapter 1, but that will be discussed further in Chapter 8. This is an example of a few departures that are in Chapter 1. Just based on detail design we had to change some equipment qualifications for access to safety-related equipment. We also have a 2-unit site versus a 1-unit site as described in the DCD and we have relocated due to equipment shortages or equipment compartment locations. We've added an annex to the control building to allow access.

Some of the license items are addressed in

Chapter 1 without going further into any detail. A lot of these are pointers or show applicable reg guides or what types of compliance that ABWR has with other issues that have come up. Some pointers to training. We can discuss radiation monitoring, for example, some more in Chapter 12. An example of a change, this is a serial item 1.12 that is tied to the RCIC, the reactor-core isolation cooling departure. The bypass line is no longer needed. It's been addressed. And we'll discuss further in Chapter 5. So without getting into, you know, touching on the items but focusing on the issues that kind of gives an accounting of what we provided in Chapter 1 and where the information is in the application.

CHAIRMAN ABDEL-KHALIK: And in many cases we'll revisit those issues when they appear in the specific chapters. Are there any questions on Chapter 1?

MEMBER BONACA: I have a general question though I am not a standing member of this subcommittee.

CHAIRMAN ABDEL-KHALIK: Please.

MEMBER BONACA: STP has been a leader in the components in these cases essentially, and they have - they have derived a lot of insights about components that could be not necessarily removed, but simply different treatment. I am expecting that there has been some involvement of STP in doing the same thing for this design?

MR. HEAD: Are you talking about the special treatment exemption?

MEMBER BONACA: Yes, but special treatment typically needs to have a different treatment. This is a - there is a mitigation of certain features here. The question is how much can you tell from PRAs and insights that are derived from - as the licensee being involved in this kind of process.

MR. CHAPPELL: My understanding of the graded QA process is that we - it's applied at 1 and 2, but right now it's not being considered at this point for 3 and 4, but that information will -

MR. HEAD: Yes, our licensing strategy would be - if we do that for 3 and 4 it would be after COL.

MEMBER BONACA: So these changes that you have presented here would not really apply to the process.

MR. HEAD: No, sir.

MEMBER BONACA: Not yet.

MR. HEAD: Not yet. It may be something

that we do after COL, but it's a resource question, it's also a staff review question so there's a number of aspects that we would have to consider at that point.

MEMBER BONACA: Okay, thank you.

CHAIRMAN ABDEL-KHALIK: At this time the staff will present their slides on Chapter 1.

MR. WUNDER: Thank you. Good morning. Good morning, Mr. Chairman, good morning gentlemen, good morning. Thank you for having us here today. My name is George Wunder and I'm the lead project manager for the South Texas Project combined license application review. I'm joined today by Mr. Michael Eudy who gave tremendous assistance in preparing this chapter and by our consultant Dr. John Larkins whom I think you might know and on whose experience and expertise we relied for preparation for much of this chapter. We'll be presenting Chapter 1 of the staff safety evaluation report. The chapter is meant to provide you with an overview of the facility. As such, this chapter does not have as much technical weight as many of the other chapters. However, there are a couple of things that we would like to mention.

Just a few words on the format of our SER and on the standards we used for our review. We've tried to make the staff's SER follow the format of the COL application which in turn follows the DCD. Any given section of the SER can do one or more of several things. It can incite an incorporation by reference in which case there's no staff review required. It can address a departure from Tier 1 or Tier 2-star information in which case the departure is reviewed in accordance with the appropriate standard review plan section. It can address a Tier 2 departure that requires staff approval in which case again the departure is reviewed in accordance with the appropriate SRP section. It can address a Tier 2 departure that does not require staff approval in which case we simply make a finding as to whether or not it is reasonable that the departure can be made without our approval, or it can address supplemental or COL information items which are provided by the applicant and in which case we will again review in accordance with the appropriate SRP section. We've tried to keep the things in this order throughout our SER and to evaluate them in this sequence.

VICE CHAIRMAN ARMIJO: George, could you just clarify, how do you distinguish between a Tier 2 that requires approval and a Tier 2 that doesn't require approval? I thought it was either Tier 2-star or Tier 2.

MR. WUNDER: No, there are - in Tier 2 section I believe it's 8b(5)(b) of Appendix A of Part 52 will tell you - it lists standards. They're very similar to the standards you find in the old shall-ing notices. You can make a change if there is - I believe there are eight standards. There's no increase in the severity of any accident previously analyzed. There's no chance for a new accident. So it's actually the applicant that determines that a departure does not require our approval. And with that I have one more thing that I'd like to say about Tier 2 departures that don't require our approval. Sometimes it's not readily apparent from the application that it is in fact reasonable that a departure can be made without our approval and as you can see in some of the material we present a little bit later on today we have on occasion asked for additional information and even gone out and conducted audits to make sure the changes that the applicant said can be made without our approval are in fact appropriate to do so.

MEMBER BROWN: So you can override?

MR. WUNDER: Yes, sir.

CHAIRMAN ABDEL-KHALIK: I guess I have a

question about strategy. In a lot of cases, you know, when there were departures related to the fuel design, et cetera. The staff came back with no, we don't agree with this particular departure or the rationale for it, and the applicant came back and said okay, we're going to sort of go back and stick with the original design like Sam indicated, you know, BWR 7 fuel. Is the strategy just to go through this process and later on you will come back with an amendment to change your fuel design?

MR. HEAD: Yes, sir.

CHAIRMAN ABDEL-KHALIK: And so just to avoid any problems in this particular area you're sort of essentially taking a bypass around this process?

MR. HEAD: I think we're - we're taking advantage of the Part 52 process. We're licensing the certified design. It was fuel that was mid-1990s fuel vintage and it's our expectation that soon after COL, probably the 2013 timeframe we will submit an amendment to the NRC to use a later vintage fuel and in the meantime we're submitting topical reports to the NRC for their review to support that amendment so that when we submit it we've in essence done the work or the NRC has done a lot of the review work to support that amendment request to use current vintage fuel.

CHAIRMAN ABDEL-KHALIK: Okay, so is the reason - you know, you clearly know what fuel you want to put into that plant already. I mean, it isn't an 8x8 assembly, okay? It's a more modern fuel. But if your reasoning that you've got some analytical methods that have to be reviewed and approved by the staff that are different so that you can then submit the, you know, the real fuel that you can put in the plant? I don't understand this.

MR. HEAD: Well, it's really almost independent of where we are. It's a matter of resources and timing that the fuel we would choose today, there's a high likelihood that would be not the fuel we'd want to use, you know, five years from now, six years from now. So it's a matter of resources and being - and effectively managing the overall review process. The certified design adds finality and we're relying on that, and at the appropriate time we will request NRC to allow us to change the fuel that we'd be using.

MR. WILSON: Could I add on to the discussion? Jerry Wilson, NRR. You shouldn't look at this as a unique situation for South Texas, but in fact that's the way all of the applications are going to be handled. So you have to understand that we're - in design certification we're reviewing a design separate from a specific application. Well, fuel designs evolve relatively frequently so we understood this going in. So you need a fuel design as the basis for approving the reactor design, yet, by the time it gets around to constructing the plant and getting ready to load fuel there's going to be a different fuel design that that licensee is going to want to choose. So we envision license amendments for all of the combined license applications that are referencing a certified design. This is just kind of a normal part of the process. It's a timing issue.

VICE CHAIRMAN ARMIJO: So this is a placeholder with certain amendments and requirements and things like that -

MR. WILSON: And revision. Everyone's going to be in this situation.

VICE CHAIRMAN ARMIJO: So it's almost like a DAC.

(Laughter)

MEMBER SIEBER: Actually, if you build the plant and you don't come up with a new fuel design you have a design that relates license with license before that. Now our existing plants do this because, you know, the PWR has basically changed from 14x14 to 15x15 to 17x17 and there's tons of different grid designs and material usage and so the fuel business is changing all the time and you do it reload by reload.

CHAIRMAN ABDEL-KHALIK: Okay. Proceed.

MR. HEAD: Somewhere in all that did we answer your question about fuel strategy?

CHAIRMAN ABDEL-KHALIK: Yes.

MR. HEAD: Okay.

MR. WUNDER: The next four slides are really just a summary of what we consider to be the highlights of this chapter, and this is where we intend to focus today's presentation. You'll notice that there are several sections on which we do not plan to present any slides. These sections may be incorporated entirely by reference. They may contain information that has administrative or regulatory importance but has no real technical weight and does not really rise to the level of something that would be interesting to the advisory committee.

Again, just to provide you with a bit of familiarization with our SER. When the applicant takes a departure it can affect multiple sections of the FSAR. Often there is one section that contains the technical bulk and you'll see throughout our SER that we say words to the effect "this departure is acceptable for the purposes of this section" and then we'll go on to reference the section of the SER where you can find the actual technical red meat. The first section, Section 1.1, contains a lot of information relative to the form and content of the application. There were four notable departures in this section. They're asking for a combined license rather than for a design certification. They're specifying that there will be two units, STP 3 and 4. They're making changes to a drawing that gives an overall heat balance, and this is due to a change in the turbine, and that's going to be discussed in detail in Chapter 10. And they're specifying that the vendor for South Texas will be Toshiba Power Systems, Inc., and we have a couple of slides on that. For the purposes of this section we found these departures to be reasonable and within the scope of the Chapter 1 review. We concluded that the applicant has provided information sufficient to support issuance of a combined license.

Next is Section 1.2, General Description of the Plant. Because this section provides a general description of the plant many of the departures that are identified here are evaluated elsewhere. The Tier 1 departures and where they're evaluated are all listed right here on the slide. I don't see any reason to go through them again. We've already gone through them. There's also a Tier 2 departure requiring our approval, and that deals with the change, the plant medium voltage distribution system, and that is reviewed in Chapter 8 in as much detail as you can stand, possibly more. And that chapter will be presented to you in a couple of weeks. There are several departures in this section that did not require staff evaluation. I could list those for you if you'd like or we can just move along. They're fairly benign, I think.

As we just noted, there are three Tier 1 departures in this section and because Tier 1 departures - and this is something that goes throughout our SER - because the Tier 1 departures are departures from Appendix A to Part 52 they have to be evaluated by the staff as a part of a future exemption. Until these exemptions are issued we cannot finalize our conclusions on this section, and for this reason Tier 1 departures will be tracked as open items throughout the SER.

The next section we looked at, Section 1.4 identifies the agents and contractors that the applicant has chosen to support them. All of these groups are known to the staff and the staff finds them acceptable to provide expertise in their identified technical areas. The next section is Section 1.4S. It's a supplementary section and it deals with vendor qualification. I presented this section to the full committee back in November. At that time our SER had not been made public and we had no conclusions. The material on the next few slides hasn't changed since November. I'd be happy to go over it again or we can jump straight to the climax.

CHAIRMAN ABDEL-KHALIK: I think we heard enough from the applicant regarding this issue, so let's move on.

MR. WUNDER: On to the climax it is, sir. The staff's conclusion is that we cannot draw a conclusion at this point. As you'll note in the slides and as we discussed earlier on back in November, there were several areas that we wanted to investigate in more depth, technical areas, as a part of our vendor qualification. One of these was containment hydrodynamic loads. We're still looking at this issue and we hope to report on our resolution to the issue when we present Chapter 6 of the staff's SER which I believe we're scheduled to present in May. We knew all along that this was going to be our - one of our toughest challenges and we're still working through it, but until this hydrodynamic loads issue is resolved we can't finalize our conclusion relative to vendor qualification. And -

MEMBER SIEBER: What is the issue?

MR. WUNDER: I believe Andrzej Drozd is here and he can address that authoritatively.

MEMBER SIEBER: Thank you.

MR. DROZD: This is Andrzej Drozd from containment section. The hydrodynamic loads are related to suppression pool behavior and it comes in three flavors. One is the pressure and temperature response of containment, the second one is suppression pool swell and the third one is combination of condensation oscillation, chugging and SRV loads. The first two were addressed by Toshiba by submitting separate reports. Formal reports, kind of topical reports that we reviewed and we are just about to accept it. The third one, we will not have a formal report, but the Toshiba will present the methodology as well as a reproduced forcing function that will be used in evaluation of structure integrity for submerged. So at the moment we are in the process of setting up audit to determine whether the methodology to reproduce having forcing functions are acceptable.

MEMBER SIEBER: Thank you, sir.

MEMBER SHACK: But is this because they've changed their analysis? I mean, it was changed from the original design.

MR. DROZD: It is not that they changed the analysis. It is in - of proprietary information. That is, there are parts of database that methodologies base the proprietary tool either party, whether GE or another party which Toshiba has access for internal analysis, but not necessarily have permission to use it outside. So Toshiba has to reproduce some part of methodology to be used in evaluation.

MR. WUNDER: I'd now like to introduce Dr. John Larkins who will be presenting the remainder of the chapter. Dr. Larkins?

DR. LARKINS: Good morning, gentlemen. A pleasure to be here again even though I'm on the other side of the table. Section 1.8 of the FSAR addresses the requirements of 10 CFR 52.79, that COLA applicants referencing a certified design should provide an evaluation of conformance to the guidance in the SRP that was in effect six months prior to the docket date of the application for the site-specific portions of the facility design. And Section 1.8S was added for conformance with the guidance in Reg Guide 1.206 to identify FSAR chapters where site parameters, interface requirements, COL license information items and CDIs are addressed, conceptual design information.

What we did was assist the staff in performing and completing its review and assessing the completeness of the applicant's submittal to the regulatory requirements I just mentioned. We reviewed Chapter 1 of the STP 3 and 4 COLA with emphasis on omissions and inconsistencies, verifying that all of the requirements had been addressed. All of the reg guides applicable to the ABWR were reviewed to see if the appropriate revisions were included in the FSAR. We did find a few that needed to be updated. Additionally, all of the SRP sections that were annotated in the DCD as COLA applicant were reviewed, and it's noted in here there were three SRP sections that needed to be reconciled.

For Section 1.8 and 1.8S there's one tier, one departure which is being tracked as an open item, 01-1. There's one Tier 2 departure on code standards and reg guide additional changes which were found to be editorial in nature and acceptable. I mentioned that these will be reviewed as necessary in the other appropriate sections of the SER. There are five Tier

2 departures not requiring NRC approval and were found reasonable and do not require NRC - well, additional information. These will be subject to NRC inspections. The staff review confirmed that the applicant -

MEMBER SHACK: Hey John, if you say you found them reasonable I would have thought that meant you'd done the audit and found them.

DR. LARKINS: Well, reasonable for Chapter 1 and the fact that they were included. There may be issues that when you get into the detail of them in the other sections. They may need further review or questions may come up. Okay.

Section 1.9 of the FSAR references Section 1.9 of the ABWR DCD with a list of COL license information items and Section 1.9 again was added in conformance with the guidance of Reg Guide 1.206 and addresses applicable reg guides, the SRP, generic issues and operational experience. For generic issues the applicant need only address issues identified in NUREG-0933 which are technically relevant to the design. Operating experience is addressed by describing how insights from generic letters and bulletins issued six months after the most recent revision of the applicable SRP and six months before the docket date and to the specific - site-specific portions of design that were not included in the reference design.

In assessing Section 1.9 of the SEP Units 3 and 4 COLA FSAR we checked the reference ABWR DCD to ensure the information in the FSAR and DCD appropriately represented the complete scope of information relating to this review topic. We also reviewed Section 1.9S to ensure that the applicant had provided the required information consistent with the guidance in Reg Guide 1.206 Part 3. We reviewed Table 1.9S-1 in order to confirm that it lists appropriate Division 1 and Division 8 reg guides and used the appropriate revisions. In this section there's one Tier 1 departure again which is being tracked as an open item 01-1. Under the supplemental information the FSAR does not address reg guides related to quality assurance and this is being tracked as an open item 01-8. There are three SRP sections that were not included in Section 1.9S and will be tracked again as an open item 01-9. And with the exceptions noted above no outstanding information is expected, but as George mentioned as a result of these open items the staff is unable to finalize the conclusions for this section at this time.

Okay, Appendices 1A and 1AA, response to TMI-related matters, plant shielding to provide access to vital areas and protective safety, equipment for post-accident operation. We reviewed these sections. The staff also checked the reference ABWR DCD to ensure that the combination of information in the COLA FSAR and information in the ABWR DCD represent the complete scope of information relating to this review topic. There's one Tier 1 departure which are being evaluated in other section - well, there's more than one. Tier 1 departures are evaluated in other sections of the SER and are being tracked again as open item 01-1. There were eight COL license information items were reviewed by the staff and found to have been addressed by the applicant as required by the DCD, and the applicant has made commitments for resolving these COL license information items. These commitments have been found reasonable by the staff and will be evaluated in the appropriate sections of the SER. Again, with the exception of the open item 01-1 there's no outstanding information expected. However, as a result of this open item the staff again is unable to finalize the conclusions of this section. Questions?

MEMBER STETKAR: I have one, I don't know

John whether you or George. This is probably not on your scope of review, but there's an open item 1-3 that has to do with aging management.

DR. LARKINS: Yes, sir.

MEMBER STETKAR: Could you quickly elaborate on that? Because as I read through the FSAR and I read through the SER. There were some potentially troubling discussions about that issue.

MR. WUNDER: That would fall under Bullet 3 of this slide, sir. Yes, plant aging management, they have a unique COL information item in the DCD for the ABWR and I believe - I don't have - I think Jerry Wilson might be able to chime in here if he's still around and provide some background, but as I understand it, the ABWR was certified before we did - before we had ever done license renewal. There was a COL information item. We have this COL information item and I'm going around saying who reviews this, and everybody I go to says, well, that's now done under license renewal. And so we were going to handle it that way, but as we were going through the final review of the chapter some of the gray beards started scratching their gray beards and said well wait a minute, there might be more to it than that. So what we're doing is we've got to get some policy guidance on this before we can dispose of the issue.

MEMBER STETKAR: It's open for policy guidance right now?

MR. WUNDER: I don't know if "policy guidance" is the right term. I think that that has a specific meaning. We're looking for guidance.

MEMBER STETKAR: It just bothered me because in the FSAR it seemed to say that - well, in fact it says because the initial license term is 40 years, an aging management plan which implements the provisions described in NUREG-1801 will be initiated to support license renewal submittal. That seems to say to me that we're not going to do anything about aging management until, oh, 40 years from now, or 45 years from now, at which point then we'll start to worry about it because we only need to worry about it for license renewal. That's sort of troubling.

MR. WUNDER: I meant it for how we're going to dispose of it, but we have to get together -

MEMBER STETKAR: I think we're learning that maybe on day one you should start to worry about aging management so that by the time you get to 40 years plus day one you don't really have any problems. I was just -

MR. WUNDER: No, that's an excellent

point, sir.

MR. THOMAS: Can we comment on that, or is that?

MEMBER STETKAR: Yes, please go ahead.

MR. THOMAS: Well, we are concerned about that and our engineering technical specification for the project has a design basis of 60 years.

MEMBER STETKAR: That's right.

MR. THOMAS: Even though we're licensing for 40 years. And so the aging management process is beginning now and we've had a lot of discussion about this issue with suppliers in terms of what that means for how we're going to manage components that obviously must be maintained to maintain a 60-year life. So I mean that's an issue that we're dealing with right now, but outside of the license.

MEMBER STETKAR: But you're not committing to implement specific aging management programs to be in conformance with the GALL report at this point?

MR. THOMAS: We're not committing to do it, but we're going to do it.

MEMBER SIEBER: Well, there is a certain degree of aging management just through the regular surveillance programs that are involved. The question is do you write it down so that you can identify what it is and what you're going to learn and what's missing.

CHAIRMAN ABDEL-KHALIK: I guess we'll see later how - sometime during the process how this third bullet is going to be resolved.

MR. WUNDER: Yes sir, yes sir, that's correct. It's an open item, it'll come back.

CHAIRMAN ABDEL-KHALIK: I just wanted to -

MR. WUNDER: And this last slide, I just want to tell you about how we see going forward with Chapter 1 for the purposes of COL issuance. We've got a total of 10 open items associated with the chapter I believe and these can be broken down into four categories. We have technical open items that will be resolved in the appropriate chapter of the SER and I think there's only one of these, and that's the one on hydrodynamic loads that we've already discussed. We have a couple that deal with regulatory issues, things like the Tier 1 departure and that will be resolved through the regulatory process as we go forward. We have areas in which we're waiting for guidance to close the open items, and we have a couple that are administrative in nature and that we'll be closing out internally over the next couple of months. And with that I just would like to thank you for your kind attention, and if you don't have any questions we can move on to heavier technical issues.

CHAIRMAN ABDEL-KHALIK: Well, we have scheduled a 15-minute break at this time and I would like for the committee to avail itself of that opportunity. So let's get back at 10:25.

(Whereupon, the above-entitled matter went off the record at 10:12 a.m. and resumed at 10:25 a.m.)

CHAIRMAN ABDEL-KHALIK: At this time I'd like to call on the applicant to present Chapter 4.

MR. HEAD: Okay. Thank you very much. We are going to present Chapter 4. With me this morning is Jim Tomkins. He'll be presenting the chapter. Also assisting me from Westinghouse are Robert Quinn and Nirmal Jain. And the agenda is pretty much our standard agenda for each of these chapters. And they're the - the attendees are also in the audience. We have Craig Swanner from NPR that might be assisting us with some of the questions we might receive. I'm going to turn it over to Jim Tomkins.

MR. TOMKINS: Okay, thank you Scott. Good morning. A little bit about my background. I've been on the STP 3 and 4 project since the inception, almost four years now. Previously I worked for 28 years at

Pacific Gas & Electric on the Diablo Canyon Power Plant. I was involved in licensing, safety analysis, PRA, system engineering and actually security for awhile. So a pretty wide range of experience at PG&E. I started my career at Westinghouse in the nuclear fuels division and I'm a graduate of Cornell University with a master's from the University of California.

So fuel. The first slide I have is an overview of Chapter 4 and you can get kind of a flavor for - there's fuel system design, there's nuclear design, thermal hydraulic design, reactor materials, functional design of the reactivity control systems. Then there's a number of appendices. The appendices contain fuel licensing and control rod licensing acceptance criteria and some results from the analysis that was done as part of the DCD. You can see from this slide that most of the sections are incorporated by reference. In fact, most all the appendices are and in fact there's only two sections that even have a departure and the rest of the sections have some COL items that were addressed. But fundamentally Chapter 4 is very close to the certified design.

We'll talk about a couple of departures. The next slide, Bob. And these are - we had the discussion earlier, but there is no departure to the fuel for purposes of the COL. These departures I'm going to discuss are Tier 2 departures, they do not require NRC approval. The first is 4.5-1, standard departure, reactor materials. And this revises control rod, drive and reactor internals materials to add some additional materials options. And these additional options reflect operating and design experience in the last 10 to 15 years, recognizing that the DCD was certified nearly 20 years ago. In most cases the materials are different grades of the same material. So I just gave an additional option for materials that could be used in these, and in all cases the materials are either equivalent or we think better than what was used in the DCD. The second departure is 7.7-1. This is a Chapter 7 departure. The only impact on Chapter 4 is that it just clarifies that the control rod drive hydraulic system is also a source of water for purging of instrument lines in the nuclear boiler system. So it's a couple sentence change in Chapter 4 for that departure.

Next item is COL items. There's five in Chapter 4. All of them have been addressed. The first three are similar and they are related to actions that weren't in the DCD that basically said the applicant will update these analyses if they change the fuel. So for the first three we're not changing the fuel, we're relying on the analysis that was done in the DCD. For example, 4.1 is stability and we're not changing the fuel so we're not, you know, the stability solution that was in the DCD is remaining as it is.

CHAIRMAN ABDEL-KHALIK: But there has been several Part 21s that came up after that DCD was certified. So perhaps whatever method that's described in the DCD may not be appropriate for design of record. Has that issue been addressed?

MR. TOMKINS: You want to handle that, Nirmal?

MR. JAIN: This is Nirmal Jain from Westinghouse. The DCD relies on Option 3 of the BWR Owners Group method and that's what - that is still applicable and that's what we -

CHAIRMAN ABDEL-KHALIK: Now remind me again. Option 3 is what?

MR. JAIN: It's detect and suppress.

CHAIRMAN ABDEL-KHALIK: That was Option 2.

MR. JAIN: No, Option 3, detect and suppress with the OPRMs. That's where you take the LPRMs and combine them into OPRMs to protect both the pool-wide and the regional oscillations. And you detect and suppress or use reactor.

CHAIRMAN ABDEL-KHALIK: But in fact some of the Part 21s or at least one of the Part 21s pertain specifically to the detect and suppress methodology, and the issue is whether or not you have actually looked at that at all.

MR. JAIN: I don't have an answer for that.

MR. HEAD: I think we have to take an action to look at that.

MR. JAIN: I do not have answer to that.

CHAIRMAN ABDEL-KHALIK: Has the staff looked at that issue?

MR. DONOGHUE: This is Joe Donoghue from Reactor Systems Branch. We're trying to get the staff member here who did look at that so we'll answer your question when we can get that person here.

CHAIRMAN ABDEL-KHALIK: Okay.

MR. TOMKINS: So COL items 4.1, 2 and 3 are - because we're not changing the fuel we're relying on the information that's in the DCD. We will look into the Part 21 issue. The fourth item, 4.4 asks that the applicant address control rod drive inspection program information to make sure that you had capability to detect incipient defects before they become serious enough to cause a problem. We provided some guidelines on our program for doing that including routine visual of samples of CRDs during outages. CRDs will be in the maintenance rule. The CRDs will also be in the ISI program and there's capability for in-service examination of the CRDs during scheduled maintenance. And so that was submitted with the application as a COL item. The final one was that there's procedures to ensure that maintenance procedures keep you from coincidentally removing the CRD blade in the drive of the same fuel assembly. And we've made a couple of statements in the application that our procedures will address that issue. And so we think we've closed that one as well.

ITAAC, there's no changes to any of the ITAAC associated with Chapter 4. So there is ITAAC on loose parts monitoring system and on control rods, but we didn't make any changes to any of those.

MEMBER RYAN: Sir, be careful with your paper on that microphone.

CHAIRMAN ABDEL-KHALIK: If there are issues in specific chapters that are identified during these discussions, for example, the issue with Part 21 for which neither the applicant nor the staff may have a satisfactory answer, how are we going to close this loop?

MR. TONACCI: I think the best thing to do is we'll take it as an item. If we can follow up in one of our subsequent meetings because we have several scheduled in the next few months. We'll try to close it then. If not, then it'll be an open item we have to follow up on at the closure, at the full committee, just a recommendation for us to follow up on this. We'd like to close as much of this stuff as we can over the next couple of months, preferably today if we can.

MR. HEAD: And that will be what we'll attempt to do is we will make some phone calls and try to understand our understanding of that Part 21 and its relevance to this question. So if we can do that today maybe as an intro to one of the future chapters we'd like to do that.

CHAIRMAN ABDEL-KHALIK: Okay. I think that's satisfactory just so that if we can't resolve it today, we'll just - at the next meeting we'd like to address any open items or issues that came out from a different meeting.

MR. HEAD: Nirmal will be here on Chapter 15 and if we have the answer at that point then -

CHAIRMAN ABDEL-KHALIK: Okay.

MR. HEAD: Thank you.

MR. TOMKINS: So that completes my presentation.

CHAIRMAN ABDEL-KHALIK: Right. At this time the staff can proceed with their presentation of Chapter 4.

MR. DONOGHUE: This is Joe Donoghue from Reactor Systems Branch. Before my staff will start on their presentation I'm just going to let you know that the question on Part 21 stability, we're going to get you an answer to that. We think we know who is involved with the review on our contractor's side and we'll get you that answer hopefully by the end of the meeting.

CHAIRMAN ABDEL-KHALIK: Thank you.

MEMBER SIEBER: I think you have the wrong slide.

CHAIRMAN ABDEL-KHALIK: The wrong chapter.

MS. GOVAN: Good morning. My name is Tekia Govan. I am the chapter project manager for Chapter 4. First I'd like to thank Jim Tomkins for his presentation on the overview of the Chapter 4 application. As he stated, the application for Chapter 4 incorporates by reference the GE-7 in that our review of Chapter 4 was very small because most of the chapter is IBR.

The staff review team consisted of George Wunder as the lead PM, myself for the technical staff review as well as - the presentation is a combined effort between the Reactor Safety Branch in which Joe Donoghue is the branch chief. Lead reviewer Jim Gilmer and the Component Integrity Branch which Neil Ray is the acting branch chief and Bob Davis is the lead reviewer. At this time we'll have Jim Gilmer discuss the staff review for Chapter 4.

MR. GILMER: Okay, good morning. As you heard earlier all sections are incorporated by reference so I won't reiterate - belabor that point unless the members have any questions regarding that. So there's really only one key issue related to Section 4.4 and it's the GSI-191 which the members are very familiar with. The design cert for ABWR happened about the same time that the generic letter of 2004-02 emerged for PWRs so the design cert and the SE for the certification did not address this issue. We have discussed with our Office of General Counsel to reach agreement that we can raise this issue and STP has been very proactive and cooperative in addressing it also. And it does cross - the upstream effects are going to be discussed in the Chapter 6 meeting I understand in May, so I will only be discussing the downstream fuel effects issues related to the core thermal hydraulic section.

As I mentioned, STP has committed to address the issue and they have in COL application Revision 2 Section 6C.1 incorporated a commitment to address the requirements of Reg Guide 1.82 Rev. 3 as well as the utility resolution guide NEDO-32686. STP is also a member of the BWR Owners Group and we also benefit from the Westinghouse test program. It's the staff position that applicant should address the flow blockage effects on fuel for fuel supports and debris filter, the debris filter that's on the GE-7 design and any anticipated future fuel that is loaded. We would also expect that all flow paths internal to the vessel as well as the emergency core cooling system blockage would be addressed by the applicant.

VICE CHAIRMAN ARMIJO: So you're going to require that they do a complete analysis of flow blockage of this GE-7 fuel in order to satisfy the staff that this - and approve this COL?

MR. GILMER: That was part of the discussion with our OGC that in order to move forward with the construction and operating license safety evaluation we have to make a reasonable assurance finding. So the agreed upon approach was to include a license condition that testing would be performed. That's actually the next.

VICE CHAIRMAN ARMIJO: So on the actual fuel.

MR. GILMER: On the actual fuel.

VICE CHAIRMAN ARMIJO: You would make them waste a lot of money doing a complete analysis on a hypothetical core.

MR. GILMER: Right. We felt there was no benefit to doing that at this point since we already know that the GE-7 fuel would not be - the fuel rendered essentially obsolete.

VICE CHAIRMAN ARMIJO: So it would be a license condition is the approach you're taking?

MR. GILMER: Yes.

CHAIRMAN ABDEL-KHALIK: Is there any impact on the performance of the pumps, the internal pumps?

MR. HEAD: I'm going to answer. I don't believe there is any substantial impact. It's -

CHAIRMAN ABDEL-KHALIK: Well, I mean, you qualify your answer by saying "substantial" and I -

MR. HEAD: I was -

CHAIRMAN ABDEL-KHALIK: - has this issue been looked at?

MR. GILMER: The staff will be looking at the Japanese experience with debris effects on seal failures and other mechanical failures for the operating ABWRs.

CHAIRMAN ABDEL-KHALIK: Well, we're looking beyond operating experience and what happens during an event, and whether the pumps will continue to do what they're supposed to do.

MR. TOMKINS: But this is really focused on the high-pressure core flooder, the RHR and the RCIC pumps, not necessarily the reactor internal pumps because they presumably would be shut down at that point.

CHAIRMAN ABDEL-KHALIK: Okay.

MR. TOMKINS: All of this is really for post-LOCA type conditions.

CHAIRMAN ABDEL-KHALIK: Okay. Okay.

MR. GILMER: So as I mentioned, the proposed approach for moving forward with the COL as a license condition for STP to complete tests on the actual fuel to be loaded in the first initial core for impacts of downstream effects. And very recently STP has proposed an acceptance criteria based on inlet pressure drop. The staff has not yet reviewed it, but we believe it's an appropriate approach. And we will actually be auditing in the near future their calculation that determines that acceptance criteria.

CHAIRMAN ABDEL-KHALIK: I guess I'm just trying to understand the discussions that were sort of addressed earlier. You don't want them to waste a lot of money showing you that GE-7 fuel will address this issue or do any testing with that because you have no intention of using the old fuel design. But how does that work from the approval process standpoint? I mean, the finality of the decision to be made that this COLA application is approved.

MR. WUNDER: I don't think I understand the question.

CHAIRMAN ABDEL-KHALIK: You don't understand the question.

MR. HEAD: Can I?

CHAIRMAN ABDEL-KHALIK: Yes, please.

MR. HEAD: We believe we've made a very thorough and detailed argument about why the - any issues with GE-7 fuel would not occur, including minimization and change of insulation in containment, materials that are in containment, just because we had that opportunity to do that right now. So we believe we've made that case with where we are right now. This license condition though closes the loop and imposes this on the actual future fuel. So that's how we believe we've addressed the licensing issue at this point.

VICE CHAIRMAN ARMIJO: Does the license condition actually apply? Let's assume that you decided to use GE-7 fuel. That license condition would make you do the same things you would do for a newer fuel.

MR. TOMKINS: Yes, sir, that's correct.

VICE CHAIRMAN ARMIJO: Okay. Okay.

CHAIRMAN ABDEL-KHALIK: Please proceed.

MR. GILMER: And the staff also agrees that if GE-7 were to be loaded, STP has very good arguments why it's going to be bounded for the Chapter 15 analysis. Some of that goes into proprietary. We can talk in closed session later if you'd like.

CHAIRMAN ABDEL-KHALIK: Well, we can talk about it at the appropriate time. Would Chapter 15 be the appropriate time?

MR. GILMER: Or Chapter 6.

MR. HEAD: Chapter 6 was really where I mentally had targeted this discussion in that detail because it's -

CHAIRMAN ABDEL-KHALIK: We'll do that then. Please proceed.

MR. GILMER: Okay. And another thing to mention is we are already aware that the there will be a switch in methods to the Toshiba Westinghouse codes, so the certified GE methods will no longer apply. So there will be an extensive review and it's already starting with the top-level that have been submitted for the future license amendment. And all the Chapter 15 analysis will be done for the initial core, probably 18 months before fuel loading. So there's some economic risk that the test may show problems that hopefully would be fixed and addressed at that time. The staff sees no reason to impede the approval at this time because we think we have a legal and a technical way of addressing it.

When we do receive the - actually we are going to receive a test plan prior to performing the test so staff will have an opportunity to review and comment and then hopefully I'm sure STP would be willing to make changes if they're reasonable. Besides the pressure drop criteria we will be looking at the normal Chapter 4 aspects and critical power effects as a function of blockage percentage, peak clad temperature issues. The debris types and sizes is more of a Chapter 6 issue although it does affect mechanical failure in the long term pitting and mechanical wear of the fuel rods so our Reactor Systems Branch would be looking at those aspects affecting 4.2 on the long-term post-LOCA performance of any debris that makes its way past the suction strainer and the individual bundle filter. Some of the analysis assumptions we will be looking at in the very near future in reviewing the STP calculation so we'll still have opportunity to address any concerns we might have related to the assumptions they're making which I believe are consistent with the utility resolution guide and the reg guide.

The COL application in its current form, the staff has reviewed and this is the one unresolved issue that will be resolved prior to fuel loading.

VICE CHAIRMAN ARMIJO: When you say related to fuel testing, is that GSI-191 related fuel testing?

MR. GILMER: Yes. For the specific license condition. So the staff concludes that the -- there's reasonable assurance that the COL can be approved.

CHAIRMAN ABDEL-KHALIK: Are there any questions for the staff on Chapter 4? Okay, thank you. We'll proceed.

MS. GOVAN: And we will come back with the action item to look at the Part 21 issue.

CHAIRMAN ABDEL-KHALIK: Thank you.

MR. CHAPPELL: We need a choreographer.

MR. HEAD: Okay, we're going to present Chapter 11 this morning. You've met Coley. Joining me at the table is Milton Recjek who is our lead rad waste engineer on 3 and 4 and as you'll hear in a second has extensive experience on 1 and 2 that he brought to our process. Again, the agenda, just a summary we'll go over. And this is one of those where we felt like we'd probably spend some time on the liquid rad waste and solid rad waste discussion and so we're prepared to go through our philosophy as to how - our thinking as we went through that. There's Milton and Coley here, and there's other people in the room that could help us and assist if we have some questions that come up during this discussion. Okay? We'll turn it over to Coley.

MR. CHAPPELL: My name is Coley Chappell. Thank you again for the opportunity to speak to you today. We'll continue on with our discussions on Chapter 11. Chapter 11 discusses rad waste management. Unlike the last chapter that we discussed there are a considerable number of departures in this chapter the majority of which are identified as Tier 2 changes and were evaluated as not requiring prior approval, but because of the extensiveness of these changes really the bringing up to speed of the rad waste system described in the ABWR DCD to current industry practices and experiences in the U.S. We have replaced a couple of sections and we are prepared to discuss those in further detail. There are some what I would call consistency changes in this chapter which are related to some of the Tier 1 departures which we discussed previously, had minor changes or corrections, and those are touched on here but I don't consider them a major issue for this section. This chapter is broken down with source terms, liquid and gaseous, solid waste systems, sampling and monitoring and also monitoring for offsite. As I mentioned, consistency changes mainly to correct references. The discussion that we had on Chapter 1 for the steam line radiation where it impacts this section in that this automatic trip function has been updated to be consistent with the Tier 1 change. If there is any other discussion that we wanted to have on this we would like to come back later and have - if there's any other questions related to this departure.

CHAIRMAN ABDEL-KHALIK: Yes, I think there are.

VICE CHAIRMAN ARMIJO: I'm just still - I've got to think some more about whether it's really a significant change in the safety of the system by removing that as opposed to addressing the N-16 problem by setpoint changes and things like that. That's just -

MR. HEAD: Well, between Chapter 7 and 19 I believe we have other opportunities to discuss that.

VICE CHAIRMAN ARMIJO: Yes.

MR. HEAD: So we've taken that as an action to be prepared to discuss that.

VICE CHAIRMAN ARMIJO: Okay.

MR. HEAD: We may still - I believe we could certainly weigh in on the risk aspect. So we'll be prepared to do that in future meetings.

VICE CHAIRMAN ARMIJO: Yes, okay.

MR. CHAPPELL: At this point we're going to get into some of the major departures in this chapter and I'd like to turn it over to Milton Recjek.

MR. REJCEK: Good morning. The advantage - disadvantage of being a little later, some of my thunder has kind of been stolen earlier, but I think it gives me the ability here to kind of focus on more of the issues of the whys. First, my name's Milton Recjek. I am rad waste engineer at STP 3 and 4. I have been at STP or involved in nuclear - first let me say, Bachelor of Science degree in nuclear engineering from Texas A&M and counting my Navy submarine experience I've been in nuclear for 35 years, construction, operation and engineering. With that when our owners announced that we were going to build Units 3 and 4, since I had already been operating for the last 15 years a process improvement program I'd call it on rad waste - I need to kind of take you back to the history of what happened in the early `90s. The industry made a focused effort through EPRI in particular which I've worked with in great detail to reduce the radioactive effluence, to reduce the dose people were getting. And South Texas Project being a good neighbor, we met all the regulations as far as 10 CFR 20 limits and stuff on Units 1 and 2, but in the early `90s we undertook a program, brought in modular equipment which at that time is really an add-on under the 50.59 program just like many of the utilities out there, boilers and PWRs did, to improve our rad waste processing, to reduce the generation of waste, reduce the dose. High dose-intensive jobs of evaporators and so forth we weren't going to run. So when they announced they were going to build 3 and 4 I was greatly interested to come over here and get this off to a good start and include all the lessons learned that we have done in the industry since the `90s. We took the program in South Texas as an example from a discharge for two units of 10 curies of gamma isotopic activity down to in the millicuries, the 30 millicurie range and we're still continuing that process. So we used a modular equipment at that time, a charcoal base. So that was the basis for our impetus of changing this chapter. We could have at the time and in hindsight I kind of sometimes wish maybe we did use IBRs because if you look at it, there are sections that read exactly the same as the old one because it is basically on this design 99 percent recycle, intentional design. But if you look at it from a big overall perspective you still have collection tanks, you still have processing equipment and then you have a sample tank which you make your decision on whether you're going to discharge or return it back to your systems, to your in this case condensate storage tank.

Technologies evolve. Where those systems in the middle here do a much better job. I have really two things I can do. I can de-mineralize it or I can filter it out and I think anybody would agree that reverse osmosis and ultra filtration have come a long way since the early `90s when the DCD was envisioned with two evaporators, with an incinerator, with a cement drumming equipment for disposal of rad waste, with a drum compactor, not even a box compactor, but a drum compactor. We've learned in the industry, we use our vendor partners. They can do a much better job of incineration. We're in the business of keeping that plant safe and making power, and we're not in the business necessarily of building the best incinerator in the world. So makes sense that we wanted to change the design. We liked at that point just a lock stop change out of those two sections, 11.2 and 11.4, liquid waste and solid waste.

Formed a team which of course at first was GE. I provided sort of the vision of saying what we wanted to do. And if you look at Chapter 11.2 you specifically see there is a reference in there to the EPRI technical reference manual with our ESBWR rad waste systems. So we took it one step further. I mean, the two engineering groups were working side by side. I mean, this is not the ESBWR rad waste, but you can see a lot of similarities because they were working side by side. So we took that approach and said we'll take the industry guidance that said here's the improvements we need to make or we suggest in the ESBWR rad waste and we were able to incorporate them in there. A couple of those key things were - one issue was the industry felt they needed to work manpower and cost-wise on a 40-hour work week. Well, to try to do your processing only within 40 hours you've got to have a little more effluent tankage as an example. We also, for instance, incorporated the concept so we could do a better job on batch releasing for - our collector tank is the same size as our sample tank. And with that I'll go ahead and put a slide. So modular components reduce -

MEMBER RYAN: Before you move to your introductory slide, could you talk a little bit more about why you've chosen reverse osmosis technology? I think the rest of the committee would like to get your insights as to why that would be a good way to go.

MR. REJCEK: Okay. From my perspective after working in the industry, the reverse osmosis technology works really good for a plant that does a lot of water which boilers do. Really and truly this rad waste system is more of a chemistry system, and I intend to return it to a condensate storage tank or back to the reactor ultimately. And the major advantage of using that versus - well, demineralizers.

You can do the same thing with demineralizers but you're going to generate a lot of waste. The evaporators as we well know in the industry were high in maintenance and it really, you're only concentrating material so you can put it in cement.

MEMBER RYAN: Can you give any rough numbers about how much waste you produce in the reverse osmosis technology versus say a resin-based system or some other? Is it 100 to 1, 1,000 to 1?

MR. REJCEK: No. Probably the best way I could do it, there was a slide I used at an EPRI conference not that long ago and it's a goal, so don't hold me to the exact numbers. We feel the ABWR could do half of what generation - BWR 6's could do on waste. Of course it's not going to have the concentrates at all, so that's gone. What I'm talking about now is DAW and all the other generation. We have hollow fiber filters, for instance, in the condensate polishing system, very much a good experience in Japan on those so you can backwash those. That's probably actually my biggest load in rad waste. But it's small as far as activity. So my answer would be roughly a half of what a generation BWR-6 could do. That's our goal. Anything else? Okay.

Mentioned high dose items removed for possible - obviously the evaporators, the incinerator and the solid waste was removed. The additional tanks were basically to help us out through outages because we know we're going to do outages a little faster than we did them in the early `90s. And the other big thing that RO helps you on is on the filters, again. If you're going to use deep bed demineralizers you've got to have some sort of filter for the fines and stuff. And certainly we'll have one of those downstream in the demins because we still have those, but by the RO ability to remove that up front, backwash it off into a backwash receiving tank you can reduce the amount of filters that you've got to handle which is - there's where most of the impacts go back to Chapter 12 is dose savings and handling stuff. Next slide.

We replaced - well, this is actually - maybe I better stop here. So any other questions on the liquid waste before we go to gas waste? Okay. Gas waste, really I'd characterize this departure really as just taking the Japanese experience and the improvements they made in the off-gas system and making the departure for the U.S. ABWR. The original DCD envisioned equipment that has never been used in the United States. The pre-heater, the recombiner and the condenser were going to be one big piece of equipment. Not been built in the United States which our Japanese partners very clearly point out to us. We've got all this experience in Japan running three separate pieces of equipment. You've got all this experience running three separate pieces of equipment in the United States. Why do you want to combine it? That was one of the major changes. We also changed - instead of eight charcoal beds with parallel flow paths experience it worked better with four. In fact, GE had it set up with two and two. If we go to the next slide I think that'll show it more from a pictorial standpoint. That's the STP off-gas system. I think most people are familiar what off-gas systems look like. Looks like a standard U.S., many years of experience in operating that. Two trains up the front. The guard bed in front with your charcoal absorbers. We all know the thing we did add because of - we've got the same amount of charcoal, so we didn't change any of the accident basis analysis. One thing we did add based on Japanese experience was put a vacuum pump on the tail end. It's kind of a push-pull arrangement, keeps the flow a lot more steady.

MEMBER STETKAR: It's actually a vacuum

pump that's just not -

MR. REJCEK: No, it's a vacuum pump. And there actually is a -

MEMBER STETKAR: Okay.

MR. REJCEK: I'm getting too detailed, I apologize. Okay, the next slide I guess or a question?

MEMBER STETKAR: Where are these things located in the ABWR design?

MR. REJCEK: They're located in the turbine building in a concrete vault. Now, the trains are in different rooms like you know -

MEMBER STETKAR: But their vault is in the turbine building?

MR. REJCEK: Yes, sir.

MEMBER STETKAR: Okay, thanks.

MR. REJCEK: Any questions on the picture? Next slide then please. As I said before, we eliminated the drumming equipment. Our experience in the nuclear industry and all the nuclear plants is that you're better off shipping this to your vendors out there and let them do it. You do some sorting and segregating ahead of time. We changed the process to shipping incinerable waste offsite by eliminating the incinerator. Quite frankly I don't know if we've ever licensed an incinerator. Maybe one plant in the United States may have been licensed, but it's not something that we thought we'd want to go ahead and get a license for, hence we'll send it off. For spent resin we added a second vessel to help us segregate resin. The main thing there is I'd like to be able to use, again, lessons learned in the industry with EPRI and utilities over the years. That condensate polisher resin, you generally take it out of service based on hey I'm worried about a condenser leak and I'm down to a capacity on the resin where it may not handle that condenser leak, so - and there are INPO guidelines on how you do that. The bottom line, there's 50 percent or more capacity still left in that resin and so we've got another tank where we can make use of reusing some of the condensate polished resin again. Less waste.

MEMBER RYAN: How did the concern, Milt, about exceeding Class C on your resins factor into your thinking?

MR. REJCEK: Ah -

MEMBER RYAN: - a long time that was an issue of we want to keep the resins either Class A or Class B or Class C based on some model of how to best optimize all the costs and effort involved.

MR. REJCEK: Well, the ones I'm worried about there, I would have concern there would be your RWCU and your fuel pool resins. Those very easily, especially today where you can get the ion-selective media you potentially could push some of those up in that range. And quite honestly, our CBCS resin in Units 1 and 2 has been high Class C resin. And then we've used microporous resin for outages to pull out the particulate and stuff like that. So those would be the two areas if we went to something like, you know, made use of some of the ion-selective stuff in those two systems where we'd have to be real careful with that. But I think the bottom line answer is you can manage it. You've got to manage it.

MEMBER RYAN: That's not - with these design changes that's not outside of what's a reasonable thing to manage like you've been managing the -

MR. REJCEK: Oh no. It would be the same as we do in 1 and 2. The same as we do 1 and 2.

MEMBER RYAN: Thank you.

MR. REJCEK: But again, the existing design only had one storage tank. It would be very, very difficult for me to do that with one storage tank. So we had to put in a second one. Obviously on the - since we're not drumming things up in cement drums and 55-gallon drums as the original DCD design envisioned we went back to the high-integrity containers. That's exactly what I guess probably 99, most of the industry uses. We added the backwash receiver tank, what I had mentioned before, again to catch that particulate and stuff. And I always say you have to add the de-watering equipment for the high-integrity containers. So we'll have a storage area for that.

And I guess the best advantage I see on this process when we form our team is again, all these systems that have evolved in the early `90s to now and continue to improve. Essentially you had to - in the existing plants you kind of have to shoehorn them in. You know, you're stuck with what you've got, or you can't make a lot of major design changes. We're able with this design on the rad waste building and that's why the building changed, quite honestly. We decided there was no point keeping the building the same size and shape when you've got different equipment in there. So we're able to make sure that our modular equipment building and everything is built there to support it. So it should be able to do a much better job there.

MEMBER RYAN: When you think about all of it together, the DAW right up through the resins and the way you redesigned it, what do you figure the dose savings are to the work force?

MR. REJCEK: We answer that in Chapter 12. I think we'll go over that, and it did drop significantly.

MEMBER RYAN: Okay. I'll wait for Chapter 12.

MR. REJCEK: I'm bad on remembering numbers.

MEMBER RYAN: No, no, if it's there, if you've looked at it and you've got it ready to show us later on that's fine.

MR. REJCEK: Yes. And of course, getting into the Chapter 12, because of some of the changes we had to redo some of the tables there.

MEMBER RYAN: Thank you.

MR. REJCEK: Okay. Is there another slide or is that?

MR. CHAPPELL: We're back to - because of the three main departures, solid, liquid, gaseous waste.

MR. REJCEK: Okay, effluent. Ready to move on?

MR. CHAPPELL: Any other questions on those three departures? All right. Just a bit of place-keeping here. This is an example of some of the sampling or monitoring deletion of the incinerator stack. For example, no longer have to monitor that. So you'll see these indicated in the chapter. COL license information has been addressed in the COLA and they deal with some of the plant-specific designs for liquid, solid rad waste, some other compliance with applicable reg guides or sampling requirements, maintenance for equipment. For ITAAC there are specific ITAAC for releases, to isolate gaseous release or liquid release under high radiation conditions. We also have some divisional separation for sumps and we have safety-related instrumentation associated with isolation for primary containment. Any other questions on Chapter 11?

MR. REJCEK: One other thing I could mention, I left out when I was talking about this. One other factor that we considered because of the operational occurrence is that I've worked 17 outages as water management. I know, believe me, I know how important moving water around and getting the processing done so you can support the outages. So a lot of that experience was also factored in here, with again, coming up with the tankage.

CHAIRMAN ABDEL-KHALIK: I must say I'm surprised that despite the changes in design you don't have any changes in the associated ITAACs.

MR. CHAPPELL: The main process is effectively the same. When you look at the basic configuration of the system as Milton described, the basic configuration described the certified design material is you have drains in, for example, ECCS rooms, reactor building, control building, and you maintain divisional separation, that's the certified design material. The rest of it is described in Tier 2. Other aspects deal with the monitoring and isolation like the gaseous system. Isolation of the liquid discharged so that you maintain your limits and you have that function, albeit not safety, it's still certified design material. You also have your Class 1E portion of the containment isolation function for the drains, equipment drains, floor drains, low connectivity waste, high connectivity waste from the containment that go into your liquid waste system. There's an isolation function there. And it's typical of BWR design. The basic configuration, basic qualification of the system, those are all described and not impacted by any of these Tier 2 changes.

MEMBER RYAN: And Mr. Chairman, I think Milt captured it, although he didn't specifically answer the question that you asked, but you know in having the room to move and in taking advantage of outage, you know, flow rates which is a very fast pace at rad waste management versus a normal operating circumstance and having the space and capability to move around and do things that are good ALARA practice and all that, all because of that I think we'll probably see some more of that in Chapter 12. It sure sounds like you've made some important progress on those issues. Thank you.

CHAIRMAN ABDEL-KHALIK: All right, thanks. We'll move on to the staff's presentation on Chapter 11.

MR. ANAND: Good morning. My name is Raj Anand. I'm a registered professional engineer and I'm with NRC for the last 30 years. I am the project manager for the Chapter 11 of the South Texas COL application. I have with me Steve Williams. Steve is the technical reviewer for Chapter 11. We thank STP for their presentation. Staff agrees with the STP presentation. Chapter 11 discusses radioactive source term, radioactive waste generation and how the waste streams out processed as well as how radiation is monitored at the plant. While source term determination and offsite monitoring program will retain the certified design, improvements are made by departure in processing of liquid, gaseous and solid waste streams and in radiation monitoring. There are three open items in this chapter's draft safety evaluation report related to condensate storage tank. The staff is currently reviewing these three open items. With this I will turn it over to Steve Williams to discuss the important topics of Chapter 11 of the draft safety evaluation report. Steve?

MR. WILLIAMS: I'm the technical reviewer in the Health Physics Branch of the New Reactors Organization. I have a Bachelor's degree in Radiological Health from Duquesne University. I have a Master's degree in Environmental Pollution Control from Penn State University.

MEMBER SIEBER: Pittsburgh.

MR. WILLIAMS: I've worked in many phases of health physics over my career. It spans approximately about 38 years.

Chapter 11 contains the design characteristics of the radioactive waste systems. Chapter 12 contains the effluent source terms and dose calculations for 10 CFR 20, 10 CFR 50 Appendix I.

This FSAR format is similar to the South Texas DCD format, therefore the source term and dose calculations will be addressed during the Chapter 12 presentation.

There are six main topics of interest for review of Chapter 11. The Chapter 11 sections 11.1 to 11.5 of the FSAR are reviewed in conjunction with the approved ABWR DCD. The departures listed for each of these sections, the appropriate COL license information items, and the applicable regulations. Section 11.1 is incorporated by reference and there are no open items. The other topic of interest discussed in the audit of South Texas concerning the 10 CFR 52 departure review analysis performed for Chapter 11. Next slide. Third topic of interest is the NRC audit of the South Texas 10 CFR Part 52 process and procedures for FSAR Sections 11.2, 11.3, 11.4 and 11.5.

The initial RAI questioned the departure evaluation for compliance with 10 CFR Part 52 requirements due to the complete redesign and replacement of solid waste management system in Section 11.4. This audit was conducted to ensure the applicant evaluations of Tier 2 departures in this chapter were in accordance with 10 CFR Part 52,

Appendix A, Section 8, Item (b)(5) and correctly concluded that these departures did not require prior NRC approval. Based on this audit the NRC issued two RAIs concerning the reviews performed on departures taken by South Texas for Sections 11.2, the liquid waste management system, and 11.4, the solid waste management system. As a result of the audit it was determined that South Texas needed to reevaluate their procedures and processes for the evaluations of the two FSAR sections mentioned above. The RAI responses revised the evaluations of the Tier 2 departures for Sections 11.2 and 11.4 and were found to be acceptable in determining that they were performed in accordance with 10 CFR Part 52 and did not require prior NRC approval. These two RAIs were then closed. Sections 11.3 and 11.5 were found to be acceptable because the departures were evaluated appropriately. Next slide.

The second topic of interest is the complete redesign and replacement of the ABWR DCD Section 11.2. South Texas has described the changes made and why the liquid waste management system was replaced and redesigned in their presentation. Various RAIs were written and resolved for this section, including a cost-benefit analysis of the liquid rad waste system was also performed in accordance with 10 CFR 50 Appendix I, Section 2(d) and Reg Guide 1.110. We reviewed the South Texas cost-benefit analysis and performed an independent cost-benefit analysis based on the site-specific parameters South Texas provided and the population doses the staff had calculated. We also regenerated their cost-benefit analysis using their input to verify their calculations noted in the FSAR.

CHAIRMAN ABDEL-KHALIK: Now in the description of Departure 11.2-1 says that a radiation monitor in the discharge line will automatically terminate liquid waste discharges from the low-conductivity waste, high-conductivity waste or detergent waste subsystem. Is there any requirement that a redundant monitoring system be present? Or can you just rely on this one monitor?

MR. WILLIAMS: I'm not sure there's any requirement. That's a tech spec requirement to have a radiation monitor at the liquid out-fall and also have an interlock feature on that monitor.

CHAIRMAN ABDEL-KHALIK: But no requirement for redundancy?

MR. WILLIAMS: I'm not aware of any requirement for redundancy.

MR. REJCEK: I'm not aware of any

requirements for redundancy. You base your actual effluent discharge which goes into your 121 report and your dose calculations on your sample. The monitor is there primarily in case you mess up. I must admit, South Texas 1 and 2 had a few instances in the past where sampled the wrong tank and the monitor caught it. So that's the primary function. We of course retain that by regulation in this design also. But again, primarily we'll probably be discharging mostly just laundry waste. The other two exception of outages, where you might need some water management issues you might discharge some of the LCW and HCW. But those three as listed will go by that rad monitor.

MEMBER SIEBER: You can actually discharge permanent - conduct a discharge without that monitor, right?

MR. REJCEK: Yes, you can. You have to have another independent sample.

MR. WILLIAMS: Right. You have to follow the tech spec requirements.

MR. REJCEK: OGC and the tech spec.

MEMBER SIEBER: So you don't need a redundant monitor.

CHAIRMAN ABDEL-KHALIK: Okay, thank you.

MR. WILLIAMS: Okay. I was talking about

the cost-benefit analysis that we did and verified. Both the analyses indicated that further treatment of the South Texas liquid effluents will not affect reductions in the cumulative population dose within a 50-mile radius of the reactor at a cost of less than a thousand dollars per person-rem. There are also three open items in this section concerning the condensate storage tanks. Next slide. These three open items requested information concerning the condensate storage tank at each site. Design information was requested including volume, location of the tanks, containment of any leakage from the tank and piping design locations. Radiological information requested included the maximum radioactive concentrations expected in the tank and associated external dose rates expected outside the tank. This information has been provided by the applicant and is presently being evaluated by the NRC staff. Concerning possible release of the radioactive content to the environment, 10 CFR 20.1406 requirements and dose rates from the tank creating external exposures.

MEMBER RYAN: This is a good place to ask this question. Have you thought about underground contamination? There have been several instances of that, and the tritium task force and all that. How has that entered into your thinking?

MR. WILLIAMS: That ties into Reg Guide 4.21 and 10 CFR 20.1406. And that'll be discussed in - well, possibly in Chapter 12, but it's discussed in this case with the lines running out to the tank and - which is an outside tank.

MEMBER RYAN: Are they double-wall pipes, or are there any protection mechanisms or how have you addressed it?

MR. WILLIAMS: The answer I think in the response was that they're in tunnels or I think they're double-walled. Is that the right answer to that as far as the design?

MEMBER RYAN: Are the tunnels above the water table?

MR. REJCEK: Yes. Well -

MEMBER RYAN: They always dry?

MR. REJCEK: No. We haven't finished the design of that.

MEMBER RYAN: Okay. Well, I mean, because you know some of these issues are - you know, we've gotten a lot of answers to questions, well, how did the tunnel get wet? Well, it was rain that leaked in a manhole well. That may be true, but there may be cases where the groundwater is close enough to the surface that it was groundwater making the manhole.

MR. REJCEK: And groundwater can be up to, what, six, ten feet I think. So I'm trying to remember what the bottom of that tunnel is.

MEMBER RYAN: And there's infiltration going down. So you know, I mean, that to me is an important area to get ahead of the curve. With a new design I'd be curious how you're thinking through that. You know, you want to make sure that while you're creating this new design you address some of these emerging issues. Tritium shows up in lots of places and my experience is that cesium and strontium aren't far behind.

MR. REJCEK: Very good point.

MEMBER SIEBER: Are these above-ground tanks?

MR. WILLIAMS: Above-ground tanks, yes. Five hundred thousand gallons.

MEMBER SIEBER: Do you get freezing weather at South Texas?

MR. WILLIAMS: Not enough to freeze that tank. Not the 500,000 I don't think.

MEMBER SIEBER: What about at level instrument lines?

MR. REJCEK: Yes.

MEMBER SIEBER: Do you have pipe heating on that? Freeze protectant even though it's sort of worn down.

MR. REJCEK: We need to make sure we're all on the same sheet of music on here. The condensate storage tank design per se was not changed from the DCD. It's in the same location, it still has a berm in there, it went through a tunnel to start out with the DCD and of course with the fact that the DCD was issued prior to 1406 the design portion is not covered - we're not required. What was in place, that's what I'm trying to say. 1406 came in after the certified design. So we have to meet the requirements on our operation and maintenance, and that's what you're - to make sure -

MEMBER RYAN: That's kind of what I'm getting at. I'm not criticizing the design.

MR. REJCEK: No, I understand.

MEMBER RYAN: At this point before you've poured any concrete is a good time to think it through.

MR. REJCEK: Absolutely, and we've talked about - the two things I'd say there is South Texas has been a very robust member of that team with the NEI, okay? We have a program in place in 1 and 2 for groundwater.

MEMBER RYAN: Yes, and again, if you're bringing those experiences -

MR. REJCEK: Absolutely. It's going to be a hop, skip and a jump on that portion. Other details we may put in place there, I'm not sure yet till the design gets a little further along, other than the fact that it's in that tunnel.

MEMBER RYAN: Sure. How does that tunnel perform when you've got groundwater.

MR. HEAD: I think that's what - in the 1406 would require us to answer these questions and do we need to go and periodically inspect and look and -

MR. REJCEK: Exactly.

MR. HEAD: And obviously if a leakage is found, ensure it's in the corrective action program and assess.

MEMBER RYAN: I'm a big fan of get ahead on the leakage and figure out how to not let it happen.

MR. HEAD: Absolutely. We understand and embrace that concept.

MEMBER RYAN: Thank you.

MR. WILLIAMS: Next slide. Third topic of interest is the redesign of the DCD activated charcoal absorber system. South Texas has again described the changes made and why the gas waste management system was redesigned in their presentation. Again, various RAIs were written and resolved for this section, and a cost-benefit analysis of the gaseous rad waste system was also performed in accordance with 10 CFR 50 Appendix I, Section 2 and Reg Guide 1.10. We reviewed the South Texas cost-benefit analysis and performed an independent cost-benefit analysis based on the site-specific parameters South Texas provided and the population doses the staff has calculated. We also regenerated their cost-benefit analysis using their input to verify the calculations noted in the FSAR. Again, both analyses indicated that further treatment of the South Texas gas effluents will not affect reductions in the cumulative population dose within a 50-mile radius of the reactor at a cost of less than $1,000 per person-rem. Next slide.

Fourth topic of interest is the solid waste management system. The solid waste management system was also a complete redesign and replacement of the ABWR DCD Section 11.4. Again, South Texas has described the changes that were made and how the system is replaced and redesigned in their presentation. South Texas Units 3 and 4 has adopted the newly issued NEI 07-10A template titled FSAR Template Guidance for Process Control Program Description which describes the administrative and operational controls used for solidification of liquid or wet solid waste and the de-watering of wet solid waste. It provides necessary controls such that the final disposal waste product meets applicable federal regulations, state regulations and disposal site waste form requirements for burial at a low-level waste disposal site licensed in accordance with 10 CFR 61. South Texas has stated that they will use Waste Control Specialists' waste disposal facility in Texas for disposal of their Class A, B and C waste if it's available at the time that they need it. As a backup, low-level rad waste onsite storage space for six months' volume of package waste is provided in the rad waste building. If only B and C waste require storage, the capacity will be approximately 10 years. Class B and C waste is expected to be 10 percent of the total waste generated in their FSAR. If offsite storage is not available, an onsite storage facility as described in Unit 1 and Unit 2 South Texas UFSAR Section 11.4 is available to store Unit 3 and 4 waste also. If still additional storage capacity is needed, South Texas 3 and 4 could construct storage facilities in accordance with applicable NRC guidance.

There's no cost-benefit analysis required for this section because the redesign of the solid waste management system described in this section has no release points directed to the environment. Compliance with Appendix I ALARA criteria is strictly based on the releases from the liquid and gas effluent management systems and not the solid waste management system. Next slide.

The fifth topic of interest is the process and effluent radiological monitoring and sampling system. South Texas Units 3 and 4 has adopted the newly issued NEI template 07-09A titled FSAR Template Guidance for Offsite Dose Calculation Manual Program Description. This program describes the methodology and parameters used for calculating doses resulting from liquid and gas effluents, operational set points, including planned discharge rates for radiation monitors and monitoring programs, and provides limitations on operation of the rad waste systems, including radiation monitor information, sampling and analysis requirements, and 10 CFR Appendix I dose and dose commitment and reporting. This chapter contained eight COL licensing information items. Of these, six are acceptable, one is confirmatory and one is under evaluation. The COL license information item under evaluation is compliance with 10 CFR 50 Appendix I which is currently being evaluated and I talk about this in Chapter 12.

MR. ANAND: In summary, the NRC staff has reviewed all the departures as identified by the applicant and determined to be appropriate. Based on staff's review of Chapter 11 radioactive waste management the staff has identified three open items in this chapter's draft safety evaluation report related to condensate storage tank. The staff is currently reviewing these three open items and is unable to finalize its conclusion concerning Chapter 11 Radioactive Waste Management in accordance with the NRC requirement at this time. Now, the staff is ready to take any questions from the subcommittee members.

CHAIRMAN ABDEL-KHALIK: Are there any questions for the staff? On Chapter 11. Are there any questions?

MEMBER RYAN: Thank you for answering my questions earlier. I appreciate it.

MR. REJCEK: You have to answer to the dose one here too.

CHAIRMAN ABDEL-KHALIK: Are there any questions for the applicant on Chapter 11? At this time we are nearly an hour ahead of schedule, and rather than waiting till the scheduled time of 1:20 to resume our presentations I'm just wondering if the staff will have the people here to start earlier if necessary? You know, we can break for lunch now and rather than starting at 1:20 - right, at 1:20, we can start at 12:30, 12:30 or 12:45. Would that work? I know the applicants will be here.

MR. TONACCI: So we'll come back and start at 12:45?

CHAIRMAN ABDEL-KHALIK: Yes. Will you have your people here?

MR. TONACCI: Yes, we'll have them here.

CHAIRMAN ABDEL-KHALIK: Okay. All right. We'll recess for lunch and we will resume at 12:45.

(Whereupon, the above-entitled matter went off the record at 11:35 a.m. and resumed at 12:45 p.m.)

CHAIRMAN ABDEL-KHALIK: We're back in session. At this time we'll proceed with the presentation on Chapter 12 and the applicant will begin the presentation.

MR. CHAPPELL: Before we begin Chapter 12 we had a question from Chapter 11 on dose I believe, and Milton would like to.

MR. REJCEK: In Chapter 12 on Table 12.4-1 we use an EPRI document on one of the evaluations, I believe it might have been Nine Mile or something where they had evaporators and then went away from evaporators. So we use their dose savings or percentages, and we reduce the man hours from not running evaporators and incinerators in the rad waste building. So that is documented in 12.4. About eight person-rem savings overall is the bottom line.

MEMBER RYAN: Yes, and that was per year?

MR. REJCEK: Yes, I believe that's for - should be per year. Annual.

MEMBER RYAN: So eight person-rem per year savings.

MR. REJCEK: Yes, sir.

MEMBER RYAN: Okay, thank you very much. Appreciate that answer.

MR. HEAD: Okay. So we're back on track. Standard agenda for us. I'd like to introduce Gordon Williams who joined us. First of all, Milton is our Chapter 12 coordinator for our COLA preparation and review support. Milton is a lead health physicist technician - or lead health physicist on 1 and 2, and has - Gordon Williams, yes. Okay, I had already booted that up, I'm sorry. Gordon Williams is a lead health physicist on 1 and 2, and is here to help us today answer any questions on this chapter. Thank you. I'm going to turn it over now just to go through our chapter presentation. Coley?

MR. CHAPPELL: Again, my name is Coley Chappell. I'll continue on with Chapter 12. The summary gives an indication about dose to the site personnel and offsite as well as environment, and how this is minimized. So we have a number of elements in there, including protection features, what source is available in our operational health program is described. A number of departures impact this section for consistency. For example, recombiners are no longer there so that assessment no longer had to do - just sort of maintenance. We had some consistency changes with I&C codes and standards, and we've discussed the rad waste building change.

Some of the impacts. Liquid and solid system changes required updates to sources and those are reflected in the tables in this chapter. There's also a couple of interesting departures in Tier 2 for noting the use of cobalt is minimized and has a graded approach so that in the core it's the minimum and then it allows more content as you move out to the vessel and other areas. So it's an attempt to maintain reasonable cost while minimizing cobalt. The 12.3-4 departure there adds particularly alarm function so more indication in the plant as well as it adds additional alarm functionality to the reactor building areas.

COL license items for this chapter have been addressed. They generally go through and discuss compliance with the reg guides as well as operational considerations and compliance with applicable regulations. Requirements for 10 CFR 70.24 in this chapter are also tied to Chapter 9 and will be discussed in more detail in Chapter 9.

MEMBER RYAN: Can I ask you just a general question about reg guides, particularly the Division 8 and some of the other ones? There's a lot of them that are woefully out of date. Have you got a plan - and you know, they're slowly but surely getting addressed and updated. How is that going to affect you if you get a rev to a reg guide that you're now out of date on?

MR. CHAPPELL: Generally speaking we evaluate reg guides and if it becomes obsolete it's generally referenced to another one or we have requirements and we evaluate them on a case-by-case basis as in the operating facility.

MEMBER RYAN: So you'll have to address that through the licensing process if things get updated. Okay. But the reason I bring it up is there may be a bunch of them in the rad protection area.

MR. CHAPPELL: Yes.

MR. WILLIAMS: That is true. For example, Reg Guide 1.21 for the effluent reports.

MEMBER RYAN: Right.

MR. WILLIAMS: That's come out, we're looking at it. This year we're submitting the old style report, but we're looking at changing our report to meet the requirements of that new document.

MEMBER RYAN: Yes. I don't think any of those are big challenges, it's just a real bookkeeping matter to kind of stay ahead of the curve on all that.

MR. EUDY: That is addressed in Chapter 1, actually. They have tables of all the reg guides and the updated revisions as well.

MEMBER RYAN: Oh good. Okay.

MR. WILLIAMS: Yes, bookkeeping, but you're really headed - I mean, you're talking about as they evolve and change, that we're reacting to it.

MEMBER RYAN: Yes. Well currently there's a schedule where many, you know, in the various divisions that would affect your application are being updated, particularly -

MR. WILLIAMS: But they affect all of our units onsite, so we're evaluating them as they come up and what we can do to meet them and implementing them. And we'll change the UFSAR as appropriate.

MEMBER RYAN: Okay. Thank you.

CHAIRMAN ABDEL-KHALIK: Now, on the previous slide, the second bullet, how much of an impact is that? I mean, I don't want to get sort of crud accumulating in the core for material that, you know, comes from somewhere else.

MR. CHAPPELL: That's due to the material selection. The materials, the cobalt content of the material selection.

CHAIRMAN ABDEL-KHALIK: Right, right, but that's why I'm asking the question. I mean, going through all this, does it really make much difference given the fact that you get a lot of crud accumulating in the core from material that's originated somewhere else.

MR. REJCEK: We can try that. I can give you my perspective on it from a rad waste perspective. RWCU the reactor water cleanup system and the fuel pool and of course the rad waste when we process water we turn to condensate, we'll be able to pull out a lot of that cobalt that came from these systems that did in fact have higher cobalt because they're further away from the core. So I'm counting on the existing systems to help us with that. That's why we could take that graded approach. I can't do a lot with the stuff that's in RWCU already or our RHR, for instance. So those you definitely want to have less cobalt there. A little tougher. You see my drift? So I'm not as worried about the other systems providing a lot of cobalt in there because we have the ability to clean some of that up.

MEMBER SIEBER: Yes, but there's been a program that's been going on for 30 years to reduce cobalt in things like stellite which is valve surfaces and - which is where it can end up irradiated and can cause problems.

MR. REJCEK: That's correct.

MEMBER RYAN: Is stellite really the lion's share of the action in the cobalt question?

MR. REJCEK: Well, cobalt-60 I think so. Stellite surfaces.

MEMBER RYAN: That's my recollection. Stellite bearings and all that stuff are a big deal.

MR. WILLIAMS: Engine rollers on control rod blades.

MEMBER RYAN: Yes.

MR. CHAPPELL: We have a commitment - I mean, we have a statement that we make in our FSAR to stay on top of material selections to minimize use of stellite. Other options come up. Remain state of the art of the industry as it pertains to the design.

VICE CHAIRMAN ARMIJO: Along that line, will the South Texas Project be utilizing zinc injection to keep the cobalt in the core as opposed to migrate around the system?

MR. REJCEK: I can answer that one too. We've got in the COLA, in the writeup we've got all the equipment connections and power and all that for zinc injection. We don't intend to make that decision, though, until at least we've had a refueling outage or two to know that we need to install that equipment.

VICE CHAIRMAN ARMIJO: Okay, so you're plumbed -

MR. REJCEK: We're plumbed up, ready to go for it. The ABWR did make use of a lot of new material - well, not new, but other materials, you know, over the last 10-15 years as we talked about earlier.

VICE CHAIRMAN ARMIJO: Well as long as

I've got you here, is that the same situation with hydrogen water chemistry, or are you definitely going to use hydrogen water chemistry?

MR. REJCEK: We're definitely using hydrogen water chemistry.

VICE CHAIRMAN ARMIJO: So that's more than just a plumbing capability, it's whatever system you need is part of the design?

MR. REJCEK: Hydrogen water chemistry? Yes. We intend to be low hydrogen water chemistry is what we hope to be.

VICE CHAIRMAN ARMIJO: Thanks. Please proceed.

MR. REJCEK: Thank you.

MR. CHAPPELL: All right. Section 12.5S discusses or incorporates an NEI template for an operational radiation protection program. And we're carrying forward the STP 1 and 2 top-down policy of a proactive radiation protection program, the training. We have a board associated with that with the departments all represented in order to minimize occupational exposure.

ITAAC. There are ITAAC related to some of the elements. For example, the plant shielding design discussed may be impacted by different aspects of the design, but areas that are continuously occupied will have the required shielding and we'll continue to develop that as the design proceeds.

MEMBER RYAN: You've used the phrase process radiation monitoring in a number of spots. Could you maybe elaborate on what that covers, please?

MR. CHAPPELL: Yes -

MEMBER RYAN: If that's coming, that's fine.

MR. CHAPPELL: Yes, you're talking about monitoring of liquid system and that's a process stream. You're talking about even steam line rad monitors is a process stream, process rad monitor. So if you're looking at some of the secondary type systems as well. Anywhere you can have contaminant get into a water system you need to have a liquid monitor.

MEMBER RYAN: So there's really not a radiation protection aspect of it. That's more how is the plant behaving.

MR. CHAPPELL: Yes.

MEMBER RYAN: There are implications for radiation protection if things go wrong, but you really - you've kind of stuck a process issue in the rad protection section, that may be where it has to be, but I just wanted to make a clear distinction that's not a radiation protection set of monitors, that's a how is the plant behaving set of monitors.

MR. REJCEK: Exactly.

MEMBER RYAN: Thank you.

MEMBER SHACK: Just to follow up on Sam's question. When you use the hydrogen water you said you were aiming for a low hydrogen water chemistry. Suppose you went for a full hydrogen water chemistry. Would you have enough shielding to keep the N-16 reasonable?

MR. HEAD: Yes. There is an ITAAC that addresses shielding. It's something that we're still evaluating exactly what we want to do because it is a rather significant dose and we're still evaluating our options there with respect to other technologies. Hopefully lower that.

MR. CHAPPELL: Any other questions on this slide? Okay.

CHAIRMAN ABDEL-KHALIK: We'll proceed with the staff's presentation.

MR. EUDY: Hello, I'm Mike Eudy, chapter PM for Chapter 12. We appreciate South Texas's presentation and the staff agrees with the scope of their application and we want to talk about our evaluation of the information at this point. We're going to talk about some of the highlights in Chapter 12 that we've identified as follows. We actually have some Tier 2 departures that were deemed by the applicant to not require NRC approval and the staff felt that there was a need to further evaluate them with respect to ALARA and Part 20 requirements so that'll be discussed. We have radiation source term and effluent dose calculations due to the range of departures to the rad waste system. We had to go over some required revised dose calculations. We have some open items involved with that. We have an open item involving spent fuel pool source term and geometry we're going to discuss. We're going to talk about a couple of COL information items that we're continuing to evaluate which is 12.7 and 12.8. We're going to go over construction worker and occupational dose assessments and we're going to talk about compliance with 20.1406 requirements. We have an open item with that. And then we're going to give a brief overview of the COL information item status. And I'm going to turn it over to Robert Kellner who's our technical expert and Steve Williams as well who will intermingle their discussion.

MR. KELLNER: Thank you, Mike. Again, my

name is Robert Kellner and as Steve alluded to earlier, the doses are - because of the way the application is set up the doses for effluent releases are included in Chapter 12 in this review as opposed to Chapter 11 which is the way it is being done currently under the new design certifications. A little background on myself. I have about 30 years of experience between the Navy Nuclear program, commercial power as well as DOE complex. I'm a technical reviewer with the Health Physics Branch of New Reactors. As Mike said we're going to be going over some technical topics of interest as well as kind of covering some of the open items that we still feel are appropriate in this section. Chapter 12 Sections 12.1 through 12.5 of the FSAR were reviewed in conjunction with the approved ABWR DCD. The departures listed in each of the sections in the appropriate COL information items and the applicable regulations. Next slide, please.

First topic we wanted to cover was the discussion of Tier 2 departure evaluation. As Mike or as Steve covered earlier the applicant reviewed the Tier 2 departures in Chapter 12 and determined that they did not require prior NRC approval and Mike - or Steve talked about the audit that we basically came to the conclusion that yes, they did not require prior NRC approval. However, because of the scope and the number of changes and the departures that were taken we felt that we needed to look at those departures to make sure that there were no Part 20 implications that maybe have gotten missed in the review and we wanted to take a deeper look at those departures. So that's the reason we did do these - a deeper look at these departures. Specifically, departures that we looked at were the rad waste departures 11.2 and 11.4. The changing and the resizing of the turbine building as well as the rad waste building, has that affected some of the zoning and some of the equipment changes and relocation of equipment. So I just wanted to kind of give you that flavor for why we looked at these departures.

ABWR Section 12.1 was incorporated by reference in the STP FSAR with supplemental information provided by South Texas. The applicant utilized two of the NEI health physics templates, NEI 07-03A and NEI 07-08A which the 07-03A is the operational radiation protection program and 07-08A is the ALARA guidance document. So by utilizing those two templates they addressed a large portion of the radiation protection program. There are no open items currently associated with Section 12.1.

Section 12.2 deals with the radiation source terms as well as the estimates of public doses from liquid and gaseous effluent releases. As Steve said earlier, he's going to cover that now and then turn it back over to me to cover the rest of Chapter 12. So, Steve?

MR. WILLIAMS: The staff performed the review and analysis of this section. We reviewed the liquid and gaseous effluent released from source terms. We confirmed the appropriate exposure pathways south of the environment. We confirmed the use of appropriate liquid dilution and atmospheric dispersion deposition factors. We also confirmed the use of appropriate land usage parameters. We evaluated the applicant's calculated doses using the NRC recommended models and we performed an independent assessment for liquid and gaseous effluent pathways.

After performing that there are five open items remaining in this section concerning effluent source terms. Most significant of these open items concerning the effluent dose calculations is the information requested for computer input and output files for the GALE computer code. This information is used to calculate the annual liquid and gaseous effluent release source terms. These source terms are then used to calculate the annual effluent doses to the environments. Since these source terms may have changed in the FSAR based on the redesign of the DCD waste systems the staff will determine with reasonable assurance that the applicant will comply with all applicable regulations. South Texas will provide the GALE code input and output data in March 2010. This month I think they have the response coming in. At that time we'll take a look at it.

MEMBER RYAN: This is a question that's related, but not to the applicant. The GALE code's under revision now, is it not? Isn't there a -

MR. SCHAFFER: This is Steve Schaffer from the Health Physics Branch. Yes, it's currently under revision.

MEMBER RYAN: What's the schedule for that revision?

MR. SCHAFFER: Right now we have working versions of GALE with the new ANSI standard and GALE with new operational experience plugged into the model. We're probably a year away from a final version.

MEMBER RYAN: Will the results of the new and the old be similar or different? I guess I'm trying to ask how does an applicant not get stuck between GALE 1 and GALE 2.

MR. SCHAFFER: Actually, if you use the new ANSI standard some results go slightly up, some go significantly lower, but it - the bottom line is it's really not going to affect compliance. They're fairly similar in result between the ANSI standard. What's going to affect it is the new operational data.

MEMBER RYAN: The code itself is what, 30 years old?

MR. SCHAFFER: Right.

MEMBER RYAN: And the data that went in is 30 years old. I guess, I don't know if that's something we should think about or address, but I would hate to see applicants kind of get stuck in between using an old code and find out that it's not up to date and right.

MR. SCHAFFER: If anything, the operational data is showing that the old GALE code was a conservative analysis.

MEMBER RYAN: Yes, but that's not really helpful. Having it conservative to the point of being ultra-conservative isn't helpful.

MR. SCHAFFER: But if they comply with the conservative analysis then they would obviously comply with the less conservative model.

MEMBER RYAN: Yes, that's like saying get a shoe three sizes too big so you're feet won't hurt. It doesn't help a lot. I appreciate your point.

MR. WILLIAMS: Okay, next slide please.

CHAIRMAN ABDEL-KHALIK: Just for the record, the discussion in the previous slide pertains to the current version of the code, that's correct?

MR. WILLIAMS: Yes.

CHAIRMAN ABDEL-KHALIK: Thank you.

MR. WILLIAMS: This table shows the preliminary evaluation of the annual routine liquid and gaseous effluent source terms and the associated calculated effluent doses from one unit at the site. This is preliminary until the applicant provides the necessary backup information to the liquid and gaseous source terms. These preliminary results indicate that the applicant and the NRC calculated doses listed above are below the 10 CFR 20, 10 CFR 50, Appendix I, and 40 CFR 190 EPA criteria. Once annual source terms are confirmed, compliance with 10 CFR 50, Appendix I, 10 CFR 20.13(o) and (e) and 20.1302 can be finalized. If there's no questions on that, the remaining source terms in Section 12.2, the spent fuel pool source term and the remaining sections of 12 will be discussed by

Bob.

MEMBER RYAN: And of course we don't calculate thyroid and other organ doses anymore to workers, for example.

MR. WILLIAMS: No, just to the environment.

MEMBER RYAN: Well, I mean these are 1959 metabolic models, okay? ICRP 2. I'm a little nervous about the number of significant digits.

MR. WILLIAMS: I did take care of that too with Steve. He's working on ICRP 60 DCFs and we have a code that'll run the 60 numbers and the results came out fairly consistent. Like you said, there's a lot of DCFs that have gone up and then there's others that have gone down. In the end you're sort of driving up the middle.

MEMBER RYAN: Sure.

MR. ROACH: If I might, this is Ed Roach. I'm the branch chief of Health Physics, New Reactors. And just to assuage some concerns we have been pushing forward with both regulatory guides supporting research in getting the Series 8s up to speed and getting the models updated to reflect current operational facilities. There's a time lag it will take us to get them in place, but we recognize that the technology and the regulations or guidance we're working to is several years away.

MEMBER RYAN: I'm not trying to be flip, it's a very important question that you bring up because we now have three different systems of dose calculation that we regularly use, one from 1959, one from somewhere in the `70s and one that's popping up now. They can give you wildly different answers for the same radiant nuclide. So it's not a matter of we all understand it, we health physicists who've been doing it for a long time, but the credibility of, you know, having wildly different answers just needs to be addressed. And it puts an applicant in a tough spot because telling them, well you've got to have three different ways to calculate the same thing. I think that's something we ought to address. Thank you.

VICE CHAIRMAN ARMIJO: I have a question. What kind of information or assumptions go into determining these source terms related to the fuel design, fuel integrity, how many failures, fuel burnup. Are there assumptions that go into - are required to determine these tables?

MR. WILLIAMS: Are you talking about the GALE code input?

VICE CHAIRMAN ARMIJO: Yes. Do you assume that all the fuel is - a certain fraction of the fuel can be failed?

MR. WILLIAMS: I'm not sure what the -

MEMBER RYAN: I think Sam's question is prior to the GALE code. Is how do you generate an inventory from what you have -

VICE CHAIRMAN ARMIJO: Yes, it's an input. You know, I'm going to assume that the fuel is perfect or I'm going to assume that a certain small fraction of the fuel has got some perforations, or - and the burnup has got to be a certain value.

MEMBER SIEBER: If you get a tech spec you're probably going to want the maximum amount of radiation that you can get as an effluent, and that presumes a certain amount of failed fuel, but it also says that when you get to this limit, weight limit, to shut down. And I think the calculations are done on that tech spec limit as opposed to an assumption as to what weight of fuel content you have. Is that correct or not?

MR. SCHAFFER: That's correct. This is Steve Schaffer again. In addition, we base our primary and secondary coolant concentrations on the ANSI N-18.1 standard. And that standard has the failed fuel assumptions and it's based on the standards committee's expert opinion on the concentrations.

VICE CHAIRMAN ARMIJO: Yes, I'm still kind of stuck on doing all this work without really knowing what your final fuel design and core design is going to be. Maybe it's - so I really don't know how you get this based on a GE-7 nuclear fuel assembly, or maybe it doesn't matter. I'm looking for some input on that. It doesn't matter.

MEMBER SIEBER: It's not based on that. It's based on scoring liquid gaseous concentrations. The fuel designer is supposed to design the fuel to maintain.

VICE CHAIRMAN ARMIJO: So those are going to be requirements, not an output based on some analysis that you've made.

MEMBER RYAN: One final question if I may on this is that it seems to me that with the uncertainties in the models, with the questions that we have about data, with what fuel fraction, what concentrations get developed from a failed fuel fraction, have you ever done uncertainty analysis on these estimates? Are we using these numbers as deterministic go/no-go criteria? How do I know 3.3 millirad of gaseous gamma effluents isn't 300?

MR. SCHAFFER: I guess I can answer this as, you know, we've used these codes in the past for the operating fleet of reactors. If we would have seen the effluent releases that the GALE code had calculated we would have measured it in the environment because that's the way the detection of this was set up and we haven't seen it in the environment. So that's sort of a confirmation that at least it's not giving you something higher than you think it would.

MEMBER RYAN: That's not an uncertainty analysis.

MR. SCHAFFER: It's validation of the model, though.

MEMBER RYAN: Well, no it's not. It's a validation that what you've got is much less than your model.

MR. WILLIAMS: It's a bounding calculation.

MEMBER RYAN: It's a bounding calculation. It's not something done with any kind of uncertainty understanding or insight.

MR. WILLIAMS: I was asked that question a long time ago in radiation monitors and things like that, but there's so many uncertainties on each part, even if you want to do a radiation monitor set point. But there's, you know, when you try to do the mathematical statistical analysis of what your total error is it's sometimes -

MEMBER RYAN: Now you're on my point. Thank you.

MR. ROACH: This is Ed Roach again, Health Physics. We'll take that to address within our model moving forward.

MEMBER RYAN: And again, I mean as a health physicist I certainly can understand it, but it troubles me a little bit that sometimes we try and communicate this with a lot more verve and weight than it actually has. It's confirmatory because we're all happy that what we're measuring in the environment is less than this - yahoo, that's a good answer - but having this low number shouldn't give us comfort by itself.

MR. WILLIAMS: Well, let me throw this out to you. Working at a plant, they always want a number. If it's five zeroes or ten zeroes, they always want a number, and that's part of the problem. We just can't say zero because we have some type of number.

MEMBER SIEBER: But there is layer upon

layer upon layer of conservatisms and everything is worst case, and if you look at what happens in the real world in terms of amount of dose they are minuscule compared to what the limits are, and it's because of all this accumulated conservatism. On the other hand, from a regulatory standpoint you've got to regulate the boundaries because someday, maybe in a million years, but someday you're going to hit all and wipe out all those conservatisms and you've got to prove under law that you aren't going to harm the environment or the people that live in it. And so that's why it turns out the way it does.

MR. KELLNER: Any questions on the chart? Next slide, please. The last item in Section 12.2 I wanted to cover is the spent fuel pool source term and geometry which is an open item. The spent fuel pool source term and geometry information is not included in either the ABWR certified design document or the STP COL FSAR. Source term tables only reference applicant in both the DCD and the FSAR. RAI was generated to request STP address this question and the information is needed for a couple of different things. One is the spent fuel, it's needed to adequately describe the spent fuel pool source term in order to be able to do the calculations required by the Tier 1 ITAAC 3.2a which is the shielding verification ITAAC in the ABWR design. At this point in time the spent fuel pool design is not complete and the design documents and criticality calculations are due from STP in the future. This is also being tracked as an open item under Chapter 9 and I think they'll have a lot more detailed information as far as the source term and the spent fuel pool design in Chapter 9. Next slide, please.

To summarize the Chapter 12.2, there are a total of six open items in this section: five of them are associated with the effluent liquid and gaseous release calculations. We have a definite path forward in resolving these - that issue. The spent fuel pool source term is the last open item in this section, and that is not going to be a near-term resolution at this time. I don't know if, you know, like I said, we're waiting on some design calculations in order to be able to finalize that. Next slide, please.

Section 12.3 and 12.4, it's been put together here. Basically it's radiation protection design features and dose assessment. There's two open items, both associated with COL information items: the operational considerations which is relative to the area radiation monitors and the airborne radiation monitor calibration methods and frequencies. That one we're still waiting - well, we have the response but we're still in the review process of that response to that question.

CHAIRMAN ABDEL-KHALIK: What's the issue there?

MR. KELLNER: It basically has to do - the COL information item requires that the applicant provide the methodologies and calibration frequencies for the area radiation monitoring systems as well as the airborne radioactive monitoring systems. It's not - the FSAR doesn't clearly describe the guidance documents that are to be used, and that's the reason we ask the RAI as far as how they're going to develop the operational procedures and what's the basis going to be for calibration frequency, the actual calibration methodology itself. They basically say we're going to use the vendors, whoever the vendor is for that instrument, that's their - is going to be their basis.

MEMBER RYAN: And that's not a good enough answer at this point?

MR. KELLNER: The question that was asked was to provide some additional information as far as what will be utilized for developing those calibration programs, i.e., industry documents, guidance documents, what will be the basis for it, or will it just be strictly vendor calibration methodologies?

MEMBER RYAN: Fair enough. I mean, I sympathize with the problem. You're asking for details about an instrument they're not going to buy for 10 years. So it'll be a brand new technology by the time they get there, so.

MR. KELLNER: However, there are industry guidance documents as well as ANSI standards that will address this and -

MEMBER RYAN: Some of which will be updated before they buy them.

MR. KELLNER: Which is possible.

MEMBER RYAN: I mean, I understand this is an important issue they've got to check the box on, but I don't think it's necessarily a deficiency in something they can't pick until they get the fruits on the tree.

MR. KELLNER: The other open item is COL information item 12.2 which has to do with criticality accident monitoring requirements. Basically the requirement is to demonstrate compliance with those requirements. However, in the FSAR it basically said they'll either provide the information or request an exemption six months prior to fuel load. Well, that's not necessarily agency policy. They need to have the exemption in place or demonstrate compliance prior to the COL being issued. So that's basically where the process is, waiting on the follow-up from that.

Two other topics I wanted to cover here, open items, were construction worker dose. Basically information was provided in the COL and we requested some additional information as far as the bases, the models and the assumptions used for doing the calculations for the construction worker doses, and we're still waiting. We have the information in-house and we're still in the process of evaluating that information.

MEMBER SIEBER: Now, a construction worker dose would be from Units 1 and 2?

MR. KELLNER: 1, 2 and 3 depending on where you are at in the construction process because 3 and 4 - 3 will be online as 4 is being constructed. So that's the reason we're asking the additional information.

MEMBER SIEBER: Are construction workers considered rad workers? Probably not, right?

MR. KELLNER: As I said, we have the information in-house on this one and we're still currently evaluating that response. Last item here is compliance with 10 CFR 20.1406 which I think that's what I asked about earlier. We asked an initial RAI which is also being asked in the other design centers. It's a very broad scope, open-ended RAI to say what are you doing to address compliance with 10 CFR 20.1406, and it references Reg Guide 4.21 as the one method of evaluating your program for compliance with 10 CFR 20.1406. We received an initial response from South Texas and based on that response we submitted a second request for additional information. We're currently awaiting the response on that one. We are expecting that within probably the next couple of weeks at which time we should be able to finalize our evaluation on this. Next slide, please.

Two topics of interest that I wanted to cover in Section 12.3-4. One was the reactor water backwash tank vent charcoal filter and this kind of goes back to the question about putting a departure in, deciding not to do the departure. When we received this departure and we had looked at the departure we questioned it based on compliance with 20.1406 because the filter is inline to the vent line prior to it going into the exhaust stack. Now, we asked if from a 20.1406 standpoint as far as minimizing contamination of the facility over the life of the plant as well as looking at it from a dose standpoint as far as occupational dose to the workers, you know, contaminating the building and that was when South Texas came back and said you know, on second thought, we don't think we're going to do this departure. However, I put in a second supplemental RAI to follow up on this because it was never mentioned anywhere in the original ABWR design except in Chapter 12. So my problem was is I wanted to make sure that it was addressed in the appropriate sections of the FSAR as far as the system went and based on that, the final response it's been added to a couple of other sections of the FSAR. So hopefully that filter will remain in place, will end up in the final design.

MEMBER RYAN: How did we get the person-millisieverts?

MR. KELLNER: You're down on my occupational dose assessment? Well, that's the way the numbers come out.

MEMBER RYAN: Right, I'm not questioning the numbers, I'm questioning the units. Are we using millisieverts in that I see now? No is the answer.

MR. KELLNER: The FSAR utilizes

millisieverts or the international units followed by person-rem.

MEMBER RYAN: That's interesting.

MR. KELLNER: So that was the other topic of interest I wanted to cover here. Your occupational dose assessment which you jumped on that one earlier, Dr. Ryan. But basically the dose reduction was a factor of four based on the EPRI document that Milton mentioned and it's actually about a 76 percent reduction in overall dose as far as operating the rad waste building. So what I did also want to cover here was that the - where we're at with the dose assessment is we're about 91 person-rem per year per unit which is about a 40 percent reduction over current operating fleet. That's based on the NUREG-0713 and I looked at it for `07 and `08, I looked at it for the 3-year rolling for - through `07 and `08 and I looked at the individual years. And overall it's about a 40 percent reduction. They're running right around 145 rem per year currently in the operating fleet. So it's kind of up and down. BWRs.

CHAIRMAN ABDEL-KHALIK: What's the experience for PWRs in Japan?

MR. KELLNER: I'm not sure exactly what the numbers are for the existing fleet, but I think you can't really compare.

CHAIRMAN ABDEL-KHALIK: You can always compare. It depends on what you draw to have a comparison.

MR. KELLNER: Well yes, you can compare, but as far as the operating history and how the units are actually operated, I don't know if - the way that the BWRs are going to be operated here in this country versus the existing BWR fleet in this country, those are our basis for comparison. As far as how they may be operated in Japan may be slightly different. One of the things was the hydrogen water chemistry which is not utilized in Japan which will be utilized here. So I don't know that you could draw a definite conclusion just by looking at dose versus dose because the operating experience, you know, as far as how they're actually operated is slightly different.

MEMBER RYAN: Bob, don't you think just on a power basis, you know, so many megawatt days you could come up with a comparison of dose?

MR. KELLNER: I did not.

MEMBER RYAN: Not the greatest comparison I'll grant you, but it's not something that I would say is meaningless. I would say it might have some insights, who knows. If one is dramatically different than the other the obvious question is why. If they're both about the same, okay, well the same amount of power produces the same amount of work.

VICE CHAIRMAN ARMIJO: The other way is how does the ABWR in Japan compare to other BWRs in Japan. Is it 30 percent lower on dose?

MR. KELLNER: I did not do that comparison. I will take that -

VICE CHAIRMAN ARMIJO: That information might be available.

MR. ROACH: This is Ed Roach, Health Physics Branch. We did have some information from the Japanese plants, but it didn't call out ABWR specifically. But we'll take that and hopefully get back to you this afternoon.

MR. KELLNER: Next slide, yes please. Summarized Chapter 12.3. Basically there are four open items. We've already discussed those - left as far as Chapter 12.3 goes. And I guess that's it. Next slide, please.

The last thing I wanted to cover here is kind of a summary of the COL information item statuses. There were a total of 11 COL information items. You'll notice that 12.3.7.4, the material selection, is added on here. It wasn't included in the South Texas presentation. It was one that was identified as we were going through as being a - it was kind of a hidden COL information item and I just wanted to kind of highlight that. Of the 11 we currently have two that have been found to be acceptable, six are confirmatory and basically are awaiting FSAR update information, and the last three are awaiting some additional information from the applicant prior to us being able to finalize our evaluation.

The staff also reviewed Section 12.5, occupational radiation effects program, and supplemental information provided by the applicant. The responses to the open items identified in the SER of open items has been evaluated and resolved, and there are currently no open items in Section 12.5. That evaluation also included 12.5S which is basically to look at the operational radiation protection program. So that completes my portion and Mike I think has got a little summary.

MR. EUDY: Yes, in summary, due to the open items that we currently have, confirmatory items, staff cannot finalize the conclusions on this chapter. We've gone over some of those open items. In terms of a tally, we're currently at 10 open items. Not all were identified a month and a half ago in the SER, but currently we're at 10 open items with three new RAIs being issued, causing some open items.

And I had some takeaways I just wanted to go over in terms of the - to make sure we're on the same page. We wanted some more information on the impact with respect to the new GALE code coming out?

MEMBER RYAN: Basically, what are the - what insights do you have in the old code versus the new code and how do you deal with uncertainties in those kinds of calculations? I guess my problem is that sometimes we use a conservative calculation and say reality is way far away from this conservative calculation. That doesn't tell you where your actual experience is with regard to could you do better or are you near a risky point or things like that, so. And you know, what does the new code do differently than the old code, that's one, and how many significant digits do you legitimately claim.

MR. EUDY: Okay, so it's a two-part, okay. That was my second one, the value of the uncertainty. Okay. Then the other takeaway I had was a comparison with Japanese operating ABWR with respect to occupational dose.

MEMBER RYAN: And I think that would help with your insight so the staff insights in evaluating the applicant's material to get some insight is to how realistic are these based on the operating plants.

MR. EUDY: Well, that concludes it for us. Are there any questions ACRS has for us?

MEMBER RYAN: Let me offer a comment if I may, Mr. Chairman. I think the instruction taken in your rad waste - particularly liquid rad waste program to give it space and really think about it as a system that needs attention instead of something that's a wastebasket that you added on at the end is really commendable. That's obviously got some dose savings potential and some material management capability. It seems like the right way to go. I took from the staff's comments that you viewed that positively as well so congratulations on moving those steps forward.

MR. EUDY: Thank you.

CHAIRMAN ABDEL-KHALIK: Okay. Thank you, gentlemen. We'll - at this time we'll proceed with Chapter 15. Please proceed.

MR. HEAD: Okay. We're going to be doing a Chapter 15 presentation. These gentlemen who've been up for Chapter 4 before. And it's the standard agenda, and individuals in the room that can help us answer any questions on this chapter. I'll turn it over to Jim.

MR. TOMKINS: Okay. So to give an overview of Chapter 15, it's somewhat similar to Chapter 4 in that there's really very few changes to Chapter 15. There's no Chapter 15-based departures, there's no departure from the fuel design which we already talked about and that's usually a big driver on Chapter 15. There's some minor descriptive changes due to departures in other chapters and I'll talk about several of those. All the COL items have been addressed and there's no ITAAC associated with Chapter 15.

CHAIRMAN ABDEL-KHALIK: Now as we sort of mentioned earlier, there is a departure in Chapter 6 related to the containment analysis and which is related to the feedwater line pipe.

MR. TOMKINS: Correct.

CHAIRMAN ABDEL-KHALIK: And part of the justification for including the departure was that the assumptions used in the analysis were non-conservative. And the question then is why hasn't that impacted Chapter 15?

MR. TOMKINS: That analysis is done in Chapter 6, in Subsection 6.2. I was going to mention that in just a second. In fact, the LOCA analysis is also in Chapter 6 as well. It's just where it's located. So we - so there was nothing to depart from in Chapter 15 associated with the containment analysis. Chapter 6 is containment and so that's where the containment analysis resides.

CHAIRMAN ABDEL-KHALIK: So Section 15.6, the decrease in RCS inventory does not discuss feedwater line breaks?

MR. TOMKINS: There's a - I don't know if it's 15.6, but there's a pointer to Chapter 6 which says this analysis is discussed in Chapter 6.

MR. JAIN: Basically the LOCA analysis, the ECCS performance to comply with 10 CFR 50.46 is done in Chapter 6.3. In 15.6 is offsite dose is calculated for LOCA. So 15.6 is limited to offsite dose calculations for LOCA. We see the performance in Chapter 6. The containment analysis is given in Chapter 6.2. And those non-conservatisms which you were referring to are really for the containment analysis.

CHAIRMAN ABDEL-KHALIK: I just want to make sure that we don't miss things because they're just put in the wrong bin.

MR. TOMKINS: We'll capture this and make sure we cover it. Again, there's going to be a substantial discussion when we get to Chapter 6 on this subject because it is a big change for the analysis.

MR. HEAD: And that's been our thinking is that we would use the Chapter 6 discussion to cover all of this as a topic and the ramifications of that issue in Chapter 6.

CHAIRMAN ABDEL-KHALIK: But you know, the whole process of tracking these departures was to know where it touches elsewhere, and I didn't see any reference to the fact that this may touch Chapter 15.

MR. TOMKINS: And the answer is it doesn't. That departure does not touch anything in Chapter 15. So I think we can go to - does that answer your question? So this is the list of sections. I will mention that we did add one supplemental section, 15.1S as a follow-on to Reg Guide 1.206 which said make sure you look at all design changes that you're making in the plant to make sure that there's none that affect the accident analysis. And so we have a supplemental section that addresses that issue. The next slide just shows some of the appendices, you know, the ATWS results are in 15E, there's some LOCA curves in 15F actually, and then there's the - 15A is the nuclear safety operational analysis, kind of the philosophy GE used to perform the accident analysis. Next one.

Let's talk about there's four Tier 1 departures that do touch on Chapter 15. The first is hydrogen recombiner elimination, we mentioned that earlier today. There's only one change to Chapter 15 associated with hydrogen recombiners and there was a figure that listed various safety system auxiliaries and we just removed that system from that figure. It doesn't really credit it in any of the analysis that's done in 15. The second Tier 1 departure, safety-related I&C architecture 3.4-1. That was discussed earlier. There's five places in Chapter 15 where nomenclature changes were made. One of the big parts of that departure is to change some of the nomenclature to a more functional type description. And these old terms that were in Chapter 15. Again, pretty minor change.

There's two more Tier 1 departures I'll mention. There was a seismic reclassification of the rad waste building, we mentioned that earlier. That's still seismically qualified, it's just not Seismic Class 1 any longer and there was some text in Chapter 15 that needed to be changed to clarify that it's now being qualified in accordance with Reg Guide 1.143

rather than Seismic Class 1. But there's no impact on any results.

And then the last one is one that we also discussed previously and that's the deletion of the MSIV closure. That feature is not credited in any of the analyses in Chapter 15. The only reason it was in there is there was a section discussing what are the ways you can get an increase in pressure event and one of the ways is to have the MSIVs closed. And so there was actually a sentence that said some examples of possible ways the MSIVs can close is actuating this particular feature, so we deleted that. So that was the extent of the change due to that departure in 15.

There's one additional one I'll discuss. This is a Tier 2 departure, but it does impact the tech specs so it does end up requiring NRC approval and that's 8.3-1. It changes the intermediate voltage from the DCD had 6.9kV and it changed it to 4.16kV and 13.8kV, two different buses. Again, no impact on the safety analysis. The reactor internal pumps are still grouped the same way they were before. There's three on two buses and there's two on two other buses. So no impact on the accident analysis.

COL license information items. There were eight that we needed to address. We've addressed all of them. There were five that were related to, again, the fuel change where it basically said if you change the fuel you need to revise and provide us this analysis. Since we're not changing the fuel that analysis that's already in the DCD stands. There were a couple of these that were related to chi over Q and what the DCD basically said is that you would update based on any change in final design or site-specific values to reflect. And so we looked at the chi over Q's and we revised some of the dose calculations in two of these COL items. The offsite doses are still well within the limits, but that was just an action that we had to take. So that's the COL items.

There's two supplements I want to discuss, 15.1S. I mentioned 15.1S previously. It really answered the questions did you make any design changes that would impact the accident analysis and we documented that there were none in this section. Then there was a supplemental subsection we asked. There was a couple of applicant items, they were sort of like - I think the previous presenter referred to hidden items, but they were - they had a sentence in the application that said the COL applicant needs to update the analysis to conform to the as-designed plant and site-specific parameters. So for the four events that you see listed in the slides, instrument line break, main steam line break, we did that and there were a couple of the chi over Q values that exceeded the values in the DCD, and they exceeded by 7 percent in one case and by 9 percent in another case, and so we re-computed the doses for those events. They're still under the limit and acceptable. The DCD was written by looking at a number of sites. And so they tried to come up with chi over Q values that bounded representative sites around the country. For a couple of values that didn't happen based on the chi over Q calculation we did. So that's it. Again, not a lot changed in Chapter 15.

CHAIRMAN ABDEL-KHALIK: How much of this stuff will have to be repeated when you select a new fuel?

MR. TOMKINS: A lot. Almost all of it, probably.

CHAIRMAN ABDEL-KHALIK: And what is - I guess I'm not sure. Does the ACRS get involved in this license amendment when they change the fuel?

MR. WUNDER: I'll have to check, sir, but I don't believe so.

CHAIRMAN ABDEL-KHALIK: Maybe we should. It's probably our choice.

(Laughter)

MEMBER RYAN: It's going to be.

CHAIRMAN ABDEL-KHALIK: We'll have to discuss this internally because this is such a major change that we may wish to look at that in detail.

MR. DONOGHUE: This is Joe Donoghue from Reactor Systems Branch again. The topical reports that will be referred to to support a future design amendment are of course going to be available for the committee's review and if you like we'll be talking to them in the future.

CHAIRMAN ABDEL-KHALIK: Yes, I understand, but this is such a big change that I believe the committee will likely want to look at this.

MR. DONOGHUE: And my branch is depending on doing a lot of work on this in the future, yes.

CHAIRMAN ABDEL-KHALIK: Thank you. At this time I guess the staff will proceed with their Chapter 15 presentation.

MR. MUNIZ: All right. This is the staff presentation related to Chapter 15 of the STP COL application, accident analysis. My name is Adrian Muniz. I'm the chapter PM that worked on this chapter. The technical people involved in this chapter are in attendance and will be ready to answer any questions by ACRS members. However, I'll be doing most of the presentation to you today. People involved in this chapter on the technical side are Jay Lee, George Thomas, Stephen Williams and Dinesh Taneja.

What we're going to be presenting to you today are key points in our - the departures on Chapter 15 which we consider to be the departures that did require NRC approval, COL information items and supplemental information that the applicant provided in their application. And we'll also provide an overview of the open items that we had in the SER. The - as you can see in the STP presented before all the - these departures didn't make changes to Chapter 15. However, they were made to make information in Chapter 15 consistent with the design changes in other chapters. None of them were evaluated in this chapter and we provided the specific chapters where they are evaluated. I understand from the earlier discussion that the ACRS members were interested in specifically in Tier 1, 2.3-1, collision in MSIV closure and the staff is ready now to provide some information on the matter.

MR. TANEJA: I'm Dinesh Taneja from the I&C branch of the NRO. Looking back there was a BWR

Owners Group addressing this issue that was a generic issue with all the BWRs at the time. I believe it was back in the early `90s. They issued a topical report on eliminating the trip from the radiation - main steamline radiation detection trip isolation of these valves. And that topical report was reviewed by the staff and an SER was issued approving that topical report. And that is the basis that have been used by a number of the operating BWR plants and most of them have already deleted that trip feature from their plants. I think there are some still in the process of doing that. Just wanted to give you guys where we are on that.

VICE CHAIRMAN ARMIJO: Okay, so that was a generic change to any BWR that wanted to eliminate that, they could go ahead and do it?

MR. TANEJA: The owners group topical was for all the operating BWR owners.

VICE CHAIRMAN ARMIJO: All right.

CHAIRMAN ABDEL-KHALIK: Now, what is the most severe pressurization transient?

MR. JAIN: Typically it's the MSIV closure is the - and then the highest pressure we calculated is MSIV closure and reactor scrams on high flux.

CHAIRMAN ABDEL-KHALIK: But eliminating

this trip does not sort of eliminate the need to do that analysis because there may be other mechanisms by which the MSIV may close.

MR. JAIN: Yes, that analysis - yes, that mechanism is still there. You just reduce the likelihood.

CHAIRMAN ABDEL-KHALIK: Okay, thank you.

MR. MUNIZ: All right. Any more questions, or any questions on this slide? Going forward. The COL information items that the staff looked at, we tried to group them together and actually there's a subsequent slide for COL information items. In COL information items related to the fuel design and COL information items related to the potential radiological effects. For this slide that we're presenting here, these are the ones related to the fuel design and as discussed by STP we haven't taken any departure from the DCD fuel design that was approved by the staff. And therefore, the analyses that are presented in the ABWR DCD are still valid and therefore that's why the staff concluded that the COL information items are satisfied at this point.

For the potential radiological effect COL information items, basically for all of them were either found to be consistent with the values approved in the ABWR DCD or bounded by these values. If the ACRS members are interested in any one in particular we have the staff here to address them. Otherwise we'll move forward to the next slide. The applicant also provided supplemental information regarding site-specific design basis accident chi over Q values. These values were looked at by the staff and were found to be bounded by the DCD values that were approved by the staff as well. And related to the open items in the SER we had four open items, but at this point we've closed three of the four. The one that remains right now is the one related to the technical support center which is an RAI that's coming from Chapter 13 and the applicant is slated to provide that information in May of this year and at that point the staff will review that information.

MEMBER SHACK: The licensee said the chi over Q values are not always bounded. The releases were within limits, but the chi over Q values were not bounded.

MR. MUNIZ: Is Jay Lee here?

MR. LEE: Sorry, I didn't hear your question.

MEMBER SHACK: It's just that here it says the chi over Q values are all bounded by the DCD and the licensee says no, that's not the case. The releases are all within acceptable limits, but some of the chi over Q values were higher.

MR. LEE: That was one of the open items, but subsequently the applicant recalculated the chi over Q values and they responded to our RAI with the new numbers showing that the old control room chi over Q values were - are indeed bounded by DCD chi over Q values.

MEMBER SHACK: And site-specific offsite? It says all site-specific offsite and control room chi over Q are within.

MR. LEE: Yes.

MEMBER STETKAR: Is that statement true? South Texas?

MR. TOMKINS: There are a couple chi over Q values that exceeded chi over Q values that were in the DCD. We did a radiological analysis to address that and the numbers are within the -

MR. LEE: Yes, also you provided new numbers in response to our RAI showing that indeed your chi over Q values you exceeded previously were - now it's bounded.

MEMBER STETKAR: On March 2, 2010, do you believe that some of your chi over Q values are indeed higher than -

MR. LEE: They were higher at that time, but I think your response to our RAI in December was upgraded.

MR. TOMKINS: Right. We responded in December, but there were still a couple that were higher.

MR. LEE: No -

MR. TOMKINS: They were just different.

MR. LEE: No today. You are all within the DCD values.

(Laughter)

MEMBER STETKAR: This is an interesting discussion, isn't it.

CHAIRMAN ABDEL-KHALIK: I think there's enough material on the record that an intelligent listener will figure out what's going on. So let's proceed.

MR. MUNIZ: All right. The conclusions that the staff arrived to are that the departures are evaluated in other chapters and the design information will be evaluated in those chapters. The COL information items were found to be satisfied by the applicant and the supplemental information provided in this chapter was found to be acceptable. And there is one outstanding item, open item that needs to be resolved in order for the staff to reach a safety conclusion.

CHAIRMAN ABDEL-KHALIK: Are there any other questions for the staff?

MR. HEAD: I had just one point. You'd asked earlier about a Part 21.

CHAIRMAN ABDEL-KHALIK: Yes, sir.

MR. HEAD: And we've not been able to bring that to a conclusion at this point, and so my expectation is the next time we meet then we'll brief you on our conclusions with respect to that.

CHAIRMAN ABDEL-KHALIK: I think there were more than one Part 21 issues.

MR. HEAD: Oh yes. We're finding - we want to understand the ramifications -

CHAIRMAN ABDEL-KHALIK: It may be a problem with the process that the staff follows in the review in that they don't normally go back and check whether there are Part 21s issued with regard to a specific topic or issue under consideration. Is that correct?

MR. DONOGHUE: Yes. This is Joe Donoghue again, Reactor Systems Branch. We did the same thing you did. We came to the conclusion that there are

Part 21s that we are going to - we've already interacted with our compatriots at NRR a little bit, but we're going to interact some more. We'll probably be talking to South Texas about those Part 21s and pursuing this. The process part of this is normally if there's something that has to be done generically a generic communication of some sort would result, and I'm not aware of that at this point, but that's what would lead us to have included this in the review. So we'll pursue the question and come back to you.

CHAIRMAN ABDEL-KHALIK: Thank you.

MR. HEAD: And obviously this last little interaction we had over the chi over Q's, we will be working with the staff to resolve that.

CHAIRMAN ABDEL-KHALIK: With everybody's indulgence we can proceed. Okay. Let's proceed with Chapter 18. All right, let's proceed.

MR. EUDY: You want us to proceed without the NRC reviewer? The NRC reviewer is not here. We're so far ahead of schedule. I'd let him know that hey, we're ahead of schedule, at lunch.

CHAIRMAN ABDEL-KHALIK: Perhaps at this time we can take a break. Let's take a 15-minute break. We'll come back at 2:15 and hopefully by that time everybody will be here.

(Whereupon, the above-entitled matter went off the record at 2:01 p.m. and resumed at 2:15 p.m.)

CHAIRMAN ABDEL-KHALIK: Before we get started on the Chapter 18 presentations, I think the staff would like to make a statement regarding some of the discussion we had immediately prior to the break.

MR. LEE: Yes, this is Jay Lee again. During the recession we checked the chi over Q values again and the applicant is right that the chi over Q - two chi over Q values for control room are still higher, but the resulting doses are bounded by DCD doses. I just want to make that correction.

CHAIRMAN ABDEL-KHALIK: Great. Thank you. All right. Now, at this time we'd like to proceed with the Chapter 18 presentations and we'll begin with the applicant's presentation.

MR. HEAD: Okay. We'll do Chapter 18. Again, our standard. I noted this morning that our operations manager Jay Phelps would be here this afternoon and he has joined us. And given the nature of this chapter we felt like there might be some questions that could come up that he could help us with, so Jay has joined us. Mike Murray, our I&C manager, talked earlier and will be participating in this presentation. We have a number of other people here today to help us with this.

MR. CHAPPELL: With that I'll continue the presentation. This is Corey Chappell again and - with STP 3 and 4 licensing. I'll go over a summary of the chapter and then hit some high points here. Chapter 18 describes human factors engineering program, as approved in the DCD. A very limited number of changes. We have not changed from the description how to implement this and how to incorporate the human system interface and design features for the ABWR. Also included in this chapter are a number of appendices which lay a foundation for ABWR emergency procedure guidelines and what we're going to follow on for the plant-specific technical guidelines and emergency operating procedures. The basis for these appendices is BWR Owners Group Emergency Procedure Guidelines Revision 4 which have been evaluated and the information that's been provided in the DCD and largely incorporated by reference shows the comparison and how these ABWR design features have been incorporated for different responses. Impacts of departures in this chapter are largely for consistency, changes, deletion of system, as discussed, some minor changes due to I&C and the deleted coded standards that's obsolete.

COL license information items discuss different aspects of the design that are to be evaluated as we go through the design process. For example, some of the TMI items for additional instrumentation, wanted to make sure that that additional instrumentation was accounted for in the operations. Or some of the features of ABWR which is hardwire controls for remote shutdown system, that that doesn't cause an undue concern for operators trying to safely shut down the plant. And these types of evaluations are being performed throughout the design process and will be evaluated and verified.

MEMBER STETKAR: Coley? One of the - we have a lot of time and you're skipping through this pretty quickly, so you have to indulge us a bit because we haven't seen Chapter 7 yet so we don't really know what's behind all of this. But a couple of things that I wanted to ask you about is if the response is going to be continually wait for Chapter 7, fine, I can accept that. But because Chapter 7 and the human system interface are so closely related I thought I'd ask here. I know one of the changes was that you were adding the drywell pressure to the SPDS displays and that the SPDS displays would be on the large display panel. Is the large display panel a safety-related display panel in this plant, or is it a non-safety display?

MR. CHAPPELL: Just for clarification, I believe that departure is under a Tier 2 change, 7.5.1, which is a tech spec change, and it was evaluated to add the parameters to the safety - the large display. So it's somewhat related perhaps to the I&C departure change, but isn't an I&C change. And the - because of what's required for containment parameters as entry conditions and responses by operators for protection of containment it's been added to the list for the safety parameters display.

MEMBER STETKAR: I think I understand that. I think what I was asking was is the safety parameter display on the large display panel, and if it is - I thought I read that it was - and if it is, is it a non-safety related display, or is it a safety-related display?

MR. DITTMAN: Coley, let me take this. I'm Kyle Dittman, STP I&C lead. Is this working?

MEMBER STETKAR: Don't know.

MR. DITTMAN: The SPDS, part of the large panel display doesn't require it to be safety-related. SPDS isn't required to be safety-related. What part is required to be safety-related is the Reg Guide 1.97

Cat 1.8 variables.

MEMBER STETKAR: Okay, that was going to be my second question of what are those? You know, I haven't read every single reg guide, so.

MR. DITTMAN: Which variables are those?

MEMBER STETKAR: Yes.

MR. DITTMAN: I won't be able to recall off memory here, but they are listed out in the DCD in our COLA. One of them I think is the drywell pressure and we added one variable because it wasn't part of the Reg Guide 1.97.

MR. CHAPPELL: This one in particular was evaluated as a requirement for Reg Guide 1.97 which led us to take the departure because this wet well pressure as well as drywell pressure is used by the operator to determine when to initiate containment.

MR. HEAD: Kyle, you can't remember this all, but could you give the basis for why they would be?

MR. DITTMAN: Typically the Cat 1E variables are required by 1.97 because there - once the operators need a safety-related application to perform immediate-type actions or they are not automated. But -

MEMBER STETKAR: I mean, I got a bit

confused. The things that bother me are statements that says the - adding the drywell pressure to the SPDS display improves reactor safety because it directly supports the operator's decision to implement manual actions associated with protection of the containment. And yet if it's a non-safety display as an operator it's not at all clear to me how I have that information available to me to protect the containment.

MR. DITTMAN: That specific variable, again coming from memory, is a safety-related - it will be displayed safety-related per Reg Guide - to meet the requirements of Reg Guide 1.97.

MEMBER STETKAR: Because I found the discussion of Reg Guide 1.97 with respect to main steamline radiation which we had some questions about earlier, but I didn't know what Reg Guide 1.97 meant.

MR. CHAPPELL: We have - perhaps maybe I would try to answer with a question maybe and get directed back on. SPDS is a collection of displays, large panel display, for overall plant status, but specific instrumentation is classified as Reg Guide 1.97 but the inclusion of the overall bit of information to get the overall plant status may or may not be Reg Guide 1.97 on that particular piece.

MR. DITTMAN: Reg Guide 1.97 is post accident monitoring, post-TMI stuff that - whole different types of display - parameters that were required to be displayed to meet the post-TMI requirements. SPDS also came up post-TMI but it was more to help guide the operators along the EOPs and stuff like that is my understanding.

MEMBER BROWN: Is the SPDS just a set of data? I thought it was a more graphical presentation that came out of - it was - I forget -

MEMBER STETKAR: It's a design. How they want to display it is a design-specific decision, but the parameters - I'm more concerned about statements that we added this parameter to an SPDS display because we determined that it'll improve safety because it cues a particular operator action and -

MEMBER BROWN: Okay. I certainly agree with those words. On the other hand, if it's implemented in a way through a non-safety related display I'm not quite sure what it's really doing for me. This kind of comes back to statements about things where perhaps we're not familiar enough with the actual design or statements that might be made that aren't fully supported by the actual design. That's what I'm trying to find out.

MEMBER BONACA: The TMI action items which have to do with SPDS and with the inadequate core cooling.

MEMBER BROWN: But most of the SPDS displays these days are non-safety related. They go away.

MEMBER BONACA: Because they had inadequate core cooling information and that was I think safety-related.

MR. HEAD: Is the language you're seeing in the justification for the -

MEMBER STETKAR: It's actually in the SER. I didn't - the language quoted was in the SER so I can ask the staff about how they determined this, but I sort of wanted to understand a little bit more about the design itself which is why I asked whether it was - whether this particular parameters in the SPDS was part of a safety-related display, or part of a non-safety related. Because in all likelihood if your non-safety is only qualified for two hours or whatever the batteries are, it might not be around by the time the operators need this.

MR. HEAD: So have we answered the question? Is the answer yes?

MEMBER STETKAR: I'm not quite sure

whether you've answered yes or no.

MR. DITTMAN: Well, the question you were asking and it sounded like you were looking at SPDS and Reg Guide 1.97 as almost like separate. A lot of Reg Guide 1.97 stuff falls in SPDS -

MEMBER STETKAR: I know there's an overlap.

MR. DITTMAN: There's a big overlap, yes.

MEMBER STETKAR: But what keyed me was just this simple parameter - this is a parameter that has apparently been added between the DCD and the COL.

MR. CHAPPELL: I think it's been reclassified in the DCD to meet Reg Guide 1.97 and Category A for Chapter 7. It was in containment.

MR. DITTMAN: Originally it was - it didn't appear - it didn't meet the requirements of Reg Guide 1.97.

MR. CHAPPELL: Right, it's been -

MR. DITTMAN: It's got more -

MR. CHAPPELL: This departure revised the classification for it.

MR. DITTMAN: Yes.

MR. CHAPPELL: And in Chapter 18 the significance of it, it was brought in and said here's a parameter that's not included in SPDS that needs to be in SPDS. So the classification and where all it's displayed within the control room are kind of a little bit two different things and I think consistent with -

MEMBER STETKAR: I guess I'm a little less concerned about what particular regulatory guide might get this thing on some part of the control room display than I am whether it's in a third parameter that should be available to the operators under accident conditions.

MR. DITTMAN: I'll take that. The regulatory guide that will drive it - be safety-related as a safety display is Reg Guide 1.97.

MR. HEAD: So, is the answer yes, that it's safety-related?

MR. DITTMAN: Yes.

MEMBER STETKAR: Okay, thanks. That helps.

MR. HEAD: I'm asking the staff. That's what I think I've heard.

MEMBER STETKAR: I thought I heard that too.

MR. TANEJA: Let me add from the existing GE plant's perspective. The existing GE plants, the SPDS displays are typically not safety-related, right? But they have a lot more than Reg Guide 1.97

variables. The Reg Guide 1.97 variables are individually displayed as safety-related displays and they're available to do the EOPs.

MEMBER STETKAR: And a lot of times they're in the so-called fixed part of the central display.

MR. TANEJA: Fixed, gated, and stuff like that, exactly. And they're also duplicated on the SPDS which are non-safety.

MEMBER STETKAR: What I was trying to get to is if this indeed is an important parameter that needs to be displayed, is it on the safety-related part or is it on a non-safety? Is it fixed, you know? People call it up. It's a design detail, but at this stage in the process we don't have a lot of that type of information to deal with. So I'm trying to think of at least within the Chapter 18 portion of what we know about the design or what we have available, how does any new information that comes out of this process affect operator interactions, you know, which is all we can really talk about in the context of Chapter 18. Thanks anyway, that was probably more than it deserved.

MR. CHAPPELL: All right. And I won't go through these items, but all of the COL items have been addressed in Chapter 18. Generally speaking we have tied them to ITAAC or provided the information in the FSAR.

For part of the design process the Tier 2-star requirements for compliance with the ITAAC or design acceptance criteria for the development of the human factors program -

MEMBER BLEY: This is probably a good place for me to interrupt you and toss something out. I don't have much trouble with what's there in this. I have a little trouble with what's not there and it meets the process okay, but the truth is I was hoping some of these DAC associated with human factors engineering would either be getting closed out before you finish this process or you'd talk some about how they get closed out. I know there's a - the I&C DAC arrangement coming up and we're going to hear about that later this week in full committee. But when I go through the details of the DAC in this area, a lot of them are clearly some kind of an inspection in work, is this document in place, does it include these kind of people. Some of the other ones, like the program showing sure operating personnel situation awareness, the operators' information of the processing requirements, operator memory requirements shall reflect the sensitivity, precision and timing of what the operators do. Those are kind of hard to put into an inspection process and I wonder how you're planning to address those, when you think this will come up. I know it doesn't - it isn't what you're doing now, but are you going to be having topicals or technical reports that come in for review or your own - you're going to have your own procedures that you have to write to satisfy these. Any idea when those are going to come?

MR. CHAPPELL: The HFE design acceptance criteria ITAAC laid out processes, it starts as a top-down. There's really several phases. So you have an overall program phase, and then a planning phase, and then an analysis phase, a verification phase, an as-built phase. And so it starts out with general plans and then develops throughout that. So a lot of the initial top-down program plan we have provided for review to the staff as an indication of where we'd be already. So this happened last year. And then throughout this upcoming year we're developing those top-level plans. So those top-level plans will be inspected at some point and Mike Murray will talk about that. And as those implementation plans are reviewed and we move forward through the analysis and then the design, ultimately getting into a simulator and verification of the details that you're asking about, it's not all the way at the end and then we look at it, it's throughout. And I'm sure that staff will discuss that because it's an important aspect.

MEMBER BLEY: I guess the other part of it that made me a little happier, you guys have looked closely at the DAC in this area. Can you think inspection of those is adequate to have these? Are you going to be comfortable with the human engineering? And it sounds like maybe we'll get more than that as we go through that process, but much of that is coming after the license, right?

MR. MURRAY: That's correct, and our approach will be, and as you said we'll discuss it more in the pilot discussion on Friday and I'll be here for that is that - it's an ITAAC so we have to show closure to it in that process. We use inspections for that basis for it. We'll provide the documentation required for, one, inspections, and also for us to be able to say that we closed it. So we'll go through those items and set the strategy that we can support and feel good that we've met the ITAAC requirements for HFE as we go through it and build those data packages that say we've done that.

MEMBER BLEY: Friday you're going to be talking I&C though.

MR. MURRAY: We'll be talking I&C, but the attributes that we develop in that pilot will apply to human factors, the other design acceptance criteria areas.

MEMBER BLEY: Okay, well I'll just put it on the shelf for you for later this week. We're going to be wondering how these specific acceptance criteria are amenable to an inspection rather than some more detailed kind of review.

MR. HEAD: The presentation will be by the staff. We will be in the meeting and we're certainly more than willing to partake.

MR. CHAPPELL: Thank you. Any other questions on any of the particular items? So this - back to the design process overview. This is a familiar element of an acceptable HFE program and we've discussed some of the review of the implementation as well. What's the significant point to make is that we haven't taken departures from this approved method of an acceptable HFE program. STP will look at the industry experience and the developments in HFE over the past years and for example will incorporate NUREG-07 Revision 2 guidance will follow the practices of that guidance, but we're not committed to that. Those will be part of the program, part of the engineering aspect, not the licensing aspect.

MEMBER BLEY: I've got to ask you one question. There's stuff in 18 that show up that you made changes that fall in the area you raised this morning, that's clear. There's another one that gets repeated and repeated that looks trivial to me, but since you went ahead and made these changes and put them all through, maybe I'm missing the subtle importance of it. And it's where you've gotten rid of plant computer is available and changed it to plant computer functions. What's the significance of that? It must be significant because you did it so much.

MR. MURRAY: Yes, well in our design we've integrated the plant computer with the plant control systems and that's - if you look at the figure that's in the COLA which is 7.90-1 you'll see there that we use plant information and control system as an integrated system. So we didn't feel it was appropriate to leave it as a - that made it look like a standalone computer system that did those functions.

MEMBER BLEY: Okay.

MR. MURRAY: Okay, so that was what we

were clarifying there since it was integrated, that those type computer functions reside in the plant information control system.

MEMBER BLEY: Good enough for now. We'll wait for Chapter 7.

MR. CHAPPELL: Just to be clear, this is a typical design. The main features will represent generally the layout of the plant, what design features of STP 3 and 4, what they will be. But it's just a typical ABWR control room. You can see information is displayed. Very unique I think compared to other BWR control rooms, but it has been in use for ABWR.

MEMBER BLEY: Is there a simulator in the U.S. that -

MR. PHELPS: We're going to talk a little bit about what we've done working on this. I'm Jay Phelps. I am the operations manager on Units 3 and 4. I've been at South Texas Project for about 22 years and held an SRO license on PWRs for about 18 years and dropped that when I moved over here. I personally spent with a number of our team nine days on the simulator in Japan at the boiling water reactor training center.

MEMBER BLEY: Did they put English on

there for you?

MR. PHELPS: We actually did have overlays over a number of the controls and they accommodate us with programming on the specific evolutions we would do to display English language on there. So it was beneficial. Kyle Dittman had an opportunity to participate with me there and we've got another team going over here in April from about the 10^{th} to the 18^{th}. And we've taken that experience to build upon the initial APODIA design as Toshiba would call this, Americanize it if you will, what indications need to be grouped together, where should they be displayed, working closely with our EPC teammates who have a number of BWR experienced individuals working as well. Where is that information, what needs to be displayed. So you'll see some changes on how this is done here. There is not a simulator in the U.S. at this time. There will be a model of it showing up sometime this year in Charlotte that Toshiba is bringing in kind of as an advertisement if you will, but not a functional ANSI standard simulator that you would do operator training on. But it'll certainly give you good ideas. We've run through a number of typical scenarios, startup, shutdown, plant trips, turbine trips, losses of power, those kinds of activities on this simulator to get a sense of what's different for the operator with this simulator compared to the current plants and the experience levels that we have now, and there are some. And so using this HFE process, and it's a good process right now, as we work through the - here's what we think is a good idea with the program plan and then verify and validate with actual plant procedures with actual operators that are going to do that and then adjust it as required or adjust the procedures as required. It may not be move the indicator over here. There may be another way through training to make this the control room of the future. Since there isn't one in the U.S. now, are you folks actively involved with Toshiba in the design of the one that you'll get?

MR. PHELPS: Oh, absolutely. Yes, yes. We have -

MEMBER BLEY: So you have - and you have yourself and other operations people involved?

MR. PHELPS: Absolutely, yes. I have myself from South Texas, I have five ex-BWR SROs working with Westinghouse on creating the actual layout and design of the control rooms. Still a good bit of work to do on the actual human system interface with the smaller screens you see on the control panel, but I think we're very far along and close to finalizing the immediate picture that you can see on the wide display panels right now.

MEMBER BLEY: When are you going to have one at the site?

MR. PHELPS: Right now the schedule date for ready for training would be about 2013. Early 2013, yes.

MEMBER BLEY: Thank you.

MEMBER STETKAR: A couple of other more focus specific questions. Forgive me because we don't have Chapter 7. Is your remote shutdown system purely analogue?

MR. HEAD: Kyle, can you address that?

MR. DITTMAN: Yes. The remote shutdown process, it meets DCD and it is analogue system hardwired.

MEMBER STETKAR: All of it's analogue?

MR. DITTMAN: Yes.

MEMBER BLEY: No talking to the other digitalized systems?

MEMBER STETKAR: The thing that I was a bit concerned about is, you know, there are statements made that while the operators have no problem transitioning over to the remote shutdown because, you know, they're trained. On the other hand, if I can't write anymore with a pen because I've learned how to use one of these computers now -

MEMBER BROWN: He just tweets it.

MEMBER STETKAR: I was curious whether you've thought about that at all.

MR. PHELPS: I have gone by the simulated single division of the remote shutdown system that exists at the Kashiwazaki-Kariwa training station down there and it's very similar to the hard wires controls that do exist in the main control room. The entire control room is not digital. There are a number of hard-wired functions that are capable of being performed there, and the actual operation of those components will be pretty much identical.

MEMBER STETKAR: Well, capable versus normally used are two different things.

MR. PHELPS: Yes, and I think -

MEMBER STETKAR: Coming from a plant where we never touched any of the alternate things, you know, for years it's a little bit different to say you can - it's capable of using it versus operator proficiency, and whether or not a different type of interface might be better.

MR. CHAPPELL: We actually had a COL item to specifically address this and this COL item, the information provided in the COLA to address the COL item ties it to elements of the HSI design as well as training as well as validation. And there will be a part of the design that evaluates this feature to ensure that it doesn't require operators under burden to manipulate.

MR. MURRAY: Let me add something from what Jay said. There are - to make sure you're clear on this, there are hand switches in the main control room that are used on a daily type basis that will be hard. They won't all be soft controls.

MEMBER STETKAR: Thanks Mike, because I didn't - that's important information. The information as best as I could tell reading through Chapter 18 was that those hard-wired switches were as a backup if the - if the VDU touchscreen type displays failed or something like that. But you're saying that the operators will actually use some combination of digital and analogue controls.

MR. MURRAY: And that's correct. That's continuously looked at through the human factors process as well of those that we feel that the operator needs manual controls for.

MR. DITTMAN: For example, some of the

controls that are hard-wired in the control room is like the tiebreakers for safety buses, diesel controls is going to be hard-wired. There will be a display, a display for diesel parameters, but not safety stuff, but the actual hard-wired stuff. There will still be hard-wired controls the operators will be using to operate some equipment.

MEMBER STETKAR: A couple other quick questions because I apparently have "PRA" stamped on my head. You said that the process - this is from the FSAR, in Section 18, or Table 18E-1 - task analysis implementation plan shall include methods for identification of critical tasks. The identified critical tasks shall include at the minimum those operator actions which have significant impact on the PRA results as presented in Section 19E-7. I think that's really good, by the way, that you're actually using the PRA as a guide for looking at task analyses for the integrated design. My only comment or question is how do you determine which actions are important from the PRA? I know Stillwell -

MR. HEAD: He's listening on the phone right now.

MEMBER STETKAR: Oh, he is?

MR. HEAD: I'm pretty sure he is.

MR. CHAPPELL: We have a baseline list of operator actions that are referenced in 19D-7 and those are what we're starting with and those are what are evaluated and included, for example, as inputs into the ABWR EPGs. So that gives us a set of important operator actions that are described in Chapter 19, a part of this chapter.

MEMBER STETKAR: Okay, we haven't seen Chapter 19 yet either, so. My only comment would be if the measure of importance is by some negative connotation, for example, risk achievement worth or - I'm sorry, risk reduction worth or Fussell-Vesely importance. Things that show up at the top of a list as being important, you certainly need to think about those because those errors have shown up as potentially important contributors to risk. It's probably more important to look at the things that don't show up because that says the PRA is taking a lot of credit for those operator actions as being very, very, very reliable. You want to make really sure that your design supports that reliability. So my only comment would be is if you're using the PRA as fundamental input to that list of actions for task analyses, don't just look at the stuff that boils up to the top as being important to risk because the very, very reliable operator actions that apparently have some assumed input from displays, alarms, procedures, whatever human interactions could become important if the human error rates were substantially higher.

MR. HEAD: What I would propose is as of right now the schedule is that we're going to be doing Chapter 7 and 19 on the same meeting.

MEMBER STETKAR: Same meeting?

MR. HEAD: Yes. That's the proposed schedule.

(Laughter)

MR. HEAD: There's some interesting discussions that we can obviously have on Chapter 19. But I would offer that we would certainly make that aspect something that Bill would cover in that briefing.

MEMBER BLEY: And related to that, especially if he's listening in, last time he was here and he told us your plant-specific PRA is moving along rapidly. I forget when he told us he thought they'd have results. I thought it was probably sooner than it really is. I thought they were saying sometime this year. Do you have any idea?

MR. PHELPS: I think it's sometime this

year.

MEMBER BLEY: If they do, if you're actually using it to do some of these things I assume you would transition into using your own PRA as soon as it was reliable enough for you to be confident in it. Is that true?

MEMBER BLEY: Yes. It's not the - what is being built now is the operational, like all the operational PRA. We have a PRA to support the certified design and we're using that as necessary, but we clearly are focusing on getting this operational PRA built and up and running, and I think it is later this year. And like I say, that may sound like a heavy day for 7 and 19, and we'll obviously consider that as part of, you know. But there will be a couple opportunities for us to discuss that in more detail.

MEMBER BROWN: I have one observation on that. We need to do Chapter 7 first, please, and we should schedule it for seven hours and let one hour be left over for the PRE. We work on stuff that's real, you know, effluvia and cloud diagrams.

CHAIRMAN ABDEL-KHALIK: I know we're ahead of schedule, but we would like to keep this focused. So are there any questions to the applicant regarding

Chapter 18.

MR. CHAPPELL: That was my last slide, so thank you.

MEMBER STETKAR: I did actually have one more, and this might be for the staff. But again, it's the relationship of the PRA to parts of the design that affect the human interface. And there apparently was some discussion about the inventory of local valve position indication, what valves need to have certain types of local indication out in the plant as best as I understood it. And again, perhaps the staff could elaborate on this. There apparently was some type of screening process done to say well, small valves that are important to plant safe operation will have local position indication and therefore by implication small valves that are not important to safe plant operation won't have local implication. Before I ask the staff about this issue, can you shed any light on how the relative importance of said small valves was determined? These are 2-inch and smaller.

MR. CHAPPELL: Those related to an RAI so it's exactly right. I mean, we used a criteria, 5 centimeters, to describe what would be large or small, but all the power-operated valves and motor-operated valves are included by default as being needed to show local indication. But because of the large number, initially we had even provided and said small valves as well will provide local indication. We received an RAI on that and they said are you sure because not only do they not really make all those, but that's a whole lot of indications that really aren't worthwhile maintaining. So what we have then are these criteria that say we'll evaluate each of these local valves or types of valves. I think those details are provided in the FSAR. And then we'll make that determination based on those evaluations, working with the manufacturer on procurement specifications to make sure that that's included in those small valves that are deemed important to safety, that they have those local indications.

MEMBER STETKAR: But those evaluations from what I hear you saying have not been performed yet?

MR. CHAPPELL: They will be performed as the design progresses and they'll be included in the issue-tracking system, they'll be included as the design documentation of the plant, the operation of the plant.

MEMBER STETKAR: Okay. So that list is

not then fully populated at the COL stage, it's populated -

MR. CHAPPELL: No, this is a requirement at this point.

MEMBER STETKAR: Thank you.

CHAIRMAN ABDEL-KHALIK: Are there any other questions for the applicant on Chapter 18? If not, we'll proceed with the staff presentation.

MR. EUDY: Hello again. I'm Mike Eudy, project manager for Chapter 18 South Texas with the staff. We appreciate South Texas's overview of Chapter 18 and we're going to now talk about the staff's evaluation, particularly some of the high points with Chapter 18. Most of it is incorporated by reference. We have Paul Pieringer here to go over the technical topics of interest. In particular, we're going to talk about the impact identified by the applicant from the departures, the technical impact that they had on Chapter 18. Paul's going to go over those, and then we're going to talk about a couple of the COL license information items of interest, 18.3, 18.6 and 18.7, and in addition, based on the previous questions for the applicant I'm going to ask Paul to go over a little bit about the HFE ITAAC evaluation and closure strategy that the staff has. I'll turn it over to Paul.

MR. PIERINGER: Good afternoon. I'm the technical reviewer for Chapter 18 for South Texas Project and the slide you just saw was a list of the key departures that affected Chapter 18. The first three that you see on this slide are actually created - the impact was created by design changes in other chapters. The first thing we did was devoted Chapters 11, 6, and 7 respectively and verify with those technical reviewers that they had actually approved these design changes. Having done that, we then went through Chapter 18 and verified that the impact of those changes were correctly accounted for in Chapter 18 and generally we found that they had been. There were several RAIs that we've actually discussed already that resolve the remaining.

Just by way of example, video display units, had some description just about how those video display units interfaced with safety-related and non-safety related systems. And there were some accuracy issues there. Those were corrected, but that is one area where we do have a confirmatory item that's following up to make sure that those changes are reflected in the next revision to the FSAR. We talked about the plant process computer system versus the computer function. From a Chapter 18 perspective we prefer the term "function" because when the applicant goes into the Chapter 18 process to develop the HFE it's an open slate. It drives them to say what's your task analysis, what's your HRA input, what's your operating experience input and how does all that design input affect the HSI design? And then once you develop that HSI design, then you know exactly what kind of computer interface you need or any other HSI. So what it does is by using that kind of language it keeps it in process. And I'll talk more about that process when we come back to the ITAAC. The next two here are pretty simple, particularly the next one. It was just an obsolete standard that happened to talk about task analysis. There are other standards that they've used that also talk about task analysis that are more current. They have a large list of different references that they use. You could take any one of them out and still have a complete list so this was not a significant issue. The post-accident monitoring, I'm not sure I can add more other than they met the intent of 1.97 more directly than it had been in the DCD. They met the requirements by adding that additional indication. Now, from a Chapter 18 perspective we don't typically get into whether it's safety-related or non-safety related. That's a decision that's made by the Chapter 7 people when they look at the design requirements for specific indications. We would look at what's needed, what's driven by the task analysis and is it in the right place and can the operator use it effectively.

MEMBER STETKAR: Doesn't whether it's safety-related or non-safety related affect how long it's available after a design basis accident and therefore, regardless of where physically it might be on this broad display of things, whether it's there or not might be affecting whether it's safety or non-safety. So I'm not quite sure if I understand you with respect to Chapter 18 whether it's important that a particular display or control for that matter is safety or non-safety related. Because the safety or non-safety related connotation may affect its survivability for a certain period of time.

MR. PIERINGER: So we assume non-safety related would go away during a design basis accident and the operator staff would be left with the safety-related controls displays and alarms. And so they have to have the sufficient design to ensure that they are available. And typically safety-related classification is one of those that ensures they have that availability. From a - there's another - I mean we also have the D3 classification, defense-in-depth diversity, right? And that's another strategy that ensures that the controls, displays and alarms that you need are available. Now, they may not be safety-related, but they come from independent software. So yes, there's different strategies to make sure that the operator has the right set of controls, displays and alarms available to them. We have the concept of minimum inventory. It's very parallel to Reg Guide 1.97. Those two - I guess, the philosophy in the case of minimum inventory and the requirement in case of 1.97 are two of the key drivers that ensure that we have that equipment survivability within the design. But it's the Chapter 7 that really looks into the technical aspects of whether the control display and alarm is really going to be there.

MEMBER STETKAR: I understand that. On the other hand, this is an integrated beast that has to be integrated with human beings and the problem is that I think some of our concerns are that if you only look at the physical design and safety-related aspects from a Chapter 7 perspective without considering human interface and real requirements, that's not good. I mean, we've learned lessons why one should not do that. If you narrow your focus on the human side of things to say, well, that's their problem over in Chapter 7 whether something is safety-related or non-safety related. It doesn't sound like the integrated perspective of the human is actually being drawn in. Now, maybe I'm just not understanding the process well enough, but I don't like to hear people say well, this is our concern over here for humans and that's their concern for hardware.

MR. PIERINGER: Typically the way I look at it is not whether it's safety-related or non-safety related. I look at it from the perspective of what is the task that requires this control, display or alarm to be required. If that task is associated with a design basis accident sequence then that control, display and alarm better be available anytime, anyplace that it's required to. And so when we do our verification validation, we're looking for those.

MEMBER STETKAR: But I mean, when is that determination made? Suppose that the designer decides that a particular display or alarm or control doesn't need to be safety-related. There's no legal requirement that it must be safety-related. You then take a broader perspective and say, well, from a human performance standpoint this display should be available to the operator, and yet under certain accident scenarios it won't be because it's not safety-related. So that has a feedback implication on the design. Somebody now needs to resolve this apparent discrepancy. When is that decision made? Because now I have to go back and change my design and make this display a safety-related display, but I already have the design.

MR. CHAPPELL: Well, part of the - I mean, this is all based on the DCD material. Analysis was performed looking at the basic responses to certain accidents as situations or precursors. And so the minimum inventory as Paul mentioned, the minimum number of controls, displays and alarms is provided for the control room, and this is an input to human factors, this is what we need to do. It's also an input into I&C as to what has to be available. And those types of results are going to be evaluated as part of the HFE and they'll also be evaluated as part of the design and the development of specific operating procedures. Go and look at this instruments, or this instrument's 1E, or go look at this other instrument. That level of detail will be kept fed back through -

MEMBER BONACA: If I remember, a lot of

the grouping or identification of these actions are results of TMI action items by which there was a full analysis of what should be in the SPDS, what should be the adequate core cooling, et cetera. You do have these displays right now still. I mean, I think back to the requirements. It's not a question of the choice or whether it's the law, it's a question of, you know, what you decide is a minimum set of parameters which define the SPDS. There is a clear basis in the regulation for that. You can't choose at that point that if it is in the SPDS it can't be safety-related or non-safety related. I believe that those displays are safety-related displays.

MR. MURRAY: Can I add something?

MEMBER BONACA: Please.

MR. MURRAY: I want to try to help with the understanding of integration you're describing and curious about, and how we're approaching that. We have our human factors engineering design team is actually made up of a number of folks that are involved in participating in the I&C design. The process goes through, identifies just what you're talking about, John, which is the important ones, those that are required to be safety-related. That is fed into the human factors engineering, the simulator design, human factors engineering, all of it, and we've got that integrated so that we don't see it as a silo in our process which is I think what you're curious about there. If I'm capturing it right.

MEMBER STETKAR: Yes, part of it. Let me see if I can maybe just bring this to a close. Is the final minimum inventory of displays and controls now fixed and available for this plant? In other words, has that evaluation been performed and is there a tabulation of that?

MR. CHAPPELL: That evaluation was performed based on the ABWR EPG and it's provided in the appendices for Chapter 18 as a minimum inventory. There's also a minimum inventory that's provided in Tier 1 in the DCD.

MEMBER STETKAR: Are there any changes from the certified ABWR to what will be constructed at South Texas that affect any of the ABWR EPGs?

MR. CHAPPELL: Yes. Tier 1 departures impact those and are also evaluated as part of Chapter 19. For example, deletion of recombiner system is an example.

MEMBER STETKAR: Have any of those changes affected the list of the minimum inventory? MR. CHAPPELL: They've been in some cases moved from fixed controls, for example, to other. In the case of fixed alarms for the steam line rad that's consistent with the change for the MSIV isolation on steam line radiation isolation. That's a movement or a deletion of particular control switches for flammability control system. So there have been changes to those lists.

MEMBER STETKAR: So you have confidence that the current minimum inventory indeed has some finality to it, that it won't change as the HFE process evolves past the COL?

MR. CHAPPELL: What we have right now is a basis for it. I mean, and based on the EPGs. If we get more specific there's a validation, and what I would say if there's more to add - if we have more to add for the down-the-line effects as we do the validation of all this is we're going to go back and validate this inventory and I don't think we can claim right now that there will be no changes, that there's no point to validating. So this is where we are and this is where we start as we go through to develop the detailed design.

MR. HEAD: In terms of where we are right now we have a list and that's what we're using. The answer is yes, but obviously there's processes that might come up with, you know, changes or alternatives as we move further. Is that fair?

MR. CHAPPELL: We're going to validate it and if a change is required we will definitely do the right thing.

MEMBER STETKAR: Okay, thanks.

MEMBER BROWN: I just wanted to ask, minimum inventory, that's what types of data you have displayed, what alarms you want, all that, so there's a list, and whether it's 10, 20, 30, 40, whatever it is. Where does the integration of that - pardon? Where does the integration of hand-eye coordination, the method of display come in? I mean, you've got a panel where the operator sits with a number of stations that they can take action that are supposedly if one fails you can operate another one or whatever so you don't lose control, redundant operator stations. But some of that data you want displayed that benefits the operator in a manner that he more readily understands what he's seeing as opposed to just a set of numbers showing up on a screen, and where controls are placed that he has to operate on an operating panel. I didn't see even in the ITAAC or anyplace else where it addressed that the operator is sitting there, he's got a screen, he's got other display information, what form does it take? Is it graphical? Is it just an alarm, red, green, yellow, purple, whatever it has to be? Is it a readout with a number on it? Is it a little man that comes out and waves a flag at him? Whatever it happens to be, I don't see any of that. Is it easy to get to the controls? Does he have to slide five feet down the panel to get to something under? Where does that come into this entire process? It doesn't - I didn't see any of that in the ITAAC for under the Tier 1 I&C ITAAC DAC, whatever you want to call it. Is it there?

MR. CHAPPELL: We have far more expertise at the front table.

MR. LANG: My name's Andrew Lang. I'm the Westinghouse human factors technical lead for this project. I've been with Westinghouse for over 10 years now, worked on large projects and small projects, modernization projects for Westinghouse. I have a master's degree in human factors from Virginia Tech. So to answer the question that's on the table, the functional requirements analysis, allocation of function and task analysis is the analysis base that takes into consideration the input documentation that exists for the plant. Now, we use that during HSI design -

MEMBER BROWN: What do you mean by "input?"

MR. LANG: The system design descriptions. Now, we take the results from those analyses and factor them into the HSI design process so that we can ensure that you're not having to be on one end of the console and perform one action and have to go to the whole other end of the console to complete that action. So we factor that in, factor in the results of our analyses during the design process.

MEMBER BROWN: That's during the design. Is there any actual - I don't want to call it a simulator, but a mock-up that is prepared so that you can actually run through -

MR. LANG: Yes.

MEMBER BROWN: - some of these circumstances or scenarios and determine the operator's ability to respond to make sure you have - I mean, do you have that interaction, dynamic interaction to try to determine that or not?

MR. LANG: Yes. During the design process we have what we call an engineering test schedule to do small-scale verification and validations on certain aspects of the design. And then further, when the design process has taken its course we have a full validation schedule that confirms that what we've designed is good and it works and it supports the operators, the procedures support the operators that they've been trained.

MEMBER BROWN: I understand the procedure part, but procedures - if you want to validate procedures it's nice to have an operating station set up where he has to execute those. So you do that before - that is part of the final validation of the design process before you actually go into the final setup, casting concrete and start building.

MR. LANG: And we use the procedures in our human factors validation as well.

MEMBER BROWN: I understand. Thank you.

CHAIRMAN ABDEL-KHALIK: Okay. Continue, please.

MR. PIERINGER: Okay. So I think we finished the discussion on this post-accident monitoring. We've driven into some other areas that one of the key attributes that we've used the word integrated system validation. That's the full name and it's one of the key attributes of this human performance program. We take a full scope simulator that's got videos, displays, basically the control room that you would send operators in to train on.

And we use that to run all the procedures through. It's not just emergency operating procedures, it's the normal procedures, it's abnormal procedures, it's severe accident management procedures, it's surveillances, maintenance testing, and when you run samples of all those different types of tasks during this integrated system validation. And that's where we really - this is kind of a summary of what everybody said. That's where we're really showing that everything works the way it's supposed to, it's in the right spot, that all the design requirements have been implemented properly and it's usable. The operator can actually perform everything that's expected of him during - by all these procedures. So if we were to find an indication or control or an alarm that the operator needed during this phase it would be documented on an HEV and then that would go back to the design process and we would determine whether it needed to be added. All those controls are in the program plans that are within the ITAAC and so the ITAAC that would drive the question you ask is ITAAC 5 most likely. It talks about HSI design implementation and it's actually how the design is accomplished. There's also what we call style guide, design style guide and it gives all the basic rules of the road if you will for good HFE design. It's a compilation of all the research and operating experience that the industry has put together over, I don't know, some 20 years I guess. So that's in summary how all this collects together and is really proofed under the integrated system validation phase.

So now shifting gears a little bit I'm going to take you into COL action space. There were 15, 16 COL actions and the major strategy here was to relate the COL action item to the ITAAC that basically did the same thing. Why was there such parallelism? I'm not sure that's a word, but why were they so similar? Well, I think that's just how - because the ABWR was kind of a vintage DCD. They wanted to make sure that any future COL applicant understood what the responsibilities were so they put - a lot of the things that occurred naturally in the ITAACs they also put them in the COL action items. There's some deviations. Those deviations actually became the discussion of the RAIs that were between us and the product of the discussion was every COL action item if it wasn't addressed within the FSAR was basically correlated to an ITAAC. Now, from a staff position we like that because it goes right back to what I told you. It's driving the - it's driving the applicant's work back to a defined process and that process we know is consistent with NUREG-0711. NUREG-0711 hadn't been written when the ABWR DCD was approved, but the people who did the ABWR DCD review were the same people who wrote NUREG-0711 and they basically had a draft NUREG-0711 put together based upon Appendix E in the DCD. If you look at Appendix E you'll see kind of the initial structure of what became NUREG-0711.

MEMBER BLEY: That's the Brookhaven guys?

MR. PIERINGER: Yes, sir. Brookhaven and Jim Bongarra from the staff.

MEMBER BLEY: Okay.

MR. PIERINGER: Yes. So we're very - from a perspective of reasonable assurance of safety, we know that if we meet the NUREG that assures safety and so we're very interested in having the applicant follow the guidance that's in the NUREG and by referencing everything back to the ITAAC which go back to the acceptance criteria for those ITAAC are in that 18E appendix. Now we have a complete circle and we think that that will ensure that reasonable assurance of safety. Yes, sir.

MEMBER BLEY: Let me ask you something that I know the ITAAC don't do. And I don't remember because it's been a couple of years since I read 0711.

When you do a detailed review you don't just look to see that things do what they're supposed to do, you look to see if there are any unusual ways they could do things you don't expect and that could cause problems for operators or for equipment. The ITAAC focused on ensuring for the most part and especially these that what eventually is in the human engineering side does what it's supposed to do. If you're using the ITAAC to confirm that the design is appropriate, what part of this process helps you pick up those things that I'm talking about, the things, unusual situations where even though it does the 150 it's supposed to do, it does something else that could cause a problem at some time. You have to search for those when you do a review and question a lot.

MR. PIERINGER: That's a hard question. The way I approach it right now is when the applicant submits their implementation plan and that's a detailed process description, they have to tell me how they're going to meet each criteria. And so I have to ask the question does this - does the process they've described fully explain how they're going to meet the criteria and does it introduce any other complications that are undesirable.

MEMBER BROWN: But it's only the process

there. The details of how they carry out the process are where these things often hide.

MR. PIERINGER: So once I have that detailed process though I have a set of acceptance criteria that now I can take into the integrated system validation phase where I'm actually watching the operator respond to all the tasks that I described earlier. And that's at the heart of detecting things that aren't working the way we anticipated. Right now that integrated system validation is one of our targets for staff inspection.

It's an ITAAC but what we've communicated to applicants who are at that stage is that we would like to watch at least part of the integrated system validation. There's a problem with that because when we watch we interfere, right? We set up a different dynamic than when they're just running the integrated system validation with their trained crews. But we think that we need to find some way to watch that so we can compare what we read on paper and what they said they were going to do with how it's actually performed on a simulator.

And then from there on there is a section in the NUREG that requires human performance monitoring as the site goes forward during operations and they have to feed back lessons learned into the corrective action process. And so they tell us how they're going to do that, but that gets into operating space and it depends upon the effectiveness of the applicant in assessing his own performance.

MR. CHAPPELL: There is an issue-tracking specific to the HFE design process. That's part of the ITAAC process.

MR. PIERINGER: Yes.

MR. CHAPPELL: So we have the idea to feed that back at any stage in the development, to feed that back and have specific items and issues incorporated into the design process. So you identify an anomaly and it goes in to get evaluated and goes back into the overall design.

MR. PIERINGER: But the question you gave me was how do you detect these anomalies.

MEMBER BLEY: Yes, and the review process, not just for this, but for systems and other things, the way we've done it historically is to have people who can ask the right questions and dig and look for funny areas. On the hardware side, something like PRA tries to systematize that, so maybe you don't need this real clever person to spot it, but over here we're relying on some pretty general ITAAC, but what you're saying is it's not this general DAC that I'm looking at, but it's things like the details of this integrated system validation process that really might - has a hope to uncover these. But the kind you just mentioned, Mike, are the ones where you get an example of something turning out troublesome rather than trying to find them ahead of time.

MR. PIERINGER: That's a pretty good summary. We depend on integrated system validation to watch the operators in real life and get off the paperwork that we've been processing up until that point and see it translated into an actual control room environment.

Now, let me add a little bit. When you look at these ITAACs they seem real general, but if you look at 1A, 2A, 3A, 4A, 5A, 6A you'll see words there that say something like develop an implementation plan that addresses this area. That is not a simple ITAAC, that is not a trivial ITAAC, that - we are - that's where 90 percent of my time is spent reviewing detailed descriptions of the process that the applicant's going to use that describe how he's actually doing his evaluations, how he's actually doing a task analysis, where does he get the tasks from, how does he do his sequence analysis, how does

with the I&C design so then we get to simulator everything comes together.

MEMBER BLEY: I appreciate this discussion. I see you're a stakeholder for the task working group on DAC. Does that mean you're a member of the task working group or is that something different?

MR. PIERINGER: No sir, I'm an active member. I write procedures and I develop plans, yes sir.

MEMBER BLEY: The description you gave me is one I like hearing. I have this anticipation from some things I've seen that on Friday somebody's going to try to tell me how an inspector can go out and do the same kind of thing you're telling me you did. So I look forward to hearing how that works out.

MR. PIERINGER: Okay.

MEMBER BROWN: By "inspector" you mean at the site?

MEMBER BLEY: I'm going to find out on Friday what I mean by that.

MEMBER BROWN: The equivalent to an onsite, somewhat of -

MEMBER BLEY: That's what I've heard.

MR. PIERINGER: For these implementation

plans I was just describing, I'm the inspector. I will do the inspection. I will use the same standards that I've used on all the inspection plans with the exception of instead of using NUREG-0711 I'll be using Appendix 18E. Now, what I do - when I do that inspection I always look at what might not be there relative to 0711 and I ask myself the question wait, does this thing in 0711 represent a safety issue that should have been in 18E? Now, I've done that exercise for the program plan and I didn't find any - there are no safety issues that would warrant some kind of a backbit or change in the DCD. But I am sensitive to that and that is one of the things I want to make sure that we look at for ABWR applications in particular. But yes, I'm - now there will be inspectors in the field who will do the as-built verifications, but staff will do the implementation plans.

MEMBER BROWN: By 18E you mean the DCD 18E and the FSAR modifications to that?

MR. PIERINGER: It's the DCD. Yes, sir.

MEMBER BROWN: That's the combined changes. Whatever the standard comprises.

MR. PIERINGER: Although if there were deviations that affected 18E they would get a lot of scrutiny. There was maybe one or two, but they were just -

MEMBER BROWN: Well, I took what you said a minute ago and I went and looked at Tier 1 items Section 3.1 where there's a fairly extensive human factors set of ITAAC from all kinds of stuff you saw. I think you said 3.5 but I couldn't find anything. But when you say 18E does that all get translated into 18E? I mean, I'm just trying to find -

MR. CHAPPELL: There's actually a roadmap that describes the ITAAC in Section 3.1. 18E breaks it down by section and says -

MEMBER BROWN: Well, 3.1 is a table that says here's the thing and here's this other thing and here's the acceptance criteria and it runs all the way down to about 15 pages long.

MR. CHAPPELL: For each of those numbers in 3.1 it describes in 18E how those are met. And it runs you down the line and it's a level of detail in Tier 2 that provides an acceptable method for completion of the ITAAC, but we haven't - we could take departures from that. It would require approval from the staff for implementing, but we haven't taken any departures other than what we mentioned in our presentation.

MEMBER BROWN: So I should be able to go

to Tier 2, Chapter 18E, Appendix E rather and I should see the Rev 4 of the DCD as it existed before and see that table?

MR. CHAPPELL: As modified by the -

MEMBER BLEY: But it's not modified much.

MEMBER BROWN: It's not - yes. That's okay.

MR. PIERINGER: But 18E is a key cornerstone for Chapter 18. It's our acceptance criteria. I think that's it. Anymore questions?

CHAIRMAN ABDEL-KHALIK: You have one more slide.

MR. PIERINGER: Well, let me just check and make sure we got everything on it. The shutdown design evaluation, just a little bit there. That was - and I'm just going to repeat it very quickly. That again was referenced back to an ITAAC. The ITAAC says here's how we're going to do our design. That design includes the remote shutdown station. So when they do the design for the shutdown station they'll have to document the bases for that design and why that's acceptable. And so the questions, the type of questions you were asking about whether analogue is appropriate and whether they will have familiarity with it, that will have to be addressed as part of that HSI design process which is an illustration of why we like to have things going back to the process. It gets things documented.

MEMBER STETKAR: I guess Paul, the only thing that - you know, the reason that I flagged that earlier was I get bothered by statements in safety evaluations at this point of the game that discusses both the MCR and RSS will be designed in accordance with HFE program plan and then says this consistency will minimize the potential for human error during the operator's transition from the mostly digital MCR interface to the analogue RSS interface. This is the staff's words, it's not the applicant's words. So the staff in the SER is essentially saying that you have confidence given essentially no information that indeed there will be consistency in this transition. That bothers me at this stage that the staff can actually draw that conclusion. It's a statement.

MR. PIERINGER: Right, and it's a statement based upon the assumption that a complete process description will be provided under that ITAAC, and that they will then follow that process. Now, in DAC ITAAC which we are, we approve all the design based upon the process they're following. That's pretty consistent.

MEMBER STETKAR: It says the design activity is performed in accordance with ITAAC. The statement in the SER says the design activity is performed in accordance with Tier 1, Table 3.1 ITAAC Item 5(a)(2), all that, but preceding that is a statement from the staff saying consistency will minimize the potential for human error during the operator's transition. I just get this uneasy feeling of statements of confidence in an SER at this stage of the COL process based on fairly nebulous commitments to meet some sort of future program. I would prefer a bit more skepticism, perhaps. That's a personal preference, by the way, but I tend to flag these things because they tend to start taking on a life of their own where the staff has performed some sort of an evaluation, there's some sort of confidence that indeed this process will work and therefore the process did work.

MR. PIERINGER: Okay. Well, we're definitely in the process -

MEMBER STETKAR: I understand that.

MR. PIERINGER: - could work phase.

MEMBER STETKAR: Could work, but the SER in some cases goes a bit -

MR. PIERINGER: So maybe I've been a

little bit too positive.

MEMBER STETKAR: Too positive in terms of kind of reinforcing that.

MR. PIERINGER: Okay.

MEMBER STETKAR: And the only concern is, as Dennis was mentioning, that as this process evolves and when I say the process, I mean both the human factors evaluation and the staff's review, audit, whatever it will be of that process, I think it's important that the people involved in that process on both sides retain that level of questioning and skepticism and not kind of be focused in on the fact that just because we have elaborated a process and that at one level the staff has reviewed that process and says yes, it should work, that by definition it will.

MR. PIERINGER: Okay.

MEMBER STETKAR: Just take it as a comment.

MR. PIERINGER: Thank you.

MEMBER SIEBER: There's always a place to lay the blame.

MR. PIERINGER: And we definitely want to make sure that we've got the checks in place that do that so it will work, and that's the ITAAC. And that's what we definitely have to make sure -

MEMBER STETKAR: It's just - I mean, it sounds petty in some sense that it sounds like a stylistic type of comment that I'm picking on words, but as we go down the road in years and you know, you said well you will be performing the inspections. Well, you might not. Other people might who might be relying on your finding today in the SER as a sense of confidence that well, maybe I don't need to worry about this area because you Paul thought about it today.

MR. PIERINGER: A good point. I understand your point, yes sir.

CHAIRMAN ABDEL-KHALIK: Let's continue.

MR. PIERINGER: Okay. We've talked about everything I was going to present under local valve position so I'm going to turn it over to Michael for conclusion.

MR. EUDY: Okay, well the only thing that we have on this chapter right now is confirmatory items so the staff can finalize their conclusions that the applicant has met the required information for the chapter in accordance with NRC requirements. In addition, impacts characterized by the applicant from the departures on this chapter have been appropriately characterized and addressed and the COL license information items have been found to be acceptable. I don't think that I have any specific follow-ups for us. I don't know if the discussion regarding HFE ITAAC implementation plan was to your satisfaction or if you had any follow-ups for us. There was a lot of questions so I didn't know if there were any specific follow-ups you wanted from staff on this chapter.

MEMBER BLEY: None from me. I appreciated the discussion we had.

CHAIRMAN ABDEL-KHALIK: Are there any other questions for the staff? All right. Well, as promised in the introductory remarks we do have a telephone bridge line and we promised to open the connection to see if there are any -

MR. WUNDER: Mr. Chairman?

CHAIRMAN ABDEL-KHALIK: Yes, sir.

MR. WUNDER: Mr. Chairman, if I could have just a moment, sir. I believe that we had an open item, one of Dr. Ryan's questions relative to ABWR and BWR dose comparisons, and if you'd like we could address that at this time.

CHAIRMAN ABDEL-KHALIK: Absolutely. Please.

MR. KELLNER: I guess - Robert Kellner. I guess I kind of mischaracterized earlier. I did actually look at the Japanese doses, but they were comparable with ours and I did not look at the Finland dose specifically. I do have three data points for you at this time based on 2007 data published in the ISOE annual report. Basically Japan is running at about 145 - 1.40 man-sieverts per reactor on a 3-year rolling average. The U.S. is running at 1.57 man-sieverts per reactor and Finland is running at 0.94. We don't have any specific breakdown on the ABWRs in that data. We can follow up with additional information as far as trying to develop that. We tried to get it up on the NEA web page and it's down for maintenance.

MEMBER RYAN: We can take an action to refine that answer which I appreciate today, but refine that for our next meeting and maybe go into a little bit more depth. The other part of the numbers too is the uncertainty and what's - I mean, is there any variation - what do the statistics on all that look like?

MR. ROACH: This is Ed Roach, Health Physics. Just - we did have information that would be Toshiba's Kashiwazaki-Kariwa Units 6 and 7 which were ABWRs, came online in 1996-1997. The data indicates combined it was dose of about 1.092 man-sieverts per year. So that was provided in the document from GE-Hitachi as opposed to something we independently verified.

MEMBER RYAN: Right.

MR. ROACH: But yes, we recognize one of the issues with the Japanese BWR dose rates are doses being higher apparently is a duration of outages are much higher. And historically that's when you pick up most of your exposure as opposed to the day-to-day operations.

MEMBER RYAN: Okay, thank you.

CHAIRMAN ABDEL-KHALIK: Any other comments that the staff wishes to add at this point? MR. WUNDER: If you'd like me to take a minute I can go over what I believe are our action items. Or would you rather do that later?

CHAIRMAN ABDEL-KHALIK: We'll do that in a minute.

MR. WUNDER: Yes, sir.

MR. HEAD: Mr. Chairman, can we add one thing? While Mr. Phelps is here with us this morning, there was a question that came up during the discussion on the temperature in the diesel and there was a question about what do we do about assessing operator stay time. And I was going to ask Jay just to go over what we plan to do there.

MR. PHELPS: Okay. Yes, and it's - there are environmentally unfriendly conditions in the existing plant, okay? We're in South Texas, it's hot, so it's not a situation that we're unaccustomed to. There are certain areas in the plant that we do weekly monitoring on in the atmosphere with our heat stress and management program, with a very defined and programmatic list of actions based on what those temperatures are. With the ABWR we would do the same thing. If it's an area that has to be continuously occupied under certain conditions you would go do the monitoring and determine does he have to be there, minimize your stay times, wear a cool vest or other technological ideas that are out there for those ideas.

So, we have areas right now like I said that are - they're hot. That's a design basis number. We rarely see those actual environmental conditions in the plant, but we do have in our turbine building right now 125 degrees in the summer is not uncommon. So just like you do outside you just don't stay there long. And fortunately there's not an area in the plant that require continual occupation, there's not emergency actions that take an extended period of time to accomplish, but we will have to accommodate those if we find that there's something on this diesel design as it's finalized that would require an operator be in that portion of the room that could potentially be 140 degrees when it's required.

MEMBER STETKAR: Okay. Jerry or Coley, we haven't seen Chapter 9 either. The problem with the coordination of these things is a little bit difficult. Just out of curiosity, did you have to change anything on the HVAC designer capacity from the certified design to make it fit South Texas?

MR. CHAPPELL: Right, in general the HVAC designs had to accommodate the design temperature.

MEMBER STETKAR: So you had to beef up chiller capacities and things, or?

MR. CHAPPELL: In some of the site-specific systems.

MEMBER STETKAR: Okay, we'll see that in Chapter 9. I was just curious.

MR. PHELPS: From the standardized design a frequent term you'll hear around our place is "tropicalization."

MEMBER STETKAR: I heard that -

MR. PHELPS: In South Texas we did our

design compared to what the actual design was on the Sea of Japan where it's cool.

CHAIRMAN ABDEL-KHALIK: Any other comments? So, right now the telephone is on listen-only mode. We have no idea whether or not there are people actually on the phone and whether or not there are members of the public who wish to make any statements or comments. And therefore we need to open that telephone connection and provide that opportunity. Please. In the meantime I guess we can just go around the table and see the main items that - numbers look like to sort of offer for us to keep track of as we go along this process.

I have one item that I think I really would like for us to keep track of which is the issue of Part 21 review. Not only with regard to the stability issue raised, but in general. Are there other areas of reviews for which Part 21's have been issued that need to be looked at one more time? And I think we need an answer to this between now and the next meeting.

MR. TONACCI: We will get you one, yes sir.

CHAIRMAN ABDEL-KHALIK: Okay.

MS. BANERJEE: The line has been opened

for you to ask questions.

CHAIRMAN ABDEL-KHALIK: All right. While the line is open is there anybody on the other end of the line who wishes to either make a comment or ask a question?

(No response)

CHAIRMAN ABDEL-KHALIK: The answer is no. So we will close that line one more time. Okay. So at this time we'll go around the table and see if people have, you know, issues that we need to keep track of. The one that I mentioned, the Part 21 issue we absolutely have to keep track of. Mario?

MEMBER BONACA: The only area where I think we need to have more addressed is the area of human factor engineering. We discussed this, but there are a number of questions still that are left hanging there in my judgment that I think we should probably review again this issue and reflect on that and the answers we got. I have some other questions relating to that that I really want to think about before I ask them anyway. But for the rest, I mean I was pretty comfortable with what I heard. I really had no major problems of any kind.

CHAIRMAN ABDEL-KHALIK: Charlie?

MEMBER BROWN: Most of mine are going to

have to wait for Chapter 7. I made the point that I think I'd like to see some detail to clearly provide an example of how they've changed and the difference between the two approaches between the protection system and the safeguard system. So other than that, I mean we had a lot of comments on the HFE type stuff which I think is all good and I got some good - I think we got some good responses. So I'll pass.

CHAIRMAN ABDEL-KHALIK: Dennis?

MEMBER BLEY: I'd like to start by echoing what some other people have said. The departure report's a great idea and it was kind of reflected in their presentations. We were seeing the linkages that we've had to pry out in other cases and that's very helpful for us. The discussion on how those DAC are going to be handled I hope to see institutionalized, something along those lines, over the next year or so as this process goes along. I think we need to follow that closely and that kind of puts me in line with Mario, that includes how this goes forward. But we're going to be seeing how it works for I&C, the beginning is next fall and I want to follow that. So that whole area is a good one to track. Some of it's going to happen later and somehow I think we need to find a way to keep involved so we can gain some confidence in how this - in how the issues we're concerned about are going to get resolved before plant startup.

CHAIRMAN ABDEL-KHALIK: John?

MEMBER STETKAR: I don't have anything to add. I'd just echo Mario's and Dennis's concerns about formalizing this process with DAC and ITAAC.

CHAIRMAN ABDEL-KHALIK: Sam?

VICE CHAIRMAN ARMIJO: Yes. Well, I think Chapter 4 and then the impact of Chapter 4 items that are not yet completed on Chapter 15 we have to look at again. I look forward to reviewing some of the topical reports that support the new methods that are going to be used in the event that the old GE methods are not adequate or are not going to be used. New data. I'd like to see what the core and fuel design finally looks like and how that impacts the Chapter 15.

CHAIRMAN ABDEL-KHALIK: Thank you. Mike?

MEMBER RYAN: Thank you. Again I compliment the folks from the plant and the staff on presenting radioactive waste management information. That was I think very useful and interesting, and again I applaud your idea of taking it from a zero design and saying what do we need to make this work properly and not fit it into the back 40 or the small corner as has sometimes been done. So that looked pretty positive to me as a design approach to have a real effective waste management system.

We've already questioned the radiological protection areas, this question of what do we do with these dose calculations from GALE. I understand, you know, all well how they're done, but sometimes the optics of those I've calculated a very conservative number and I'm taking comfort in that.

Well, you know, what's the uncertainties in those numbers and why are you taking comfort in it is the next question. I think we need to probe that a little bit more and really make sure that we're comfortable with those numbers because they're used subsequently for lots of other detailed design work and implementation work - surprises that can come up and get you. So I think just a little bit more depth in that in the next round of discussion would be helpful, and maybe we gain some insights and perhaps you will as well. So other than that it's been a real informative day and a well-structured and well-prepared set of briefings so I compliment you on really working hard to cover a lot of ground in a very short period of time. So thank you.

CHAIRMAN ABDEL-KHALIK: Bill?

MEMBER SHACK: I just, you know, obviously you do very well answering specific questions. DAC is a little difficult thing to deal with. I thought today's discussion was probably the best we've had on DAC and I'm sort of looking forward to the Friday presentation when we come at this. But again, you know, it's clearly the most difficult thing to deal with I think in these licensing things and I just - in fact, today we saw more production than most of the discussions we've had.

CHAIRMAN ABDEL-KHALIK: Jack?

MEMBER SIEBER: It's sort of in the eye of the beholder. It depends on what the DAC says and how the staff and the applicant interpret it as to whether it's going to be satisfied or not. I have questions about details about a lot of things that I don't think we're going to get to review the details with all this. It takes a change in mind set on my part to be able to deal with the large umbrella conceptual ideas and trust everybody that the details will be okay.

And I don't know how to resolve that conflict that I'm going to have. On the other hand, I felt pretty comfortable that I understood what the applicant is trying to do, and I understand how the staff has conducted its review, so I did not after today's session end up with burning issues that need to be addressed, other than those that the other members have already identified. So thank you very much.

CHAIRMAN ABDEL-KHALIK: At this time I, on behalf of the - yes.

MEMBER BONACA: I had a question I would like to ask of the licensee.

CHAIRMAN ABDEL-KHALIK: Yes, of course.

MEMBER BONACA: Who developed the EPGs for your plant? Because there's a set of EPGs already, I mean.

MR. PHELPS: They are in the process of being developed under the BWR Owners Group guidelines for Revision 4.

MEMBER BONACA: Okay, so in Japan they're running these plants, do they use similar EPGs to ours in this country?

MR. PHELPS: Yes. Their flow chart, obviously I've never been able to read one, but they are built to Rev 4, the BWR Owners Group in Japan, and for the Taiwanese they are currently running with the BWR SAG Revision 1.

MEMBER BONACA: Okay.

MR. PHELPS: So there's a little

difference between those two.

MEMBER BONACA: Okay, thank you.

CHAIRMAN ABDEL-KHALIK: Are there any other questions, additional questions or comments? Okay. Well, at this time I'd like to express our thanks to both the applicant and the staff for a focused and meaningful and informative presentation. Thank you. The meeting is adjourned.

(Whereupon, the above-entitled matter went off the record at 3:54 p.m.)

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Presentation to the ACRS ABWR Subcommittee

South Texas Units 3 and 4 COL Application Review

Status of Staff Review

March 2, 2010

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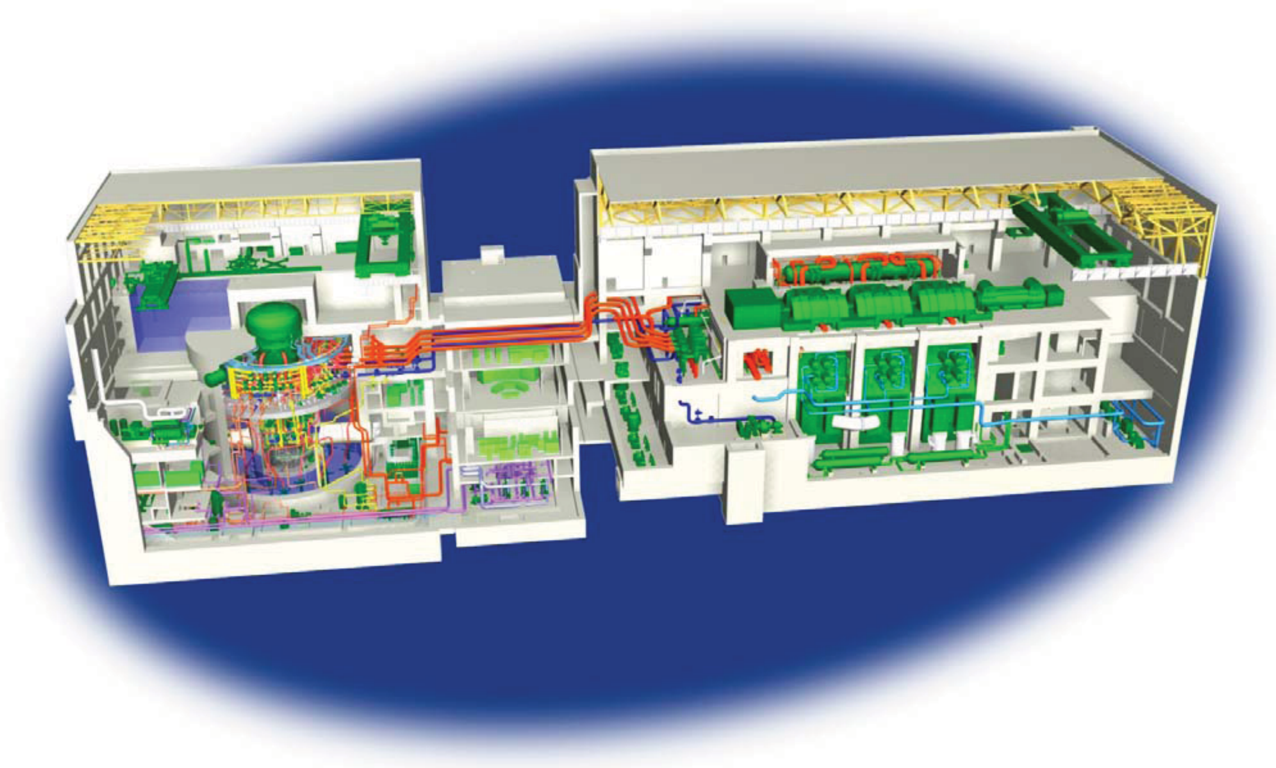
Status of COL Review

- Phase 2 will be completed on schedule with the exception of Chapters 2 and 3
- Presentations to ABWR subcommittee on all other chapters between March 2, 2010 and May 20, 2010
- Date of presentation to full Committee to be determined

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 1

Introduction & General Description of Plant



Agenda

- Introduction to the STP 3&4 COLA
  - Site Characteristics
  - History of the STP 3&4 COLA
  - Alternate Vendor
  - Departures – General Discussion
- Contents of FSAR Chapter 1
  - Chapter 1 Departures
  - Site-Specific Supplements
  - COL License Information Items

Attendees

Scott Head	Regulatory Affairs Manager, STP 3&4
Steve Thomas	Engineering Manager, STP 3&4
Thomas Daley	Engineering Supervisor, STP 3&4
Coley Chappell	Licensing, STP 3&4
Ryuji Iwasaki	Toshiba
Robert Quinn	ABWR Licensing, Westinghouse
Caroline Schlaseman	MPR

STP 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

History of STP Units 3 and 4 COLA

09/20/07	STP 3&4 COLA submitted referencing Appendix A to 10 CFR 52, U.S. 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 vendor to supply certified design for ABWR
09/16/09	COLA Revision 3 submitted to NRC
09/17/09	NRC completed COLA Safety Review Phase I (RAIs Issued)

Alternate Vendor Capabilities

STP Due Diligence Review was performed:

- Objectives
  - Toshiba Capability Assessment Program
  - Independent Assessment

Alternate Vendor Capabilities

Conclusions:

- STP concluded Toshiba is qualified to supply the U.S. ABWR
- Confidence in the ability of the EPC Team to build the certified design and support the STP COLA
- Project risks and impacts have been addressed and found acceptable

Introduction to the STP 3&4 COLA

- Tier 1 of the ABWR DCD contains the certified design material
  - Design description
  - ITAAC
  - Significant interface requirements for systems outside DCD scope
  - Significant site parameters envelope for certified design
- Tier 1 of the ABWR DCD and designated Tier 2 information (Tier 2*) may not be changed without prior NRC approval (Exemption).
- Some examples of Tier 2* information are:
  - Equipment seismic qualification methods
  - Piping design acceptance criteria
  - Design, qualification & testing of MOVs

Introduction to the STP 3&4 COLA

- Tier 2 of the ABWR DCD contains the approved safety analysis material:
  - Final Safety Analysis Report (FSAR)
  - Other relevant material
    - TMI requirements
    - Technical resolution of unresolved safety issues
    - Generic safety issues

Introduction to the STP 3&4 COLA

There are primarily two types of new information in the COLA:

- **Departures from the information in the DCD**
  - Standard (STD), suitable for use in subsequent COLAs
  - Site-specific (STP), applicable only to STP 3 & 4
- **Supplements to information in the DCD**
  - Information to address COL Items
  - Information to replace DCD conceptual design information
  - Information on siting & site-specific systems
  - Organization and programs
  - Information added for clarification or to address issues not addressed in DCD

Introduction to the STP 3&4 COLA

- The STP 3 & 4 COLA is the reference-COLA (R-COLA) for the ABWR standard design
- STP 3 & 4 COLA, Part 2 incorporates the ABWR DCD, as applicable, by reference without repeating the DCD information
- STP 3 & 4 is basically identical to the U.S. ABWR Certified Design
  - Limited number of Tier 1 Departures (13)
  - One Tier 2* Departure
- Changes to Tier 2 information do not require an exemption and are screened/evaluated according to Part 52 App A VIII.B.5 for prior NRC approval

Tier 1 Departures

- **STD DEP T1 2.1-2: Reactor Pressure Vessel System Reactor Internal Pump (RIP) Motor Casing Cladding**
  - Departure modifies the RIP motor casing design description to be consistent with the ABWR RIP motor casing design in current ABWR use
    - Casing is clad with stainless steel from top to the motor secondary seal and around bottom of casing

Tier 1 Departures

- **STD DEP T1 2.2-1: Control System Changes to Inputs, Tests, and Hardware**
  - Test clarification for Rod Control and Information System (RCIS) non-Class 1E uninterruptible power supplies
    - The detailed design of the dual redundant RCIS controller equipment is such that each channel remains operable as long as either of the redundant power supplies remain operable.

Tier 1 Departures

- **STD DEP T1 2.3-1: Deletion of MSIV Closure & Scram on High Radiation**
  - Originally designed to mitigate the effects of a control rod drop accident
  - This trip is not credited in any ABWR safety analysis
  - U.S BWRs have experienced spurious trips resulting from variations in N-16 concentrations during normal plant operation
  - This change has been previously approved by the NRC for U.S BWRs

Tier 1 Departures

- **STD DEP T1 2.4-1: Residual Heat Removal & Spent Fuel Pool Cooling**
  - ABWR DCD has two RHR loops connected to the Fuel Pool Cooling System with normally closed cross-tie valves.
  - This change provides the ability to supply fuel pool cooling or makeup from any of the three RHR loops.
    - Enhances the capability and reliability to perform division outages for maintenance and other activities during all plant operating modes

Tier 1 Departures

- **STD DEP T1 2.4-2: Feedwater Line Break Mitigation**
  - This change adds a trip of the condensate pumps following indication that feedwater line break has occurred in the drywell
    - This trip is not credited in the safety analysis
  - This departure to be discussed in Chapter 6 presentation

Tier 1 Departures

- **STD DEP T1 2.4-3: Reactor Core Isolation Cooling (RCIC) Turbine/Pump**
  - DCD incorporated steam turbine driven pump
  - This change incorporates a monoblock design with pump and turbine mounted on the same shaft within the same casing
  - To be discussed further in Chapter 5 presentation

Tier 1 Departures

- **STD DEP T1 2.12-1: Electrical Breaker/Fuse Coordination & Low Voltage Testing**
  - The description of interrupting device coordination has been modified to conform with current industry practices and standards and codes, coordinated to the maximum extent possible
  - This change also allows performance type tests at the manufacturer's shop for the operating ranges of Class 1E AC and DC electrical equipment.

Tier 1 Departures

- **STD DEP T1 2.12-2: I&C Power Divisions**
  - This change adds a fourth division of safety-related power to the Instrument and Control power supply system for the Distributed Control and Information System (DCIS) Division IV cabinets and chassis
    - Allows most power problems to be addressed on-line
    - No loss of functionality as a result of faults
  - To be discussed further in Chapter 8 presentation

Tier 1 Departures

- **STD DEP T1 2.14-1: Hydrogen Recombiner Requirements Elimination**
  - 10 CFR 50.44 “Combustible Gas Control for Nuclear Power Plants” amended after ABWR certification eliminating requirements for hydrogen control systems
    - Hydrogen Recombiners (Flammability Control Systems) eliminated
    - Containment Hydrogen & Oxygen monitoring systems downgraded to non-safety-related

Tier 1 Departures

- **STD DEP T1 2.15-1: Re-classification of Radwaste Building Substructure from Seismic Category I to Non-Seismic**
  - The Radwaste Building does not house any safety-related components or systems
  - Design is consistent with Regulatory Guide 1.143 "*Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light Water Cooled Nuclear Power Plants*"
  - To be discussed further in Chapter 3 presentation

Tier 1 Departures

- **STD DEP T1 2.15-2: Reactor Building Safety-Related Diesel Generator HVAC**
  - This departure revises the maximum DG room temperature during DG operation from 50º C to 60º C based on ambient design temperatures and HVAC flows
  - No impact to environment for DG controls
  - To be discussed in greater detail in Chapter 9 presentation

Tier 1 Departures

- **STD DEP T1 3.4-1: Safety-Related I&C Architecture**
  - Separate and independent system level data eliminates obsolete data communication technology
  - Functional (vs. hardware) design of digital control platforms
  - To be discussed further in Chapter 7 presentation

Tier 1 Departures

- **STP DEP T1 5.0-1: Site Parameters**
  - Site Specific Analysis resulted in departures from the generic envelope.
    - Minimum shear wave velocity
    - Design basis flood level increased
    - Maximum design precipitation increase
    - Ambient design temperature increase
  - To be discussed further in Chapter 2 presentation

Tier 2* Departure

- **STD DEP 1.8-1: Tier 2* Codes, Standards, and Regulatory Guide Edition Changes**
  - Updates applicable tables to more recent revisions/editions of selected applicable NRC Regulatory Guides and industry standards approved or endorsed by the NRC
    - Adopts more recent industry design and construction practices
    - Updates requirements in fields that have advanced considerably since certification
    - Deletes obsolete requirements

Chapter 1 Contents

- 1.1 Introduction
- 1.2 General Plant Description
- 1.3 Comparison Tables
- 1.4 Identification of Agents & Contractors
- 1.5 Requirements for Further Technical Information
- 1.6 GE Topical Reports and Other Documents
- 1.7 Drawings
- 1.8 Conformance with SRP and applicability of Codes & Standards
- 1.8S Site Parameters, Interface Requirements, COL License Information items, and Conceptual Design Information
- 1.9 COL License Information
- 1.9S Conformance with regulatory criteria
- 1.10S Impacts of Construction

Chapter 1 Appendices

1A	Response to TMI Related Matters
AA	Plant Shielding to Provide Access to Vital Areas and Protective Safety Equipment for Post-Accident Operation
1B	Not Used
1C	ABWR Station Blackout Considerations

Chapter 1 Departures

STP DEP 1.1-2 Two unit site

- No shared safety-related systems
- Fire protection System water supply shared
- Main Cooling reservoir shared with STP 1 & 2

STD DEP 1.2-1 Relocation of Reactor Internal Pump (RIP) Motor-Generators

- RIP motor-generators & associated equipment moved to new Control Building Annex, an adjacent non-Seismic Category I building

STD DEP 1AA-1 Integrated Doses for Environmental Qualification of Safety-Related Equipment

- Detailed design used to recalculate and update doses
  - Equipment in ECCS rooms and SGTS areas will be qualified to increased values

COL License Information Items

1.1 Design Process to Establish Detailed Design Documentation

- Described in Quality Assurance Program Description, to be reviewed by NRC in Chapter 17

1.1a Plant Design & Aging Management

- Steps are initiated in the design process to aid in the application, selection, and procurement of components with optimum design life characteristics and to maintain the plant's original design basis throughout its life (FSAR Section 1.2.1.3)

1.2 P&ID Pipe Schedule

- Minimum pipe schedule for ANSI nominal pipe sizes are identified (FSAR Section 1.7.6.1)

1.3 SRP Deviations

- Identified in Table 1.8-19 (Standard Review Plan and Branch Technical Positions Applicable to ABWR)

COL License Information Items

1.4 Experience Information

- Applicable to ABWR, identified in Table 1.8-22

1.5 Emergency Procedures & Emergency Procedures Training Program

- Will be developed and implemented prior to fuel load, and included in the Operations Training Program (FSAR 1A.3.1)

1.6 Review & Modify Procedures for Removing Safety-Related Systems from Service

- Administrative procedures will be developed prior to fuel load directing that approval will be required for performance of surveillances and maintenance of safety-related systems, including equipment removal and return to service (FSAR Section 1A.3.2) (COM 1A-2)

COL License Information Items

1.7 In-Plant Radiation Monitoring

- Equipment, training, and procedures necessary to accurately determine the presence of airborne radionuclides in areas where personnel may be present during an accident will be developed prior to fuel load (FSAR Section 1A.3.3)

1.8 Reporting Failures of Reactor System Relief Valves

- Procedures will be developed prior to fuel load directing that failures of reactor system relief valves be reported in the Annual Report to the NRC (FSAR Section 1A.3.4)

1.9 Report on ECCS Outages

- Procedures will be developed prior to fuel load directing that instances of ECCS unavailability due to component failure, forced or planned maintenance, or testing shall be collected and reported to the NRC annually (FSAR Section 1A.3.5)

COL License Information Items

1.10 Procedure for Reactor Venting

- Emergency procedure guidelines have been written for the ABWR which are applicable to STP 3 & 4 (FSAR Section 1A.3.6)

1.11 Testing of SRV & Discharge Piping

- Testing of SRVs and discharge piping is included in the initial test program (FSAR Section 1A.3.7)

1.12 RCIC Bypass Start System Test

- The bypass line and valve are no longer required. RCIC start test will be performed during the initial test program to confirm system startup characteristics (FSAR Section 1A.3.8)

1.13 Station Blackout Procedures

- Will be developed consistent with the Plant Operating Procedure Development Plan in Section 13.5 (FSAR Section 1C.4.1)

Chapter 1
Introduction & General Description of Plant

Questions and Comments

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Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 1
“Introduction and General Description of Plant”

March 2, 2010

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Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM, DNRL/NGE1
  - Michael Eudy, Chapter PM, DNRL/NGE1

- **Staff Technical Consultants**
  - Dr. John Larkins, ERI
  - Dr. Roy Karimi, ERI

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Content of Staff’s SER

- Incorporation by reference
- Departures from Tier 1 information
- Departures from Tier 2* information
- Departures from Tier 2 requiring approval
- Departures from Tier 2 not requiring staff approval
- Supplemental information
- Responses to COL Action Items

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Summary of Technical Discussion Points for South Texas COL Chapter 1

SER Section		Summary of Supplemental Information
1.1	Introduction	Change to type of license requested Dual units at STP Change in Vendor
1.2	General Plant Description	Several departures that will be discussed in detail in appropriate chapters
1.3	Comparison tables	No slides
1.4	Identification of Agents and Contractors	Supplementary information regarding STPNOC contractors

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Summary of Technical Discussion Points for South Texas COL Chapter 1

SER Section		Summary of Supplemental Information
1.4S	Qualification of Alternate Vendor	Toshiba Power Systems, inc. will supply the ABWR design for STP Units 3 and 4
1.5	Requirements for Further Technical Information	No slides
1.5S	Other Regulatory Considerations	No slides Open Item regarding financial qualification
1.6	General Electric Topical Reports	No slides

Summary of Technical Discussion Points for South Texas COL Chapter 1

SER Section		Summary of Supplemental Information
1.7	Drawings	No slides Open item related to Tier 1 departure
1.8	Conformance with Codes and Standards	
1.9	COL License Information	
1.9S	Conformance with Regulatory Criteria	Open items related to tables 1.9S and 1.9S-4

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Summary of Technical Discussion Points for South Texas COL Chapter 1

SER Section		Summary of Supplemental Information
1.10S	Impact of Construction Activities	No slides Awaiting issuance of Interim Staff Guidance
Appendix 1A and 1AA	Response to TMI Items	
Appendix 1B	Not Used	No slides
Appendix 1C	Station Blackout	No slides Reviewed in Chapter 8

Section 1.1, Introduction

Section 1.1 contains a general description of the application’s contents and format.

- Items of interest:
  - Requests a COL rather than a design certification
  - Specifies that the application is for two units
  - Change to rated heat balance (Chapter 10)
  - Specifies that the vendor for STP 3&4 will be Toshiba Power Systems, Inc.

- Section Conclusion:
  - Within the scope of the Chapter 1 review, the applicant has provided all information required to support issuance of a COL

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Section 1.2, General Plant Description

This section provides a short description of major design features:

- Tier 1 Departures:
  - Remove MSIV closure/SCRAM on high radiation (Ch.11)
  - Change to RCIC turbine pump design (Ch. 6)
  - Removal of requirement for hydrogen recombiners (Ch. 6)
  - Changes to safety-related I&C architecture (Ch. 7)
- Tier 2 Departure Requiring Staff Approval:
  - Change to plant medium-voltage electrical system (Ch.8)

Section 1.2, General Plant Description (cont.)

Conclusion:

- Tier 1 departures are tracked as open items throughout the application
- Until Tier 1 departures are addressed we cannot finalize our conclusions

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Section 1.4, Identification of Agents and Contractors

This section gives the qualifications of agents, contractors, and specialized consultants

Conclusion:

The agents, contractors, and specialized consultants are known to the staff and acceptable for providing expertise.

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Section 1.4S, Qualification of Alternate Vendor

This section provides the staff's evaluation of the applicant's demonstration of Toshiba Power Systems, Inc., as a qualified alternate vendor

The Code of Federal Regulations at 10 CFR 52.73(a) allows for an application referencing a certified design to have an entity other than that originally obtaining the certification provide the design if that entity is demonstrated qualified to do so.

Foundation for staff determination

- Can they obtain all relevant information?
- Do they have the physical capabilities?

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Section 1.4S Vendor Qualification Activities (cont.)

- Review of STPNOC due diligence summary report
- Audits and inspections to support review of the STPNOC due diligence effort

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Fundamental Questions
Section 1.4S (cont.)

- What information may not be available to AV?
- How does STPNOC intend to fill gaps?
- Has STPNOC assessed AV’s ability to reconstitute information?
- Has STPNOC done a reasonable job of scoping?
- Can they assume duties normally assigned to plant vendor?
- Can they manage design changes and support licensing process?
- Can they address differences?

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Review of Design Basis Documentation
Section 1.4S (cont.)

- Identification of reference material
- Categorization and disposition of reference material
- Identification of further inspection/audit needs
  - Pressure/Temperature limits
  - Neutron fluence projection
  - Containment analytical model
  - Hydrodynamic loads
  - Instrumentation & Control
  - Quality assurance

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Inspection and Findings
Section 1.4S (cont.)

- Conducted a week long inspection in Japan in July to assess AV's programs
  - Part 21
  - Appendix B program
  - Design control
  - Procurement document control
  - Control of purchased material
  - Corrective action program
  - Training and qualification
  - Initial test program

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Summary of Staff AVQ Effort Section 1.4S (cont.)

- Staff conducted document review and inspection
- Staff effort summarized in SER Chapter 1
- Parts of review found throughout SER
- Inspection report available to public (ML092370709)

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Section 1.4S (cont.)

Conclusion:

- The staff is still resolving an issue related to containment hydrodynamic loads.
- The technical review of this open item will be presented in Chapter 6.
- Until we resolve this open item, we cannot finalize our conclusions

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Section 1.8 “Conformance with SRP and Applicability of Codes and Standards

Section 1.8S “Site Parameters, Interface Requirements, COL License Information Items and Conceptual Design Information

- Sections 1.8 and 1.8S provide information on conformance with SRP and RG 1.206. They include:
  - One Tier 1 Departure which is being tracked as **Open Items 01-1**
  - One Tier 2* Departure on Codes, Standards, and RG Edition Change are editorial in nature and acceptable
  - Five Tier 2 Departures Not Requiring Prior NRC Approval were found reasonable and do not require NRC approval (subject to NRC inspections)
- The staff’s review confirmed that the applicant has addressed the required information. With the exception of **Open Items 01-1,** no outstanding information is expected.
- As a result of the Open Item the staff was unable to finalize the conclusions for this Section.

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Section 1.9 COL License Information and 1.9S Conformance with Regulatory Criteria

- These sections includes one Tier 1 Departure, and Supplemental Information
  - Tier 1 Departure is being tracked as **Open Items 01-1**
  - Supplementary Information included in Section 1.9S addressing applicable RGs, SRP, Generic Issues and Operational Experience was acceptable with the following exceptions:
    - FSAR does not address RGs related to quality assurance; this is being tracked as **Open Item 01-8**
    - 3 SRP Sections, "Communications Systems," "Operating and Maintenance Procedures," "Quality Assurance During the Operational Phase," were not included in Section 1.9S and will be tracked as **Open Item 01-9**
- With the exceptions noted above, no outstanding information is expected.
- As a result of the Open Items the staff was unable to finalize the conclusions for this Section.

Appendices 1A and 1AA “ Response to TMI Related Matters, and plant Shielding to Provide Access to Vital Areas and Protective Safety Equipment for Post-Accident Operation

- These appendices include Tier 1 and Tier 2 Departures, and COL License Information Items.
- Tier 1 Departures are evaluated in other sections of SER and are being tracked as **Open Item 01-1**
- Tier 2 Departure Not Requiring Prior NRC approval related to Shielding Design Review was found reasonable and does not require prior NRC approval
- Eight COL License Information Items were reviewed by the staff and found to had been addressed by the Applicant as required by the DCD.
- The applicant’s commitments for resolving these COL License Information Items were found reasonable, and will be evaluated in the appropriate sections of the SER
- With the exception of **Open Item 01-1,** no outstanding information is expected.
- As a result of the Open items the staff was unable to finalize the conclusions for this Section.

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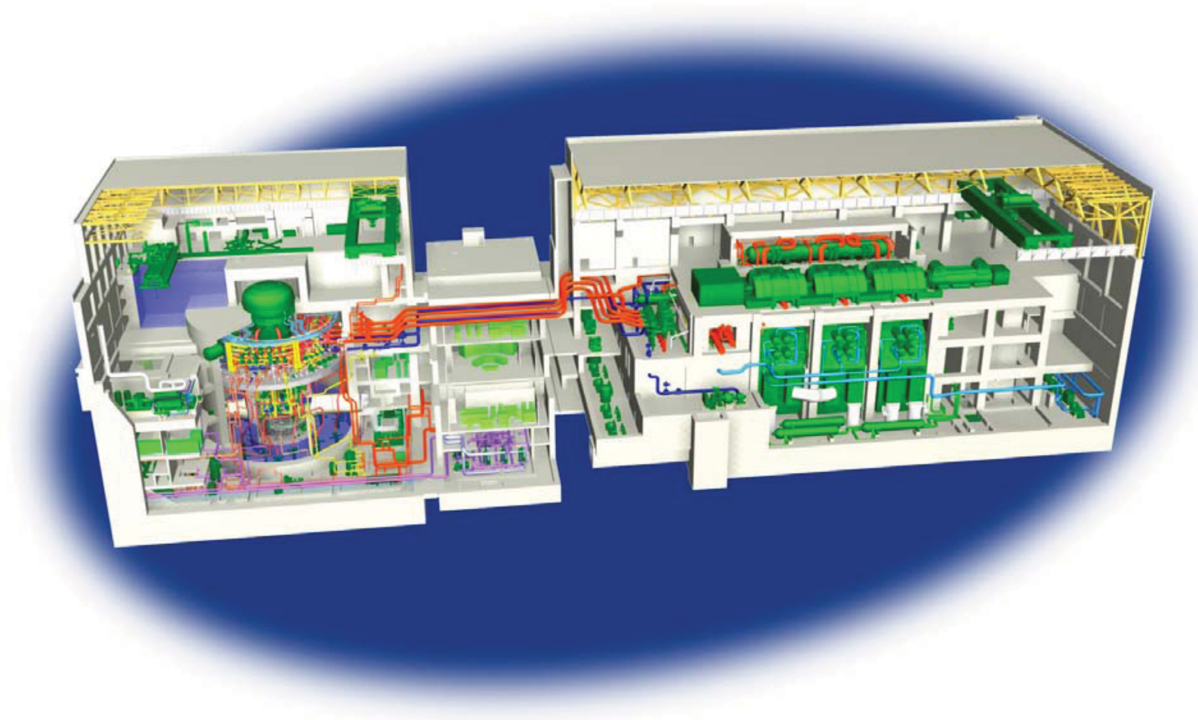
Chapter 1 Summary

- Open Items
  - Technical – To be resolved in appropriate SER chapter
  - Regulatory To be resolved as part of licensing process
  - Policy – To be resolved with additional staff guidance
  - Administrative – To be resolved by DNRL

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 4 Reactor



Agenda

- Introduction
- Attendees
- Contents & Summary
- Departure Information
- COL License Information Items
- ITAAC

Attendees

Scott Head	Regulatory Affairs Manager, STP 3&4
James Tomkins	Licensing, STP 3&4
John Price	Licensing, STP 3&4
Tom Daley	Engineering, STP 3&4
Robert Quinn	Westinghouse
Nirmal Jain	Westinghouse
Craig Swanner	MPR

Chapter 4: Reactor

Chapter Contents and Summary

Section 04.01 Summary Description - ***Incorporated by Reference***

Section 04.02 Fuel System Design - ***Incorporated by Reference***

Section 04.03 Nuclear Design – ***COL Item 4.1***

Section 04.04 Thermal-Hydraulic Design - ***COL Item 4.1; COL Item 4.2; COL Item 4.3***

Section 04.05 Reactor Materials – ***STD DEP 4.5-1; COL Item 4.4***

Section 04.06 Functional Design of Reactivity Control System - ***STD DEP 7.7-1; COL Item 4.5***

Appendix 04A Typical Control Rod Patterns and Associated Power Distribution for ABWR - ***Incorporated by Reference***

Appendix 04B Fuel Licensing Acceptance Criteria - ***Incorporated by Reference***

Appendix 04C Control Rod Licensing Acceptance Criteria - ***Incorporated by Reference***

Appendix 04D Reference Fuel Design Compliance with Acceptance Criteria - ***Incorporated by Reference***

Departures

Tier 2 Departures not requiring NRC approval

- **STD DEP 4.5-1, Reactor Materials**

This departure clarifies the use of equivalent and improved materials for the control rod drive mechanisms and reactor internals, based on successful experience in operating ABWRs.

- **STD DEP 7.7-1, RPV Water Level Instrumentation**

This departure clarifies the source of water for purging of the instrument lines in the Nuclear Boiler System. This departure is discussed in Chapter 7.

COL License Information Items

All COL Items addressed by STP.

- COL Item 4.1 – Addresses the use of approved stability compliance methodology if fuel design is changed (FSAR Section 4.3).
- COL Item 4.2 – Addresses the requirement to provide a power/flow operating map if fuel design is changed (FSAR Section 4.4).
- COL Item 4.3 – Addresses the requirement to provide the thermal limit analysis if the fuel design is changed (FSAR Section 4.4).
- COL Item 4.4 - Addresses information for Control Rod Drive Inspection Program (FSAR Section 4.5).
- COL Item 4.5 – Addresses the development of procedures for Control Rod Drive and Fine Motion Control Rod Drive installation and verification during maintenance (FSAR Section 4.6)

ITAAC

- No changes to ITAAC associated with Chapter 4

Chapter 4

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Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 4
"Reactor"

March 2, 2010

Staff Review Team

- **Project Managers**
  - George Wunder
  - Tekia Govan

- **Technical Staff**
  - SRSB, Chief, Joseph Donoghue
  - CIB2, Acting Chief, Neil Ray
  - SRSB, Lead Reviewer, James Gilmer
  - CIB2, Lead reviewer, Robert Davis

Summary of Staff Review

- Downstream Fuel Effects (GSI-191)
- FSAR Section 6C.1 of COLA, Rev. 2 commits to meeting the requirements of RG 1.82, Rev. 3 *("Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident")* and NEDO-32686 *("Utility Resolution Guide for ECCS Suction Strainer Blockage)*

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Downstream Effects

- Staff Position:

  – Applicants should consider flow blockage associated with fuel supports and debris filter, and their effects on fuel rod temperature.

  – Flow paths between downcomer and lower plenum should be evaluated for long term cooling degradation resulting from flow interruption due to plugging.

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Downstream Effects (Continued)

- COL license condition to submit an evaluation confirming that the fuel for the initial fuel load meets established acceptance criteria for evaluation of the downstream effects of containment debris on the reactor fuel.
- STP proposed acceptance criteria: fuel assembly steady state inlet pressure drop less than a value to be determined by analyses

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Downstream Effects (Continued)

- Staff evaluation of License Condition will consider:

  – CPR vs. % blockage
  – MCPR and PCT impact
  – Debris types and sizes (Chapter 6)
  – ECCS flow rates and debris loading times (Chapter 6)
  – Analysis Assumptions

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SER Conclusion

- Staff review confirmed that the applicant addressed the required information relating to the reactor core design and there is only one unresolved issue related to fuel testing.

ACRS Subcommittee Presentation
SER/OI Chapter 4

Discussion/Committee Questions

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Backup Slides

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Downstream Effects (continued)

- STP Minimizes Impact of Downstream Effects by:
  - Insulation limited to Reflective Metallic
  - Tortuous path from break locations inside drywell to wetwell
  - Strainer hole size
  - low potential chemical debris
  - wetwell cleanup
  - Multiple coolant injection systems and locations
  - Cleanliness program/procedural controls

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COL ITEMS

4.1 Thermal Hydraulic Stability

Applicable only for Plants which change the fuel design.

There is no fuel design change for COL

COL ITEMS

4.2 Power/Flow Map

DCD Sections 4.4.3.3.1, Figures 4.4-1, 2 include the power/flow map for the fuel in the core being licensed.

COL ITEMS

4.3 Thermal Limits

SLMCPR >1.07

OLMCPR - is specified in Cycle Operating Limits Report (COLR)

Average Planar Linear Heat Generation Rate (APLHGR) is specified in COLR

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COL ITEMS

4.4 CRD Inspection Program

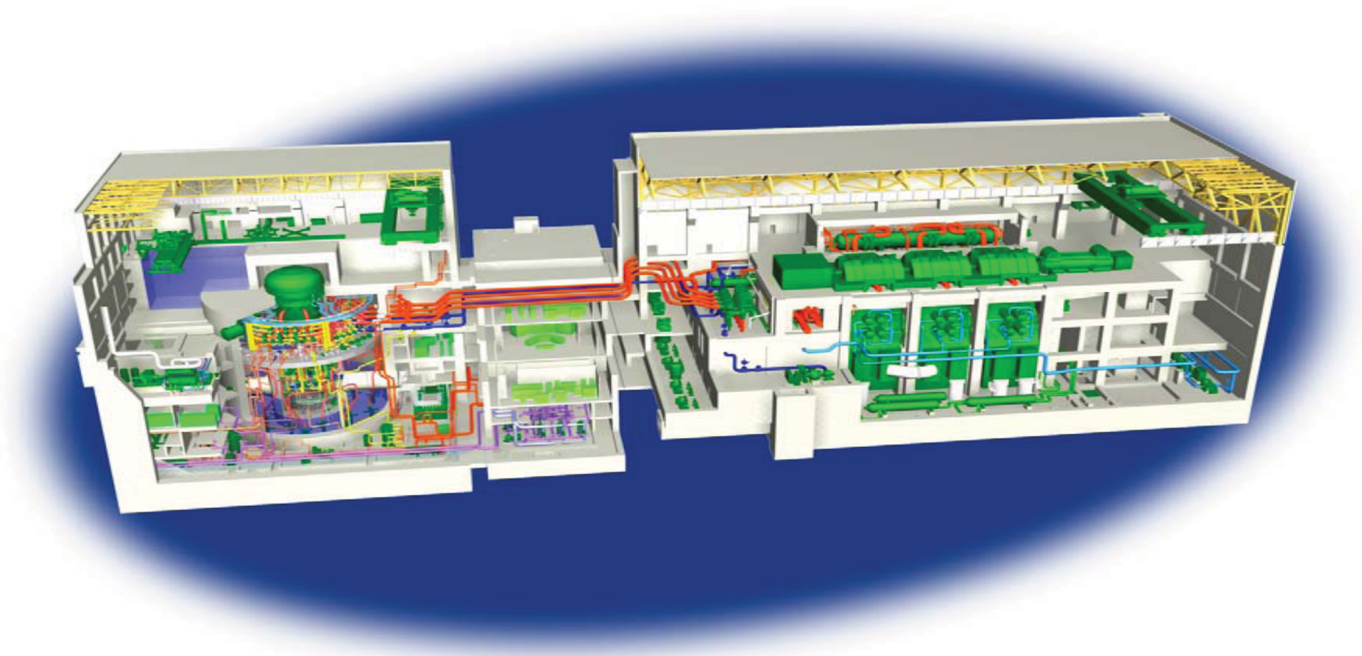
- The condition and integrity of CRDs are monitored by routine visual inspection of a selected sample of CRDs during each outage period and included in the preventive maintenance program.
- CRD performance is monitored under the provisions of the maintenance rule. CRD nozzles and bolting are included in the ISI program.

COL ITEMS

4.5 Fine Motion Control Rod Drive (FMCRD) Installation and Verification During Maintenance

The procedures for FMCRD identified in DCD Table 1.9-1 will be incorporated into plant procedures as described in FSAR Section 13.5.3.4.2 Item 8

South Texas Project Units 3 & 4
Presentation to ACRS Subcommittee
Chapter 11
Radioactive Waste Management



Agenda

- Introduction
- Summary
- Contents of FSAR Chapter 11
  - Departure Information
  - COL License Information Items
  - Site-Specific Supplements
- ITAAC

Attendees

Scott Head	Regulatory Affairs Manager, STP 3&4
Tom Daley	Engineering Supervisor, STP 3&4
Milton Rejcek	Engineering, STP 3&4
Coley Chappell	Licensing, STP 3&4
Scot Stephens	Licensing, STP 3&4
Tooru Karasawa	Senior Manager, TANE
Joe Johnson	Engineering, Sargent & Lundy

Chapter 11 Contents

- Provides STP 3 & 4 source terms
- Describes the processing of Liquid, Gaseous, and Solid Waste streams for recycle, release, or disposal
- Describes Radiation Monitoring Systems and monitoring of releases to the environment

11.1 Source Terms

11.2 Liquid Waste Management System

11.3 Gaseous Waste Management System

11.4 Solid Waste Management System

11.5 Process and Effluent Radiological Monitoring and Sampling Systems

11.6 Offsite Radiological Monitoring Program

Departures

- Deletion of MSIV Closure and Scram on High Rad (STD DEP T1 2.3-1)
  - Eliminated an input to the Reactor Trip system
- Safety-Related I&C Architecture Changes (STD DEP T1 3.4-1)
  - Nomenclature changes to Radiation Monitoring Systems
- Main Condenser Evacuation System (STP DEP 10.4-3)
  - Added a second mechanical vacuum pump
- Condensate and Feedwater System (STD DEP 10.4-5)
  - Improved efficiency and tighter temperature control on the Gaseous Waste Condenser

Departures

Liquid Waste Management System

STD DEP 11.2-1

Replaced system described in DCD with current processing technology:

- Modular components and reduced system complexity provide improved performance and processing flexibility.
- Modular components will allow technology upgrade in future.
- High-dose, high maintenance items removed where possible.
- Additional tanks to segregate materials and support re-use (outages).
- Reverse osmosis technology replaces conventional filters.
- Removal of conventional filters reduces solid radwaste generation.

Departures

Gaseous Waste Management System

STD DEP 11.3-1

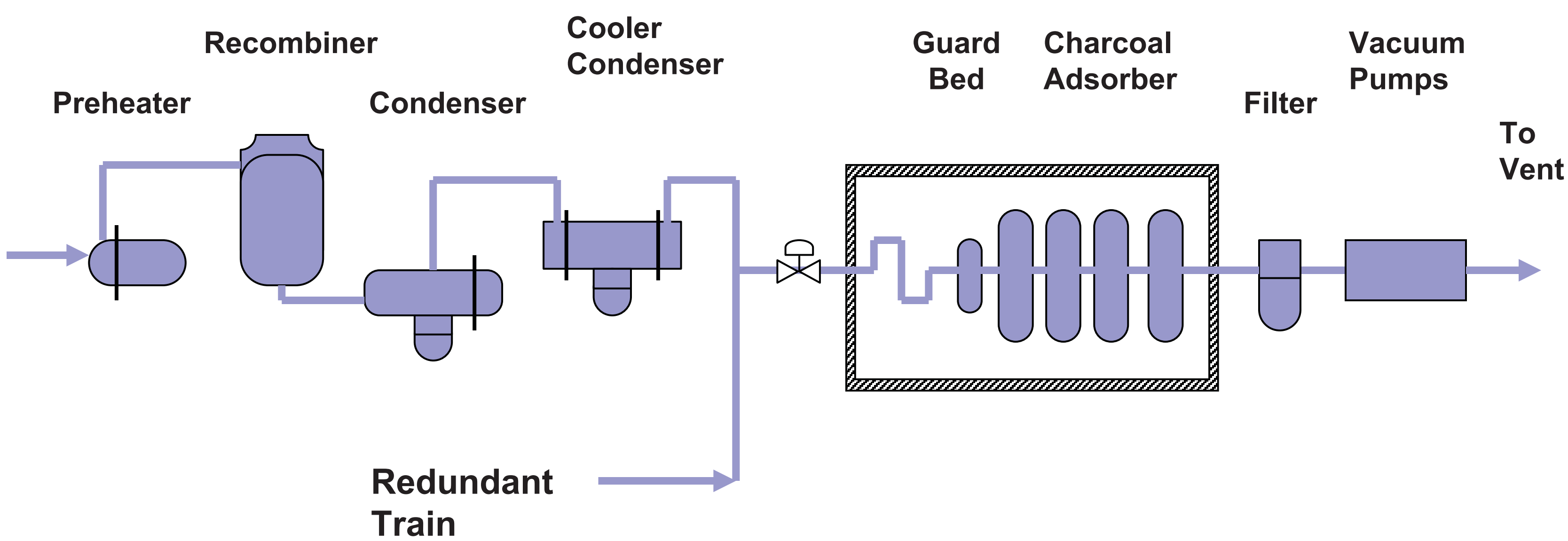
- Replaced designed but never built integrated recombiners with existing design of three-component recombiner trains.
- Incorporated a series flow path through guard bed and delay beds.
- Added vacuum pumps to outlet of system for flow stability.

Departures

Gaseous Waste Management System

STD DEP 11.3-1

STP 3 & 4 Offgas System



Departures

Solid Waste Management System

STD DEP 11.4-1

- Eliminated drumming process and equipment
- Changed process to ship incinerable waste to offsite vendor and eliminated incinerator and supporting equipment
- For spent resin, added second vessel to allow segregation and re-use of resin where possible
- Implemented use of High Integrity Containers for offsite disposal
- Added reverse osmosis backwash receiver tank to support RO technology in LWMS
- Added de-watering equipment for High Integrity Containers

Departures

Process and Effluent Radiation Monitoring and Sampling System Description

STP DEP 11.5-1

- Implemented flexibility in the selection of instruments to allow use of current technology.
- Eliminated radiation monitors that supported deleted equipment.

COL License Information Items

All Items have been addressed in the COLA:

11.1 Plant Specific Liquid Radwaste Information (FSAR 11.2.5.1)

11.2 Compliance with Appendix I to 10 CFR 50 (FSAR 11.3.11.1)

11.3 Plant Specific Solid Radwaste Information (FSAR 11.4.3.1)

11.4 Calculation of Radiation Release Rates (FSAR 11.5.6.1)

11.5 Compliance with the Regulatory Shielding Design Basis (FSAR 11.5.6.2)

11.6 Provisions for Isokinetic Sampling (FSAR 11.5.6.3)

11.7 Sampling of Radioactive Iodine and Particulates (FSAR 11.5.6.4)

11.8 Calibration Frequencies and Techniques (FSAR 11.5.6.5)

ITAAC

No departures from the Tier 1 certified design material, or associated ITAAC for Radwaste Systems.

Chapter 11
Radioactive Waste Management

Questions and Comments

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Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 11
"Radioactive Waste Management"

March 2, 2010

Staff Review Team

- Project Managers
  - George Wunder, Lead PM, DNRL/NGE2
  - Raj Anand, Chapter PM, DNRL/NGE2
- Technical Staff Presenters
  - Stephen Williams, Reviewer, DCIP/CHPB
  - Steven Schaffer, Reviewer, DCIP/CHPB

Overview of STP FSAR Chapter 11 Radioactive Waste Management

Topics of Interest	Summary
NRC Audit of STP 10 CFR Part 52 departure review process	RAIs issued for FSAR sections 11.2 and 11.4
Liquid Radioactive Waste Management	STD DEP 11.2-1, Liquid Radwaste Process Equipment STP COL 11.2.1.2, Cost-Benefit Analysis of population doses
Gaseous Radioactive Waste Management	STD DEP 11.3-1, Gaseous Radwaste Process Equipment STP COL 11.3.11.1, Cost-Benefit Analysis of population doses
Solid Radioactive Waste Management	STD DEP 11.4-1, Radioactive Solid Waste Update
Radiation Monitoring	STD DEP 11.5-1 Process and Effluent Radiation Monitoring and Sampling System
COL Licensing Information Items	8 COL License Information Items included in Chapter 11

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NRC Audit of the Liquid, Gaseous, and Solid Waste Management System 10 CFR Part 52 Analysis Process

Technical Topic of Interest

- Review the STP 10 CFR Part 52 departure process and procedures
- RAIs issued based on audit findings for Chapter 11 sections 11.2 and 11.4

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STP FSAR Section 11.2
Liquid Waste Management System

Departure 11.2-1

- Complete revision of LWMS design, complies with RG 1.143

Staff Analysis

- Cost-Benefit Analysis (NRC) - Liquid System Augment ~$33,000 to $125,000 per person-rem evaluation
- Three open items concerning Condensate Storage Tanks.

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STP FSAR Section 11.2
Open Items

- RAI 11.02-7:
  Requested information for the STP 3 & 4 Condensate Storage Tanks including radioactive source term, function, and volume.

- RAI 11.02-08:
  Clarification requested concerning the STP 3 & 4 Condensate Storage Tank locations, design features, and 10 CFR 20.1406 implications.

- RAI 11.02-9
  Requested radioactive source term related to maximum expected radioactivity concentrations in the CST, and dose rate calculations from the CST source term

Section Conclusion

As a result of these open and confirmatory items, the staff is unable to finalize its conclusions concerning section 11.2, “Liquid Waste Management System” in accordance with NRC requirements at this time.

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STP FSAR Section 11.3
Gaseous Waste Management System

Departure 11.3-1

- Rearrangement of Activated Charcoal Adsorber system

Staff Analysis

- Cost-Benefit Analysis (NRC) – Gaseous System Augment ~$6,300 to $17,700 per person-rem evaluation
- No open items

Section Conclusion

As a result of the confirmatory items, the staff is unable to finalize its conclusions concerning section 11.3, “Gaseous Waste Management System” in accordance with NRC requirements at this time.

STP FSAR Section 11.4
Solid Waste Management System

Departure 11.4-1

- Use of approved NEI 07-10A, Generic FSAR Template to fulfill program description for the Process Control Program.
- Onsite or offsite storage of low-level radioactive waste. Use of Waste Control Specialist disposal facility in Texas, or onsite storage capacity for all four STP units

Staff Analysis

- No cost-benefit analysis included, effluent releases of SWMS are included in the cost-benefit analysis of FSAR sections 11.2 and 11.3
- No open items

Section Conclusion

As a result of the confirmatory items, the staff is unable to finalize its conclusions concerning section 11.4, “Solid Waste Management System” in accordance with NRC requirements at this time.

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STP FSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems

Departure 11.5-1

- Use of approved NEI 07-09A, Generic FSAR Template to fulfill program description for the Offsite Dose Calculation Manual (ODCM) Program

Staff Analysis

- No open items

Section Conclusion

As a result of the confirmatory items, the staff is unable to finalize its conclusions concerning section 11.5, “Process and Effluent Radiological Monitoring and Sampling Systems” in accordance with NRC requirements at this time.

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COL Information Items

11.1	Plant Specific Liquid Radwaste Information **Acceptable**	FSAR 11.2.5.1
11.2	Compliance with Appendix I to 10 CFR Part 50 **Evaluating**	FSAR 11.3.11.1
11.3	Plant Specific Solid Radwaste Information **Confirmatory**	FSAR 11.4.3.1
11.4	Calculation of Radiation Release Rates **Acceptable**	FSAR 11.5.6.1
11.5	Compliance with the Regulatory Shielding Design Basis - **Acceptable**	FSAR 11.5.6.2
11.6	Provisions for Isokinetic Sampling **Acceptable**	FSAR 11.5.6.3
11.7	Sampling of Radioactive Iodine and Particulates **Acceptable**	FSAR 11.5.6.4
11.8	Calibration Frequencies and Techniques **Acceptable**	FSAR 11.5.6.5

Summary

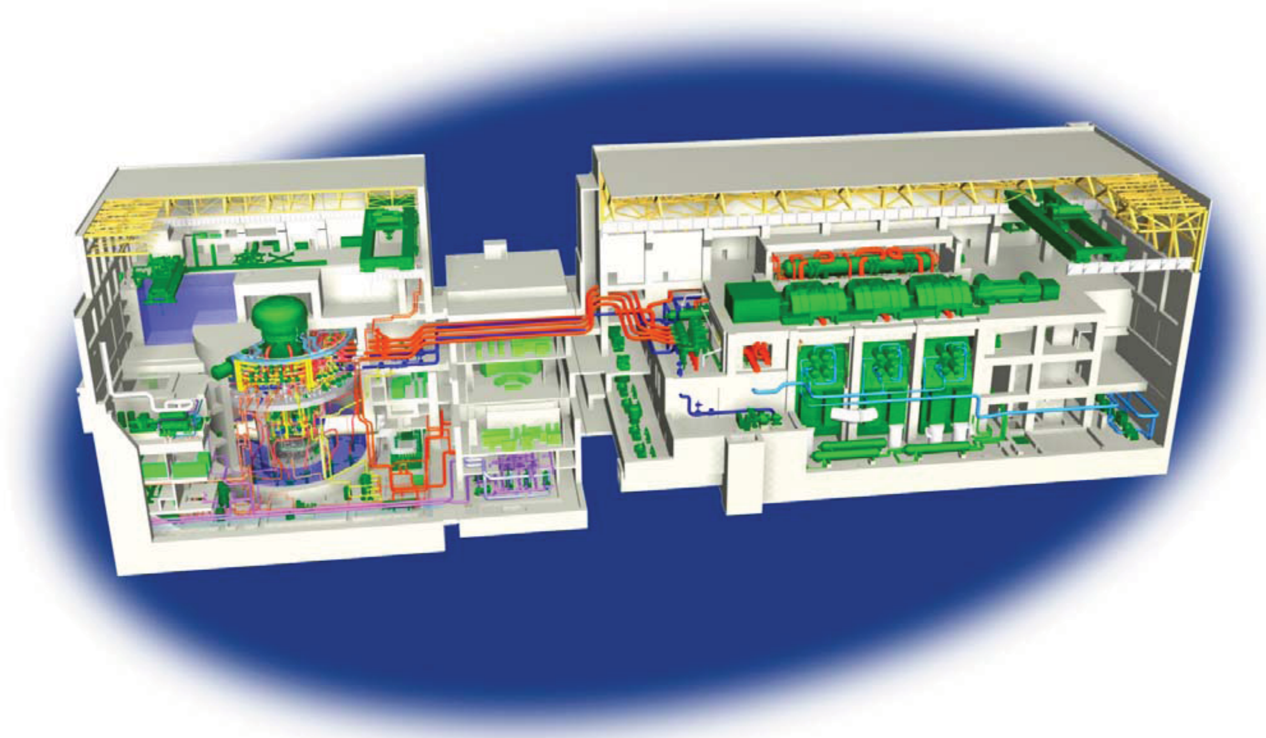
- Overview of conclusions presented.
- Potential ACRS follow-ups and IOUs
- Overview of Open Item Status

ACRS Subcommittee Presentation
Overview of STP RCOL Chapter 11

Radioactive Waste Management

Discussion/Committee Questions

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee Chapter 12 Radiation Protection



Agenda

- Introduction
- Summary
- Contents of FSAR Chapter 12
  - Departure Information
  - COL License Information Items
  - Site-Specific Supplements
- ITAAC

Attendees

Scott Head	Regulatory Affairs Manager, STP 3&4
Tom Daley	Engineering Supervisor, STP 3&4
Milton Rejcek	Engineering, STP 3&4
Gordon Williams	STPNOC Radiation Protection
Coley Chappell	Licensing, STP 3&4
Scot Stephens	Licensing, STP 3&4
Tooru Karasawa	Senior Manager, TANE
Joe Johnson	Engineering, Sargent & Lundy

Chapter 12 Summary

Chapter 12 describes how dose to the worker, the public, and the environment are assessed, and how design, plant specific programs and processes, and continual monitoring limit that dose to as low as possible.

12.1	Ensuring that Occupational Radiation Exposures are ALARA
12.2	Radiation Sources
12.3	Radiation Protection Design Features
12.4	Dose Assessment
12.5	Health Physics Program
12.5S	Operational Radiation Protection Program
12A	Calculation of Airborne Radionuclides

Departures

- STD DEP T1 2.14-1, Eliminated Hydrogen Recombiners
  - Reduction of maintenance work (dose) in Reactor Building
- STD DEP T1 3.4-1, Changes made to I & C Architecture
  - Nomenclature changes to Radiation Monitoring Systems
- STD DEP 1.8-1, Codes and Standards (Tier 2*)
  - Updated to revised Regulatory Guides 1.153, 1.75, and 1.84.
- STD DEP 3.8-1, Re-sizing of the Radwaste Building
  - Due to radwaste processing equipment changes

Departures cont'd:

- STD DEP 11.2-1, STD DEP 11.4-1
  - Updated radiation sources in the Liquid Radwaste System and Solid Radwaste Sytem due to departures
- STD DEP 12.3-1: Cobalt content in Stainless Steel
  - A graded approach to the use of cobalt, with lowest cobalt bearing steel in the core
- STD DEP 12.3-4: Alarm Capability for Area Radiation Monitors
  - Alarm function added to certain area radiation monitors (Reactor Building, Turbine Building, and Radwaste Building
  - Added Area Radiation Monitors in Reactor Building

COL License Information Items

All of the COL Items are addressed (FSAR section):

12.1 Regulatory Guide 8.10 Compliance (12.1.4.1)

12.2 Regulatory Guide 1.8 Compliance (12.1.4.2)

12.3 Tracking Occupational Radiation Exposure (12.1.4.3)

12.4 Regulatory Guide 8.8 Compliance (12.1.4.4)

12.5 Compliance with 10 CFR 20 and 10 CFR 50 App I (12.2.3.1)

12.6 Airborne Radionuclide Concentration Calculation (12.3.7.1)

12.7 Operational Considerations (12.3.7.2)

12.8 Requirements of 10 CFR 70.24 (12.3.7.3)

12.9 Radiation Protection Program (12.5.3.1)

12.10 Compliance with Paragraph 50.34(f)(xxvii) of 10 CFR 50 and NUREG-0737, Item III.D.3.3 (12.5.3.2)

Site-Specific Supplements

Section 12.5S addresses the site specific Operational Radiation Protection Program, with supplemental information and/or responsibilities to address the following:

- Management Policy
- Plant Manager
- Radiation Protection Manager
- Methods to maintain exposures ALARA
- Access Control
- Dose Control

ITAAC

Tier 1 ITAAC items related to:

- *Process Radiation Monitoring*
- *Plant Shielding Design*
- *Ventilation and Airborne Radiation monitoring*

Chapter 12
Radiation Protection

Questions and Comments

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 12
"Radiation Protection"

March 2, 2010

Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM, DNRL/NGE2
  - Michael Eudy, Chapter PM, DNRL/NGE2
- **Technical Staff Presenters**
  - Robert Kellner, Reviewer, DCIP/CHPB
  - Sara Bernal, Reviewer, DCIP/CHPB
  - Stephen Williams, Reviewer, DCIP/CHPB

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Overview of South Texas COL

Topics of Interest	Summary
Review of Tier 2 Departures Identified by the Applicant as Not Requiring Prior NRC Approval	The staff evaluated these departures for ALARA considerations and compliance with the requirements of 10 CFR Part 20
Radiation Source Term and Effluent Dose Calculations (Section 12.2)	• Departures to liquid, gaseous, and solid radwaste systems resulted in changes in the plant radiation source terms, requiring revision of the effluent dose calculation parameters, and revised dose calculations. • COL License Information Item 12.5 - Compliance with 10 CFR Part 20 and 10 CFR Part 50 Appendix I • Spent Fuel Pool Source Term and Geometry
Radiation Protection Design Features and Dose Assessment (Section 12.3-12.4)	• COL Information Item 12.7 - Operational Considerations • COL Information Item 12.8 - Criticality Accident Monitoring for 10 CFR 70.24 • Construction Worker Dose Assessment • 10 CFR 20.1406 Compliance– Minimization of Contamination • STD DEP 12.3-2 - CUW Backwash Tank Vent Filter • Occupational Dose Assessment
COL Information Item Status	Current status of STP FSAR Chapter 12 COL Information Items

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Tier 2 Departure Evaluation

Technical Topic of Interest

- Applicant evaluation of Tier 2 Departures throughout COL FSAR Chapter 12 determined that the departures, in accordance with 10 CFR Part 52, Appendix A, Section VIII item B.5, did not require prior NRC Approval.
- The staff determined that it is reasonable that these departures do not require prior NRC approval.
- In order to make a determination of reasonable assurance that the departures did not result in any changes to radiation protection equipment and design features identified in the ABWR DCD, the staff evaluated these departures to ensure that estimated occupational and public radiation exposures will be ALARA, and that STP 3 and 4 will be constructed and operated in compliance with the Part 20 requirements.

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STP FSAR Section 12.2

Radiation Sources - Technical Topic of Interest

Staff performed the following reviews and analyses:

- Reviewed liquid and gaseous effluent releases
- Confirmed appropriate exposure pathways
- Confirmed the use of appropriate liquid dilution and atmospheric dispersion/deposition parameters
- Confirmed the use of appropriate land usage parameters
- Evaluated the Applicant's calculated doses using NRC recommended models
- Performed an independent dose assessment for liquid and gaseous pathways

There are five open items associated with RadioactiveSource Terms

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STP FSAR Section 12.2

Radioactive Source Terms - Open Items

- Additional information requested for evaluating compliance with 10 CFR 20 and 10 CFR 50 Appendix I for gaseous effluents in FSAR section 12.2 **(OI 12.02-1)**
- Additional information requested for evaluating compliance with 10 CFR 20.1301(e) and 40 CFR 190 compliance in FSAR section 12.2 **(OI 12.02-2)**
- Information requested for evaluating the liquid effluent source term in FSAR section 12.2 in accordance with the GALE code **(NEW OI, RAI 12.02-15)**
- Information requested for evaluating the gaseous effluent source term in FSAR section 12.2 in accordance with the GALE code **(NEW OI, RAI 12.02-16)**
- Supplemental information requested for evaluating the effluent data presented in response to 10 CFR 20.1301(e) and 40 CFR 190 compliance **(NEW OI, RAI 12.02-17)**

Dose evaluation of STP Routine Liquid and Gaseous Effluent Releases and Comparison to Regulatory Criteria

Regulation	Type of Effluent	Pathway	Organ	Regulatory Limit (mrem/yr per unit)	Applicant SAR (mrem/yr per unit)	NRC SER (mrem/yr per unit)
10 CFR Part 50, Appendix I	Liquid	all	total body	3	0.00025	0.0028
		all	any organ	10	0.0011	0.0074
	Gaseous	all	total body	5	3.2	2.18
		all	skin	15	7.25	6.04
	Iodine & Particulate	all	any organ	15	2.19	2.18
	Gaseous	γ air dose	n/a	10 mrad	3.30 mrad	3.30 mrad
		β air dose	n/a	20 mrad	4.28 mrad	4.28 mrad
40 CFR Part 190	all	all	total body	25 per site	5.71 (2 units)	5.83 (2 units)
	all	all	thyroid	75 per site	4.55 (2 units)	9.54 (2 units)
	all	all	other organs	25 per site	1.94 (2 units)	6.96 (2 units)

STP FSAR Section 12.2

Spent Fuel Pool Source Term – Open Item

- STP COL FSAR and ABWR DCD radiation source term tables do not contain source term or geometry information for radiation sources contained in the spent fuel pool (SFP)
- SFP source term and geometry has not been adequately described to allow for verification of the shield design calculations required in Tier 1 ITAAC 3.2a
- STP 3 and 4 SFP design is not complete
- SFP design documents and criticality calculations are due from STP in the future

This is open item **12.02-4** in the SER with OI

STP FSAR Section 12.2

Section 12.2 – Open Item Status

Open Items in SER Section 12.2 with OIs - 4 Open Items	Current status of Open Items - 6 Open Items remaining
12.02-1 - Compliance with 10 CFR 20 & 10 CFR 50, Appendix I, gaseous dose requirements	**Five** open RAI questions related to gaseous and liquid source term calculations (three new since SER with OI) remain to be resolved. Staff to confirm Annual Liquid and Gaseous Effluent Releases through independent verification. Resolution will be through NRC staff verification of annual release calculations, and confirmation of compliance with 10CFR50, Appendix I, and 10CFR20.1301(e) and 20.1302.
12.02-2 - Compliance with 1 0CFR 20.1301(e) (40 CFR 190) liquid & gaseous dose requirements	
12.02-3 - Describe Contained Sources > 100 millicuries (resolved and is now confirmatory)	
12.02-4 - Spent Fuel Pool Source Term Information	The SFP design is not final. Design documents and criticality calculations are due from STP in the second quarter of 2011. **One** open RAI.

<u>Section 12.2 Conclusion</u>

As a result of these open items, the staff is unable to finalize its conclusions concerning Section 12.2, “Radiation Sources”, in accordance with NRC requirements at this time.

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STP FSAR Section 12.3-12.4
Radiation Protection Design Features – Open Items

- COL Information Item 12.7 - Operational Considerations
  - ARM and airborne monitor calibration methods and frequencies during operation **(OI 12.03-12.04-2)**
- COL Information Item 12.8-Criticality Accident Monitoring requirements of 10 CFR 70.24
  - Applicant must demonstrate compliance with the criticality accident monitoring requirements of 10 CFR 70.24, or possess an exemption prior to a Part 52 license being issued. **(OI 12.03-12.04-3)**
- Construction Worker Dose
  - Bases, model, and assumptions used in the dose calculations
- Compliance with 10 CFR 20.1406(a)
  - Initial RAI about using RG 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning”
  - Open supplemental RAI **(OI 12.03-12.04-4)**

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STP FSAR Section 12.3-12.4 Radiation Protection Design Features - Technical Topics of Interest

STD DEP 12.3-2 - CUW Backwash Tank Vent Charcoal Filter

- RAI questioned the departure based on compliance with 10 CFR 20.1406(a)
- In the response the applicant proposed COL FSAR revision to retract the departure and included the vent filter in the system

Occupational Dose Assessment

- Radwaste building operation and maintenance dose reduced by 80 person-mSv/year (8 person-rem/yr)
- Annual occupational dose estimate is 909 person-mSv/year (90.9 person-rem/yr) per unit
- Approximate forty percent reduction over current operating BWR units.

STP FSAR Section 12.3-12.4
Section 12.3-12.4 – Open Item Status

Open Items in SER Section 12.3 with OIs - 5 Open Items	Current status of Open Items - 4 Open Items remaining
12.03-12.04-1 - CUW Backwash Tank Vent Charcoal Filter (resolved and is now confirmatory)	
12. 03-12.04-2 - ARM and airborne monitor calibration methods and frequencies during operation	RAI response received and being evaluated by the staff. (COL Information Item 12.7)
12. 03-12.04-3 - Compliance with the criticality accident monitoring requirements of 10 CFR 70.24 (COL Information Item 12.8)	Awaiting response from applicant. (COL Information Item 12.8)
12. 03-12.04-4 – Compliance with 10 CFR 20.1406	Awaiting revised response from applicant.
12. 03-12.04-5 - Bases, models, and assumptions used to calculate construction worker doses.	RAI response received and being evaluated by the staff.

Section Conclusion

As a result of these open items and confirmatory items, the staff is unable to finalize its conclusions concerning Section 12.3, “Radiation Protection Design Features” and Section 12.4, “Dose Assessment”, in accordance with NRC requirements at this time.

STP FSAR Chapter 12 COL Information Item Status

12.1	Regulatory Guide 8.10 Compliance	**Confirmatory**	FSAR 12.1.4.1
12.2	Regulatory Guide 1.8 Compliance	**Confirmatory**	FSAR 12.1.4.2
12.3	Tracking Occupational Radiation Exposure	**Confirmatory**	FSAR 12.1.4.3
12.4	Regulatory Guide 8.8 Compliance	**Confirmatory**	FSAR 12.1.4.4
12.5	Compliance with 10 CFR 20 and 10 CFR 50 Appendix I	**Evaluating**	FSAR 12.2.3.1
12.6	Airborne Radionuclide Concentration Calculation	**Acceptable**	FSAR 12.3.7.1
12.7	Operational Considerations	**Evaluating**	FSAR Section 12.3.7.2
12.3.7.4	Material Selection	**Acceptable**	FSAR Section 12.3.7.4
12.8	Requirements of 10 CFR 70.24	**Evaluating**	FSAR Section 12.3.7.3
12.9	Radiation Protection Program	**Confirmatory**	FSAR Section 12.5.3.1
12.10	Compliance with Paragraph 50.34(f)(xxvii) of 10 CFR 50 and NUREG-0737, Item III.D.3.3	**Confirmatory**	FSAR Section 12.5.3.2

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Chapter Summary

Due to Open Items and Confirmatory Items, the staff is unable to finalize conclusions concerning Chapter 12, “Radiation Protection” at this time.

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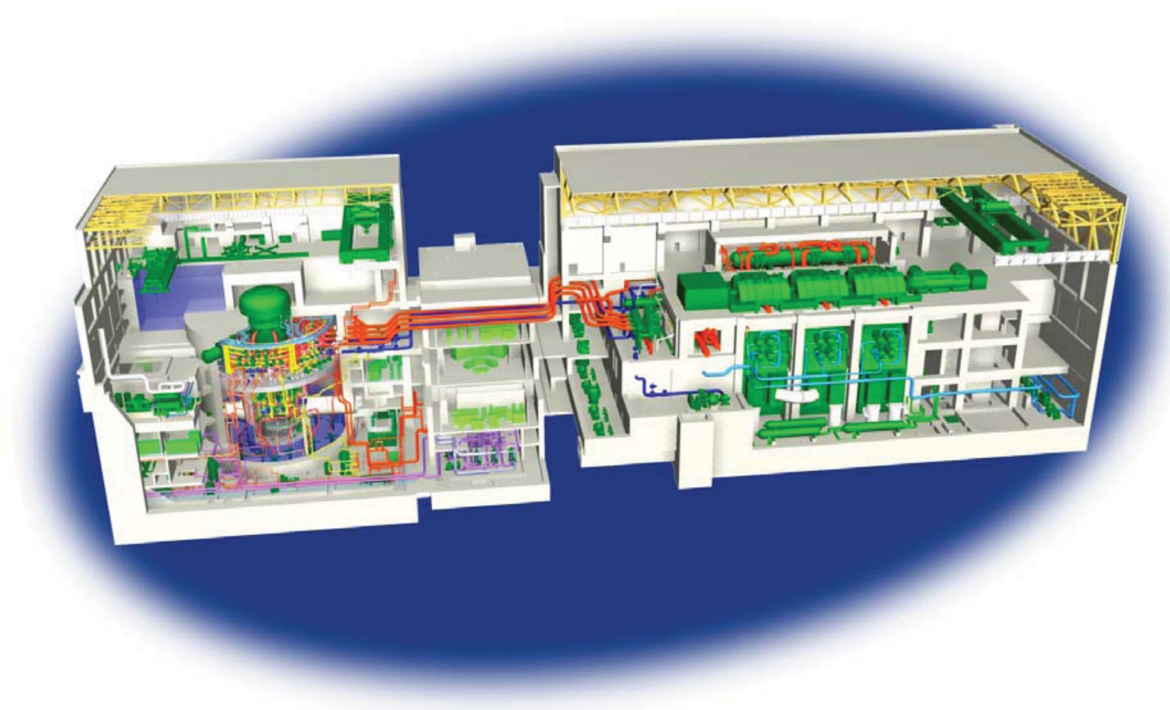
ACRS Subcommittee Presentation Overview of STP RCOL Chapter 12 – Radiation Protection

Discussion/Committee Questions

South Texas Project Units 3 & 4 Presentation to ACRS Subcommittee

Chapter 15

Accident and Analysis



Agenda

- Introduction
- Attendees
- Chapter 15 Overview
- Contents of FSAR
  - Departure Information
  - COL License Information Items
  - Site-Specific Supplements

Attendees

Scott Head	Regulatory Affairs Manager, STP 3&4
James Tomkins	Licensing, STP 3&4
Tom Daley	Engineering, STP 3&4
Robert Quinn	Westinghouse
Nirmal Jain	Westinghouse
YJ Lin	Bechtel

Chapter 15 Overview

- Essentially identical to the certified design
- No Chapter 15 based departures
- No departure from fuel
- Minor descriptive changes due to departures in other chapters
- All COL Information Items addressed
- No ITAAC

Contents of Chapter 15 (Sections)

- 15.0 Accident and Analysis
- 15.1 Decrease in RCS Temperature
- 15.1S Transient and Accident Classification
- 15.2 Increase in RCS Pressure
- 15.3 Decrease in RCS Flow Rate
- 15.4 Reactivity Anomalies
- 15.5 Increase in RCS Inventory
- 15.6 Decrease in RCS Inventory
- 15.7 Radioactive Release
- 15.8 Anticipated Transients w/o Scram

Contents of Chapter 15 (Appendices)

- 15A Nuclear Safety Operational Analysis
- 15B Failure Modes and Effects Analysis
- 15C Not Used
- 15D Probability Analysis of Pressure Regulator Downscale Failure
- 15E ATWS Performance Evaluation
- 15F LOCA Inventory Curves

Departures

<u>Tier 1 Departures</u>

- Eliminate Hydrogen Recombiners (STD DEP T1 2.14-1)
  - Removes system from a figure
  - Not credited in Chapter 15 analysis
- Safety Related I & C Architecture (STD DEP T1 3.4-1)
  - Nomenclature changes

Departures (continued)

Tier 1 Departures

- Seismic Reclassification of Radwaste Building (STD DEP T1 2.15-1)
  - Revises Radwaste Building descriptive text
- Deletion of MSIV Closure and Scram on Hi Rad (STD DEP 2.3-1)
  - Removed from list of possible MSIV closure events

Departures (continued)

Tech Spec departure requiring NRC Approval

- STD DEP 8.3-1
  - Revises intermediate voltage from 6.9 kV to 4.16 and 13.8 kV
  - No impact on the safety analysis

COL License Information Items

All COL Items addressed by STP

- Anticipated Operational Occurrences
- Operating Limits
- Design Basis Accidents
- Radiological Effects of MSIV Closures
- Mislocated Fuel Bundle Accident
- Misoriented Fuel Bundle Accident
- Iodine Removal Credit
- Radiological Consequences of Non-Line Break Accidents

Site-Specific Supplements

- Supplemental Section 15.1S
  - Concluded that there were no design differences that could impact the STP 3 & 4 accident analysis
- Supplemental Subsection 15.6.5S
  - Addressed differences between DCD and site-specific X/Q values
  - Provides site-specific doses in Table 15.6.5S-2 for:
    - Instrument Line Break
    - Main Steamline Break
    - Loss of Coolant Accident
    - Cleanup Water Line Break
  - Results within acceptance criteria

Chapter 15
Accident and Analysis

Questions and Comments

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Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 15
"Accident Analysis"

March 2, 2010

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Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM, DNRL/NGE2
  - Adrian Muñiz, Chapter PM, DNRL/NGE2
- **Technical Staff**
  - Jay Lee, Reviewer, RSAC
  - George Thomas, Reviewer, SRSB
  - Stephen Williams, Reviewer, CHPB
  - Dinesh Taneja, Reviewer, ICE2

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Summary of Technical Discussion Points

- Departures Requiring NRC Approval
- COL Information Items
- Supplemental information
- Open Items

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Departures Requiring NRC Approval

- **STD DEP T1 2.3-1**, ”Deletion of MSIV Closure and Scram on High Radiation.” Evaluated in Chapter 11.
- **STD DEP 8.3-1**, “Plant Medium Voltage Electrical System Design.” Evaluated in Chapter 8.
- **STD DEP T1 2.15-1**, “Re-classification of Radwate Building Substructure from Seismic 1 to Non-Seismic.” Evaluated in Chapter 3.
- **STD DEP T1 2.14-1**, “Hydrogen Recombiner Requirements Elimination”. Evaluated in Chapter 6.
- **STD DEP T1 3.4-1**, “Safety-Related I&C Architecture”. Evaluated in Chapters 7 and 19.
- Changes in Chapter 15 are being made to make information consistent with design changes made in other Chapters.

COL Information Items

- **COL Item 15.1**, “Anticipated Operational Occurrences”
- **COL Item 15.2**, “Operating Limits”
- **COL Item 15.3**, “Design Basis Accidents”
- **COL Item 15.5**, “Mislocated Fuel Bundle Accident”
- **COL Item 15.6**, “Misoriented Fuel Bundle Accident”
- No departures are taken from the DCD fuel design, including the core loading map used for the transient and accident analyses and the control rod strategy
- Analysis in the ABWR DCD still valid, and therefore COL Items are satisfied.

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COL License Information Items (Cont'd)

Potential Radiological Effects

- COL Item 15.4, "Radiological Effects of MSIV closure"
  - Consistent with the values approved in the ABWR DCD
- COL Item 15.7, "Iodine Removal Credit"
  - Consistent with the values approved in the ABWR DCD
- COL Item 15.9, "Radiological consequences of Non-line Break Accident"
  - Bounded by the values approved in the ABWR DCD

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Supplemental Information/Open Items

- 15.6.5S, "Site-Specific Design Basis Accident χ/Q Values" (Regulatory Guide 1.206, Section C.I.15.6.5)
  - Addressed differences between DCD and site-specific χ/Q values. All site-specific offsite and control room χ/Q values are bounded by the reference ABWR DCD χ/Q values.
- Open Items
  - 3 out of 4 open items were closed.

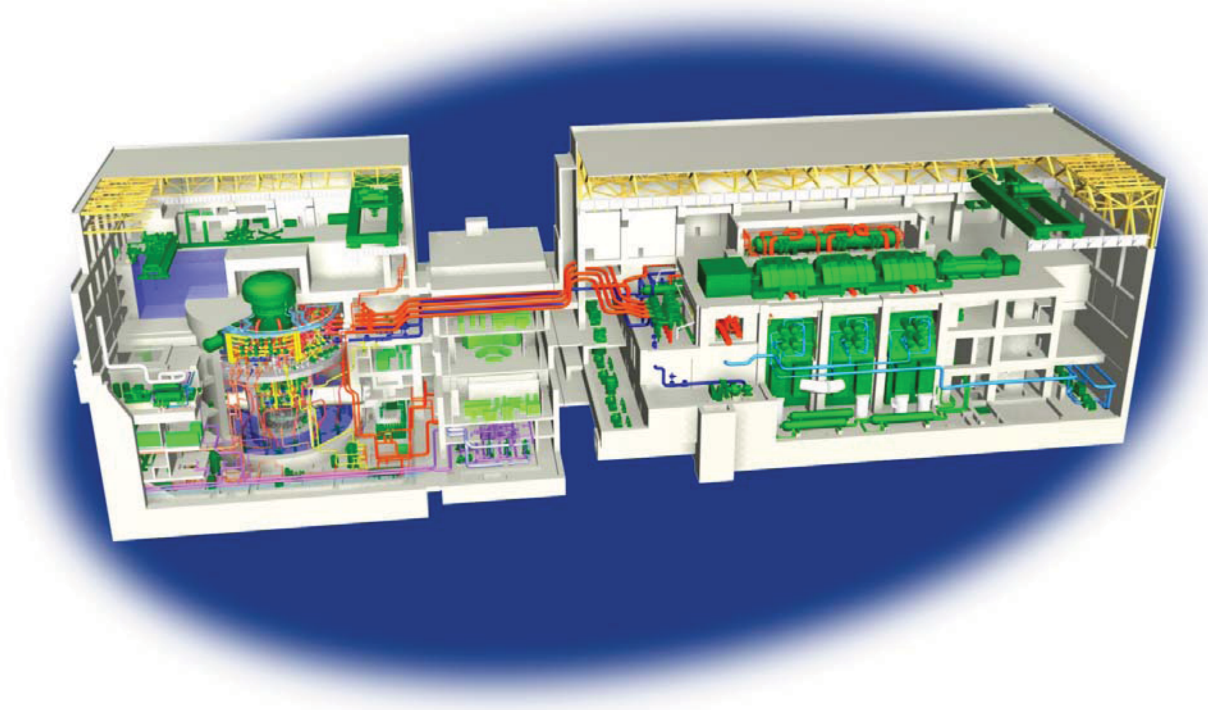
Conclusion

- Departures are evaluated in other Chapters
- COL Information items are satisfied
- Supplemental Information was found to be acceptable
- Outstanding Open Item needs to be resolved in order for the staff to reach a safety conclusion

Questions and Answers

- Questions
- Follow-up actions

South Texas Project Units 3 & 4
Presentation to ACRS Subcommittee
Chapter 18
Human Factors Engineering



Agenda

- Summary
- Contents
  - Departures
  - COL License Information Items
- Design Process Overview

Attendees

Scott Head	Regulatory Affairs Manager, STP 3&4
Jay Phelps	Operations Manager, STP 3&4
Mike Murray	I&C Manager, STP 3&4
Coley Chappell	Licensing, STP 3&4
Kyle Dittman	Engineering, STP 3&4
Linda Taylor	Engineering, STP 3&4
Bob Quinn	ABWR Licensing, Westinghouse
Andrew Lang	Engineering, Westinghouse
Craig Swanner	MPR / Toshiba America Nuclear Energy

Summary

- No changes to the Human Factors Engineering design acceptance criteria and associated ITAAC, and no departures from the approved HSI design implementation process

- Describes human-system interface (HSI) design goals and bases, including main control room standard design features and technologies, and the Remote Shutdown System

- Describes the ABWR Emergency Procedure Guidelines and inventory of controls, alarms and displays needed in the control room

Contents

Incorporated by reference (*IBR*) from the reference ABWR DCD except for a few departures and supplements:

- 18.1 Introduction – ***IBR***
- 18.2 Design Goals and Design Bases – ***IBR***
- 18.3 Planning, Development, and Design – ***IBR***
- 18.4 Control Room Standard Design Features
- 18.5 Remote Shutdown System – ***IBR***
- 18.6 Systems Integration
- 18.7 Detailed Design of Operator Interface System – ***IBR***
- 18.8 COL License Information

Contents

Appendices

18A Emergency Procedure Guidelines (EPGs)

18B Differences Between BWROG EPG Revision 4 and ABWR EPG

18C Operator Interface Equipment Characterization

18D EPG Input Data and Calculation Results – ***IBR***

18E ABWR HSI Design Implementation Process

18F Emergency Operation Information and Controls

18G Design Development and Validation Testing‡ – ***IBR***

18H Supporting Analysis for Appendix 18F

‡ *Historical description*

Departures – Tier 1 and Tier 2*

Deletion of MSIV Closure/Scram on High Radiation (STD DEP T1 2.3-1)

- Revised associated controls, displays, and alarms

Hydrogen Recombiner Requirements Elimination (STD DEP T1 2.14-1)

- Deleted references to Flammability Control System (FCS)

Safety-Related I&C Architecture (STD DEP T1 3.4-1)

- Changed I&C descriptions (hardware vs. functional), and references to obsolete technology, *e.g.*, multiplexing system
- Revised a standard design feature associated with non-safety system control and monitoring

Tier 2* Codes, Standards, and RG Edition Changes (STD DEP 1.8-1)

- Deleted obsolete reference in Table 18E-1

COL License Information Items

All items have been addressed by redundant items identified in ITAAC Table 3.1 and/or appropriate FSAR updates:

18.1 **HSI Design Implementation Process**

– Appendix 18E corresponding to Tier 1 ITAAC Table 3.1

18.2 **Number of Operators Needing Controls Access**

– Evaluation of operators required for ABWR operations

18.3 **Automation Strategies and Effects on Operator Reliability**

– Evaluation of strategies and confirmation of automation design

18.4 **SPDS Integration With Related Emergency Response Capabilities**

– Design of Safety Parameter Display System based on review of operating staff functions necessary to cope with rare events

18.5 **Standard Design Features Design Validation**

– Table 18E-1 criteria

COL License Information Items

18.6 **Remote Shutdown System Design Evaluation**

– RSS design uses conventional, hardwired controls and indicators to maintain diversity from the main control room, design will be evaluated and adequacy confirmed by ITAAC

18.7 **Local Valve Position Indication**

– Requirements for evaluations are provided in FSAR Section 18.8.7

18.8 **Operator Training**

– Establishment of a program that meets 10 CFR 50

18.9 **Safety System Status Monitoring**

– Design addresses human factors aspect (TMI item)

18.10 **Power Generation Control System (PGCS) Malfunction**

– Verified & validated using dynamic task performance test evaluations

18.11 **Local Control Stations**

– Evaluation of all operations critical to plant safety, identified by analysis

COL License Information Items

18.12 **As-Built Evaluation of MCR and RSS**

– As-built shall conform to certified & validated design configurations

18.13 **Accident Monitoring Instrumentation**

– Evaluation of potential for operator error due to additional instrumentation in MCR (TMI item)

18.14 **In-Core Cooling Instrumentation**

– Evaluation of potential for operator error due to additional instrumentation for detection of inadequate core cooling (TMI item)

18.15 Performance of Critical Tasks

– Evaluation of the HSI design for critical tasks

18.16 Plant Status and Post-Accident Monitoring

– Evaluation of potential for operator error due to additional instrumentation (TMI item)

Design Process Overview

- Satisfaction of Tier 2* requirements in Chapter 18 “shall result in full compliance” with ITAAC Table 3.1:
  - HFE design team and program plan
  - System Functional Requirements Analysis
  - Allocation of Function
  - Task Analysis
  - HSI design implementation plan
  - Verification & validation
  - As-built inspections
- To demonstrate compliance, information will be provided for review throughout the HSI design implementation process

Design Process Overview

- STP 3&4 is committed to and not departing from the design acceptance criteria provided in Appendix 18E and Tier 1 ITAAC Table 3.1, and the approved HFE program in the ABWR DCD.
- STP 3&4 will consider the good human factors engineering practices of NUREG-0711 Revision 2 as appropriate.

Typical ABWR Advanced Control Room

(Hamaoka-5 control room simulator design)

Chapter 18

Questions and Comments

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Presentation to the ACRS Advanced Boiling Water Reactor Subcommittee

South Texas Units 3 and 4 COL Application Review

SER/OI Chapter 18
“Human Factors Engineering”

March 2, 2010

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Staff Review Team

- **Project Managers**
  - George Wunder, Lead PM, DNRL/NGE1
  - Michael Eudy, Chapter PM, DNRL/NGE1
- **Technical Staff Presenters**
  - Paul Pieringer, Reviewer, COLP

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South Texas COL Chapter 18 Presentation Topics

Topics of Interest	Summary of Supplemental Information for Presentation
Tier 1, Tier 2, and Tier 2* Departures Impacting Chapter 18	STD Departure T1 2.3-1 STD Departure T1 2.14-1 STD Departure T1 3.4-1 STD Departure 1.8-1 STD Departure 7.5-1
COL License Information Items	COL 18.3 - automation strategies COL 18.6 - remote shutdown design COL 18.7 - local valve position indication

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Tier 1, Tier 2, and Tier 2* Departures Impacting Chapter 18

- **STD DEP T1 2.3-1**: Deletion of MSIV Closure/Scram on High Radiation
- **STD DEP T1 2.14-1**: Hydrogen Recombiner Requirements Elimination
- **STD DEP T1 3.4-1**: Safety-Related I&C Architecture

The above three departures impact terminology, HSI descriptions, EPGs, and Minimum Inventory. Chapter 18 has been properly updated to reflect these departures.

- **STD DEP 1.8-1**: Tier 2* Codes, Standards, and RG Edition Changes
  - Deleted Mil Std 1478 which is obsolete. Impact on chapter acceptable.
- **STD DEP 7.5-1**: Post-Accident Monitoring (Drywell Pressure)
  - Addition of wetwell pressure which supports operator manual action and RG 1.97. Impact on chapter acceptable.

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COL License Information Items for Chapter 18

- **STP COL Item 18.3**: Automation Strategies and Their Effect on Operator Reliability
  - Added reference to ITAAC 3.a

- **STP COL Item 18.6**: Remote Shutdown Design Evaluation
  - Added Reference to ITAAC 5.a(2)

- **STP COL Item 18.7**: Local Valve Position Indication
  - Added admin control of small manual valves

Staff found that All Chapter 18 COL information items are redundant to ITAAC except COL item 18.7 which has been acceptably addressed in the FSAR.

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Chapter Wrap Up for Staff Review of South Texas COL Chapter 18: Human Factors Engineering

- With the exceptions of Confirmatory Items, the staff has found that the applicant has addressed the required information relating to this chapter in accordance with NRC requirements.
- The staff has found that the impact on this chapter by the departures identified by the applicant have been appropriately characterized and addressed.
- That staff has found that the applicant has adequately addressed the required COL License Information items.
- ACRS requests/follow-up items for Staff ?

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Chapter Wrap Up for Staff Review of South Texas COL Chapter 18: Human Factors Engineering (cont.)

Discussion/Committee Questions