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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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PLANT OPERATIONS AND FIRE PROTECTION SUBCOMMITTEE

+ + + + +

THURSDAY

DECEMBER 15, 2011

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear  
Regulatory Commission, Two White Flint North, Room  
T2B3, 11545 Rockville Pike, at 8:30 a.m., Harold B.  
Ray, Chairman, presiding.

MEMBERS PRESENT:

- HAROLD B. RAY, Chairman
- SAID ABDEL-KHALIK, Member
- CHARLES H. BROWN, JR., Member
- MICHAEL T. RYAN, Member
- JOHN D. SIEBER, Member
- GORDON R. SKILLMAN, Member
- JOHN W. STETKAR, Member-at-Large

1 NRC STAFF PRESENT:

2 GIRIJA S. SHUKLA, Designated Federal Official

3 LETA BROWN, NRR/DRA/AADB

4 ROBERT HAAG, Region II

5 PAT MILANO, NRR

6 SAMUEL MIRANDA, NRR/DSS/SRXB

7 JOHN PARILLO, NRR/DRA

8 ROGER PEDERSEN, NRR/DRA

9 JUSTIN POOLE, NRR/DORL

10 ED SMITH, NRR

11

12 ALSO PRESENT:

13 GORDON ARENT, TVA

14 ROBERT BRYAN, TVA

15 STEVE HILMES, TVA

16 FRANK KOONTZ, TVA

17 ALAN MACDONALD, Westinghouse

18 CHRIS MCHUGH, Westinghouse

19 RYAN ROSSMAN, Westinghouse

20 DAVID STINSON, TVA

21 TOM WALLACE, TVA

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

8:31 a.m.

CHAIR RAY: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards Subcommittee on Plant Operations and Fire Protection. I'm Harold Ray, chairman of the subcommittee. Subcommittee members in attendance are Said Abdel-Khalik, Gordon Skillman, John Stetkar, Charles Brown, Jack Sieber and Michael Ryan. Mr. Girija Sukha of the ACRS staff is the Designated Federal Official for this meeting.

This meeting will be open to public attendance. A telephone bridge line has also been established for this meeting to preclude interruption of the meeting. The phone will be placed in listen-in mode during presentations and committee discussions. The subcommittee will hear presentations from the NRC staff and the applicant, Tennessee Valley Authority, regarding the status of construction, inspection and licensing activities related to Watts Bar Nuclear Plant Unit 2.

We've received no written comments or requests for time to make oral statements from members of the public regarding today's meeting. There is time on the agenda for public comments at the end of

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1 the day.

2 The subcommittee will gather information,  
3 analyze relevant issues and facts, and formulate  
4 proposed positions and actions as appropriate for  
5 deliberation by the full committee. The rules for  
6 participation in today's meeting have been announced  
7 as part of the notice of this meeting published in the  
8 Federal Register on November 18th, 2011. A transcript  
9 of the meeting is being kept and will be made  
10 available as stated in the Federal Register notice.  
11 Therefore, we request that participants in this  
12 meeting use the microphones located throughout the  
13 meeting room when addressing the subcommittee. The  
14 participants should first identify themselves and  
15 speak with sufficient clarity and volume so that they  
16 may be readily heard.

17 Please silence your cell phones as the  
18 chairman is now doing with his. We will now proceed  
19 with the meeting and I will call NRC staff to make  
20 introductory remarks. Mr. Pat Milano.

21 MR. MILANO: Good morning, Mr. Ray and  
22 members of the subcommittee. We're here today as Mr.  
23 Ray indicated to continue with our discussions on the  
24 operating license application submitted by Tennessee  
25 Valley Authority for ultimate operation of Watts Bar

1 Unit 2. With me today and the individuals who will be  
2 speaking, to my left Justin Poole who's also with the  
3 Watts Bar Special Projects Branch, another one of the  
4 licensing project managers, and from the staff in  
5 Region II Mr. Bob Haag who is branch chief with the  
6 Division of Construction Projects and he'll be  
7 discussing the inspection status. There will be also  
8 members from the NRR technical staff who conducted,  
9 who were the primary leads for conducting the areas of  
10 review that we will be discussing today.

11 Before I actually get into the actual  
12 topics of discussion just so that you understand a  
13 little bit of change to the organization within the  
14 Watts Bar Special Projects Branch. Our branch handles  
15 both Watts Bar Unit 2 and TVA's Bellefonte 1 and 2,  
16 the Bellefonte 1 project in particular. So because of  
17 that and a shifting of our work assignments Mr. Poole  
18 is, Justin is going to be doing more of the lead  
19 review for Watts Bar, or coordination for Watts Bar.  
20 So, today he'll be doing the majority of the  
21 coordination for the NRC staff and in the future will  
22 be handling everything himself.

23 For today the agenda, we're going to be  
24 talking, TVA's going to be talking first. I'll be  
25 introducing them shortly. They're going to give you

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1 a short discussion of the construction completion  
2 status that currently exists and then we're going to  
3 go into the areas of the FSAR review that we're here  
4 for today. Noting that some of these areas cover  
5 multiple supplements to the Safety Evaluation Report  
6 because of the fact that we postponed discussions and  
7 in particular with the accident transient analysis in  
8 Chapter 15, we did that awhile back. We were going to  
9 do that in one of the earlier meetings.

10 So today we're going to discuss Chapters  
11 11 and 12. Basically that entails the liquid and  
12 gaseous release and operational dose consequences.  
13 Then we're going to go into Chapter 15.4 discussing  
14 the accident dose consequences. And it seems like, a  
15 little bit out of sequence but this aligns with the  
16 way TVA is going to make their presentation. Then  
17 they're going to talk to the actual accident transient  
18 analysis that's in Chapter 15.

19 Also, when the NRC comes up late this  
20 morning and then this afternoon we're going to, Mr.  
21 Haag will give you the status of the construction  
22 inspection and then we're going to go into a short  
23 status on open items. As you're aware, in Supplement  
24 25 currently there are 83 items that remain in an open  
25 condition. Forty of those items are open and will

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1 require some amount of staff evaluation once either,  
2 once TVA provides something or we obtain something  
3 from the region.

4           There are a couple items that are  
5 inspectional in nature like environmental  
6 qualification, inspection and audit. Of the other 43  
7 items out of that 83 are what the staff calls  
8 confirmatory items and those items, the areas that  
9 those items exist in have to do with stuff where the  
10 staff has already made its reasonable assurance  
11 determination but that was based on something, based  
12 on the staff's understanding. And what those will be  
13 is as long as our inspection program or TVA provides  
14 us documentation which confirms the fact, the basis  
15 for our conclusion then there will be no other staff  
16 evaluation that needs to take place. We'll just  
17 document the fact that TVA confirmed something or the  
18 region confirmed by inspection that item. So in  
19 reality out of those 83 only 40 of them really will  
20 require some amount of staff evaluation and we'll be  
21 discussing those in future subcommittee meetings. And  
22 then lastly we'll discuss the few items that remain  
23 for staff review and presentation in the April  
24 subcommittee meeting.

25           CHAIR RAY: On the open items I think you

1 gave a good summary and certainly we all understand  
2 that confirmatory items are open because of the  
3 reasons that you said. In going through the 40 I'm  
4 sure there are some that you won't want to have to  
5 come back and talk to us about but there are some that  
6 we will.

7 MR. MILANO: Yes.

8 CHAIR RAY: And if we have time, let's see  
9 how time goes today but we may want to be more clear  
10 about which those are so that people aren't surprised  
11 or disappointed respectively on the subject.

12 And then I did want to say as I mentioned  
13 to you before the meeting, I guess I thought we were  
14 going to have more discussion of the complex  
15 relationship between Unit 2 and Unit 1 when it comes  
16 to flooding hazard and that assessment and the time  
17 lines associated with it and so on. There's a license  
18 condition proposed that deals with that, but I think  
19 we still need to understand it better than we did last  
20 time. I thought we were going to do that this time.  
21 It's not urgent but we do need to understand it  
22 because the full committee may wish to express an  
23 opinion about it.

24 MR. MILANO: Right. You are indeed  
25 correct, the staff's plans are to address that. There

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1 are some actions that are continuing to go on in  
2 basically two areas. One is we -- this issue is not  
3 Unit 2-specific, it's site-specific. The same  
4 probable maximum flood level affects both units  
5 equally. The compensatory actions that are taken are  
6 for both units and so right now what the staff is  
7 doing, it's going to -- we believe it's going to take  
8 a licensing basis change and a license amendment for  
9 Watts Bar Unit 1. That is, the staff is working with  
10 TVA to get that submitted and evaluated, and also the  
11 staff is looking at doing some further evaluation of  
12 the results that were submitted in -- as an amendment  
13 to the Unit 2 FSAR that provided the new probable  
14 maximum flood level. We're going to be doing some  
15 amount of confirmatory analysis that's not yet  
16 completed and we'll present that also to you along  
17 with the discussion.

18 We were hoping to do that in April.  
19 However, based on all these activities it's doubtful  
20 that TVA and the staff can get completed by April. So  
21 those will be one of the follow-on discussions that  
22 we'll have at a later time.

23 CHAIR RAY: Well all right, but I still  
24 want to point out that this may not be as simple as oh  
25 well, we'll adopt what we did for Unit 1. It's

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1 possible that there's some comment that would be  
2 forthcoming as to Unit 2 on its own and so the sooner  
3 the better so that that can be discussed. Thank you.

4 MEMBER STETKAR: Just out of curiosity,  
5 that all has to be integrated with Bellefonte also,  
6 right?

7 MR. MILANO: Bellefonte, what TVA had done  
8 is as you're probably aware when TVA reassessed the  
9 complete Tennessee Valley watershed area and stuff,  
10 and it came up during the Bellefonte 3 and 4 review  
11 and you're correct, it will affect Bellefonte, there's  
12 some actions that TVA is contemplating completing for  
13 Bellefonte 1 and 2 to change the site characteristics  
14 over there. So you're correct, it affects all of  
15 their stations.

16 MEMBER STETKAR: Okay, thanks.

17 MR. MILANO: With that I'm going to turn  
18 it over to TVA to begin their discussions. And Mr.  
19 David Stinson, the vice president for Watts Bar Unit  
20 2 and his staff will be making the presentation.

21 MR. STINSON: Good morning.

22 CHAIR RAY: Good morning.

23 MR. STINSON: It's a pleasure to talk with  
24 you today. What we're going to do is I'm going to  
25 give you a fairly quick update on Watts Bar status.

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1 We've had some changes since the last time we met that  
2 you may be interested in. Bob Ryan to my right will  
3 talk about meteorology and radiation protection along  
4 with radiological consequences of accidents, and Frank  
5 Koontz will talk about transient analysis. Then we'll  
6 open it up for questions.

7 As far as status goes let me just talk  
8 about four primary subjects to kind of give you an  
9 overview of the project. One is how we're doing with  
10 safety, quality, our safety-conscious work environment  
11 program, and then some reorganizations that we've done  
12 and new alignments on the project, and then Gordon  
13 will talk about Appendix HH status.

14 So last week we surpassed 13 million man-  
15 hours without a lost work day. That's a major  
16 milestone for us. TVA's record there is 14.3 so we  
17 still have a little ways to go. If we can keep  
18 ourselves focused on safety through the next three  
19 months we'll actually have two years without a lost  
20 work day so we're very proud of that. It's a good  
21 accomplishment for the project.

22 Last year we worked almost 7.5 million  
23 man-hours. We had a recordable injury rate of 0.49.  
24 On projects like what we are doing this job today we  
25 look for companies that have an RIR around 1 to 1.5 as

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1 being a good record, so 0.49 is an exceptional safety  
2 record. Our contractors in the OTV team have done a  
3 good job here.

4           There are over 28,000 supervisors' safety  
5 interventions. This is something that we've done  
6 contractually. We try to get more people involved.  
7 We know that about 83 percent of all injuries occur  
8 when the foreman's not in the area, some level of  
9 supervision, so we try to get as many folks out in the  
10 plant as we can. Also, our craft engaged in this. I  
11 know the program card, the intervention, the card  
12 program when they find someone that's not wearing the  
13 correct protective equipment or doing something in the  
14 wrong manner, they write those things up and submit  
15 them and we get better because of it. So we're proud  
16 of our safety program, we continue to focus on that  
17 and keeping people safe to come back to work the next  
18 day.

19           Organizational structure. We had a  
20 contract with the Bechtel Power Corporation that was  
21 based on an engineering procurement construction  
22 contract. We've reached a time in the project where  
23 TVA needs to take more responsibility so we've  
24 actually converted that to more of a managed task  
25 contract, and the roles you'd expect for Bechtel are

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1 being --

2 CHAIR RAY: Excuse me, Dave. Say that  
3 last sentence again, please? You converted it to?

4 MR. STINSON: To more of a managed task  
5 approach or a contract as opposed to in an EPC  
6 basically we give them the keys to the plant, they do  
7 the work and in the end they give the keys back.  
8 We're a little different in that TVA does have the  
9 startup responsibilities for the plant, we have an  
10 operating unit next door and the degree of interaction  
11 that we need to have daily is a little smoother when  
12 there's TVA people working directly with TVA people.  
13 So we modified the contract slightly. TVA, Bechtel  
14 has responsibility for engineering, for quality  
15 assurance, for supply chain and for ASME construction  
16 and other type construction work that we assign to  
17 them. What's changed really is TVA has taken on a  
18 different role in that whereas before work priority  
19 came under the EPC, TVA takes responsibility for work  
20 priority. We assign day-to-day direction. I think  
21 more importantly we're responsible singlehandedly for  
22 schedule and work performance. So this is, like I  
23 said, a natural evolution on the project.

24 We've staffed to fill these  
25 responsibilities on the TVA side. We have a few

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1 vacancies that we still need to fill, and I think  
2 what's important for us is that this is the model that  
3 we'll actually start Bellefonte out as and finish as.  
4 It's TVA taking that leadership role day to day. So  
5 it clearly defines responsibility and it lines up our  
6 management model with our contract model so there are  
7 no conflicts between the two.

8 Organization is, I know you can't read  
9 this slide that easily, but what's important is that  
10 we've got bold blocks in there and then the non-bolded  
11 blocks. The bold blocks are the Bechtel organization.  
12 Because of the end stamp and their requirement to  
13 maintain technical direction we place them in the  
14 center of the organization and wrapped the TVA  
15 organization and other contractor organizations around  
16 that group. And like I said, it cleans up lines of  
17 responsibility and it changes behavior in a way that  
18 I think is very positive for us in that if we have  
19 issues on the project they're not a company problem,  
20 they're a project issue that we need to resolve.  
21 We've actually gone to one color hard hat for all our  
22 Unit 2 people to kind of further, you know, build that  
23 team environment on the project. And we've seen some  
24 success with that. Let's go to the next slide.

25 Quality. I just want to point out the

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1 quality program has not changed. TVA still maintains  
2 the oversight role in that area. What has changed is  
3 that we modified our contract so that more companies  
4 can work under that quality, under Bechtel's quality  
5 program, gives us the ability to put different skill  
6 sets on the job and be more efficient. So no major  
7 changes there other than the fact that other companies  
8 are also working under Bechtel's quality assurance  
9 program.

10 Safety-conscious work environment is an  
11 important program for us. It's one of the  
12 cornerstones of our nuclear quality program. I think  
13 we understand the foundation of any SCWE-type program,  
14 communication. We spent a lot of time, I just  
15 finished 24 all-hands meetings to get all 2,800 folks  
16 through that process talking about the changes to the  
17 organization that we've had, our safety program,  
18 quality program, that sort of thing. So we try to  
19 talk a lot. We also try to listen more effectively.  
20 As managers we tend to be very focused on -- not  
21 necessarily listening, so we're working on that  
22 program.

23 We have a lot of different monitoring  
24 tools that we use to pulse the site, to make sure that  
25 we don't have issues that are ongoing that we're not

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1 aware of. And like most utilities we have a lot of  
2 different ways for people to get safety issues on the  
3 table as you're aware. The supervisor is a principal  
4 path for identifying safety issues and getting those  
5 raised and resolved. And then we also have our  
6 Corrective Action Program, it's anonymous, and a kind  
7 of sign-your-name type program. Our employee concerns  
8 program, both the companies that we're working with  
9 and TVA. Interesting to note that people tend to be  
10 more comfortable coming to TVA's ECP, so about 92  
11 percent of the people feel more comfortable working  
12 with that. We have both avenues available. We also  
13 have our inspector general who's actually onsite and  
14 either walk into any of their office or they can also  
15 use the empower line, phone line that works very  
16 effectively. I tell the folks that if they have an  
17 issue that they don't feel comfortable coming to their  
18 supervisor they can use that. Every morning at 6:30  
19 I get the previous day's comments that may have come  
20 in and I get 15 days to respond so it's a good program  
21 there. And then finally, you know, the NRC and  
22 walking through the door there or hitting the hotline  
23 as well. This was an area that we were concerned  
24 with. Let's go to the next slide.

25 MEMBER SKILLMAN: Before you go, let me

1 ask this. I'm Dick Skillman. What events triggered  
2 your taking back the keys and your focus on  
3 presentations on SCWE? You just said you had 24  
4 meetings to meet 2,800 people.

5 MR. STINSON: Right.

6 MEMBER SKILLMAN: That is a huge focus for  
7 you and your staff. Taking the keys back from Bechtel  
8 Williams was also a very large step. What triggered  
9 that?

10 MR. STINSON: Well, it was really was the  
11 conflict between the way that the project needed to be  
12 managed and the level of involvement that TVA needed  
13 to exercise on the program and the integration between  
14 all the different organizations. So the Williams  
15 part, Williams is actually relatively new. We took  
16 the indirect work, scaffolding laborers, because we  
17 have local contractors now working on the project more  
18 than just Bechtel, that was the original intent, so we  
19 have Day & Zimmerman, we have Williams working a  
20 couple of different scopes. We wanted to have like a  
21 single integrated support organization that supported  
22 all the contractors that TVA would integrate to make  
23 sure that everyone got supported equally. We found  
24 when we did that we actually had an overlap of  
25 responsibility, around 129 people. So we saw some

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1 efficiencies that could be gained by reorganizing our  
2 contract models and then also the site. And then, and  
3 I would say it was time that we're in the stage where  
4 we're starting to start up systems in the plant, hand  
5 over major areas of the plant and so we needed to  
6 exercise more responsibility and our contract really  
7 didn't allow that easily. It was, we had to be given  
8 that authority under the contract. We just  
9 renegotiated the contract so it was clear that TVA had  
10 the lead role and that we would take responsibility  
11 for those actions.

12 MEMBER SKILLMAN: How about the SCWE part?

13 MR. STINSON: Kind of two reasons. One is  
14 it's a requirement. We have a confirmatory order that  
15 says that we'll do a certain number of meetings a year  
16 and engage the site population on the importance of  
17 the program. So there's a mandatory requirement. But  
18 also, and if we go to that next slide I'll show you,  
19 last year when I, I've been here about 9 years but  
20 when I first came onsite I asked how we were doing  
21 with NRC allegations and we had 26. And so in my view  
22 when you have a number like that, and the project that  
23 I came off of, the MOX project in Macon, South  
24 Carolina, another NRC reviewed site. And you know, we  
25 had around three in the four years that I was in the

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1 same role there. So I saw that number as being very,  
2 very high and in my mind it really boils down to a  
3 trust issue. Do you feel like as an employee that you  
4 can raise safety concerns and that people will listen  
5 and they'll do something about it.

6 And so we have, you know, I talked about  
7 the past employee concerns resolutions, we have those  
8 five paths, four of those are internal to either the  
9 companies that work with us or TVA, and in fact both  
10 have those same paths. Usually if you're comfortable  
11 with the environment that you will use one of those  
12 four paths. And not always, but usually. So to me it  
13 looks like potential for a trust issue with the  
14 management team. And so I felt that it was important  
15 to continue focusing on these areas so that we could  
16 let people know, you know, our approach.

17 And it's really simple like trying to  
18 focus like with managers what their responsibilities  
19 are. We talked in terms of how we set work hours. I  
20 can tell you my work hours are set. I come in before  
21 the project starts and I leave you know well after the  
22 project is over for that shift, and the idea being  
23 that we ought to make sure that people know they can  
24 come in and talk and raise safety concerns or any  
25 issue that they might have, that that's my

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1 responsibility that if no one else will listen to you  
2 I will. That was the message. Managers have that  
3 responsibility as well. So when you go from a  
4 situation where you have a lot of things that are  
5 going outside the internal paths to get resolution,  
6 that you've got to do things that are different. And  
7 so we're trying to take a different approach to folks  
8 and personalize the concerns process, trying to really  
9 emphasize to people you know like me. I grew up  
10 within five miles of the Valley, my family still lives  
11 you know right next to Browns Ferry. This is  
12 personal. You know, we need to make sure that we do  
13 a good job. We're all interested in this being a safe  
14 plant and that if no one else will listen to you that  
15 I will, and that's kind of the example that we're  
16 trying to set through these meetings.

17 MEMBER SKILLMAN: Thank you.

18 MR. STINSON: And you know, how are we  
19 doing, we're doing better. I wouldn't say we're good  
20 yet. We've, through September we've had four  
21 allegations, a couple earlier in the year and then one  
22 each in August and September. We have had an upturn  
23 in allegations. We, through this reorganization and  
24 through our new budget that we established for 2011 we  
25 had a layoff. About 750 people were affected by that

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1       layoff. We got 3 to 4 allegations in October and I  
2       think we had 2 in November so we're up in the 10 to 11  
3       range for the year. Better, still not where we need  
4       to be. And so there was a belief that we needed to  
5       continue to reinforce that message of openness on the  
6       project. So we're doing better, not quite where we  
7       need to be. I'd like to see that at zero or one, you  
8       know, kind of number. Let's go to the next slide.

9               I wanted to just follow up with some  
10       pictures of the plant as we finish out the area. A  
11       lot of focus right now in two areas. One's the  
12       turbine building. We're trying to get out of that by  
13       springtime so we're really focusing on just completing  
14       the startup of the secondary side of the plant, and  
15       also upper containment. We're in the process of  
16       painting out upper containment right now. That's lube  
17       oil system, the different panels that are there.

18              One of the things that this plant is a  
19       little unique in that we've had an operations and  
20       maintenance staff that have worked on a single unit  
21       inside a 2-unit plant for the last 16 years, and had  
22       been able to do pretty much what they wanted to do at  
23       the plant because it was all theirs. Now we're  
24       talking about bringing in a second unit and we want to  
25       make sure that it is very, very clear that they're on

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1 Unit 2 and so we do that with color. So Unit 2 is the  
2 blue unit on the site. If you walk up to a panel the  
3 floor is actually will all be blue here in the near  
4 future. You know that you're on Unit 2. If you walk  
5 up to an MCC panel and the bucket is blue it's Unit 2;  
6 if it's white, it's common systems; if it's red it's  
7 fire protection; if it's any other color it's Unit 1.  
8 So we've been very directive on how we were going to  
9 paint out the plant to make it easier for people to  
10 understand the difference between the two units  
11 visually and then all the other cues are there as  
12 well, but just to minimize mistakes because of the  
13 many years that we've been running as a single unit.  
14 Let's go to the next slide.

15 Turbine deck itself. Like I said this is  
16 something that for us is a point of pride. You know,  
17 we have millions of man hours that go into this plant  
18 and when we finish all people really see are the paint  
19 and insulation, and so it needs to reflect the pride  
20 and the skills that we put into our work. So we're  
21 focusing very heavily in this area so we'll present  
22 the plant with a unit that they'll be very proud to  
23 own and to operate. Let's go to the next slide.

24 Talk quickly about our startup program on  
25 this slide. There's really nothing new. We have, you

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1 know, a standard startup program, meeting all the  
2 Chapter 14 requirements. We're going through a  
3 component test and system test at this time. We've  
4 used a focus on the turbine building site so that we  
5 could get all of our safety-related system procedures  
6 and skills that are needed tested on the non-safety  
7 side so that we would minimize any errors that might  
8 occur on the safety-related side. And that testing is  
9 going well. Next slide.

10 So we're currently about 23 percent  
11 complete with component testing. We're doing system  
12 flushing. Right now we're flushing out the feedwater  
13 lines on the secondary side. Pre-operational testing,  
14 it's the 1.68 and FSAR guidance, we've got 43 out of  
15 119 procedures that are approved and we're about 71  
16 percent complete with overall procedure generation.  
17 We have 20 additional in our JTG. All the testing and  
18 flushing that's done is under NGDC as opposed to the  
19 operational group NPG. We've turned over 38 of 86  
20 systems to startup. We turned over four systems to  
21 the operations organization. We have two more  
22 scheduled by the end of the year.

23 So where are we at? So we have our tanks  
24 are filled with pump suction, refueling water storage  
25 tank, RWST, and the primary water storage tank. We

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1 have condensate in operation, feedwater in service  
2 with two of the hotwell pumps running on 3 mrem.  
3 Booster pumps are running. We have tested through two  
4 of the three and the third one should be tested this  
5 week. The condenser circulating water is in service  
6 so the cooling towers are in operation. Raw cooling  
7 water is in service. The oil systems are put in  
8 place. We're turning over the turning gear, putting  
9 our turbine on turning gear weekly. Annunciator  
10 computer systems are in service. We're calibrating  
11 our solid state protection systems. The main  
12 feedwater pump oil systems are in service and the  
13 pumps are where we're flowing water through the  
14 feedwater system for flushing. And control air  
15 flushing is in progress.

16 I will tell you that we felt like the  
17 plant was in a good cleanliness level overall but  
18 we've been very surprised with how well the plant's  
19 cleaned up. We're very finding very little material  
20 in the strainers and we're going to come down in  
21 January and take condensate out of service. We'll go  
22 into the hotwell and we expect to find, you know,  
23 debris there but as you would normally. So we'll go  
24 and muck that out, clean that out and then we'll have  
25 a very clean, tight system in order to operate the

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1 plant. Next slide.

2 So transitioning operations. The  
3 operations group are engaging regularly, you know,  
4 with us. We have a Unit 1-Unit 2 interface team, that  
5 32 individuals that are part of the plant staff that  
6 work with us to make sure that the plant is ready to  
7 accept the systems and that the systems are in the  
8 right stage of completion for them to own. Our chief  
9 nuclear officer meets with us every other month in  
10 what we call a management review meeting. We've gone  
11 through and I think we've briefed on where we are with  
12 permanent staffing but we have a major turning program  
13 and new license classes for both licensed and non-  
14 licensed operators and maintenance craft. And one of  
15 the things that we're doing over this next year  
16 because our schedule is extending into next year is  
17 that we're actually using the Unit 2 maintenance staff  
18 as part of our startup organization and so we have 19  
19 I&C techs that are in today working. By the end of  
20 February we expect to have about 30 mechanical  
21 maintenance people that are out of the class, 20  
22 electrical and 20 more I&C techs, so about, I think  
23 the number is going to be around 79 maintenance people  
24 will be there. So the advantage is normally we would  
25 do startup with a contract staff but we'll actually do

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1 it with our own maintenance people so they'll get the  
2 opportunity to learn the plant as it comes up, how  
3 they operate. Even though the plants are identical,  
4 you know, the pumps sound different, you know, than  
5 the other so it gives them a chance to really learn  
6 the plants. We think, you know, that's going to be  
7 very positive.

8 Training is continuing on dual unit  
9 licenses and unit differences and we try very hard to  
10 minimize those differences. As we go through the next  
11 refueling outage in September for Unit 1 those  
12 differences become less and less as Unit 1 comes up to  
13 some of our modifications. And under the work  
14 management program, you know, we're fully flushing out  
15 the process to get to a 26-week schedule basis prior  
16 to going into our surveillances for fuel load for the  
17 plant.

18 MEMBER STETKAR: You mentioned you're  
19 going to license the operators dual unit.

20 MR. STINSON: Right.

21 MEMBER STETKAR: Are you going to have a  
22 fully shared maintenance staff also or are they, are  
23 they unitized?

24 MR. STINSON: The maintenance staff is not  
25 unitized.

1                   MEMBER SKILLMAN: In your preparations to  
2 head towards operations, what operating experience  
3 have you incorporated?

4                   MR. STINSON: So, and I'm going to speak  
5 to the operations folks and Tom Wallace is our  
6 operations manager on Unit 2 that's doing a lot of  
7 that work for us. But there's been a lot of concern  
8 within TVA and the operational group that this has  
9 been a single unit for a long time. Now, we have a  
10 sister unit, Sequoyah, down the road. One of the  
11 things that they've stressed with operations and  
12 maintenance people is that they start taking care  
13 visits and going up to the Duke plants, going up to  
14 D.C. Cook, similar type plants, looking at their  
15 operation, but also looking at other utilities. So  
16 they've worked with INPO to set up these peer meetings  
17 and so that is one way that they're doing it. And  
18 then I think the other way is we, actually today we've  
19 got an SRO that's sitting in the horseshoe on Unit 2  
20 and so we had a license class, made folks available.  
21 We have five AUOs that are on shift that are permanent  
22 AUOs for the plant and so they're coming into the  
23 testing process. You know, they're turning switches,  
24 operating equipment, they're doing rounds. We're  
25 working very hard to establish our standards, you

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1 know, for performance and cleanliness in the plant and  
2 working with them to make sure that our standards, you  
3 know, are equal to or better than the standards on the  
4 operating plant.

5 So it's really that whole process, peer  
6 visits, bringing both operations and maintenance  
7 personnel onto Unit 2 in the startup phase of the  
8 operation where they start taking ownership of a  
9 plant. To me that's the biggest barrier is when is it  
10 yours. At what point in time do you take ownership.  
11 And so our intent was to bring that date in as early  
12 as possible, start making the opportunities available  
13 for the operating site to start owning that unit.

14 MEMBER SKILLMAN: Thank you.

15 MR. STINSON: Next slide. So  
16 transitioning operations. We have a procedure called  
17 TI-437 which is how the operations staff goes through  
18 the turnover documents and accepts the system. And  
19 fairly involved as you would expect. It goes through  
20 all the documents that go with that system, drawings,  
21 calculations, procedures, maintenance instructions,  
22 that sort of thing. And wrapped around some very  
23 intensive lockdown to make sure that the plant is  
24 exactly in the mode that operations staff expects.

25 To this point we've turned over four

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1 systems. The first system we turned over was building  
2 heat, obviously a very small system, about five  
3 breakers involved in that, but it was a little rough.  
4 And we're thinking gee, five breakers, that's, you  
5 know, shouldn't have been a little rough but it was  
6 because you know, there's always that kind of conflict  
7 that you'll see between the organizations. What are  
8 you giving me, you know, how clean is that system.  
9 Are you giving me work to do after I accept it. And  
10 so part of this is that trust thing within  
11 organizations as well. And so that was a little  
12 rough. We did system 37 gland seal water and that was  
13 a system that does have ties into the operating unit  
14 directly on the secondary side. That was another  
15 level of complexity. As we went through we stopped at  
16 the end of each process and said okay, what worked,  
17 what didn't and we continued to revise these  
18 procedures.

19 Last week we turned over two more systems.  
20 These are heating and ventilation type systems, again,  
21 30 Oscar November. We have two more systems that  
22 we're looking at this week and will actually go  
23 through plant health next week with the outside chance  
24 we might be able to do four. We've got a couple of  
25 electrical systems that will go over once the RCP

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1 board, and so we're continuing this process. So we're  
2 still on primarily non-safety systems. We're working  
3 through the processes to make sure that the system,  
4 the process that we use is smooth and then we'll  
5 finish the safety systems. We'll be more effective  
6 that way. Gordon?

7 MR. ARENT: Yes, this is Gordon Arent from  
8 TVA. I just wanted to --

9 CHAIR RAY: Just a second. You're done,  
10 David, are you?

11 MR. STINSON: Yes, sir.

12 CHAIR RAY: Earlier in our review, I can't  
13 remember which meeting it was now for sure, but it was  
14 maybe the first or second meeting, the relationship  
15 between the Unit 2 schedule and the Unit 1 operating  
16 schedule, outage schedule and so on was of some  
17 concern because it was, Unit 2 appeared to be driven  
18 to a very tight schedule by the Unit 1 operating  
19 availability. Nothing is discussed here although I  
20 recall that subsequently there was some change made to  
21 relieve some of that pressure that existed. This is  
22 perhaps before you had the engagement, I'm not sure,  
23 but in any event I guess I'd like to ask you to  
24 comment on to what extent Unit 2 is being driven by  
25 Unit 1 outage and other status schedule requirements.

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1 MR. STINSON: Okay. I may get some help  
2 with this from the folks around the room. I would  
3 tell you that there was a lot of pressure at the last  
4 outage trying to get the RCW completed during the  
5 outage because of the potential for needing a mid-  
6 cycle outage if you didn't get it during that outage.  
7 We were able to do that work but I think we learned a  
8 lot, you know, from that. And I would tell you today  
9 the interaction with the site you know goes through a  
10 process that does it slow us down from time to time?  
11 It does. We may want to get out of the system. You  
12 know, we're working around train weeks, you know.  
13 We're pretty closely tied into those units, especially  
14 around the electrical board so we, you know, we have  
15 to work around the train systems. The outage work,  
16 for now, you know, if -- we have the next outage for  
17 the unit is in September. We view that as an  
18 opportunity to do some work in an easier, that's the  
19 simplest word I can --

20 CHAIR RAY: Well, the issue at hand was  
21 whether or not Unit 2 was being driven beyond the  
22 headlights because of the need to meet those outage  
23 windows in Unit 1.

24 MR. STINSON: I don't see that today. I  
25 don't know, Frank, if you want to, or Tom, do you want

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1 to comment?

2 MR. KOONTZ: Steve may be able to -- I  
3 think the issue at the time when we were up here  
4 earlier was the blackout testing on the diesels.

5 CHAIR RAY: Well, there was some but then  
6 there was this change --

7 MR. KOONTZ: I think we resolved that.

8 CHAIR RAY: -- that occurred.

9 MR. KOONTZ: How to do that without an  
10 outage.

11 CHAIR RAY: Maybe some overview of the  
12 schedule is yet to come and we'll understand that.  
13 We're not as concerned I don't believe with the  
14 turnover status, that's your business, but with  
15 whether or not you're having to do things on Unit 2  
16 prematurely or under too much pressure or whatever  
17 because of the outage windows on Unit 1 that are  
18 available to you.

19 MR. STINSON: No sir, I don't see that  
20 today. I don't feel that pressure. Tom?

21 MR. WALLACE: No, sir. I don't think we  
22 have that pressure. We worked through earlier issues  
23 with our blackout testing and our need for tech spec  
24 changes that are ongoing in the process. We did put  
25 our hot pipe basically on our essential raw cooling

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1 water system to be able to get our flow numbers that  
2 we needed to be able to determine if we could do flow  
3 balancing online or we'd have to do it in an outage.  
4 We were able to complete that in the outage and have  
5 the numbers we need right now to make that decision  
6 and not have an impact on the operating units.

7 CHAIR RAY: All right, well, that's fine  
8 then. Take your time. We're not in any -- we're not  
9 trying to push the schedule.

10 (Laughter)

11 CHAIR RAY: We want to make sure that if  
12 there is an interaction between the two that it's not  
13 leading you to do something on Unit 2 that you would,  
14 that's sub-optimal.

15 MR. STINSON: The one point I probably  
16 didn't mention and I should is that it's obvious we're  
17 not on our original schedule, that we're not going to  
18 finish in April of next year. And we're in the  
19 process now of doing a complete estimate-to-complete  
20 on the unit. This one is slightly different in that  
21 TVA actually has taken ownership of the schedule and  
22 the databases that drive it. We're running samples to  
23 make sure that the numbers are accurate. Once we have  
24 those estimates complete we'll go through actually a  
25 seven kind of level governance review till we get to

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1 our board in February and at that point in time we  
2 will announce what our budget to complete will be,  
3 what our schedule to complete will be and we'll be  
4 able to share that, you know, with you. It's somewhat  
5 frustrating I know for staff, you know, wanting to  
6 know and set their inspection times around our  
7 schedule but because of Sarbanes-Oxley we can't  
8 release that. But it's clear that we have a little  
9 more time, it's given us a little more planning time  
10 to work around these critical issues.

11 CHAIR RAY: I think you're speaking to the  
12 thing that was of concern to us, it just didn't seem  
13 to me I could see how you were going to make what was  
14 being laid out. We'll see what you're going to come  
15 up with after you're ready -- when you're ready.

16 MR. STINSON: Yes, sir.

17 CHAIR RAY: Okay.

18 MR. ARENT: Briefly, I just wanted to talk  
19 about the open items. Pat mentioned that at the  
20 outset meeting. There were 124 open items total to  
21 date from SSERs 22-25. On the right-hand side of the  
22 picture you can see that 41 of those items have been  
23 in fact closed. We, TVA, have submitted 39 items for  
24 review so 80 out of the 124 are in some stage of  
25 closure or review for closure. The remaining 44, a

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1 number of those as Pat mentioned are confirmatory  
2 items that will either be closed by the region or by  
3 NRR.

4 We do owe probably about 10 direct  
5 responses into NRR for their final review. That's not  
6 actually a confirmatory item but additional  
7 information that's owed, and right now we're on track  
8 over the next two submittals to have those completed  
9 by the end of January. So, a number of these items  
10 though from a confirmatory nature will go out as we  
11 complete the plant because some of them are physical  
12 verifications of plants. So that's where we're at  
13 today on that. Again as Pat mentioned we can go into  
14 more detail offline if you like on some of those  
15 specific items.

16 CHAIR RAY: Well, yes. We're talking  
17 about the same thing. We want to make sure that  
18 particular open items, not the confirmatory items I  
19 don't believe but open items that need some further  
20 opportunity for review here that we know which ones  
21 those are.

22 MR. ARENT: Right. Okay. That's all I  
23 have. I'm going to turn it over to Bob Bryan who's  
24 going to start our discussion on radiation protection.

25 MR. BRYAN: Thank you, Gordon. Good

1 morning.

2 CHAIR RAY: Good morning. As Dave  
3 mentioned we live in the Valley and we work at the  
4 plant so ALARA is important to us, so we've tried to  
5 build that into the plant. That said the basic  
6 shielding features for Watts Bar Unit 2 are identical  
7 to Watts Bar Unit 1. The buildings report at the same  
8 time. The plants are mirror images, they're not  
9 slide-alone units so it's, so when you walk on the  
10 Unit 2 side the things that are closest together are  
11 the common features and as you move out to the things  
12 that are closest to the outside wall on Unit 1 or  
13 closest to the other outside wall on Unit 2. The  
14 ventilation is designed so that you bring air into the  
15 upper floors that are clean and exhausted through the  
16 dirtier rooms so that you don't spread contamination  
17 that way. Because of the layout of the plant a lot of  
18 the features that go into the radiation protection  
19 such as counting rooms, decontamination rooms and labs  
20 were built as common areas that have feeds from both  
21 units and so they're shared between the units. The  
22 access to the auxiliary building into the radiation  
23 zone is common between the two units and so there's  
24 not a separate one for Unit 2, it's the same one  
25 that's used for Unit 1 and the egress is the same.

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1           MEMBER SKILLMAN:  If I could, your point  
2           that the units are mirror images intrigues me and I'm  
3           curious why you made that point.

4           MR. BRYAN:  A lot of units when they build  
5           things the units are slide-along units.  So when you  
6           walk into one the -- ours is just a little different.

7           CHAIR RAY:  I can weigh in and say having  
8           built a mirror image unit and look at 1 Diablo Canyon,  
9           getting the reactor vessel back --

10           (Laughter)

11           CHAIR RAY:  -- can create problems when  
12           things are right-handed, they're right-handed in both  
13           units which causes the arrangement sometimes to be  
14           awkward.

15           MEMBER SKILLMAN:  Well, I wondered if that  
16           meant the operators have to be dyslexic on Unit 2.

17           MR. BRYAN:  They have to be really good,  
18           but the constructors are the ones that have to be  
19           really good because at Sequoyah we did what they did  
20           at Diablo Canyon.

21           MEMBER SKILLMAN:  I understand that there  
22           is a complication that comes because you can't go from  
23           Unit 1 to Unit 2 and expect the identical physical  
24           configuration.  Got it.  Yes, sir, thanks.

25           MR. BRYAN:  Okay.  On the NUREG/0737 items

1 we have done mission dose calculations for Unit 2 that  
2 we have updated in terms of some of the differences.  
3 I'll be talking about them a little bit later but we  
4 have done those and the vital areas of the plant were  
5 set up for Unit 1 operation for the single-unit  
6 operation so we recast the documentation to reflect  
7 the two-unit operation and it'll be next year when we  
8 actually transition to the finished plant  
9 configuration vital areas for the two units.

10 Similarly on radiation monitors the  
11 coverage is really virtually identical to Unit 1  
12 there. There are a total of 84 radiation monitors  
13 shared between the two units, 29 are Unit 1 monitors,  
14 29 are Unit 2 monitors, 26 are common. Eight Unit 2  
15 monitors were put in service to support Unit 1  
16 operation at the time of license so we're adding 21  
17 new Unit 2 monitors. These are almost exclusively in  
18 the containment and along the secondary side paths.  
19 With the new monitors channel operability test  
20 extensions will be based on the operating experience.  
21 We have an adequate statistical base to support that.  
22 Unit 1 in the original plant, we had a number of local  
23 continuous air monitors. They have over time replaced  
24 those with portable continuous air monitors maintained  
25 by the rad protection people. Unit 2 is following the

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1 same arrangement and will generally use portable  
2 monitors for the local continuous air monitors. We're  
3 able to use the building-wide range gas monitors to  
4 provide the basic 10-deck hour protection requirements  
5 and then we have installed continuous air monitors in  
6 the fuel pool area. The rest of the plant monitors  
7 are done with the portable monitors.

8 MEMBER ABDEL-KHALIK: Is there an  
9 unfiltered in-leakage, control room in-leakage tech  
10 spec?

11 MR. BRYAN: Yes.

12 MEMBER ABDEL-KHALIK: And will that be  
13 changed?

14 MR. BRYAN: No.

15 MEMBER ABDEL-KHALIK: Or is it the same --

16 MR. BRYAN: No, it's a common control  
17 room. The control building isolation area is the same  
18 for both, it's the same room for Unit 1 and Unit 2.  
19 You can look from the Unit 1 horseshoe to the Unit 2  
20 horseshoe. So it shares the same ventilation.

21 MEMBER ABDEL-KHALIK: So it will remain --

22 MR. BRYAN: Pardon?

23 MEMBER ABDEL-KHALIK: It will remain the  
24 same as it's always been for Unit 1?

25 MR. BRYAN: Yes. It shares ventilation

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1 system, it shares the same emergency ventilation  
2 system, same filtration system.

3 MEMBER ABDEL-KHALIK: Okay.

4 MR. BRYAN: Similarly the rad waste  
5 systems are, much of it is shared between the two  
6 units. There's a fair amount of operational  
7 flexibility though built into the system so that we  
8 can manage how much processing that we have to do on  
9 the releases. Typically the rad waste systems that  
10 treat reactor coolant and its associated waste get a  
11 high level of processing but typically on the  
12 secondary side we've run very, very clear. And for  
13 instance, we don't use the condensate demineralizers  
14 except generally in the startup mode and on Unit 1  
15 we've never had to put them in service to handle high  
16 source in the secondary side as an example. So  
17 generally that waste is just monitored and diluted and  
18 released as an untreated release. If we did get a  
19 high source in there we are able to process it first  
20 by the condensate demineralizers. Then we also have  
21 a mobile demineralizer skid that we would treat the  
22 regeneration waste with.

23 MEMBER SIEBER: You said that you don't  
24 use condensate demineralizers during normal operation.

25 MR. BRYAN: That's right.

1                   MEMBER SIEBER: And so you have a boiler  
2 blowdown system that's a substitute for that?

3                   MR. BRYAN: We do a steam generator  
4 blowdown, yes.

5                   MEMBER SIEBER: Right. And is that a  
6 continuous process?

7                   MR. BRYAN: Yes, and it's just monitored  
8 and generally released.

9                   MEMBER SIEBER: And what treatment do you  
10 provide to the blowdown water?

11                  MR. BRYAN: Right now none other than  
12 dilution.

13                  MEMBER SIEBER: Okay.

14                  MR. BRYAN: It's monitored. But if we got  
15 a high-level release in there then we would treat it  
16 through the condensate demineralizer system. And then  
17 depending on how that came out probably would be  
18 treated also through the mobile demineralizer skid.  
19 But in the 14 years of operation on Unit 1 we've had  
20 no issues with just treating it.

21                  MEMBER SIEBER: So let's pretend you get  
22 a small steam generator tube leak, you make a decision  
23 to continue to operate because it's so small. Your  
24 condensates and mineralizers will become radioactive.  
25 Your blowdown system if you used it would also be

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1 radioactive. Do you have treatment facilities and  
2 procedures to deal with that kind of a situation?

3 MR. BRYAN: Absolutely, and that's, I  
4 mean, that was the way the plant was designed from --  
5 that was part of the initial design. There are  
6 radiation monitors in the demineralizer areas.  
7 They're set up to be high-radiation areas with the  
8 shielding and restrictions. So yes, that's built into  
9 the --

10 MEMBER SIEBER: Right. Some licensees  
11 when they encounter that situation are surprised where  
12 the activity goes.

13 MR. BRYAN: Understand.

14 MEMBER SIEBER: Okay.

15 MEMBER ABDEL-KHALIK: Let's go back to the  
16 control room handling please for a moment. First of  
17 all, what is that tech spec limit?

18 MR. BRYAN: I'm sorry, I --

19 MEMBER ABDEL-KHALIK: It must be very  
20 small. Unfiltered control room in-leakage.

21 MR. BRYAN: I'll have to find out.

22 MEMBER ABDEL-KHALIK: I'm just wondering  
23 how often do you have to test for that.

24 MR. BRYAN: Pardon?

25 MEMBER ABDEL-KHALIK: How often do you

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1 test for that?

2 MR. BRYAN: Well, once -- Tom?

3 MEMBER STETKAR: Make sure you identify  
4 yourselves.

5 MR. HILMES: Steve Hilmes, electrical and  
6 I&C. Eighteen months surveillance.

7 MEMBER ABDEL-KHALIK: Right. Has that  
8 been challenged, the tech spec limit for Unit 1 during  
9 the construction activities for Unit 2?

10 MR. HILMES: We did -- what do you mean by  
11 challenged?

12 MEMBER ABDEL-KHALIK: Meaning have you  
13 exceeded tech spec limits?

14 MR. HILMES: No.

15 MEMBER ABDEL-KHALIK: Did you have to  
16 enter an LCO because of that?

17 MR. HILMES: Tom Wallace.

18 MR. WALLACE: Like the man said, we have  
19 a breaching program. If we have to breach a  
20 penetration into the control room it limits the amount  
21 of open space you can actually have. It's the same  
22 space that you would have with the operating side if  
23 we weren't here. We can't see any limits. It's there  
24 and it's within the design of the plant. As long as  
25 we stay within the margin of those breaches and meet

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1 the requirements that are set up with our engineering  
2 department to make that particular breach we do not  
3 challenge our tech spec.

4 MR. KOONTZ: Yes, this is Frank Koontz.  
5 I can also mention that a lot of, as Tom mentioned a  
6 lot of these breaching permits come over to  
7 engineering and we evaluate them. For example, if  
8 they're doing cable pulls through the walls we'll look  
9 at the flow area there, we'll look at whether that's  
10 an acceptable flow area you know as far as the in-  
11 leakage into the control room or we look at how to  
12 seal it up in an emergency if they have to seal it for  
13 some reason. If we would have an event then we're  
14 required to do that, what they need to do. All that  
15 is evaluated under the breaching permit.

16 MEMBER ABDEL-KHALIK: Usually that tech  
17 spec limit is pretty tight and I was just wondering if  
18 these construction activities would in any way  
19 challenge that limit.

20 MR. BRYAN: No.

21 MR. KOONTZ: So far we've not allowed it.

22 MR. BRYAN: We haven't allowed it. That's  
23 what Tom was saying, that basically we are limited as  
24 to the maximum breach that we can have in there and --

25 MEMBER SIEBER: Time and size.

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1 MR. BRYAN: -- and so, by size. And so  
2 when we do the construction activities we are not  
3 allowed to --

4 MEMBER ABDEL-KHALIK: It's usually CFM.

5 MR. BRYAN: Right, but that -- but you can  
6 equate that to -- size hole. You know, the exact --  
7 it's under 150 inches, cubic inches.

8 MR. WALLACE: Oh, yes, that's the problem  
9 is a much smaller --

10 MR. BRYAN: Much smaller than that.

11 MR. WALLACE: That's for the auxiliary  
12 building where we have 117 inches we can work within.

13 MEMBER ABDEL-KHALIK: For the control room  
14 it's much smaller.

15 MR. BRYAN: Much smaller.

16 MR. WALLACE: And much tighter  
17 requirements, that's correct. Yes, we have to do  
18 things like make sure the turbine building ventilation  
19 is set up and the doors are properly set. We've got  
20 a high energy stimulating the turbine building that it  
21 wouldn't factor into the equation.

22 MEMBER STETKAR: Have you finished pulling  
23 all the cables into the control room for Unit 2 yet?

24 MR. HILMES: Steve Hilmes. No, I haven't  
25 completed it all yet.

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1 MEMBER STETKAR: Started?

2 MR. HILMES: Yes. Quite far along.

3 MEMBER STETKAR: Okay. So you have --  
4 what I'm trying to -- you have some experience at  
5 least and you still haven't entered an LCO during any  
6 of the other capables.

7 MR. HILMES: We don't, yes, we don't enter  
8 the LCOs. We figure a way to limit the amount of in-  
9 leakage you get when you're opening it up. And  
10 there's tricks to the technique to get the cables in.

11 MEMBER ABDEL-KHALIK: So the tech spec is  
12 based on a CFM limit, or based on a whole size limit?

13 MR. BRYAN: The tech spec's based on a CFM  
14 limit.

15 MEMBER SIEBER: Right. You can calculate  
16 the whole thing.

17 MR. BRYAN: But you can take that and you  
18 know what the pressure differentials you're  
19 maintaining are and so you can calculate back what an  
20 allowable hole size would be with some conservatism.  
21 We'll have to get back to you on whether we have ever  
22 entered the LCO on control room leakage but to the  
23 best of my knowledge we haven't. It's something that  
24 we certainly never do routinely.

25 MR. STINSON: So you're saying no, we've

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1 never --

2 MR. WALLACE: I can never recall that  
3 we've entered the tech spec. We've always stayed  
4 within the margin of the breaching program which the  
5 system's tested and that's numbers established based  
6 on the amount of leakage we had.

7 MR. HILMES: Steve Hilmes. When they  
8 performed the testing you end up with the given margin  
9 that you have left and that's what you can work with.

10 MEMBER ABDEL-KHALIK: And has the last  
11 testing been done after you started cable pulling for  
12 Unit 2?

13 MR. HILMES: Yes, it would have had to  
14 have been.

15 MR. BRYAN: Yes.

16 MEMBER ABDEL-KHALIK: And you passed the  
17 --

18 MR. HILMES: Yes.

19 MEMBER ABDEL-KHALIK: -- the tech spec  
20 during the test?

21 MR. BRYAN: The other thing was a few  
22 years ago when the generic industry issue came out  
23 about control room leakage Watts Bar control room  
24 design passed adequately. We didn't have to go back  
25 and do any of the special activities that some of the

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1 plants did. The tracer gas testing that was done.

2 MEMBER ABDEL-KHALIK: Okay, thank you.

3 MEMBER RYAN: Just one follow-up question  
4 on the waste area. You've got common waste management  
5 systems. Have you evaluated, could you describe a  
6 little bit if you have how you looked at stresses from  
7 both units coming to that system at the same time, or  
8 a combination of different stresses coming to the rad  
9 waste area at the same time?

10 MR. BRYAN: Yes, we have. The systems  
11 were designed coming in as to supply two units. You  
12 know, it was built, they were sized for two-unit  
13 operation. They're very, very similar to the systems  
14 that we have at Sequoyah. So we've got good  
15 operational history of two-unit operation on these  
16 system designs.

17 MEMBER RYAN: I appreciate that's a normal  
18 operating circumstance. What if things aren't normal  
19 and you get more rad waste to deal with in both  
20 places? What's the head room and your ability to  
21 process I guess is one way to think about it?

22 MR. BRYAN: Well, actually quite a bit.  
23 And I was going to get to that here in a minute but --

24 MEMBER RYAN: Okay, that's fine. Save it  
25 for when you're going to get there, that's fine.

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1 MR. BRYAN: Okay. One of the last things  
2 that's different in terms of the way we operate today  
3 than when Unit 1 was licensed, the original licensing,  
4 the plant assumed that we would do 22 containment  
5 purges a year at -- Unit 1 has gone to 100 CFM, the  
6 continuous filtered vent. Unit 2 is going to operate  
7 the same way and so the routine releases were analyzed  
8 with that set of assumptions.

9 MEMBER SKILLMAN: What drives that  
10 requirement, please?

11 MR. BRYAN: Well, two things. We're an  
12 ice condenser containment which is a relatively small  
13 volume containment so it manages pneumatic leakage  
14 into the containment so that you keep your pressures,  
15 control containment pressure. And the other thing is  
16 it also helps you with keeping the containment  
17 relatively clean for the weekly entries.

18 MEMBER SKILLMAN: Thank you.

19 MR. BRYAN: We use the ANSI N18.1-1984  
20 search term for doing the routine releases. Things  
21 that were different from Unit 1, we updated the  
22 meteorology we were using to cover the period of time  
23 from 1986 to 2005. This is more or less consistent  
24 with the dates that went in with the Supplemental  
25 Final Environmental Impact Statement.

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1           The FSAR information was based on the 2007  
2 land use survey. When we do our annual releases we do  
3 an annual meteorology and an annual land survey so  
4 those are current for the year. The Watts Bar site is  
5 very similar to Unit 1. We use terrain adjustment  
6 factors for the local site area and then we did our 50  
7 mile population dose, was based on a revised 20-40  
8 year estimate.

9           MEMBER STETKAR: Bob, here's an off the  
10 wall question. You'll probably have to take it away,  
11 but maybe not. You have common meteorological towers  
12 for both of the units and I was reading about that.  
13 It has a data acquisition computer and something  
14 called the environmental data station which I'm  
15 assuming is at the tower, and it sends meteorological  
16 data to the plant, the central emergency control  
17 center (CECC) where there's a computer that then  
18 distributes it out to the technical support center and  
19 I guess eventually the EOP and any emergency planning  
20 folks. What are the power supplies for those  
21 facilities? Where do they get power to both the EDS  
22 and the CECC?

23           MR. BRYAN: Well, the CECC has its power  
24 supplies out of the, I mean, it's basically supplied  
25 by the Chattanooga Electric Power Board but it has,

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1 the building has, and that part of it has backup power  
2 supplies at the TVA offices. Steve, do you know?

3 MEMBER STETKAR: Where is the CECC?

4 MR. BRYAN: It's in Chattanooga.

5 MEMBER STETKAR: Chattanooga? It's -- has  
6 its own diesel? How about the onsite, the EDS?

7 MR. BRYAN: Well, the onsite emergency  
8 center is in the --

9 MEMBER STETKAR: No, no, no, the data  
10 acquisition system, the thing that actually collects  
11 the meteorological data, processes it and sends it  
12 out.

13 MR. BRYAN: Steve, do you know the?

14 MR. HILMES: Steve Hilmes. The tech  
15 support center which is --

16 MR. BRYAN: He's talking about the met  
17 towers.

18 MEMBER STETKAR: The met tower itself. As  
19 I understand it, maybe I misunderstood it. The data  
20 comes to a met tower, goes into a little data  
21 acquisition system. The computer does a bunch of  
22 processing, sends it out to the CECC. The CECC sends  
23 it back to the tech support center and to, you know,  
24 the CECC itself and, you know, whatever other places  
25 you use for emergency planning if there are any.

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1 That's at least reading through the brief summary in  
2 the FSAR as I understood it.

3 MR. WALLACE: This is Tom Wallace. The  
4 met tower, meteorological tower itself has plant power  
5 to it. There's a small interruptible power supply off  
6 there for some of the computers. There's also a small  
7 gasoline. It's been years since I've been there but  
8 there was a gas generator up there as well.

9 MEMBER STETKAR: I was going to say since  
10 it's been awhile since you've been there does anybody  
11 ever go out and check whether the gas generator  
12 actually works?

13 MR. WALLACE: Yes, sir. It's done by  
14 people up at Kingston plant that do that or one of the  
15 facilities that come out and service our  
16 meteorological tower up there. It alarms. But we  
17 know if the met tower goes down you know it  
18 immediately in the control room.

19 MEMBER STETKAR: I'm obviously thinking  
20 about it against the, you know, prolonged loss of  
21 offsite power, whether or not you'd actually have  
22 real-time meteorological data available for any of  
23 your emergency planning action limits.

24 MR. WALLACE: From our rev you'd have  
25 backup in that tower. It's out of -- that you get

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1 from other staples in other locations.

2 MEMBER STETKAR: Well, but I mean there --  
3 that's okay but it's not Watts Bar-specific, you know,  
4 as far as wind speeds and directions.

5 MR. STINSON: So why don't we take that  
6 back and get you a better answer.

7 MEMBER STETKAR: Okay, thanks.

8 MEMBER SKILLMAN: Yes, I would like to add  
9 onto that if I could. It sounds like from the  
10 gentleman's response that the staff at the Kingston  
11 station keeps an eye on your met tower physical  
12 facility. And I'd be curious whether or not your  
13 radiological controls people from your station or your  
14 maintenance people that are under the leadership of  
15 your station actually do hands-on on the met tower  
16 because that is your eyes and ears for an accident.

17 MR. STINSON: So, Tom Wallace runs  
18 operations. Of course he was the operations man.

19 MR. WALLACE: The people that do the met  
20 tower maintenance and manage that stuff out of our  
21 environmental group do the -- it's the same equipment  
22 for all the TVA sites. They're responsible for each  
23 and every one of those stations. But the system  
24 itself is smart too and if it goes down it makes  
25 notifications to people. There are requirements set

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1 up, frequency-type requirements set up for maintenance  
2 that has to be done and maintained, surveillance if  
3 you will I guess you'd call it for that maintenance  
4 that's required to be done.

5 MEMBER SKILLMAN: Okay, thank you. Let me  
6 ask one more question. The terrain adjustment  
7 factors, those were identified in the SER on page 2-4  
8 that TVA was not using the terrain adjustment factors  
9 and in this slide you're indicating --

10 MR. BRYAN: Well --

11 MEMBER SKILLMAN: Is that a change?

12 MR. BRYAN: No. We applied terrain  
13 adjustment factors basically to the area within about  
14 five miles of the site. We did not apply the terrain  
15 adjustment factors at, either on Unit 1 or Unit 2 out  
16 to 50 miles. We did do some studies of the -- and to  
17 understand how we did the terrain adjustment factors  
18 the doses are done with a straight line Gaussian  
19 program and so we ran a variable trajectory code to  
20 get, and looked at the chi over Q's at the locations  
21 of interest. And basically if the, for the near site  
22 if the variable trajectory code gave us higher chi  
23 over Q's we used those. If our straight line  
24 Gaussians gave us higher chi over Q's we used those.  
25 So we basically picked the worst case in that.

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1           When you go out and you look out to 50  
2 miles we ran the variable trajectory code out all the  
3 way to 50 miles and if you apply those to all the  
4 receptor locations you end up with doses that are, oh,  
5 between about three and five times lower than you  
6 would get using the straight-line Gaussian alone. If  
7 you take the worst case from all of them you end up  
8 with about to the 50 mile total person-rem. You  
9 change at about 0.3 rem over to 150 to 1.5 million  
10 people. The requirements are that you don't, for  
11 terrain adjustment factors that you don't  
12 substantially underestimate the dose. We don't feel  
13 like we are. So, what it's talking about in the SER  
14 is we didn't apply terrain adjustment factors to all  
15 the receptors on the 50 mile dose. We did apply them  
16 to all within about five miles.

17           MEMBER SKILLMAN: Thank you.

18           MEMBER RYAN: What case did you assume to  
19 say that you had the worst case? What meteorological  
20 condition did you assume to say you are now in the  
21 worst case?

22           MR. BRYAN: We looked at the  
23 meteorological, I mean we looked at the hourly  
24 meteorology for 20 years and so --

25           MEMBER RYAN: But you said it was the

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1 worst case so in 20 years the meteorology changes  
2 quite a bit.

3 MR. BRYAN: Right.

4 MEMBER RYAN: Fumigation is the worst  
5 case.

6 MR. BRYAN: Well, what I meant was when  
7 you went in and you calculated the chi over Q's using  
8 our straight line trajectory code. So for each  
9 receptor I get a chi over Q.

10 MEMBER RYAN: Yes.

11 MR. BRYAN: I went and did that again with  
12 a variable trajectory code. All right, so now I've  
13 got two sets of chi over Q's. If the variable  
14 trajectory one was higher we'd pick that value for  
15 this receptor.

16 MEMBER RYAN: Okay.

17 MR. BRYAN: For this other receptor --  
18 whichever one was higher was the one we used.

19 MEMBER RYAN: That's not the worst case  
20 analysis but that I accept.

21 MEMBER SIEBER: No, it's not.

22 MEMBER RYAN: I understand what you did  
23 now, but that's most assuredly not the worst case.

24 MR. BRYAN: I understand, not the worst,  
25 worst case. We took the, of those two values we took

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1 the more conservative one.

2 MEMBER RYAN: You took the higher which is  
3 conservative. Did you do uncertainty analyses on  
4 those calculations?

5 MR. BRYAN: No.

6 MEMBER RYAN: No, so you really don't have  
7 much insight into that uncertainty or precision. I'm  
8 not arguing what you did, I'm just trying to make sure  
9 I understand the characterization of it.

10 MR. BRYAN: Okay.

11 MEMBER RYAN: All right, thanks.

12 MEMBER SKILLMAN: Thank you.

13 MR. BRYAN: For Unit 1 we used the RM 50  
14 addendum to Appendix I which allows you to set limits  
15 based on the site. With two-unit operation we went to  
16 the basic Appendix I which puts the limits on a per-  
17 unit basis. The one addition that you have to do for  
18 Appendix I is you have to do a cost/benefit analysis  
19 which we did. It showed that there were no  
20 enhancements required. And then I think probably the  
21 best thing of all is we've got 15 years of operational  
22 data on Unit 1 and it shows that we're a very small  
23 fraction of -- what we actually put out is actually a  
24 very small fraction of what even the FSAR releases  
25 are.

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1           MEMBER RYAN: I appreciate what you said  
2 and reading through that it struck me that you really  
3 have no insight into uncertainty. What you actually  
4 have are a range of values. You did bounding analysis  
5 kind of calculations and you were still under, you  
6 know, the limits that were set. So I'm trying to  
7 understand how you gain insight into variability or  
8 margin in those kind of calculations.

9           MR. BRYAN: Well, I think the most, you  
10 know, if you want to go look where a conservatism is  
11 and things you go and you look at the -- I mean, you  
12 start with the source term. And the source term would  
13 be equivalent to about 50 to 60 fuel pins leaking.  
14 That's a very, very large number. So, and I think  
15 when you go in and you look at what your FSAR releases  
16 are compared to your actual releases that really is  
17 the basis for most of the differences in them. And so  
18 that, I think there's, I guess we feel like there's  
19 more than sufficient conservatism there to bound other  
20 uncertainties.

21           I mean, we do, as I say we do look at all  
22 the meteorological data and we, for these releases we  
23 basically look at averages of the things. When you  
24 get over to the accident releases you're picking the  
25 things that are in the, you know, 5 percent, top 5

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1 percent area.

2 MEMBER RYAN: Okay, I'll think about that.  
3 I guess what I'm struggling with is trying to  
4 understand your insight into what things could go  
5 wrong that could mean a bigger difference than other  
6 things that could go wrong in those releases. I mean,  
7 if they're all low, okay? But which one's more  
8 important. They probably have relative importance in  
9 terms of if something did go wrong which one  
10 contributed more.

11 MR. BRYAN: I mean, activity in the  
12 reactor coolant's most important. Then what your  
13 primary to secondary leakages is another key driver.  
14 Beyond that it's, I think everything else is at a  
15 lower level.

16 MEMBER RYAN: Thanks.

17 MEMBER SIEBER: What's the topography  
18 around the plant look like? Is it flat or hilly or  
19 mountains?

20 MR. BRYAN: It's a hilly river valley. I  
21 mean, the site, there's some local hills very close to  
22 the site. The Cumberland Plateau runs north,  
23 essentially north-south 5 to 10 miles to the west and  
24 off to the east probably about 40 miles you have the  
25 Appalachians.

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1                   MEMBER SIEBER: Okay. And so do you have  
2 occasional or frequent inversions?

3                   MR. BRYAN: There are, at places in the  
4 Valley you do have substantial inversions.

5                   MEMBER SIEBER: Traps.

6                   MR. BRYAN: Chattanooga in particular was  
7 noteworthy for that. What I think we've seen, as you  
8 look at the, now about 40 years of meteorological data  
9 for the site what we have tended to see is that  
10 overall wind speeds are lower now than they were maybe  
11 back in the '70s. We don't have quite as many periods  
12 of calm now as we had maybe in the '70s.

13                  MEMBER SIEBER: Have you ever considered  
14 using particle cell type codes for dispersion as  
15 opposed to gaseous distribution?

16                  MR. BRYAN: There's a yes and no to that.  
17 Our meteorological people who do the basic studies for  
18 the valley do use the more advanced codes for their  
19 studies. For us at the sites because we've got the  
20 features built into this one that we need we haven't  
21 made the decision.

22                  MEMBER SIEBER: Well, for emergency  
23 planning you need realtime data so whatever processing  
24 system you use to connect to your met tower plus  
25 whatever other inputs you might have, it depends on

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1 what the software does with that data to determine  
2 where the radiation levels are high, where they're low  
3 and so forth. Usually in hilly country where you have  
4 a lot of inversions, radiation doses in the valleys  
5 are higher than they are on the hilltops. That can be  
6 quite pronounced.

7 MR. BRYAN: And we, that's -- we also  
8 have, we have field teams that go out and monitor.

9 MEMBER SIEBER: Yes, yes. That takes time  
10 to get them out there.

11 MR. BRYAN: It does.

12 MEMBER SIEBER: Yes. Thanks.

13 MR. BRYAN: Last slide. There were,  
14 through SSER 24 we had seven open items. Six of those  
15 were basically items where we needed to incorporate  
16 information into the FSAR that we had previously  
17 submitted. The other one was to perform the  
18 cost/benefit study. Of these seven we have one that's  
19 currently open.

20 CHAIR RAY: Of the seven what did you say?

21 MR. BRYAN: We have, we've performed the  
22 cost/benefit study and we've updated the FSAR for six  
23 of them so we have one that we still need to provide,  
24 including with the FSAR.

25 CHAIR RAY: Okay.

1 MR. BRYAN: That completes this part of  
2 the presentation.

3 CHAIR RAY: All right. I believe you're  
4 going to also do the next one.

5 MR. KOONTZ: Well, I've got -- this is  
6 Frank Koontz.

7 MR. BRYAN: We can move ahead and go to  
8 dose consequences.

9 CHAIR RAY: You want to go to dose and  
10 then come back? That's fine. What's on the agenda is  
11 radiological consequences of accidents.

12 MR. BRYAN: Okay. For the accident dose,  
13 for all of the accidents the dose consequences are of  
14 course less than 10 CFR Part 100 and also for those  
15 where you're supposed to be substantially below the  
16 Part 100 limits we meet those. The next bullet shows  
17 basically the regulatory criteria that we were meeting  
18 for each of the different accidents that we evaluated  
19 for dose. If you want to flip to the next slide.

20 Things that were different from Unit 1.  
21 For the accident analysis we updated the meteorology  
22 to get the chi over Q's based on a 20-year period from  
23 1991 to 2010. Unit 2 has the original steam  
24 generators in them which have a slightly smaller  
25 primary and secondary volume than the replacement

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1 steam generators at Unit 1 so we've accounted for  
2 that. We don't have tritium-producing rods in Unit 2.  
3 The dose equivalent iodine for these analyses was  
4 reduced to the tech spec limit and then we revised our  
5 fuel handling accident for the accident in the  
6 auxiliary building to use alternate source terms. The  
7 one for the containment, with the containment isolated  
8 still uses the Reg Guide 1.25 analysis. The fuel  
9 handling accident for -- in the containment with the  
10 equipment hatch open is bounded by the action in the  
11 spent fuel pool and so that analysis covers the  
12 containment open case 2.

13 CHAIR RAY: That's the containment open to  
14 the auxiliary building, right?

15 MR. BRYAN: Yes.

16 CHAIR RAY: Not to the exterior. What's  
17 the reason for that assumption? I couldn't find why  
18 you need to know more about how you operate I guess to  
19 understand why you wouldn't assume open to the  
20 outside, the door opened to the outside.

21 MR. BRYAN: Because once you get the head  
22 removed and you're flooded up you open the equipment  
23 hatch so you have ready access to the containment for  
24 maintenance work and other outage activities.

25 CHAIR RAY: Well, maybe I'm asking the

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1 question unclearly. Why is it not assumed that the  
2 door to the exterior rather than to the auxiliary  
3 building is open?

4 MR. BRYAN: It doesn't have a door to the  
5 auxiliary building.

6 CHAIR RAY: Well, or -- but the auxiliary  
7 building is open to the outside. I'm just trying to  
8 recall what I read in the analysis which is that the  
9 door is open to the auxiliary building, not to the  
10 outside.

11 MR. BRYAN: That's true. The equipment  
12 hatch goes to the auxiliary building. It does not go  
13 to the outside and the auxiliary building is kept  
14 closed from the outside.

15 CHAIR RAY: I misunderstood the comment  
16 then I guess. It made it sound like to me that there  
17 was an assumption being made about there not being an  
18 opening that could have existed but doesn't, and  
19 you're just saying there isn't any such possibility.

20 MR. BRYAN: There isn't such possibility,  
21 no.

22 CHAIR RAY: All right. I misunderstood.

23 MR. BRYAN: Okay. The other things that  
24 were slightly different from Unit 1, a lot of even the  
25 emergency ventilation systems are shared between the

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1 two units. So typically even for events in Unit 2  
2 releases could come off of the Unit 1 shield building  
3 stack and that tends to be for, for LOCA as an example  
4 that's still the limiting event. For events that have  
5 releases off of the secondary side that go out through  
6 our valve vault, steam line rate, tube rupture and  
7 loss of AC. The path from the Unit 2 valve vault to  
8 one of the control building intakes tends to be the  
9 limiting path. So for Unit 2 they were analyzed on  
10 the basis of that.

11 MEMBER SKILLMAN: May I ask you to back up  
12 to slide 31, please? The bases for these analyses.  
13 These reg guides have in their lifetime gone through  
14 various revisions and upgrades. May I ask you to  
15 please comment on whether or not you have used a new  
16 or different version of a reg guide so that your  
17 analyses for Unit 2 are successful where they would  
18 not have been had you used the previous version of the  
19 reg guide? I'm just asking if you're cherry-picking.

20 MR. BRYAN: No. The only place that was  
21 for the fuel handling accident we changed some damper  
22 timing, damper closure timing and that would have  
23 applied to Unit 1 also. And using the alternate  
24 source term was advantageous for that but relative to  
25 the older reg guide analysis.

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1                   MEMBER SKILLMAN: Because I read it, your  
2 real conservatism for your fuel handling accident is  
3 the 23 feet of water over the drop assembly. That's  
4 what really gives you the lower amount that is  
5 released because so much is removed by the column of  
6 23 feet of water.

7                   MR. BRYAN: Right and that's what the  
8 alternate source term lets you take advantage of.

9                   MEMBER SKILLMAN: Is that the same for  
10 Unit 1?

11                  MR. BRYAN: For Unit 1 they are running,  
12 currently they were using that as an engineering  
13 evaluation of their damper condition. They are in the  
14 process of submitting the license amendment request to  
15 change their analysis basis to the alternate source  
16 term for fuel handling accidents also.

17                  MEMBER SKILLMAN: Thank you.

18                  MR. BRYAN: If there are no more questions  
19 I'll turn it over to Frank Koontz.

20                  CHAIR RAY: Okay. We're a little ahead of  
21 schedule so we can go ahead and I think do this next  
22 piece and then we'll take a break.

23                  MR. KOONTZ: Okay. This is Frank Koontz.  
24 I believe some of this information on Chapter 15 may  
25 have been covered at the last meeting. I wasn't at

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1 the meeting. I was actually in Hawaii so I was going  
2 to say I missed the last meeting but I didn't.

3 (Laughter)

4 MEMBER STETKAR: You were absent.

5 MR. KOONTZ: I was absent from the last  
6 meeting. One of the things that we wanted to make a  
7 point of here is that the Unit 2 analyses that we did  
8 for Chapter 15 were generally similar to the ones that  
9 we had done for Unit 1 at the operating license for  
10 Unit 1. Some of the similarities is that we have the  
11 original steam generators in Unit 2, that's the model  
12 D-3 Westinghouse steam generators. Since the original  
13 license on Unit 1 they have upgraded the steam  
14 generators and they have gone to a new model 68AXP but  
15 we still have the original ones.

16 We do not have credit for a measurement  
17 uncertainty recapture. That's a leading edge flow  
18 meter. We do have that hardware installed but we're  
19 not asking for that under our initial license. That's  
20 similar to what Unit 1 had at their original license  
21 is they did not have LEFM installed at that time so  
22 our startup power is 3411 megawatts thermal NSSS, our  
23 reactor power. So those two are very similar to the  
24 original license.

25 Some of the things we did update and some

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1 of the differences is what I'm going to talk about  
2 next. The first thing we did is we re-baselined the  
3 large-break LOCA and the small-break LOCA. We decided  
4 that we wanted to get away from the old BART/BASH  
5 methodology on large-break LOCA. We had gone to a  
6 best estimate analysis with Westinghouse on Unit 1.  
7 We wanted to do that best estimate analysis on Unit 2  
8 and so we updated it with the ASTRUM methodology and  
9 that's what we've got for Unit 2. We did see a  
10 difference in the peak clad temperatures. For  
11 example, the Unit 2 95th percentile peak clad  
12 temperature under ASTRUM is 1552 so that gives us a  
13 large margin to the 2200 degrees.

14 We understand there is an Information  
15 Notice the NRC sent out with respect to PAD, their  
16 fuel thermal performance model and how that might  
17 affect ASTRUM but we do have a large margin there.  
18 And I don't know if we mentioned PAD but we're working  
19 with both Westinghouse and the Owners Group to see  
20 what we need to do to update that PAD code to put in  
21 the variable thermal conductivity as a function of  
22 burn-up, but that'll take awhile.

23 The benefit we've got there, the positive  
24 that we've got is that the thermal conductivity effect  
25 doesn't kick in for awhile as far as burn-up and so we

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1 are in pretty good shape for at least the first cycle  
2 for Watts Bar Unit 2. But that would not be an impact  
3 to us and the NRC staff is looking at possibly a  
4 license condition on Watts Bar Unit 2 to resolve that  
5 issue before we get in the first refueling.

6 For the small-break LOCA we re-baselined  
7 that. We used the NOTRUMP code similar to what we use  
8 on Unit 1 and similarly there we've got a pretty large  
9 margin. Unit 2 came out around 1184 degrees  
10 Fahrenheit for the PCT for Unit 2.

11 Some of the other things we did in Chapter  
12 15 is we had several new analyses. The next slide  
13 there, Gordon. One of the things the staff asked us  
14 to look at was overpressure protection on the second  
15 trip. Our Westinghouse analysis had looked at a  
16 turbine trip event as causing a peak overpressure on  
17 the system and but it credited the first safety grade  
18 trip. It was on the pressurizer. And the staff said  
19 well, the Standard Review Plan really says look at the  
20 failure of the first trip and model it as if it  
21 tripped on the second trip. So we went back and we  
22 re-analyzed that for the staff. We did get acceptable  
23 results. It didn't make a large difference. For  
24 example, the limit is 2750 psia, that's 110 percent of  
25 the design pressure. The original trip came in at

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1 2691 psia and when we went to the second trip it came  
2 in at 27, around 2715 psia. So we still have a  
3 margin, that limit of 2750. So the staff accepted  
4 that and they may talk about that this afternoon.

5 They also asked that we look at a CVCS  
6 malfunction event. We had not looked at that for Unit  
7 1. What we did look at was an inadvertent SI and we  
8 had made the case that that was bounding to the CVCS  
9 malfunction. The difference in those two events is  
10 for an inadvertent SI you get an immediate reactor  
11 trip on the safety injection. For a CVCS malfunction  
12 it may be something like a charging pump control  
13 failure of some type, that the charging starts to  
14 over-charge and perhaps the letdown isolates and then  
15 you're filling up the pressurizer. And the question  
16 on that event is whether it will fill the pressurizer  
17 and actually relieve water through the PORVs on the  
18 pressurizer and whether the PORVs are qualified for  
19 water relief.

20 So we had Westinghouse go back and analyze  
21 several cases on CVCS malfunction. We were able to  
22 show that we did not get to a point where we had water  
23 relief through the PORVs, that the operators could  
24 terminate that event in a timely fashion.

25 MEMBER ABDEL-KHALIK: In which mode?

1 MR. KOONTZ: This is in power mode, mode  
2 1.

3 MEMBER ABDEL-KHALIK: Have you analyzed  
4 that during modes 4, 5 and 6?

5 MR. KOONTZ: No. We haven't looked. We  
6 believe that the power mode is bounding. We do have  
7 the staff here from Westinghouse that did the  
8 analysis. Ryan, would you like to comment? Would  
9 there be any differences in the lower modes? Or Alan,  
10 or Chris, either one of you three guys, that you  
11 believe would be more limiting.

12 MR. MCHUGH: This is Chris McHugh from  
13 Westinghouse. Thermal remotes are not typically a  
14 problem because it's conservative less decay heat. If  
15 you turn decay heat off at mode 1 it takes forever to  
16 fill. It's really a combination of the SI and the  
17 decay heat cause the thermal expansion. So there's a  
18 lot more time in lower modes than there is in mode 1.

19 MEMBER ABDEL-KHALIK: We heard a different  
20 story for another licensing action so you may want to  
21 consider.

22 MR. KOONTZ: And that's for the CVCS  
23 malfunction? Because I know we also get into the  
24 lower modes in the boron dilution event also.

25 MEMBER ABDEL-KHALIK: Right.

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1 MEMBER STETKAR: Do you want, when you  
2 shut down on Unit 1 do you basically fill the  
3 pressurizer solid? How do you do gas on Unit 1? I  
4 don't know how plants do it.

5 MR. KOONTZ: The question is how do we go  
6 through the shutdown process.

7 MEMBER STETKAR: When you're coming down,  
8 when you do degassing and you're coming down, do you  
9 cycle pressurizer level essentially full?

10 MR. WALLACE: Yes, sir. We will carry the  
11 pressurizer solid. We'll continue to run solid all  
12 the way through de-gas and cleanup.

13 MEMBER STETKAR: Decay heat is still  
14 pretty high at that time because that's typically the  
15 first day or two. Okay, thanks. There's a  
16 vulnerability, for example.

17 MR. KOONTZ: Yes. Well, we do have  
18 protection systems there for coms and you know, safety  
19 valves to protect the system if there was water solid.

20 MEMBER STETKAR: Are your PORVs qualified  
21 for water relief or not?

22 MR. KOONTZ: Well, not through a  
23 regulatory process. I mean, the PORVs are the target  
24 rock models. They were successful in some of the EPRI  
25 valve testing as far as water relief so I think the

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1 case could be made that they would qualify. And we  
2 did look at the civil analysis on the tailpipes and  
3 the tailpipes will withstand the water relief load.  
4 We haven't made that case at the NRC so I'd say in a  
5 licensing space we're not qualified.

6 MEMBER STETKAR: But they're the target  
7 rock.

8 MR. KOONTZ: They're the target rocks,  
9 yes.

10 MEMBER SIEBER: Do you have loop seals on  
11 the discharge side?

12 MR. KOONTZ: Not on the PORVs. On the  
13 safety valves we used to have the loop seals on the  
14 safety valves but we drained the loop seals and put in  
15 the associated trim for the safety valves. We found  
16 that the slug loads from clearing the loop seals on  
17 the safety valves were just too high.

18 MEMBER SIEBER: You have to do a lot.

19 MR. KOONTZ: So even on Unit 1 a long time  
20 ago we learned that lesson and drained the loop seals  
21 out. And that's one of the things we're trying to  
22 show to the staff is that we didn't get water relief  
23 which would challenge either the PORVs or the  
24 safety's. The safety's in the EPRI valve test had a  
25 little harder time passing water. They tend to

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1 chatter and then gall and stick, and then you have a  
2 potential of moving to a more severe event like a  
3 small-break LOCA. So that was the goal of the  
4 analyses was to show that we wouldn't challenge the  
5 PORVs or the safety's.

6 One of the other analyses that the staff  
7 was interested in was the core response to the main  
8 steam line break. And the principle problem was a  
9 couple of things. They were a little bit concerned  
10 comparing Unit 2 to Unit 1 that we had a better return  
11 to power, in other words a lower value. They didn't  
12 understand that, compared to both Unit 1 and other  
13 plants that they had seen. So one of the things we  
14 did to --

15 MEMBER ABDEL-KHALIK: In terms of what,  
16 your NTC?

17 MR. KOONTZ: In terms of the peak heat  
18 flux, return to power.

19 MEMBER ABDEL-KHALIK: Because you have  
20 different core design?

21 MR. KOONTZ: Well, it wasn't so much  
22 different core designs as it was different  
23 conservatisms in the reactivity coefficients that we  
24 had used in the analyses. That was one thing. And we  
25 were able to deconstruct for them the results going

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1 from Unit 2 all the way back to Unit 1 showing as we  
2 changed each of the parameters back how it went from  
3 the Unit 2 results all the way back to the Unit 1  
4 results so they could see, you know, what the changes  
5 did and how those affected the results. And what we  
6 ended up doing was re-running the main steam line  
7 break core response using consistent reactivity  
8 parameters, in other words, same amounts of  
9 conservatisms in both analyses and the staff was able  
10 to see then that they had the right relationship  
11 between the loss of offsite power cases and the power  
12 available cases, and then also how that compared to  
13 Unit 1 including the shutdown margins that we had  
14 committed to on Unit 1 in the analysis versus the Unit  
15 2 analysis. So they became satisfied that the main  
16 steam line break indeed was responding as they thought  
17 it should. And a lot of it was due to this  
18 conservatism that was held up in some of the  
19 reactivity coefficients.

20 MEMBER ABDEL-KHALIK: What is your tech  
21 spec limit on the NTC at end of cycle?

22 MR. KOONTZ: Well, we're -- Tom? I think  
23 it's zero. We do not allow it to go positive.

24 MEMBER ABDEL-KHALIK: End of cycle.

25 MR. KOONTZ: Oh, the end of cycle.

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1 MEMBER ABDEL-KHALIK: Hopefully is a big  
2 negative number.

3 MR. KOONTZ: I don't know. Do you know  
4 the tech spec, Pat? You, Chris, or Tom?

5 MR. WALLACE: No, not off the top of my  
6 head I don't.

7 MR. KOONTZ: We can find that out if you  
8 want to know what it is.

9 MEMBER ABDEL-KHALIK: Okay.

10 MR. KOONTZ: Some additional analyses that  
11 we did. We did re-look at the inadvertent ECCS  
12 analysis. As I mentioned earlier we had looked at it  
13 on Unit 1 from the perspective of not challenging the  
14 safety valves. We were worried about the Crosby 6M6  
15 safety valves. Like I mentioned they did perform  
16 poorly in some of the EPRI tests as far as water  
17 relief. So what we did in our original safety  
18 analysis is we assumed the PORVs were blocked and then  
19 that would maximize the challenge to the safety. In  
20 other words, we didn't credit any relief through the  
21 PORVs. We made it look to see if it would challenge  
22 the safety's, relieve water through the safety's.

23 That's a good safety analysis. The staff  
24 didn't accept that though. They had issued a RIS  
25 2005-29 and the RIS was actually oriented towards if

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1 you did credit the PORVs then you need to show they're  
2 qualified and they can relieve water and whatnot to  
3 protect your safety's. Well, we hadn't done that but  
4 they asked the question what if the PORVs got  
5 challenged. Then how would you handle that? So we  
6 went back and we re-analyzed the event and were able  
7 to show that even if the PORVs were allowed to open  
8 that we didn't challenge the PORVs, that they would  
9 not pass water and that the peak reactor, or peak  
10 pressurizer level remained below the top of the  
11 pressurizer. So we got acceptable results. They  
12 would not challenge the PORVs or the safety's.  
13 Neither one would pass water.

14 MEMBER STETKAR: That's based on a timing  
15 analysis for operators?

16 MR. KOONTZ: It's based on timing, it's  
17 based on 10-minute operator action time and time for  
18 the operators to respond to the event. Any other  
19 questions on that?

20 CHAIR RAY: Said, did you want to make a  
21 more definite request with regard to the CVCS and  
22 other modes?

23 MEMBER ABDEL-KHALIK: I would like to see  
24 that.

25 CHAIR RAY: Okay.

1 MR. KOONTZ: Okay, so CVCS malfunction and  
2 shutdown events.

3 MEMBER ABDEL-KHALIK: Right.

4 MR. KOONTZ: Shutdown modes. Okay.

5 MEMBER STETKAR: Yes, I mean, you know, we  
6 worry primarily is going down when the system is still  
7 tight and the level is high. You know, and there are  
8 a couple of time windows in there that you're  
9 vulnerable to those types of malfunctions. You know,  
10 pressurizer.

11 MR. KOONTZ: Pressurizer, yes.

12 MEMBER STETKAR: Overfill --

13 MR. KOONTZ: Overfill in the pressurizer.

14 MEMBER STETKAR: -- malfunctions.

15 MR. KOONTZ: One of the other analyses the  
16 staff was interested in was boron precipitation. We  
17 have the same tech spec requirements for our boron  
18 that we have on Unit 1. Unit 1's are based  
19 principally on the fact that they have the tritium-  
20 producing burnable absorber rod so they have to  
21 maintain a higher boron concentration in the  
22 accumulators in the RWST to offset lithium that's lost  
23 during a large-break LOCA. To lower operator  
24 confusion we decided to keep the same tech specs for  
25 Unit 2 and what that does, it results in a time-to-

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1 hotleg recirc around three hours as what we use for  
2 both Unit 1 and Unit 2. So the staff wanted to  
3 reassure themselves that that was a conservative time.  
4 So we had performed calculations to show it was in the  
5 order of five hours is when you'd really need to go to  
6 hotleg recirc and we gave the staff enough data that  
7 they could independently do their own confirmatory  
8 analysis. And they may talk about that this  
9 afternoon. But they also came up with acceptable  
10 results so the three hours was considered a good time  
11 frame.

12 One of the open items that we have on the  
13 Chapter 15 transient analysis is the boron dilution  
14 and at the last meeting we indicated that we had just  
15 started looking at that. This was boron dilution in  
16 modes 3, 4 and 5. We had the analysis in the FSAR for  
17 modes 1, 2 and then the refueling shutdown mode 6. So  
18 we went back to do explicit analysis on modes 3, 4 and  
19 5, and one of the things we did first was that we went  
20 over to the simulator and ran some tests. Bob and I  
21 both went over there and observed some of the  
22 indications that came in that would alert the  
23 operators that they had a boron dilution going on in  
24 modes 3, 4 and 5. Then we went off and did the  
25 Westinghouse safety analysis because it's a more

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1 conservative model to see what kind of timing would  
2 result for operator action. And the goal in these  
3 studies is to show that the operators have at least 15  
4 minutes to respond from the time they get the alarm or  
5 indication that there's a dilution event going on  
6 until they can go out and secure the system so that it  
7 doesn't go re-critical.

8 That analysis is just now getting to  
9 completion. Chris McHugh has been working on that at  
10 Westinghouse. We haven't submitted the results to the  
11 NRC yet so this is preliminary information but we did  
12 get acceptable results in mode 3 that the time from  
13 alarm to re-criticality ranged from, depending on  
14 which case we were running 36 to 97 minutes. So there  
15 was quite a bit of time for the operators. In mode 4  
16 it ran from 36 to 58 and in mode 5 we had cases  
17 running from 22 to 29 minutes. Of course that's  
18 subject to staff review and they'll look at the  
19 conservatism we had in the models and see if they  
20 concur with us on those. And we'll probably submit  
21 those perhaps by the end of the year we can get it  
22 through checking and review.

23 And that's really the most controversial  
24 things I guess out of the staff reviews on Chapter 15.  
25 Most of the other analyses that they looked at were

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1 pretty similar to Unit 1 and although we had a lot of  
2 RAI questions on each event these were the ones that  
3 they concentrated on. That's the only thing I have.

4 MEMBER ABDEL-KHALIK: What is your peak  
5 pressure for the loss of feedwater ATWS?

6 MR. KOONTZ: Ryan do you know, or Chris?  
7 We can look it up. I don't remember what it is off  
8 the top of my head.

9 CHAIR RAY: Okay. Because Said you're not  
10 able -- we have two meetings running today and Said  
11 won't be with us this afternoon. Would you like us to  
12 try after the break to bring forward the staff  
13 discussion comparable to this Chapter 15 discussion  
14 we've had here?

15 MEMBER ABDEL-KHALIK: That would be good.

16 CHAIR RAY: Pat, can you do that?

17 MR. MILANO: Yes, our transient analysis  
18 reviewer, we've called him and he should be on his way  
19 over here now.

20 CHAIR RAY: All right, because we're  
21 supposed to hear from the region but because of Said's  
22 having to attend two meetings today I think it would  
23 be helpful to the subcommittee if we could have the  
24 staff do their review comparable to what Frank has  
25 done after the break. Okay? Anything else?

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1                   MEMBER ABDEL-KHALIK:  If that's okay with  
2                   the person from the region.  He may have travel  
3                   scheduled.

4                   CHAIR RAY:  Well, yes, I was hoping that  
5                   I could assume that but I shouldn't.  Thank you.  All  
6                   right.  So we'll try and do that.  But before we  
7                   adjourn for the break let's see if there's any other  
8                   questions for TVA.

9                   MR. ARENT:  We do have one follow-up item.  
10                  This is Gordon Arent.  To your earlier question  
11                  regarding the tech spec limit for in-leakage it's P1  
12                  CFM 51, 51 CFM.  And that is tested on an 18-month  
13                  period.

14                  MEMBER ABDEL-KHALIK:  No, the question  
15                  really is whether, given all the work that you're  
16                  doing in the control room, whether that testing  
17                  frequency is still okay.

18                  MR. ARENT:  And we'll confirm that.  But  
19                  again, it is looked at each time we perform a  
20                  penetration into that boundary so.

21                  MEMBER ABDEL-KHALIK:  Right.  It is a very  
22                  small number.

23                  MR. ARENT:  Yes, it is.

24                  CHAIR RAY:  Yes, I think the issue would  
25                  be has experience shown that it's unlikely that you're

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1 violating that unaware during the work that's ongoing.  
2 Okay. If there's nothing else we will take a break  
3 until 20 minutes to 11, 20 minutes to 11. And then  
4 hopefully we can shuffle the agenda here so that the  
5 item 11 on the list here which is the transient  
6 analysis --

7 MEMBER ABDEL-KHALIK: He's here.

8 CHAIR RAY: Okay, good. Then we will  
9 resume with the staff will come forward with that  
10 discussion. And then we'll pick up with the agenda  
11 with the region before lunch. We are in recess.

12 (Whereupon, the above-entitled matter went  
13 off the record at 10:20 a.m. and resumed at 10:41  
14 a.m.)

15 CHAIR RAY: Back on the record. And  
16 before the staff makes the presentation that we asked  
17 for before the break TVA has asked to respond to some  
18 questions that were left open.

19 MR. KOONTZ: Yes, this is Frank Koontz  
20 again. We were able to determine some of the  
21 responses for your questions that we had this morning  
22 during the break. One of the questions surrounded the  
23 met tower and its backup capabilities. And what we  
24 determined there is that the system is configured with  
25 a 30-minute uninterruptible power source and then

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1 there's a propane-driven 30 kilowatt generator as a  
2 backup to that. So that was the met tower.

3 There was a question on the end of cycle  
4 moderator temperature coefficient. And it's not in  
5 our technical specification but it's in our core  
6 operating limits report, and it's listed as -4.5 times  
7  $10^{-4}$  and that's delta-k/k degrees Fahrenheit.

8 And then there was a second question  
9 similar to that on the ATWS event. And what we do  
10 there is we follow the generic methodology in WCAP-  
11 8330. And for the loss of normal feedwater event  
12 which is the one you mentioned the peak pressure is  
13 2725 psia and for the loss of load turbine trip event  
14 it's 2780 psia. And we still have the outstanding  
15 question on this in modes 3, 4 and 5.

16 MEMBER ABDEL-KHALIK: Thank you.

17 MR. KOONTZ: That's all I have.

18 CHAIR RAY: All right, thank you. Now to  
19 the staff.

20 MR. MILANO: I'll just do a quick  
21 introduction. The lead reviewer for the accident  
22 transient analysis from the Reactor Systems Branch was  
23 Samuel Miranda and Mr. Miranda will be presenting the  
24 results of his, or the findings he obtained during the  
25 course of his review of Chapter 15.

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1 MR. POOLE: I think, you know, Pat opened  
2 it up. Frankly, as part of the request we're jumping  
3 ahead to Sam's portion of the review which was Chapter  
4 15, Transient Accident Analysis.

5 MR. MIRANDA: Good morning. My name is  
6 Sam Miranda. We met yesterday. I ended up, the  
7 Reactor Systems Branch part of the review of the Watts  
8 Bar license application. And I'll give you a summary  
9 of what the major issues were during this review.  
10 I'll follow that structure there, review procedures,  
11 results. We selected a few aspects of the review that  
12 presented some challenges to the staff and finally the  
13 conclusions.

14 We were instructed in this review to refer  
15 to the Watts Bar Unit 1 analyses. They had been  
16 reviewed and approved and basically we were asked to  
17 look for any differences that might have occurred  
18 between the time at Watts Bar Unit 1 and Unit 2. But  
19 as we got into the review we found that it was more  
20 complicated than that and things had come up in that  
21 intervening time period. And some of our findings it  
22 turned out would also apply to Unit 1. And we'll see  
23 that later on.

24 The analytic methods that were used were  
25 approved methods for both Units 1 and 2. And we also,

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1 during our review we tried to keep a perspective on  
2 this plant. Since it is such a dated design we wanted  
3 to compare it to other plants of a similar design and  
4 power level. This did result in several rounds of  
5 RAIs and I have to admit some of the responses we got  
6 did not really answer our question so we had to do  
7 several rounds of RAIs and we had to do two audits.  
8 The first audit, there were many questions that  
9 remained. We had to settle them finally in June in  
10 the second audit, two-day audit.

11 We have the benefit of a Safety Evaluation  
12 Report. We had 22 supplements of the Safety  
13 Evaluation Report to look at, and it provided a long  
14 history of analyses and reviews dating back to '84 I  
15 think, or actually earlier than that. And we found  
16 that the results we have received from Watts Bar Unit  
17 2 were acceptable with sufficient margin. They met  
18 the acceptance criteria that applied.

19 We did single out five accident analyses  
20 that we had some issues with and we'll go through  
21 these individually. The first was the overpressure  
22 protection analysis. In that case the Standard Review  
23 Plan specifies that the reactor trip that is credited  
24 in the analysis should be the second safety-grade  
25 trip. And the analysis that we received with the

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1 application credited the first reactor trip. The  
2 second issue with the CVCS malfunction event, it  
3 simply wasn't in the licensing basis. It wasn't in  
4 the FSAR and I pointed out to TVA that this should  
5 have been submitted way back when Watts Bar Unit 1  
6 safety analyses were submitted. It was specified in  
7 the Reg Guide 1.70, the standard format for --  
8 standard format and content for the safety analyses  
9 reports. It's listed as one of two mass emission  
10 events in Table 15-1. And eventually we received that  
11 analysis. We had an issue with the inadvertent ECCS  
12 actuation of power and that's a long story which we'll  
13 get into in further slides.

14 We asked for a boron dilution analysis in  
15 modes 3, 4 and 5. TVA had submitted analyses in modes  
16 1, 2 and 6. And the steam line break had a number of  
17 issues that we'll describe later.

18 So as I said we were looking for an  
19 analysis in which the second reactor trip signal was  
20 credited. We didn't get that. We got a copy of the  
21 overpressure report, certified overpressure report and  
22 in that report it said that the first reactor trip  
23 signal was credited. TVA was trying to argue that the  
24 first reactor trip signal was the trip signal that is  
25 received from the turbine hall and that was not

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1 accepted by the staff. The trip coming from the  
2 turbine hall is not considered qualified since it's  
3 coming from a non-seismically qualified source. So  
4 we're looking for the second reactor trip signal from  
5 the reactor protection system. Usually the first  
6 signal is the high-pressure followed by an over-  
7 temperature delta t. When that signal occurs we  
8 assume the reactor is tripped and the peak reactor  
9 coolant system pressure that is attained during the  
10 analysis which is a loss of load analysis is the  
11 limiting pressurization transient. And that is  
12 verified to be less than 110 percent of reactor  
13 coolant system design pressure. In TVA's case it went  
14 up from something like 2694 psi in the previous  
15 analysis to the 2714 psi, still below the 110 percent  
16 of design pressure which is something like 2750 psi.

17 As I said before the CVCS malfunction is  
18 missing. We asked for it. TVA had argued that this  
19 event was bounded by the inadvertent SI actuation  
20 event and our response, the staff's response was yes,  
21 the flow rate is lower for this case. It's usually  
22 less severe than the inadvertent SI actuation event  
23 but it's a different transient, different things  
24 happen and it's not exactly an apples to apples  
25 comparison that we would have to see an analysis. And

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1 the analysis results indicated that there was adequate  
2 time for manual mitigation. It was 10 minutes or more  
3 available for shutting off the charging flow, and it  
4 was bounded by the SI actuation event although it's  
5 not necessarily true that the inadvertent SI actuation  
6 event would always bound this case.

7 MEMBER STETKAR: Sam, a couple of  
8 questions on that to look at. Is there a requirement  
9 for the applicant to perform a feasibility analysis  
10 for that nominal 10-minute time window or is it just  
11 presumed that people are always 100.00000 percent  
12 successful because they have nominally 10.0000 minutes  
13 to mitigate this event regardless of its cost? For  
14 example, if local operator actions are required out of  
15 the plant to turn the pumps off. So, the basic  
16 question is is there a requirement to perform what,  
17 you know, we typically call a feasibility assessment  
18 that indeed those actions can be performed within 10  
19 minutes.

20 MR. MIRANDA: We have been, we have been  
21 presuming that 10 minutes is sufficient time for  
22 operator action. And the practice has been that if 10  
23 minutes is shown by analysis to be available then we  
24 accept that. If it's less than that then we ask for  
25 a verification through simulator exercises.

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1 MEMBER STETKAR: So 9.9999 minutes you  
2 need an analysis, 10.0001 minutes the operators are  
3 guaranteed success?

4 MR. MIRANDA: That's what it amounts to,  
5 yes.

6 MEMBER STETKAR: Okay.

7 MR. MIRANDA: Yes.

8 MEMBER STETKAR: You weren't here when we  
9 were discussing the CVCS malfunction event with TVA.  
10 The question arose about possible CVCS malfunctions  
11 during modes other than power operation 3, 4, 5, 6.  
12 The 10-minute time window here I assume was for a CVCS  
13 malfunction that is initiated at normal pressurizer  
14 level. There are conditions when a plant is shutting  
15 down, in particular degassing operations where they  
16 actively fill the pressurizer almost water solid. The  
17 CVCS malfunction that occurs during those conditions  
18 gives the operators, oh, essentially zero time before  
19 you actually challenge whatever relief capacity you  
20 have, depending on how they actually do the degassing  
21 operations. Have you looked at all, asked TVA about  
22 those types of malfunction events? Because, you know,  
23 arguments are that, well, decay heat is much lower.  
24 It's actually not when you're coming down because they  
25 typically do the degassing within the first couple of

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1 days of the outage. So decay heat levels still can  
2 be, you know, not as high as immediate post-scrum but  
3 still interesting. Have you asked TVA about those  
4 other malfunctions during non-power conditions?

5 MR. MIRANDA: Well, the Reg Guide 1.70  
6 specifies that the limiting case should be presented  
7 in its safety analysis report, and the limiting case  
8 usually is at full power. In this case --

9 MEMBER STETKAR: Excuse me. The limiting  
10 case is usually at full power because nobody's ever  
11 thought of non-power conditions. That's why the  
12 limiting case in the regulations is at full power  
13 because nobody's ever thought of non-power conditions.

14 MR. MIRANDA: We've thought about it.

15 MEMBER STETKAR: Okay. That's what I'm  
16 challenging.

17 MR. MIRANDA: We thought, for example, one  
18 of the questions we asked was we wanted analyses of  
19 the boron dilution in modes 3, 4 and 5. Those studies  
20 had been done in the past looking at different  
21 accident analyses in the lower modes and the  
22 determination had been made that there's less margin  
23 available at full power.

24 MEMBER STETKAR: Absolutely.

25 MR. MIRANDA: In this case for the CVCS

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1 malfunction we didn't ask for analyses in lower modes.  
2 Part of that is covered by LTOP and that's considered  
3 elsewhere in the FSAR.

4 MEMBER STETKAR: The only question though  
5 is if there -- you said LTOP but if the valves aren't  
6 qualified for water relief or if there's a reasonable  
7 chance that they might stick open you now have an  
8 inventory control problem. So.

9 MR. MIRANDA: Yes.

10 MEMBER STETKAR: You know, LTOP is good,  
11 they'll probably open the valves pretty quickly if  
12 it's in service under those conditions and it probably  
13 is, but that still doesn't solve the water relief  
14 problem through the valves.

15 MR. MIRANDA: Well, you can reasonably  
16 argue that the valves are qualified for water relief  
17 based on the fact that that you are at reduced  
18 temperature, that you're passing subcooled water  
19 through those valves. Okay. Because the valve tests,  
20 the valve tests are conducted for various transients  
21 and for various water conditions up to saturation.  
22 And I think the results show that when you, as you go  
23 away from saturation that the valves are --

24 MEMBER STETKAR: Is this for PORVs?

25 MR. MIRANDA: Yes.

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1                   MEMBER STETKAR: I'm not talking about the  
2 safety.

3                   MR. MIRANDA: Right, the PORVs. Right.  
4 Right. And there are some PORVs that, the ones I can  
5 think of offhand are target rock valves that are  
6 qualified for water relief under any condition based  
7 on the test results. So it depends on the plant and  
8 the conditions and part, some of those lower modes  
9 which fall into the LTOP region where you have  
10 analyses of relief through those valves, through the  
11 PORVs either due to mass addition from the charging  
12 system or due to a heat addition of some kind.

13                  MEMBER STETKAR: Yes, most of them I've  
14 seen look at the heat addition part of it, or mass  
15 addition, you know, making the argument about the time  
16 available for somebody to stop the mass addition. But  
17 there are admittedly short, but there are time windows  
18 where that available time for operator intervention  
19 can be pretty short where you do -- the only thing you  
20 have mitigating an overpressure transient is basically  
21 LTOPs. And then qualification valves then comes into  
22 question.

23                  MR. MIRANDA: Right, and those valves for  
24 LTOP are set to a much lower pressure. And also, when  
25 you're in the lower mode you also consider what

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1 systems are operating and available. So for example,  
2 if you're, say if you're in mode 3 or even mode 4 you  
3 wouldn't have the, wouldn't necessarily have  
4 pressurizer level control in the sense that, you know,  
5 you wouldn't have a failure there so what would be  
6 your postulated failure would have to be an operator  
7 error.

8 MEMBER STETKAR: Operator error or some  
9 sort of electronic or control system malfunction.

10 MR. MIRANDA: Yes, and a lot of those  
11 control systems would not be operational. There's no  
12 automatic control there, it's just, you know, whatever  
13 the operators are doing. And you can reasonably argue  
14 that, you know, an operator making an error would  
15 realize it rather quickly and correct it. You know,  
16 having his hand on the switch and he says oh, I  
17 shouldn't have turned that switch. I'll turn it back  
18 again.

19 MEMBER ABDEL-KHALIK: Wouldn't that be the  
20 case with the boron dilution transient during these  
21 modes that you ask them to do?

22 MR. MIRANDA: Yes. The boron dilution is  
23 a plant operation and you start the boron dilution, so  
24 many gallons in so many minutes and so on. And that,  
25 the boron dilution is, I believe is usually an

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1 operator error. Yes.

2 MEMBER ABDEL-KHALIK: But there your  
3 criterion is to give them 15 minutes.

4 MR. MIRANDA: Yes, it's 15 minutes in  
5 modes 1 through 5 and 30 minutes in mode 6. Yes.

6 MEMBER ABDEL-KHALIK: What I'm trying to  
7 say is that your logic is inconsistent.

8 MR. MIRANDA: It is. I didn't make it, I  
9 just followed -- these are the safety analysis  
10 conventions that have been adopted over the past 40  
11 years. It's 15 minutes for operator action in boron  
12 dilution, it's 30 minutes for operator action in most  
13 events and for the mass addition events it's come to  
14 pass that 10 minutes is accepted. Anything less than  
15 10 minutes we demand simulator exercises. I can't  
16 support it any further than that.

17 CHAIR RAY: Well, we appreciate the candid  
18 summary anyway. Thank you.

19 MR. MIRANDA: The inadvertent ECCS  
20 actuation. The analysis we received -- well, let me  
21 back up a little bit on this. The inadvertent ECCS  
22 actuation is an event that is classified as a  
23 condition 2 event. It's an anticipated operational  
24 occurrence. It happens, it has happened. It's  
25 happened at Millstone 3, it's happened at Salem. The

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1 pressurizer does fill and the PORVs open. So far a  
2 PORV has not failed to open although some PORVs when  
3 they receded were leaking.

4 The analysis we received from TVA  
5 consisted of an inadvertent ECCS actuation, the  
6 maximum safeguards flow, but the PORVs were not  
7 assumed to be operational. And the logic there was  
8 without the PORVs they did an analysis showing that  
9 the maximum pressurizer pressure achieved during this  
10 event did not reach the safety valve opening setpoint.  
11 And they said well, we've demonstrated that we won't  
12 open the safety valve. It's important not to open the  
13 safety valve because the safety valve once opened and  
14 failed open is not isolatable. The PORVs we don't  
15 need to worry about because the operator can always  
16 close a block valve. That was their logic and --

17 MEMBER ABDEL-KHALIK: What is the shutoff  
18 head of these pumps?

19 MR. MIRANDA: The shutoff head is usually,  
20 it's very close to the opening setpoint of the.

21 MEMBER ABDEL-KHALIK: Let me just try to  
22 ask a specific question. What is the shutoff head of  
23 these pumps and what is the flow rate that you would  
24 get at the normal operating pressure?

25 MR. MIRANDA: I don't know offhand what

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1 the flow rate is. The shutoff head of the charging  
2 pumps is usually around 2,600 psi. The opening  
3 setpoint of the safety valves is 2,500 psi.

4 MEMBER ABDEL-KHALIK: I understand all  
5 that, I'm just trying to get a feel for what is the  
6 flow rate when these pumps are actually actuated at  
7 normal operating pressure.

8 MR. MIRANDA: We've got that information.  
9 Let me see if I have it. I don't have the currents  
10 with me but that information is available. We can go  
11 back and get that information.

12 MEMBER ABDEL-KHALIK: Thank you.

13 MR. MIRANDA: In fact, it's a question  
14 that we sometimes ask, you know, give us the flow  
15 delivery curve. We have received that.

16 MEMBER ABDEL-KHALIK: So just continue.

17 MR. MIRANDA: Okay. So the results of the  
18 analysis showed that the peak pressure that was  
19 achieved was just under the opening of the pressurizer  
20 safety valve setpoint, just below that. And we said  
21 well, there you are. If we have such an event we're  
22 not going to open the safety valve. Therefore, we're  
23 okay.

24 MEMBER ABDEL-KHALIK: Now, let me ask you  
25 a question. If the shutoff head of these pumps is

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1 above the setpoint of the safety valves what  
2 terminates the transient?

3 MR. MIRANDA: The transient is not  
4 terminated.

5 MEMBER ABDEL-KHALIK: What limits the peak  
6 pressure?

7 MR. MIRANDA: The peak pressure is  
8 basically the run-out of the shutoff head of the  
9 charging pumps and what you have here is --

10 MEMBER ABDEL-KHALIK: You just said that  
11 the shutoff --

12 MR. MIRANDA: I know.

13 MEMBER ABDEL-KHALIK: -- head is higher  
14 than the --

15 MR. MIRANDA: Right, I said that. What we  
16 have here is we have a pressurizer that's so many feet  
17 high, the safety valve is on top of the pressurizer  
18 and the pressure, there's an elevation head involved  
19 here. You have flow coming in from the charging  
20 pumps. It's going to be a very small flow at the  
21 shutoff head, 2,600 psi or something below 2,600. And  
22 as it goes through the reactor coolant system there  
23 are pressure drops along the piping and then there is  
24 the elevation head to get from the search line up to  
25 the top of the pressurizer where the safety valves are

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1 located. And that elevation head, the difference in  
2 the pressurizer pressure compared to the reactor  
3 coolant system hotleg pressure is usually something  
4 like 80 psi.

5 MEMBER ABDEL-KHALIK: Are the reactor  
6 coolant pumps assumed to be tripped during this event?

7 MR. MIRANDA: No. No, they're not.  
8 Nothing happens during this event. It relies on  
9 operator action. The operator has to recognize what's  
10 going on and following procedures of what -- let me  
11 revise that. The reactor is tripped at time zero  
12 because the safety injection signal also trips the  
13 reactor.

14 MEMBER ABDEL-KHALIK: Right.

15 MR. MIRANDA: And then the operator, then  
16 nothing else happens. The operator has to follow  
17 emergency operating procedures to diagnose what's  
18 happened here and determine that the proper course of  
19 action is to shut off the safety injection. And he  
20 has basically 10 minutes to do that.

21 MEMBER ABDEL-KHALIK: So the peak pressure  
22 that's -- maybe if the licensee can answer this that  
23 would be very helpful. The peak pressure is limited  
24 to a value below the setpoint of the safety's even  
25 though the shutoff head of the pumps is greater than

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1 the setpoint of the safety's because of what?

2 MR. MACDONALD: This is Alan Macdonald  
3 from Westinghouse Transient Analysis. During that  
4 time period the operator -- credit is taken for  
5 operator action to terminate the SI. Usually what  
6 happens is that you terminate SI prior to the  
7 pressurizer going water solid. However, post you have  
8 a swell of decay heat which causes the pressurizer to  
9 go water solid and that time is just a race to move to  
10 decay heat fast enough to make it so that you offset  
11 that swell.

12 MEMBER ABDEL-KHALIK: But the event is  
13 terminated by operator action.

14 MR. MACDONALD: Yes.

15 MEMBER ABDEL-KHALIK: Thank you.

16 MR. MIRANDA: As I said, this analysis was  
17 not accepted by the staff and the reason is that  
18 unless a plant is operating with block valves closed  
19 you wouldn't have a situation like this. And you will  
20 open the PORVS, and there will be water passing  
21 through the PORVs. And what we were looking for was  
22 some assurance that these PORVs if they open under  
23 water relief they'll recede. We don't have that, we  
24 don't know that unless they're qualified for water  
25 relief. And in most plants they're not. In TVA's

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1 case they're not. So we asked for a new analysis.

2 MEMBER STETKAR: I'm sorry, you said in  
3 TVA's case they're not qualified for water relief?

4 MR. MIRANDA: Right. There are only six  
5 plants that have qualified PORVs. Watts Bar is not  
6 one of them.

7 MEMBER STETKAR: So during LTOPs if they  
8 have water relief they're not qualified?

9 MR. MIRANDA: Well, during LTOPs as I said  
10 it's a different set of conditions. It's lower  
11 pressure, lower temperatures.

12 MEMBER STETKAR: Not lower pressure.

13 MR. KOONTZ: Maybe I can help on that.  
14 Frank Koontz. When I mentioned earlier that the PORVs  
15 were not qualified that's for full pressure power type  
16 operation conditions. We do credit PORVs. We  
17 submitted information to the staff showing that they  
18 will work under LTOP conditions which is much lower  
19 temperatures and pressures.

20 MR. MIRANDA: So, we were getting analyses  
21 like this, along these lines where the safety valves  
22 are demonstrated not to open and the PORVs are, the  
23 PORVs are set aside as being valves that could be  
24 isolated. And we found that to be unacceptable and  
25 the reason was that if in the event that the PORV

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1 should open under water relief and should stick open  
2 that by itself constitutes a small-break LOCA at the  
3 top of the pressurizer and that violates the  
4 acceptance criteria that prohibits a condition 2 event  
5 from developing into a condition 3 event. So if the  
6 operator is closing a block valve he's not mitigating  
7 an inadvertent SI actuation, a condition 2 event, he's  
8 mitigating a small-break LOCA, a condition 3 event  
9 which is evidence that the criterion has been  
10 violated.

11 So we wrote a RIS on that in 2005  
12 basically saying don't send us analyses like this  
13 anymore. Show us that you meet the condition 2  
14 acceptance criteria. And that was in 2005 and TVA  
15 submitted an analysis like this in 2008. So we went  
16 back to them and asked them for a new analysis. And  
17 after several rounds of RAIs we did get the new  
18 analysis and the results showed that there was at  
19 least 10 minutes available for operator action. So  
20 they were acceptable.

21 Boron dilution. We got analyses only in  
22 modes 1, 2 and 6. We were looking for analyses in all  
23 modes. And TVA at first tried to tell us about  
24 Generic Letter 85-05. It's a letter written by the  
25 staff in 1985 which basically said don't worry about

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1 analyses in modes 3, 4 and 5. We don't consider it a  
2 safety risk in the sense that we don't want to be  
3 backfitting anyone. If you don't have analyses in  
4 modes 3, 4 and 5 you don't need to submit them because  
5 we don't think it's worth it. And that was addressed  
6 to operating plants. Except Watts Bar units were not  
7 operating in 1985 so we asked them to do the analyses  
8 and we haven't gotten them yet. This is an open  
9 issue.

10 But the two things we're looking for in  
11 all modes, especially in modes 3, 4 and 5 which are  
12 the shutdown modes, we want to see that the operator  
13 has sufficient time to terminate the dilution, 15  
14 minutes, and that 15-minute time span has to begin  
15 from some indication, some reliable indication to the  
16 operator that there is a boron dilution going on. And  
17 the Westinghouse methodology that we received from  
18 Watts Bar was a set of analyses in modes 1, 2 and 6  
19 where this time span, this time period 15 minutes  
20 began at the initiation of the event, not at the time  
21 of a reliable indication.

22 MEMBER ABDEL-KHALIK: Wouldn't the  
23 assumption that the 15-minute period begins at the  
24 initiation of the event be more conservative?

25 MR. MIRANDA: The time -- let me see. No,

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1 because if you don't get an indication that would  
2 alert the operator that something is going on that  
3 boron dilution could continue until you reach  
4 criticality. And that could be anytime. If the  
5 operator doesn't know that he needs to do something he  
6 could reach criticality. The operator would never  
7 know it until it's too late.

8 MR. MILANO: Is your question, you know,  
9 the difference between the start time of initiation  
10 and start time of initiation based on the alarm? And  
11 I think what Sam, what the difference is is that -- is  
12 the way the staff is reviewing it it takes into  
13 account that there has been a certain period of time  
14 of dilution that's already occurred prior to the  
15 alarm, and then the operator has 10 minutes more, you  
16 know, where dilution could still be taking place until  
17 he terminates it. So you've got a longer time period  
18 where dilution is occurring if you -- and by the way  
19 the staff is reviewing it.

20 MR. MIRANDA: I think, in other words when  
21 the operator finally realizes there is a boron  
22 dilution going on there may be no time left, or very  
23 little time left.

24 MEMBER STETKAR: Depending on where the  
25 alarm is set.

1 MR. MIRANDA: Yes.

2 MEMBER ABDEL-KHALIK: And your assumption  
3 is that it will take the operator a minimum of 15  
4 minutes to do it because that would be the only way to  
5 logically say that, assuming that time counting starts  
6 from the point of detection is the more conservative  
7 is if this 15 minutes is an assumption that this is  
8 the minimum time it would take the operator to do the  
9 job.

10 MR. MIRANDA: That's the way it works out,  
11 yes. That's the -- you call it an assumption, it's a  
12 ground rule. It's 15 minutes we have to have, yes.  
13 Right.

14 MEMBER ABDEL-KHALIK: It is an assumption.

15 MR. MIRANDA: Yes.

16 MEMBER ABDEL-KHALIK: Okay, thank you.

17 MR. MIRANDA: The steam line break. We  
18 had a lot of discussions concerning this.

19 MEMBER SKILLMAN: Would you please discuss  
20 what "too good" means in that context, please?

21 MR. MIRANDA: Yes, yes, I will do that.  
22 Steam line break is a condition 4 event and it's  
23 analyzed with and without offsite power. And the  
24 results in almost all cases for all plants,  
25 Westinghouse plants, is that the case with offsite

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1 power will lead to a return to criticality. This is  
2 a steam line break occurring on hot zero power. The  
3 core returns to critical and generates power. And the  
4 power, the peak power level in a case with offsite  
5 power is always, always higher than the case without  
6 offsite power. And the reason is that without offsite  
7 power the reactor coolant pumps are tripped. The  
8 reactor coolant system flow is lower and therefore the  
9 primary to secondary side heat transfer rate is lower.  
10 So the cooldown that is initiated from the secondary  
11 side due to the steam break has less of an effect  
12 because the primary system flow rate is lower so that  
13 in the case without offsite power the return to  
14 critical and the power generation that results would  
15 go to a lower level. So for example, a 4-loop plant  
16 of the Watts Bar design might return to critical and  
17 produce, say, I don't know, 15 or 18 percent power  
18 with offsite power and only about 5 percent without  
19 offsite power.

20 The TVA results were reversed. The case  
21 without offsite power produced a higher power level,  
22 and that was not very high, it was only about 3 to 5  
23 percent power. The case with offsite power produced  
24 a much lower power levels, less than 2 percent, so I  
25 questioned that. And the response was that, the case

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1 without offsite power, because the heat transfer rate  
2 was not as high it caused a less severe  
3 depressurization in the reactor coolant system, and  
4 this depressurization did not extend to the  
5 accumulator setpoint. So there was no benefit of  
6 boron coming from the accumulators. Therefore, the  
7 core reached a higher power level. The case with  
8 offsite power produced a great depressurization. It  
9 caused the accumulators to inject so the core got more  
10 boron in that case.

11 So the natural question after that was  
12 well, show me a smaller steam line break case with  
13 offsite power, one that is too small to depressurize  
14 the reactor coolant system to the accumulator  
15 injection setpoint. I want to see a case without  
16 offsite power and without the accumulator boron. And  
17 the answer received was that all sizes will produce  
18 accumulator -- with power will produce accumulator  
19 injection which I couldn't believe. And Westinghouse  
20 provided some analyses.

21 MEMBER ABDEL-KHALIK: Excuse me. All  
22 sizes including inadvertent openings of secondary side  
23 valve?

24 MR. MIRANDA: All sizes. Even zero. Even  
25 zero, yes. So after several rounds of questions the

1 answer it turned out was that they were always getting  
2 accumulator injection for the with-power cases because  
3 of the auxiliary feedwater assumptions they were  
4 using. They were using very, very conservative flow  
5 rates for auxiliary feedwater, very high rates of  
6 auxiliary feedwater addition so they were cooling down  
7 the plant just with auxiliary feedwater. So a zero  
8 break size would cause accumulator injection.

9 MEMBER STETKAR: Does that mean every  
10 plant trip causes accumulator injection?

11 MR. MIRANDA: Well, according to those  
12 assumptions, yes. Yes, they were flooding the steam  
13 generators with aux feed.

14 MEMBER STETKAR: A lot of cold feedwater.

15 MR. MIRANDA: Yes, yes. So, we got a new  
16 analysis --

17 MEMBER ABDEL-KHALIK: But if that's the  
18 case it wouldn't make any difference whether the  
19 power, you have offsite power or you don't.

20 MR. MIRANDA: Well, you have the  
21 offsetting effect of the degraded heat transfer due to  
22 the lower flow. So you could have more heat being  
23 extracted from the secondary side but how that feeds  
24 back to the core under reduced flow conditions, it's  
25 not obvious. It just, there is -- you're increasing

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1 the secondary side heat extraction, but how it  
2 translates to the core temperatures is not, there's  
3 not as much of a direct link due to the reduced RCS  
4 flow.

5 So that was one question I had. Another  
6 question was they analyzed one state point. The  
7 procedure for steam line break is to select state  
8 points from the transient and feed them through to a  
9 detailed core model, thermal hydraulic model to  
10 evaluate the DNB ratio. So they would take the power,  
11 temperature, pressure, boron concentration and so on  
12 at any given point and they would do a transfer of  
13 state points. And this is basically hundreds of state  
14 points but they select one, the one they think is  
15 going to be the most severe and they take that, they  
16 carry that through to a natural DNBR calculation. And  
17 that DNBR calculation should result in a DNBR that's  
18 greater than the limit which would be 1.3.

19 MEMBER ABDEL-KHALIK: So your primary  
20 concern was DNB?

21 MR. MIRANDA: DNB, yes. The steam line  
22 break, it's a condition 4 event but it meets the  
23 Westinghouse plants, it meets condition 2 criteria.

24 MEMBER ABDEL-KHALIK: So what was the peak  
25 containment pressure for this ice condenser

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1 containment during a steam line break?

2 MR. MIRANDA: That's a different analysis.  
3 That is done at full power and it's designed to  
4 produce high temperature. It's a containment pressure  
5 response analysis where you try to dump as much steam  
6 into containment as possible. In this case you're  
7 trying to maximize the cooldown.

8 MEMBER ABDEL-KHALIK: What is the steam  
9 generator pressure at hot zero power?

10 MR. MIRANDA: At hot zero power the steam  
11 generator pressure is at its highest.

12 MEMBER ABDEL-KHALIK: Correct.

13 MR. MIRANDA: And it's about 1,100 psi.

14 MEMBER ABDEL-KHALIK: Correct. So if I  
15 had a steam line break inside containment at hot zero  
16 power at end of cycle wouldn't that produce the  
17 highest containment pressure?

18 MR. MIRANDA: No because if you have, you  
19 have the high pressure and you have the contents of  
20 the steam generator which are also pretty high. But  
21 if you do a case at full power you're generating power  
22 so that the steam --

23 MEMBER ABDEL-KHALIK: The reactor trips  
24 very, very quickly. The reactor trips very quickly in  
25 that --

1                   MEMBER SIEBER: But you've got the decay  
2 heat level circuit.

3                   MR. MIRANDA: Yes, you have decay heat.  
4 In the hot zero power case you assume there's no decay  
5 heat because you want to maximize the cooldown. So  
6 basically what you're doing for the containment  
7 pressure response case, you have the plant initially  
8 at full load, it trips, then you have the full decay  
9 heat that you need to remove and you're generating  
10 steam with that decay heat. And --

11                  MEMBER ABDEL-KHALIK: So let me just ask  
12 the licensee the question. What is the peak  
13 containment pressure during a steam line break?  
14 Whether it is at full power or at hot zero power and  
15 in this case it would have to be end of cycle so that  
16 you can have the highest NTC and the highest decay  
17 heat.

18                  MR. KOONTZ: This is Frank Koontz again.  
19 We'd have to check on the peak containment pressure.  
20 What I can say is that for the containment design what  
21 we worried about for pressure is the large-break LOCA  
22 because that's the one that generates the most mass  
23 energy release to the containment, generates the peak  
24 pressure.

25                  MEMBER ABDEL-KHALIK: I understand, but

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1 sometimes they are comparable.

2 MR. KOONTZ: Right. For the steam line  
3 break it turns out that what that generates is the  
4 highest temperatures in containment. They're much  
5 higher temperatures than for the large-break LOCA and  
6 they peak around 325 degrees to 327 degrees  
7 Fahrenheit. And for the steam line break although you  
8 get a lot of steam out there's not a lot of mass  
9 associated with that compared to the LOCA where you've  
10 generated all the primary side leak into containment.  
11 The ice does not fully melt out in a steam line break  
12 as it does in a large-break LOCA. So from the  
13 perspective of the containment design we don't melt as  
14 much ice for the steam line break but we do generate  
15 higher temperatures in the lower compartment. And for  
16 the LOCA we melt all the ice but we don't generate  
17 quite as high of temperatures in the lower  
18 compartment. And what Sam's concerned about is the  
19 event he was looking at is the quarter response, the  
20 return to power and all those effects that you get  
21 from over-cooling the water from the steam line break.

22 MEMBER ABDEL-KHALIK: Right.

23 MR. KOONTZ: We can look it up. I mean,  
24 I don't remember exactly what the --

25 MR. BRYAN: This is Bob Bryan. In the

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1 design your first pressure peak, whether it's a steam  
2 line break or a LOCA is pretty much caused by the  
3 shoving all of the air from the lower compartment into  
4 the upper compartment. And that gives you about a  
5 psi. And so that's just basically a gas law equation.  
6 So even for moderately small steam line breaks you  
7 will essentially blow all of the air out of the lower  
8 compartment. So basically for all of these breaks  
9 except for very, very small ones you're going to see  
10 pressures in or about the 8 psi range. And as Frank  
11 said, since you've got total energy release is so much  
12 lower in a steam line break compared to LOCA you never  
13 melt the ice so that represents the peak pressure.

14 MEMBER ABDEL-KHALIK: Could you please  
15 give us definitive numbers to the peak containment  
16 pressure during the event?

17 MR. BRYAN: To contrast that the peak  
18 pressure for LOCA is around 12.5.

19 MEMBER ABDEL-KHALIK: Okay, thank you.  
20 Thanks. Now, are these calculations done at the  
21 moderator temperature coefficient that they give for  
22 a tech spec limit of, I guess I translate your units  
23 to -45 PCM per degree?

24 MR. MIRANDA: The core response steam  
25 break analyses which we were reviewing are conducted

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1 at hot zero power, end of life conditions with the  
2 most negative NTC. And that's in order to generate  
3 the greatest reactivity excursion.

4 MEMBER ABDEL-KHALIK: Okay.

5 MR. MIRANDA: So, my first impressions in  
6 looking at the steam break analyses were that, first  
7 of all that this relationship between a steam break  
8 with offsite power versus a steam break without  
9 offsite power seemed to be reversed and that was  
10 attributed to the effect of the accumulator. And then  
11 also the magnitude of the return to power seemed to be  
12 rather low. And Westinghouse explained that that was  
13 because of their reactivity coefficients they were  
14 using. And they had been improving shall we say,  
15 improving since the time we first saw the Watts Bar  
16 results back in the '80s until today. So that the --  
17 in similar plants they're also getting rather low  
18 returns to power.

19 And so what we did was during the second  
20 audit Westinghouse conducted a series of analyses in  
21 which they changed one reactivity coefficient at a  
22 time starting with the Doppler feedback and then going  
23 to the moderator temperature coefficient and so on  
24 until they reproduced the results I had seen earlier  
25 from the '80s. So that explains the effect of each

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1 coefficient that was in use. And these coefficients  
2 that Westinghouse was using were documented and used  
3 in other plants of similar design.

4 MEMBER ABDEL-KHALIK: Now, you indicated  
5 earlier that, you know, you did sort of due diligence  
6 and found out that they are running the aux feedwater  
7 flow at fairly high value and that's the reason  
8 perhaps for this discrepancy in the result. What was  
9 the assumed aux feedwater flow and is that within the  
10 capability of the aux feedwater pumps?

11 MR. MIRANDA: They were, it's  
12 conservative. You'd have the cooldown, the maximum  
13 cooldown so what they were doing was using the maximum  
14 aux feed flow available, all pumps running and I  
15 believe they were all going to the faulted steam  
16 generator. So it's kind of an unrealistic situation.

17 MEMBER ABDEL-KHALIK: So they were  
18 assuming runout capacity for all aux feedwater pumps  
19 and all of that going to the faulted generator?

20 MR. MIRANDA: That's what I --

21 MEMBER ABDEL-KHALIK: Is that correct?

22 PARTICIPANT: That's correct. It's 2,842.

23 MEMBER ABDEL-KHALIK: Okay.

24 MR. MIRANDA: So in effect they were  
25 creating another accident in aux feed flow-induced

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1       cooldown.

2                       During the course of this review we --  
3       there was a lot of reliance on the WCAP-9226 which was  
4       written in 1978 which was written in order to show  
5       that limiting cases were identified for Reg Guide 1.70  
6       which requires limiting cases. So the WCAP-9226 did  
7       a series of -- reported a series of sensitivity  
8       studies, steam line breaks of different sizes and  
9       different assumptions including cases with and without  
10      offsite power. And they concluded from that WCAP that  
11      the largest steam break was also the limiting case.

12                      But a lot of things have changed since  
13      1978 and just to mention a few. In 1978 the flow  
14      measuring Venturi was located in the steam line and  
15      therefore it was possible to have a break upstream  
16      with a steam line which amounted to a 4.5 square foot  
17      break. And that was analyzed in WCAP-9226. Today  
18      Westinghouse plants don't have a flow Venturi steam  
19      line. It's located in the steam generator outlet  
20      nozzle so it's not possible to have a break upstream  
21      of that Venturi. And the maximum break that could  
22      occur in a Westinghouse plant is 1.4 square feet which  
23      is the area, the 16 inch flow area through the nozzles  
24      where the flow chokes. So, more than half of the  
25      cases analyzed 9226 were no longer applicable, they

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1 were the large-break that doesn't exist anymore.

2 MEMBER ABDEL-KHALIK: No, let's go back to  
3 the sort of unreasonable assumption of too much aux  
4 feedwater flow. Regardless of whether you have the  
5 reactor coolant pumps running or not this assumption  
6 leads to a much more severe cooldown transient, is  
7 that correct?

8 MR. MIRANDA: Much more than I would  
9 expect under normal conditions, yes.

10 MEMBER ABDEL-KHALIK: Correct. So  
11 regardless of whether one is more severe than the  
12 other per your expectations you would expect that  
13 because the assumed transient is more severe in terms  
14 of the cooldown that if they were to do this correctly  
15 either, number one, the reactor would not return to  
16 power or the peak power would actually be less than  
17 what they calculated.

18 MR. MIRANDA: You mean if they were to  
19 reduce the aux feed flow to --

20 MEMBER ABDEL-KHALIK: Correct. To make it  
21 a less severe cooldown transient.

22 MR. MIRANDA: Yes. Right. They do that  
23 to produce a conservative analysis. Right. So if  
24 they were to use a smaller aux feed flow rate I would  
25 expect a, either a no return to criticality or a

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1 smaller peak power level.

2 MEMBER ABDEL-KHALIK: So if that's the  
3 case why are you concerned and asking them to repeat  
4 the analysis?

5 MR. MIRANDA: I asked them to repeat the  
6 analysis to understand how they got the results they  
7 got because the other side, the other side of that  
8 question was why is the flow rate, why is the peak  
9 power level reached so small. It should have been  
10 much higher, especially with the higher aux feed flow.  
11 It should have been, I was expecting a peak power  
12 level in excess of 20 percent and they were showing  
13 only, I don't know, about 5 percent. So that part of  
14 it, the analyses they repeated to examine that part  
15 was due to the reactivity coefficients they were  
16 using. They were much improved coefficients compared  
17 to the ones they were using in the '80s.

18 MEMBER ABDEL-KHALIK: But nevertheless  
19 they have agreed to redo the analysis.

20 MR. MIRANDA: They did that. They did it  
21 during the audit, yes. And because, actually it was  
22 a series of analyses where they separated out each  
23 coefficient to see the effect of it.

24 MEMBER ABDEL-KHALIK: Okay.

25 MR. MIRANDA: So I was able to get from

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1 the '80s results to the 2008 results.

2 MEMBER ABDEL-KHALIK: Thank you.

3 CHAIR RAY: You have this all written up  
4 somewhere I trust for historical purposes if we wind  
5 up having to re-resurrect this from five years?

6 MR. MIRANDA: Well, we do have an audit  
7 report.

8 CHAIR RAY: Yes, okay.

9 MR. MIRANDA: Another thing that changed,  
10 this is historical. Another thing that changed since  
11 WCAP-9226 was written was the boron injection tank.  
12 Plants in those days had a boron injection tank in the  
13 safety injection system containing 20,000 ppm boron  
14 which was injected into the core and then had a  
15 dramatic effect on the reactivity. That's been  
16 removed and now the concentration of boron in the  
17 safety injection water is only about 2,500 ppm.

18 So, it doesn't, the reactivity curves  
19 don't show, you can't tell by looking at the  
20 reactivity curves exactly when the safety injection  
21 water enters the core. It used to be that there would  
22 be a big drop-off. Now it just levels off.

23 And the end of the steam line break is not  
24 so much the time at which high concentration boron  
25 enters the core, it's more related toward when the

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1 steam generator dries out, when the -- basically when  
2 the cooldown has proceeded to its logical end. And  
3 then the temperatures begin to level off and the  
4 reactivity excursion is ended and the core returns to  
5 sub-critical.

6 So the staff as a result of this  
7 particular review, it was the only review by the way  
8 that I've seen where these results were reversed. And  
9 it's traced back to the methods used that date to  
10 1978. And we are, the staff is reviewing WCAP-9226  
11 and chances are that it's not going to be accepted any  
12 longer for referencing in licensing applications  
13 because it's outdated. And the staff retains the  
14 right to do that when they approve a method or topical  
15 report. When things change the staff can withdraw its  
16 approval.

17 So as a result of all this all of the  
18 analyses we've seen with the exception of the boron  
19 dilution where we're still waiting for results, we've  
20 seen -- we're convinced that --

21 MEMBER ABDEL-KHALIK: Sorry, back to the  
22 comment you made about withdrawing approval of a  
23 licensing topical report. What code was used to do  
24 this analysis?

25 MR. MIRANDA: The code that was used to do

1 the Watts Bar analyses was the RETRAN code.

2 MEMBER ABDEL-KHALIK: The RETRAN.

3 MR. MIRANDA: RETRAN.

4 MEMBER ABDEL-KHALIK: LOFTRAN.

5 MR. MIRANDA: Was it LOFTRAN?

6 MEMBER ABDEL-KHALIK: LOFTRAN, that's  
7 almost 30 years old.

8 MR. MIRANDA: That's right, okay. You're  
9 using LOFTRAN. You usually use RETRAN. For this case  
10 you're using LOFTRAN and for the sensitivity studies  
11 at the audit it was also LOFTRAN. WCAP-9226, the  
12 studies that were done for that report in 1978 they  
13 used the MARVEL code.

14 MEMBER ABDEL-KHALIK: MARVEL.

15 MR. MIRANDA: And that code is no longer  
16 used, except by Mitsubishi. And you'll find MARVEL  
17 studies --

18 MEMBER ABDEL-KHALIK: So your withdrawing  
19 approval of that particular licensing topical report  
20 does not impact the staff's approval of LOFTRAN.

21 MR. MIRANDA: No, no, LOFTRAN is a valid  
22 code, so is RETRAN. So is MARVEL. It's just the way  
23 in which they were used for the steam line break  
24 analysis.

25 MEMBER ABDEL-KHALIK: Okay.

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1 MR. MIRANDA: We found that some of the  
2 things that came up during the Unit 2 reviews would  
3 extend to Unit 1. So that's something that needs to  
4 be addressed, how Unit 1 is going to deal with the  
5 effects that were found in Unit 2. And as I said  
6 before, the steam break analysis methods have to be  
7 updated. The methods that Westinghouse is using today  
8 are not the same methods that were described in WCAP-  
9 9226. There are some things they no longer do and  
10 there are other things that they've added that they  
11 haven't reported.

12 MEMBER SKILLMAN: Does your second bullet  
13 point to deficiencies in the present analyzed  
14 condition of Unit 1?

15 MR. MIRANDA: Well, for example, the  
16 inadvertent SI actuation, both Units 1 and 2 have  
17 that, well, before the review started they had that  
18 analysis that looked at depressurizing safety valves  
19 and showing they wouldn't open. Well, the licensing  
20 basis as a result of this review for Unit 2 has a new  
21 analysis and so now we have two different licensing  
22 bases with two different analyses. And we would  
23 expect to see a similar change made to Unit 1 and that  
24 would be also in line with the RIS that was written in  
25 2005. That RIS indicated that kind of analysis was

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1 not acceptable and that applications by licensees even  
2 on unrelated topics would be reviewed with respect to  
3 the inadvertent SI actuation event and if necessary  
4 there would have to be a change. That's what the RIS  
5 said that would be reviewed.

6 MEMBER SKILLMAN: How is that handled in  
7 enforcement space for Unit 1?

8 MR. MIRANDA: Well, I don't know. I don't  
9 consider this to be a safety issue, I think it's a  
10 licensing issue. I don't think you're going to have  
11 a small-break LOCA tomorrow at one of these plants.

12 MEMBER SKILLMAN: Our business here, it  
13 poses a very interesting question when you take a  
14 newer unit and apply it to the licensing basis of the  
15 older unit. And then the analytical activities on the  
16 newer unit discover what could be a shortfall or an  
17 efficiency on the licensing basis of the old unit.

18 MR. MIRANDA: Yes.

19 MEMBER SKILLMAN: That seems like even  
20 though that's not ACRS's purview for Unit 2 that  
21 certainly raises a flag about what is going to be done  
22 on Unit 1.

23 MR. MIRANDA: Yes. Another example is  
24 that Unit 1 does not have the CVCS malfunction in its  
25 license. It's not in their FSAR, it needs to be added

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1 to comply with Reg Guide 1.70.

2 CHAIR RAY: Well, let's not get into  
3 what's required to comply with the reg guide. Go  
4 ahead.

5 MR. MIRANDA: Well, that's it. Unless  
6 there are any further questions.

7 MEMBER STETKAR: Can I ask TVA a question?  
8 What is your, you refer to it as LTOPs. It's referred  
9 to as COMS, the low pressure setpoint on the PORVs.  
10 I've been searching for it here, I can't find it in  
11 the FSAR.

12 MR. KOONTZ: You mean where do they arm,  
13 the pressure that they harness?

14 MEMBER STETKAR: What is the arming  
15 pressure, do you know?

16 MR. KOONTZ: For Unit 1 it's 350. I think  
17 for Unit 2 it can be armed as low as I'm thinking it  
18 was 250.

19 MEMBER STETKAR: Well no, not the arming.  
20 What is the actual pressure, the opening pressure  
21 setpoint.

22 MR. KOONTZ: Oh, it's a variable. We'd  
23 have to look into it.

24 MEMBER STETKAR: Oh, it's variable as  
25 opposed to the temperature.

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1 MR. KOONTZ: Yes.

2 MEMBER STETKAR: Okay.

3 MR. KOONTZ: It's in the pressure  
4 temperature limits report is where it's at.

5 MEMBER STETKAR: Okay.

6 MR. KOONTZ: PTLR they call them.

7 MEMBER STETKAR: Yes. We obviously don't  
8 have that. I was just trying to get a feel for where  
9 it's at.

10 MR. KOONTZ: I was trying to think, it may  
11 be in the --

12 MEMBER STETKAR: I can't find it in the  
13 FSAR. I've been sitting here trying to find it so I  
14 don't think it is. Okay, thanks.

15 CHAIR RAY: Okay. Well, any other  
16 comments or questions on the transient analysis  
17 presentation now that we've heard both from the TVA  
18 and the staff? Thank you, Sam. Okay, now --

19 MEMBER ABDEL-KHALIK: Thank you for  
20 accommodating us.

21 CHAIR RAY: Yes, appreciate that. Pat, we  
22 can either break for lunch now or we can take the  
23 region. I think we would prefer to break unless the  
24 region needs to go forward in which case we can  
25 accommodate that.

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1 MR. MILANO: Bob has already indicated to  
2 us that he doesn't have a travel restriction that  
3 wouldn't prevent us from doing it this afternoon.

4 CHAIR RAY: All right. Then we will take  
5 a break for lunch and we'll resume at, in accordance  
6 with the schedule we'll resume at 1 o'clock.

7 (Whereupon, the above-entitled matter went  
8 off the record at 11:48 a.m. and resumed at 1:03 p.m.)

9 CHAIR RAY: We'll resume session and we'll  
10 begin with our scheduled report before the lunch break  
11 from Region II.

12 MR. POOLE: Okay. So the next portion of  
13 the presentation we'll go turn it over to Bob Haag to  
14 go over the status of the Region II construction  
15 inspection activities.

16 MR. HAAG: Good afternoon. As mentioned  
17 before my name is Bob Haag. I'm the branch chief from  
18 Region II with oversight for Watts Bar 2 construction  
19 activities. What I wanted to do was kind of give you  
20 the results of some of our recent inspection efforts  
21 and assessment efforts, then go over kind of the  
22 status of where we're at with implementing the  
23 inspection program. Our level of effort is the amount  
24 of inspection that we've been performing, kind of  
25 where the staff is as far as how many people have been

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1 assigned to the project and inspecting at Watts Bar.  
2 And I was also going to spend a bit of time at the end  
3 of the presentation going over pre-op testing  
4 inspections and where we're at in our preparation  
5 phase.

6 So the first slide deals with the results  
7 of our inspection program. In previous presentations  
8 I had described how we were assessing performance for  
9 Watts Bar 2 construction project, and it's similar to  
10 the way we're looking at performance and assessing  
11 performance under the ROP. It's very structured, you  
12 know, at each quarter we'll look at performance at a  
13 mid-cycle. We look at it in a more formal manner at  
14 the end of cycle. We also look at it -- we've adopted  
15 that policy and that process.

16 So our last formal performance assessment  
17 was the 2011 mid-cycle review. And the overall  
18 results from that review was that we felt performance  
19 was at an acceptable level and that TVA's programs,  
20 processes and implementation were adequate for the  
21 given level of activities involving safety-related  
22 work.

23 I wanted to highlight three areas that we  
24 both discussed during our performance review which is  
25 an internal NRC review and that we highlighted to TVA

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1 in our assessment results letter. The first area I  
2 wanted to highlight was a problem that we'd seen with  
3 implementing, their implementation of corrective  
4 action for some historical problems. And these were  
5 issues that had been identified back in the '80s time  
6 frame. Most of them were identified through TVA's  
7 rating of a condition, a construction deficiency  
8 report (CDR) and we were following up on those actions  
9 to make sure that they were properly implemented. And  
10 what we found were four examples of where TVA thought  
11 the corrective actions were complete. When we looked  
12 and pursued it we identified that corrective actions  
13 had not been adequate. They resulted in a severity  
14 level IV violation that we issued. And our concern  
15 there was based on the number of historical issues  
16 that TVA has to fix, again that have been identified  
17 during regional construction and some of the more  
18 recent construction activities is the fact that they  
19 need to be diligent in making sure those corrective  
20 actions are complete. So we've iterated that to them,  
21 we've discussed that in some public meetings and  
22 clearly we're following up during our review of other  
23 historical --

24 MEMBER ABDEL-KHALIK: Can you give us  
25 examples of significant historical issues that fall in

1 that category?

2 MR. HAAG: Not significant, none of these  
3 were significant as far as the typical, you know, mind  
4 frame of what a significant issue is. The ones that  
5 come to mind as far as these four examples, a couple  
6 of them dealt with welds, inadequate welds that either  
7 they needed to go back and assess as far as were the  
8 welds adequate or they had already identified they  
9 needed to do some repairs and hadn't done the repairs.  
10 None of them, though, I would characterize as far as  
11 significant.

12 MEMBER ABDEL-KHALIK: Okay, thank you.

13 MR. HAAG: The second area I wanted to  
14 highlight was the ongoing saga with the Heinemann  
15 circuit breakers and the seismic qualification for  
16 those breakers. These are the molded case, 120 volt  
17 circuit breakers and during a previous inspection we  
18 had identified a problem with the seismic  
19 qualification. These are new breakers, replacement  
20 breakers that they're using. And what we highlighted  
21 in our letter was just the length of resolution for  
22 this and the fact that it hadn't been resolved. It's  
23 been going on for almost two years as far as once we  
24 identified it TVA's initial resolution or initial  
25 response to us, the back and forth. Where it stands

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1 right now is we wrote, the region wrote a TIA request  
2 for information for the technical branch and NRR to  
3 look into it and they've had a series of public  
4 meetings where the TVA staff presented to the NRR  
5 staff their position and where they're at with the  
6 qualification effort. It's still yet to be resolved.

7 The third item I wanted to mention was the  
8 fact that during this review, the mid-cycle review we  
9 went and looked at crosscutting aspects. We follow a  
10 very similar process for our construction inspections  
11 as we do in the ROP. If we have a finding we'll look  
12 to see if there are crosscutting aspects and if the  
13 numbers reach a certain threshold we're questioning  
14 whether there is a substantive crosscutting issue.

15 During an earlier assessment back in I  
16 think this was the end of cycle review for 2010 they  
17 had satisfied the criteria in our manual chapter for  
18 number of similar crosscutting aspects that would give  
19 you a substantive crosscutting issue. But at that  
20 time we recognized that two of the four issues were  
21 very recent and we had yet to be able to really assess  
22 TVA's corrective action. So we delayed deliberation  
23 to say whether there was a substantive crosscutting  
24 issue. We went back and we reviewed that in our 2011  
25 mid-cycle review and determined there was not a

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1 substantive crosscutting issue. So that kind of blows  
2 the book on that issue.

3 MEMBER ABDEL-KHALIK: Because of  
4 corrective actions?

5 MR. HAAG: Because of the corrective  
6 actions and the fact that when we had an additional  
7 six months of review time the numbers actually went  
8 down to less than what the threshold would have been  
9 in manual chapter as far as reaching a certain  
10 threshold.

11 The other points I discuss from our mid-  
12 cycle review is that when we looked over at the period  
13 of time, and typically you always look back for a 12-  
14 month period of time, there have been 12 severity  
15 level 4 violations identified during that period and  
16 they had a variety of subjects, design control,  
17 corrective action, I mentioned one of the corrective  
18 action issues, procurement and procedural compliance.  
19 I would highlight, you know, there were no escalated  
20 enforcement or severity level penalties, civil  
21 penalties and that's one of the criteria in the manual  
22 chapter as part of our assessment process where if  
23 there were escalated enforcement or civil penalties we  
24 would look at increasing our inspection effort.

25 CHAIR RAY: Bob, does this matter of who's

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1 got the keys that you heard discussed earlier today,  
2 I think you were here for it.

3 MR. HAAG: Yes.

4 CHAIR RAY: Just tell us how that affects  
5 you if at all.

6 MR. HAAG: As far as the change recently  
7 and how TVA is interacting with their contractor?

8 CHAIR RAY: Well, you could express it  
9 that way but basically we're looking at a period of  
10 time here which has included both modes of operating  
11 going way back. I don't know if you were there or  
12 not. We talked about how because of the legacy of  
13 responsibility having shifted to a portion of it at  
14 Bechtel and some that is still there that used to be  
15 with TVA and now part of it, and I'm not trying to  
16 differentiate here between quality affecting  
17 activities and management responsibilities. I  
18 understand the difference between them, but I'm really  
19 asking the question how if at all, and a comment was  
20 made about everybody wears the same color hat now so  
21 implying that it's a single integrated team, no  
22 differentiation between TVA and Bechtel is the way I  
23 took that. The question really is are you affected by  
24 that at all one way or the other.

25 MR. HAAG: No.

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1 CHAIR RAY: Does it make any difference at  
2 all?

3 MR. HAAG: The answer is no. I mean, when  
4 I look at how we were conducting our inspections,  
5 interfacing with either TVA or the workers, it has  
6 changed very little over the past, well, since the  
7 project has taken place. I mean, TVA has always had  
8 an active role, contractually things may have changed  
9 but they've always had an active role in the project  
10 from my perspective. And they continue to maintain  
11 that.

12 CHAIR RAY: Okay. Well, I noticed design  
13 control is an issue up there and of course design  
14 control moved from TVA to Bechtel and I guess it's  
15 still with Bechtel even under this modified.

16 MR. HAAG: Clearly engineering efforts are  
17 being done by Bechtel engineers.

18 CHAIR RAY: Okay.

19 MEMBER SKILLMAN: Bob, my question is with  
20 this inadequate corrective action for several items  
21 that are legacy, years old, what confidence do you  
22 have in TVA's present QA program and particularly  
23 their energy around criterion 16 to identify items and  
24 to pursue them until they are fixed.

25 MR. HAAG: The way I'd respond to that is

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1 the current corrective action program while clearly  
2 has to envelop these legacy issues they're somewhat  
3 separate. And we look at the current corrective  
4 action program under the same tools that we do the  
5 ROP. We do PI&R inspections, we typically look at,  
6 you know, when problems are identified do they  
7 correctly identify it, do they capture all aspects of  
8 them and then we'll look at the corrective action.  
9 And we do, we've been doing annual PI&R inspections  
10 and we've seen some problems there and we've seen some  
11 improvements and the typical corrective action program  
12 and what's implemented right now at the station.

13 These historical issues, the  
14 identification was not a problem. You know, the  
15 identification had been done years ago. It really was  
16 the follow-up to the issue and ensuring that, you  
17 know, if you had some belief that corrective action  
18 was done back in the '80s and now you needed to  
19 confirm that, well you need to have some clear  
20 evidence that those actions were done, not relying on  
21 somewhat anecdotal information. So it was more of  
22 that where they, the level of pursuit of the  
23 corrective actions, that's where we saw some  
24 breakdowns at least in these four examples.

25 Our confidence going forward? It really

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1 has to be built. I mean, we're going to, we've  
2 identified those historical issues that we have on our  
3 inspection plate and we're going to look at those  
4 things so clearly we're not just sampling those.  
5 There's, you know, a set number of historical issues  
6 we're going to inspect. So we'll be verifying the  
7 corrective action for those. And again, through the  
8 discussions we've had, management discussions and you  
9 know, in emphasizing to TVA, the importance that they  
10 understand what the corrective actions are and that  
11 they do due diligence, making sure it gets done.

12 MEMBER SKILLMAN: Have you heard with the  
13 same energy that TVA leadership speaks of building a  
14 safe work environment, the same energy around having  
15 quality workmanship and a quality product for what  
16 they are doing at Watts Bar 2?

17 MR. HAAG: I mean, I would say that was  
18 never a problem. It was these examples where we found  
19 shortcomings. And you know, we've looked at TVA's  
20 corrective actions for the severity level 16 violation  
21 in that, you know. Obviously the individual items had  
22 to go back and be corrected but they also needed to  
23 step back and look at and ask themselves why didn't we  
24 pick up on this. Why did we think the problem was  
25 resolved when it really wasn't. And we've pursued

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1 that and we're looking at that. Yes, we have some  
2 confidence that they have made some changes and have  
3 improved their process but again, until we get, you  
4 know, additional examples where we've looked at their  
5 closure packages, where we've looked at their  
6 corrective actions and have some confidence, you know,  
7 it's still an open issue.

8 MEMBER SKILLMAN: Thank you.

9 MEMBER ABDEL-KHALIK: I had a question  
10 about design control. Are there any concerns about  
11 updating design drawings in a timely fashion to  
12 correctly reflect the as-built condition?

13 MR. HAAG: I'm not aware of specific  
14 examples or concerns related to that, you know,  
15 updating their drawings, making sure that the design  
16 you know didn't fit what they thought it did, that  
17 when they make a change that they clearly update all  
18 the design documents. I don't think we've seen  
19 problems there. The design control, it's typically  
20 been, you know, classic criterion 3 violation where  
21 they didn't properly translate the design maybe into  
22 a working document, or you know, the product that they  
23 had in the plant, that was more the examples that  
24 we've seen as far as design control.

25 MEMBER ABDEL-KHALIK: Could you say that

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1 again, please?

2 MR. HAAG: The criterion 3 where you have,  
3 the plant is designed. You have the design basis,  
4 whether it's a calculation or an analysis, and then  
5 transcribing that to your field instructions, your  
6 work packages for actually building the plant. That's  
7 where we've seen some of the disconnects. Again,  
8 these would have been at a severity level 4 level so  
9 they weren't necessarily that significant themselves.

10 MEMBER ABDEL-KHALIK: Okay, all right.  
11 Thank you.

12 MR. HAAG: So the next slide I wanted to  
13 use was to kind of give you a sense of the level of  
14 effort that we're expending for the construction  
15 inspections. For 2011 we spent over 17,000 of related  
16 hours involving inspection. Now those are all not  
17 direct inspection effort. Those are some of the hours  
18 that the inspectors and the folks who work in the  
19 region, who work for me, you know, managing the  
20 project. But a large number of that is inspection  
21 effort, inspectors actually out at the plant, out  
22 there looking at construction, looking at records.  
23 That was an increase from the previous year of almost  
24 4,000 hours. And when we look at our scheduled  
25 inspections and what's left to be done we think it's

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1 going to pretty much stay at that level of 17,000  
2 hours which is a huge effort. When you convert that  
3 to FTE I mean it's a significant effort.

4 We're planning to continue the four  
5 resident inspectors, staffing at four inspectors  
6 onsite. We've had success in being able to look at  
7 areas that we wanted to, especially on those things  
8 where the schedule isn't as firm as you might  
9 necessarily would like as far as predictability and  
10 being able to send the regional inspector. So having  
11 someone out there on a full-time basis clearly  
12 alleviates that problem. They're there always and you  
13 know, if there's a change in schedule they can look at  
14 something else and be ready to look at the particular  
15 area that you're interested in.

16 As far as effort besides the four resident  
17 inspectors, when I went back and I counted up over the  
18 past year as far as how many inspectors you can see  
19 the number, 41 inspectors. I think that's pretty  
20 impressive as far as folks we either had from the  
21 region, some of those are contractors. We had a  
22 couple of inspections where we had contractor  
23 inspectors but 41 other individuals, you know, have  
24 actually been, you know, having eyes on construction  
25 activities and doing inspections.

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1           As far as the regional complement and this  
2           is still within my branch we've increased the numbers.  
3           We have four people who work for me on a full-time  
4           basis on the project and that's an increase from we  
5           had two before back in 2010. And this previous year  
6           we added a team leader and a senior project manager to  
7           my branch.

8           Another initiative I wanted to talk about  
9           was our periodic public meetings. Our regional  
10          administrator has an interest in maintaining ongoing  
11          dialogue and allowance for the public to understand  
12          where the project is so he's asked us to conduct  
13          periodic meetings as necessary to set the time frame.  
14          He just wants us to ensure the local public has the  
15          ability to understand where the project is from an  
16          inspection standpoint, understand any of the issues  
17          that may be going on between NRC and TVA, ask  
18          questions and comments. So we're initiating those.

19          And we're taking credit for several  
20          different initiatives. We have an end of cycle  
21          meeting as part of the process and I'm including that  
22          as the ability to get out and tell the public what  
23          we're doing, let them ask questions, provide comments.  
24          So in total we had four public meetings out at the  
25          site in the local area at different venues in which

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1 the public had an opportunity to, again, hear our  
2 inspection effort, what we're doing, any issues that  
3 are going on between TVA and the NRC and then ask  
4 comments and questions.

5 MEMBER SKILLMAN: Bob, please tell us what  
6 the mood is when you meet with the public.

7 MR. HAAG: It's varied. You know, none of  
8 the meetings have had a huge turnout. I'd say  
9 typically we may get, you know, between 20, 25, 30  
10 members of the public and it's varied. We have, there  
11 are several individuals who are opposed to the project  
12 and they're routine attendance. We also get quite a  
13 bit of turnout from local officials who are supporting  
14 the project and they want to just voice their  
15 continued support for the project.

16 MEMBER SKILLMAN: Thank you.

17 MR. HAAG: So it does vary.

18 MEMBER SKILLMAN: Thank you.

19 MR. HAAG: So the status of where we're at  
20 in implementing the inspection program. During a  
21 previous briefing I had described kind of how we  
22 developed the inspection program for Watts Bar Unit 2  
23 and it is unique because the history and the time  
24 frame from when they did the initial construction to  
25 where they're at right now, we had a -- we're doing

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1 more than just typically what was done in earlier  
2 plants. Clearly the NRC has a program for inspecting  
3 construction. It's managed at 25.12, pre-op is 25.13,  
4 start is 25.14 but we're doing more than that, you  
5 know. So we went back, and again I don't want to go  
6 over all that, but we've looked in these different  
7 areas. And we ended up with over 500 unique  
8 inspection items that we're doing for Watts Bar Unit  
9 2 and we've got those loaded into an access database  
10 where we're tracking. Whenever we do an inspection  
11 we'll track it and we'll close it out. So in the end  
12 we're going to be able to say we've completed the  
13 inspection program. To date we've closed a little  
14 over 150 of the items so there's still quite a few  
15 left to be done.

16 A large majority of the remaining items we  
17 have looked at one way or another and we've documented  
18 that inspection in a report. There's just either a  
19 few things we want to continue to follow up on and  
20 close out. Some of them we haven't even looked at at  
21 all but a large majority of the remaining items we  
22 have spent some inspection on. And you know again,  
23 there's just a piece that we need to look at to be  
24 able to say we're finally complete.

25 We've completed inspection of seven of the

1 corrective action programs, special programs. Those  
2 were the get well programs that TVA initiated to deal  
3 with the problems from the early construction that was  
4 done back in the 1980s. A couple of those programs  
5 are broken out into sub-issues and we've closed eight  
6 of those sub-issues. So there's still quite a bit of  
7 work left to do there, but again I would say the large  
8 majority of the CAPs and SPs we have inspected to some  
9 degree and you know, we understand what's left to be  
10 done and we're just either waiting on the construction  
11 to be finished or our ability to get up there and look  
12 at these issues.

13 MEMBER STETKAR: Bob, are you, you know,  
14 you mentioned your resource estimates for FY 2012 on  
15 the order of about 17,000 person hours. Given the  
16 fact that at least according to this slide, now  
17 recognizing that you're in progress on several of  
18 those, but this is, what, 30 percent complete roughly?

19 MR. HAAG: Just based on --

20 MEMBER STETKAR: I have no idea what TVA's  
21 new schedule will look like but are you quickly going  
22 to become resource-constrained or do you think that  
23 you're okay?

24 MR. HAAG: We think we're okay and it's  
25 more than just, you know, just a hunch. You know,

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1 what we've done for all of the IPS items, we've  
2 estimated the level of inspection by number of hours  
3 and we routinely track that as far as where are we at,  
4 percentage complete, what's left to be done, when are  
5 you going to inspect it. We've had a recent  
6 initiative where we want to get the remaining  
7 inspections loaded into our Primavera construction  
8 inspection schedule. We're pretty successful on that.  
9 What's the uncertainty part, and that's the last  
10 bullet right here, is the corresponding construction  
11 activities. What we're trying to do, and it's similar  
12 to the effort that they're doing for the Part 52  
13 plants is to take your construction inspection effort,  
14 whatever you want to look at, whether it's a weld, the  
15 installation of a hanger, whatever, tie that to the  
16 construction schedule from the utility, align the line  
17 time. And when they update their schedule our  
18 inspection schedule is also updated. We've had  
19 moderate success in doing that. It's a work in  
20 progress. I mean, it sounds like an easy process but  
21 it's not because, you know, the way they code items in  
22 their construction schedule sometimes it's difficult  
23 for us to be able to link our inspections to that.  
24 But again, you know, we're working on that. As part  
25 of the fact that we're also, CCI is also doing the

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1 Part 52 construction and they're much more  
2 sophisticated in that effort. You know, we're taking  
3 advantage of the people who have that expertise to be  
4 able to help us out in the Watts Bar 2 project. Next  
5 slide.

6 So the last thing I wanted to do was kind  
7 of give you an idea of where we're at with the pre-  
8 operational testing inspections. I mentioned earlier  
9 we added a position to my branch. It's a team leader  
10 and his focus and his charge really has been looking  
11 at the 25.13 inspection program, kind of defining  
12 that, what do we want to do, coming up with the  
13 resource estimates, interfacing with TVA, what does  
14 their schedule show for system turnover, when the  
15 testing is going to be done and make sure we're ready  
16 for that. And we're having success in at least the  
17 initial scoping effort.

18 Manual Chapter 25.13 has mandatory tests,  
19 tests that have to be witnessed. These are the larger  
20 tests, the containment integrated leak rate test, hot  
21 functional test, RPS. Then it also has the primal  
22 system tests. Those are, you know, it lists over 20  
23 different systems and you can pick and choose which  
24 systems you want to spend your inspection effort on to  
25 be able to look at both the test procedure, test

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1 witnessing and records reviews. So we've gone through  
2 and we've selected the systems that we want to focus  
3 on and we've assigned inspectors, lead inspectors for  
4 all the mandatory and the primal tests. Our challenge  
5 now is to define the remaining inspection support  
6 group that's going to be needed because one person  
7 certainly can't look at many of these tests. They're  
8 involved and you may need, you know, three or four  
9 people, you know, back shift coverage and things like  
10 that. So what we're looking at right now is coming up  
11 with the resources that are needed, figuring out who  
12 in the region or even outside the region can provide  
13 those inspections. We're also looking at possibly  
14 having contract inspectors to assist us in that.

15           The other part of 25.13 is the operational  
16 preparedness inspections. Those are the areas, the  
17 traditional support areas. Management controls the  
18 procedures and I gave you some examples up there,  
19 radiation protection, chemistry, security, fire  
20 protection. We're taking a little different approach  
21 there. If you spend any time looking at those  
22 inspections and the way the program is defined the  
23 procedures have not been updated since they were  
24 issued and used back in the '70s and '80s, maybe early  
25 '90s. So you know, we've questioned is there a need

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1 to do all those inspections as currently written. We  
2 think the answer is no so we're going through and  
3 doing a review to understand what's required for the  
4 inspection, factor in related inspections that may  
5 have been done recently under the ROP or other related  
6 inspection areas and come up with a clear  
7 understanding of what's needed for Watts Bar Unit 2  
8 given its, you know, situation, the fact that many of  
9 these programs have been established and have been in  
10 use for Watts Bar Unit 1. We've been inspecting them  
11 over a number of years so what do we need to look at.  
12 Do we need to look at program inspections or do we  
13 need to look at, you know, implementation and has TVA  
14 captured, you know, what needs to be added to the  
15 program to cover Unit 2. We think that's the answer,  
16 but again we need to go back, define those, come up  
17 with some recommendations, make sure the program  
18 office, the NRR branches who have responsibility for  
19 those areas are in agreement with that and then kind  
20 of lay out our inspections there. So that was what I  
21 wanted to present to you as far as the inspection  
22 program.

23 MEMBER BROWN: Can I ask a question?

24 MR. HAAG: Sure.

25 MEMBER BROWN: You talked about, and you

1 have a list of access, I guess it's a database for  
2 stuff and there are, I don't know, there's a hundred  
3 and something, 120, 130 open items that are covered in  
4 the SSER where Region II is identified as the lead  
5 person or lead organization for resolving those,  
6 confirmatory and otherwise. Are those in your --

7 MR. HAAG: Yes, they are.

8 MEMBER BROWN: -- database also?

9 MR. HAAG: Yes.

10 MEMBER BROWN: The other thing I noticed  
11 in here was that there's a number of combinations of  
12 Region II NSIR items all dealing with emergency  
13 facilities, accident control, whatever, for the site.  
14 Nothing in there relative to the cybersecurity issues  
15 relative to the new rule 73.54. How is that being  
16 addressed in terms of your long-term confirmation of  
17 that the integrating of that particular issue? I seem  
18 to remember we had a previous full meeting on  
19 cybersecurity stuff and they explained what they were  
20 doing. All I'm trying to do is figure out how, I  
21 don't see anything being set up to go cover that. Or  
22 at least it's not listed.

23 MR. HAAG: And it's not included in that  
24 access database mainly because the temporary  
25 instruction that is going to be written to cover the

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1 inspection effort has not been finalized. It's still  
2 in draft.

3 MEMBER BROWN: Who's doing that,  
4 headquarters or you?

5 MR. HAAG: NSIR is doing that. The region  
6 has been involved, there is a point of contact in the  
7 region, not in our division but the Division of  
8 Reactor Safety who will be doing the inspections at  
9 the operating site. He's also been involved in it as  
10 far as planning for Watts Bar Unit 2 because that will  
11 be one of the first plants that actually gets this  
12 inspection. So that's a point of contact, you know,  
13 from a continuous standpoint, you know. They've been  
14 involved in it, they will be involved in it, not just  
15 for construction activities but also for the operating  
16 plants. We will put, once that temporary instruction  
17 comes out it will get added to the IP&S database so we  
18 make sure we track that and we've completed it before  
19 we say all our construction inspections are done.

20 MEMBER BROWN: I don't know, I'm just, I'm  
21 winging it right now, okay? I'd really like to hear  
22 at a later date when that's, I think we should hear at  
23 a later date how that's being executed. You know,  
24 what does it look like, what do you all intend to do.

25 MR. HAAG: Yes.

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1           MEMBER BROWN: In other words, how is that  
2 getting passed down, what's the temporary instruction  
3 say, how will you all execute that and what are the  
4 key critical areas which you intend to go pull the  
5 string on to ensure that we've isolated the plant and  
6 the items of interest from external hacking to put it  
7 bluntly. So I'd like to have that on the -- Harold,  
8 if you don't mind I'd like to have that discussion at  
9 some point from an inspection standpoint when it's  
10 available.

11           CHAIR RAY: Well, yes. As far as this  
12 process that we're engaged in here now of course it's  
13 leading up to a full recommendation and a full  
14 committee letter or perhaps more than one letter and  
15 we can discuss at that time whether to put something  
16 in the letter pertaining to what you're --

17           MEMBER BROWN: No, I just wanted to have  
18 some detail instead of waiting until the eleventh  
19 hour. I'd just like to have some idea of where  
20 they're going and how you intend to do that before we  
21 get to that point.

22           CHAIR RAY: Oh, I thought you wanted  
23 something more than just some additional information.

24           MEMBER BROWN: At one of the other  
25 meetings I'd like to have --

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1 CHAIR RAY: Let me ask Justin here. We  
2 need to have some tracking of this between yourself  
3 and Girija so that Charlie or I can ask when are we  
4 going to get any more information about this  
5 inspection procedure.

6 MR. POOLE: Sure.

7 CHAIR RAY: And we're not going to, like  
8 I say, if nothing is available by the time we need to  
9 wrap this process up we can make a note of it at that  
10 time.

11 MR. MILANO: I'd like to make one comment.

12 CHAIR RAY: Sure, Pat.

13 MR. MILANO: One of the other things that  
14 we're going to do in this process is working with NSIR  
15 they are going to do a pilot audit at Watts Bar and  
16 that's not an audit type of inspection out there.  
17 What they're going to do is after the temporary  
18 instruction is prepare. They're going to take it to  
19 Watts Bar and look at its ability to be implemented.  
20 And it'll be sort of like a tabletop review. They'll  
21 go through it and say, you know, can this step  
22 actually be accomplished or do they need to adjust the  
23 focus or the direction in it to accomplish the  
24 objective that they want. So that audit right now  
25 we're looking at sometime late spring but it's still,

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1 it's not fixed. It's all predicated as we've  
2 indicated on the initial development of the temporary  
3 instruction.

4 MEMBER BROWN: I'm just not sure what the  
5 instruction is going to say. I'd like to have some  
6 idea what's in it, what it's intended to accomplish.  
7 What an instruction does, is it just to make sure that  
8 the plant comes out like you want it to be or is it  
9 something that somebody's going to do every three  
10 months for the next 30 or 40 years, or what is it? I  
11 mean, I just, I don't even know what this instruction  
12 is supposed to accomplish. That would be a nice thing  
13 to know also.

14 MR. MILANO: The reason why I was bringing  
15 that up was it's probably, timing-wise it's probably  
16 best to, if you do want to hear something about it is  
17 after the audit is done and it's adjusted accordingly  
18 --

19 MEMBER BROWN: That's fine, I'm not  
20 pointing at any, tomorrow, or something. I'd just  
21 like to have, before we close out and we're ready to,  
22 you know, make a full understanding of what we think  
23 we've got we ought to have some idea what's going on  
24 there, that's all.

25 MR. SHUKLA: Mr. Chairman, there is only

1 one subcommittee meeting between and the full  
2 committee meeting remaining, so.

3 CHAIR RAY: Well, that may or may not be  
4 the case, we'll see. But in any event as Charlie said  
5 I'm not trying to change whatever the present schedule  
6 is, I just don't want to lose track of this item. If  
7 we can get the information before we're done and  
8 resolve it so that it goes away I think that's in  
9 everybody's interest. If not.

10 MEMBER BROWN: I have one other once we're  
11 finished with this.

12 CHAIR RAY: That's fine.

13 MEMBER BROWN: A couple of the action  
14 items also still have to deal with the communications  
15 between the Eagle 21 and the integrated computer  
16 system, the site, this large site integrated computer  
17 system. And they have a nice explanation of what this  
18 is supposed to be, you know, a configuration and how  
19 it was supposed to be hard-wired and all this other  
20 kind of stuff. You guys are down as the responsible  
21 action party to resolve this and make sure it comes  
22 out looking like that. And I guess I'd like, I  
23 presume you're going to be recommending that it be  
24 closed or not closed. Two of the items, let's see,  
25 one of the items associated with this is a

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1 confirmatory item, the other one is an open item but  
2 you were still down as the action party for both of  
3 those. I guess I'd like to, because of the delicate  
4 nature of that whole one-way communication, you know,  
5 does it get configured the way it's supposed to, how  
6 are you going to check it, what are the resources you  
7 have to do that and how is it made such that it can't  
8 be, you can, the configuration control for that area  
9 which is kind of open.

10 MR. HAAG: So you'd like to have a  
11 presentation once we finish that inspection, give you  
12 the results?

13 MEMBER BROWN: Yes, that sounds like a  
14 short item, 5 or 6 minutes, 10 minutes, whatever it  
15 is. It's not rocket science, it's a matter of what's  
16 it look like in reality as opposed to the PowerPoint  
17 slide and explanation. That's something a little bit  
18 more to amplify again what's in the SSER to make it  
19 clear.

20 MR. HAAG: As I mentioned earlier we have  
21 included all those Appendix HH items that have Region  
22 II inspection portion, we have those included in IP&S  
23 and we've got an individual inspector assigned to all  
24 of that appendix items. So there is someone who is  
25 assigned to it. I can't tell you right now how far in

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1 this case it's a female, how far she is in looking at  
2 it but we've got --

3 MEMBER BROWN: I'm not asking for that  
4 right now. Just, it's item 63 and 93 I believe. So  
5 thanks to Harold reminding me.

6 CHAIR RAY: Appendix HH.

7 MEMBER BROWN: Yes, Appendix HH in the  
8 latest SSER. The details are in SSER 23.

9 MR. HAAG: Sure. Okay.

10 MEMBER BROWN: Okay?

11 MEMBER SKILLMAN: Bob, I'd like to ask  
12 another question, please. What's interesting about  
13 Watts Bar 1 and 2 is the number of years between Unit  
14 1 having come online and when Unit 2 will come online.  
15 And you've identified a number of programs here that  
16 are essential for the health of the unit rad pro,  
17 chemistry, security, fire protection, but there are  
18 more, configuration control, configuration management,  
19 design control. And my presumption is that by and  
20 large Unit 2, Watts Bar 2 will either adopt or be  
21 adopted by the Unit 1 procedures. And that leads me  
22 to wonder are there weaknesses in the Unit 1  
23 procedures that need to be resolved before the  
24 integration of Watts Bar 2 is pulled into  
25 applicability for those procedures. In other words,

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1 are there existing weaknesses today that really need  
2 attention so that when Watts Bar 2 is adopted that the  
3 program is healthy for both? Have you given any  
4 consideration to that, please?

5 MR. HAAG: I'd answer that by saying the  
6 people who will be doing that portion of the 25.13  
7 inspections are the same organizations within Region  
8 II who have been doing the inspections on the Unit 1  
9 programs. For example, the radiation protection. You  
10 know, the ROP clearly has baseline inspections that  
11 you do on an annual and a biannual, you know, period.  
12 We'll be having that same branch perform the  
13 inspections on Unit 2 that once we define what  
14 inspections need to be done they'll be doing those  
15 inspections. So they would have the best insight from  
16 a regulatory standpoint as far as where are some of  
17 the problem areas that have been identified with the  
18 Unit 1 programs if they exist and how are those, if  
19 it's a shortcoming or, you know, a marginal program  
20 how is that being addressed now because there's two  
21 units that that program has to support. So I mean, I  
22 think that's the best answer I'm going to be able to  
23 give you in that, you know, we have that consistency  
24 both from an understanding of where the problems are  
25 and also, you know, history on, you know, where do I

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1 need to look, where should I be spending my time  
2 because of insights from previous inspections.

3 MEMBER SKILLMAN: Harold, do you consider  
4 that something worth talking about at a later point?  
5 I'm thinking about a lot of the work that I've done  
6 where I've found that the organization knew it had  
7 problems but didn't do anything and a year or two  
8 passed and now two units were in trouble. Here's a  
9 case where there's really a time constant that is  
10 introduced.

11 CHAIR RAY: Well, let's talk about it at  
12 the end, Dick. I'm not inclined to think that it's  
13 something we should create an action item about.

14 MEMBER SKILLMAN: Okay, thank you. Bob,  
15 thank you.

16 MR. POOLE: Okay. Thanks. The next part  
17 of the presentation is to go over the status of the  
18 licensing activities.

19 Okay, this slide shows based on the  
20 staff's review over the past two years or so and  
21 asking RAI questions and writing up their SE  
22 evaluations. TVA has had to make numerous amendments  
23 to their FSAR. The current version of the Watts Bar  
24 2 FSAR is at Amendment 107. The next bullet there is  
25 to show that over the --

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1                   MEMBER STETKAR: Is that -- that's been  
2 amended?

3                   MR. POOLE: Yes. Yes, it was. The next  
4 bullet there is to show that over the past five  
5 supplements to the safety report a large chunk of the  
6 review, the safety review has been completed and  
7 having gone before you guys today most of them have at  
8 least been discussed in front of the committee. The  
9 major areas that we have remaining is fire protection  
10 which we intend to talk in April and then the closure  
11 of the open items in the SER. And then I'll also  
12 point out, it probably should have been a bullet on  
13 here too, was the discussion we had last time on  
14 hydrology and the maximum flood level.

15                   MEMBER STETKAR: For sure.

16                   MR. POOLE: Okay. So as has been pointed  
17 out a few times already both in the introduction and  
18 TVA had a slide in their presentation and we've heard  
19 from some of the members here there's been a number of  
20 questions on how do we handle the open items. So we  
21 provided a slide here today just to go over some of  
22 the numbers, how we break them down and then Chairman  
23 as you mentioned we would love to hear at some point,  
24 you know, which ones, go over at some point which ones  
25 you guys are most interested in.

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1 CHAIR RAY: Yes, I've gone over them  
2 myself. We have hard copies for those who want to use  
3 same but it looks to me like we'll have time that we  
4 can refer to that today and just go over the open  
5 items to see if any numbers have particular ones that  
6 are open at this time that we think warrant further  
7 discussion with the subcommittee or potentially full  
8 committee. But you tell me when you would like us to  
9 do that.

10 MR. POOLE: Sure. Let me run through this  
11 slide and then we can talk about that. So as the  
12 first bullet says there was 124 open items that were  
13 written into the different supplements of the Safety  
14 Evaluation Report. Just to avoid confusion there was,  
15 you know, looking at Table HH I believe the final  
16 number on there is actually 139. The reason for the  
17 discrepancy is that in preparing the different  
18 supplemental SERs there were drafts, open items  
19 originally created and then for whatever reason never  
20 ended up getting published. They were either resolved  
21 prior to publishing or were delayed until a further  
22 publication. So there were some numbers that were  
23 never used.

24 As TVA pointed out before, to date as of  
25 SER 25 we've closed 41 of those 24 which means that

1 there's a total of 83 that remain open. We show in  
2 this slide that we break those down into essentially  
3 two categories, the items requiring NRC confirmation  
4 of which there are 43, and then items which require  
5 additional NRC evaluation which there are 40. Items  
6 that require confirmation essentially were created  
7 when the staff was provided sufficient information in  
8 order for them to make a finding of reasonable  
9 assurance. We needed confirmation, needed some sort  
10 of confirmation from the applicant to complete a  
11 follow-up action. This action could have been  
12 satisfactory testing, installation of equipment, or it  
13 could be a submittal of a report or a safety FSAR  
14 update. So given that, the closure of these  
15 confirmatory items can be accomplished either by  
16 regional inspection or a submittal to the headquarters  
17 staff.

18 For items requiring a submittal to  
19 headquarters staff the staff will verify that the  
20 information submitted is what was expected in order  
21 for the item to be closed. A very typical example of  
22 this is when during the review the staff required  
23 additional information and requested via an RAI. TVA  
24 provided the response and in reviewing the response  
25 staff felt that the information provided was important

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1 enough to require an update to the FSAR. In many of  
2 these RAI responses TVA actually provided draft  
3 versions or pages of what they intended to update the  
4 FSAR to look like which allowed the staff to review at  
5 the same time as they're reviewing the technical  
6 information. So these truly are just a check of  
7 getting the same information that was already sent in,  
8 and then the staff just wanting to verify that it gets  
9 put into their FSAR to remain as part --

10 CHAIR RAY: We understand, I think.

11 That's fine.

12 MR. POOLE: Okay. And then the other part  
13 of that is -- so because it's just a check, a  
14 confirmation there's no evaluation done in the  
15 Supplemental Safety Evaluation Report. It's marked  
16 off in Appendix HH and the submitted document is  
17 referenced in the table. This is also done similarly  
18 for inspection items, confirmatory items that are  
19 closed via inspection. There's no evaluation written  
20 in the SER and its update of the table pointing to the  
21 evaluation done by the region and their inspection  
22 report.

23 And then the items that require additional  
24 evaluation which are essentially the true open items,  
25 these were written because the staff required further

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1 information from the applicant in order to complete  
2 its review. Upon receipt of the information the staff  
3 can finish its evaluation and document it  
4 appropriately in the next, in a further supplement to  
5 the Safety Evaluation Report. Our goal is to close as  
6 many if not all of these by the April subcommittee.

7 CHAIR RAY: Okay, well, tell you what,  
8 Justin. You probably have staff people standing by  
9 here that are intending to participate in these  
10 scheduled items of staff presentation. Why don't we  
11 stop the review of open items here now. I think we  
12 understand the difference between confirmatory items  
13 and other open items.

14 MR. POOLE: Okay.

15 CHAIR RAY: And so that we can let these  
16 people get back to productive work. Let's do the  
17 staff presentations that are on the schedule now. We  
18 will have a break perhaps after the first one given  
19 what time it is now. But finish them up and then at  
20 the end we'll be able to go through the open items  
21 table and give an indication to you and the applicant  
22 which items warrant consideration for the next, or if  
23 there are other subcommittee meetings in addition to  
24 the next one, future subcommittee meetings.

25 MR. POOLE: Okay.

1 CHAIR RAY: Can we do it that way?

2 MR. POOLE: Yes, that's fine.

3 CHAIR RAY: That way it lets the staff get  
4 back to their business. So, with that you take over  
5 and let's go through the items where there are staff  
6 presentations yet to do.

7 MR. POOLE: Okay. While they're making  
8 their way up to the table here I'll just point out,  
9 the next slide was just to say that before the --  
10 their presentations are based on previous to  
11 Supplement 24 and 25. These were the dates. Okay.  
12 The next part of the presentation that we'll go over  
13 is the status of radiation protection. The reviewer  
14 for this portion was Mr. Roger Pedersen. I'll now  
15 turn it over to him.

16 CHAIR RAY: All right, Roger.

17 MR. PEDERSEN: Good afternoon.

18 CHAIR RAY: Good afternoon.

19 MR. PEDERSEN: I'm a senior health  
20 physicist in the Office of Nuclear Reactor Regulation.  
21 I reviewed Amendments 92 through 104 in terms of how  
22 those changes related to radiation protection both the  
23 occupational radiation protection in Chapter 12 of the  
24 FSAR as well as public radiation protection in terms  
25 of radiological effluents, both liquid and gaseous

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1 effluents that's contained in Chapter 11 of the FSAR.

2           TVA made several changes to Chapter 12 in  
3 terms of occupational radiation protection design  
4 features. The list that I have here are some of the  
5 more notable. I didn't provide an exhaustive list of  
6 all the changes that were made. And of these six  
7 changes only the third bullet there in that last  
8 bullet resulted in a situation in which the initial  
9 change was unacceptable to the staff and we had to go  
10 back through the RAI process and resolve those issues.  
11 But let me run through them real quickly here.

12           There were a number of changes to the  
13 source terms that were identified in the FSAR. The  
14 most notable is the containment airborne estimates.  
15 TVA had identified an error in their previous  
16 calculation so they corrected that. It did not result  
17 in a significant change. It did not change the, even  
18 though the airborne estimate in the upper containment  
19 and lower containment changed it did not change  
20 whether they were considered an airborne area  
21 requiring controlled access or not. So it had no  
22 impact on our previous analysis.

23           There were a number of changes in plant  
24 radiation monitoring. Again, the most notable of  
25 those were the area airborne radiation monitors in the

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1 aux building. Previously the FSAR described a fixed  
2 system of airborne monitoring. TVA had revised the  
3 FSAR consistent with how Unit 1 is being operated and  
4 that in the aux building which is pretty much common  
5 to both plants they have four portable monitors that  
6 provide four channels of airborne monitoring that are  
7 comparable to the fixed monitors that were previously  
8 described there. They alarm locally, they alarm --

9 CHAIR RAY: Was this a 50.59 change for  
10 Unit 1 or what?

11 MR. PEDERSEN: I would imagine so.

12 MR. BRYAN: This is Bob Bryan. Yes, it  
13 was.

14 CHAIR RAY: Okay.

15 MR. PEDERSEN: In addition to that there  
16 was a change in the description of the calibration  
17 frequencies and the channel operability tests. I'll  
18 get back to the position that we negotiated. There  
19 was a significant change in the description of the HP  
20 support facilities. The original FSAR had layout  
21 drawings depicting things like whole body counters and  
22 dosimetry and respiratory protection issues. Those  
23 layout drawings were removed from the FSAR. In lieu  
24 of replacing those drawings I accepted a detailed  
25 description of the facilities and the commitment out

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1 of the applicant that they're adequately sized for  
2 two-unit operation which of course will be a subject  
3 of follow-up inspection activities.

4 The applicant also changed, made some  
5 changes to their dose assessment both the collective  
6 dose assessment, the annual dose that they expect to  
7 operate the plant and the dose assessment for vital  
8 area access. That's the dose to operators that have  
9 to access the plant during accident conditions to  
10 operate vital equipment to mitigate the course of the  
11 accident. It's TMI Lessons Learned item 0737-2B2.  
12 And that last item is actually one of the open items.  
13 Most of the RAIs that I had with these issues and the  
14 other issues were clarification issues asking for the  
15 applicant to clarify the basis for the change. And so  
16 they have clarified the basis for the change with the  
17 vital area access, they just haven't documented that  
18 in the FSAR yet. That's I believe the only open item  
19 left in the open item list.

20 And then the last item, again that was one  
21 of the ones that ended up as not acceptable to the  
22 staff, was an issue about RPM qualifications. The  
23 previous FSAR had a fairly clear commitment to the  
24 regulatory guidance in our Reg Guide 1.8 1978 in terms  
25 of what the qualifications are for the radiation

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1 protection manager. That was removed. The response  
2 that I got to my RAI was not clear. It actually  
3 precipitated a review of the current procedure on  
4 qualifications. And one of the two issues besides the  
5 number of years of operating experience, one of the  
6 other issues that I brought up was whether there was  
7 a clear criteria as to how long someone who does not  
8 meet the qualifications could act as the RPM. It  
9 turned out that their procedure wasn't adequate to  
10 cover that to ensure the way they did things would be  
11 consistent with the Reg Guide 1.8. So I believe that  
12 generated a corrective action. That's what I was  
13 told, I haven't verified that. So they're going to  
14 change their procedure based on that. But now there's  
15 a clear commitment to Reg Guide 1.8 in their FSAR.

16 Let me back up to the other item before we  
17 change slides. The area of radiation monitoring, the  
18 channel operability test. The previous FSAR and the  
19 way Unit 1 was originally licensed, there was a  
20 commitment to do quarterly channel operability tests.  
21 That's to take each channel of the area radiation  
22 monitors, test the alarm capability, make sure they  
23 alarm at the appropriate point, make sure that they  
24 have full range of reading, et cetera. They had made  
25 a change, a 50.59 change from that commitment to a

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1 periodic test per their procedures and that's what the  
2 original change to the FSAR stated. They went from a  
3 quarterly commitment to a periodic commitment. When  
4 I asked what "periodic" meant I got the 50.59 change  
5 package and some problems with the bases there. So  
6 the long and the short of the review is that the TVA  
7 has committed to quarterly changes or a frequency  
8 that's established by the performance of the same or  
9 similar monitors. So that it's a performance-based  
10 criteria now. The statistical acceptance criteria is  
11 that 95-95 acceptance. It's a 95 percent confidence  
12 that the individual monitor will pass the next test 95  
13 percent of the time is what that means. And although  
14 I'm not an I&C guy I understand that's a standard I&C  
15 acceptance criteria for performance-based frequencies.  
16 Next slide.

17 In terms of the plant effluents, the  
18 liquid effluents there were a number of changes to the  
19 source term associated with the liquid effluents from  
20 the plant. Most of them had very minor changes to the  
21 overall dose. In fact, there were only very minor  
22 changes to the overall dose calculations. However,  
23 there was a significant change to the description of  
24 the source terms. TVA had changed the source term  
25 table that's there, Table 11.2-5 which gives the

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1 normal operating source term which is actually the  
2 bottom slash there. I apologize for having these a  
3 little bit backwards. But the normal operating mode  
4 would be as was discussed earlier that the steam  
5 generator blowdown would be released from site  
6 unprocessed as long as it was below the trip setpoint  
7 on the monitor for the blowdown line, and that the  
8 condensate demineralizer, the effluent from the  
9 regeneration of the condensate demineralizer would  
10 also be released from the site unprocessed. If in  
11 fact there was operation with steam generator leakage  
12 in excess of that trip point the blowdown would be  
13 directed to the inlet of the condensate demineralizer  
14 and processed through the condensate demineralizer.  
15 Then there were two sets of source terms given in this  
16 change that would address either releasing the  
17 effluent from the condensate demineralizer  
18 regeneration directly to the environment without  
19 processing or to go ahead and process that effluent  
20 with the mobile demineralizer that's part of their  
21 normal rad waste processing.

22 The purpose of that Table 11.2-5 was to  
23 demonstrate that these modes of operation actually  
24 meet the 5 curie total release limit that's in RM 50-2  
25 and those tables do in fact demonstrate that.

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1       However, in response to a question that I had they  
2       also provided some tables that adjusted these total  
3       curies to an effluent concentration limit for those  
4       three modes of operation and compared them with the  
5       concentration limits in 10 CFR 20 Appendix B. The  
6       result of that analysis is that the -- for the normal  
7       operating mode they meet 10 CFR 20. For the operating  
8       mode in which they would process the blowdown through  
9       the condensate demineralizer and then process the  
10       condensate demineralizer through the mobile  
11       demineralizer that in fact meets Part 20 as well.  
12       However, without that additional processing with the  
13       mobile demineralizer it clearly does not meet Part 20.

14               So they will have to control how long --  
15       now, the Part 20 concentration limits are annual  
16       average so it's the average concentration over the  
17       entire operating year. So obviously extended  
18       operation in that mode would not be acceptable. So  
19       they will have to administratively limit how long they  
20       can operate in that mode. And that would be covered  
21       by the technical specifications, the effluent  
22       technical specifications that'll be put into place in  
23       the offsite dose calculation manuals that are  
24       associated with that that control and limit the  
25       effluents. Although we haven't received the ODCM as

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1 yet so we haven't reviewed that yet but that is going  
2 to be a part of it.

3 CHAIR RAY: When you talk about all these  
4 things is there, this is just a new review independent  
5 of Unit 1 the way it is today? Or do you link these  
6 things in some way saying this is different, this is  
7 the same, that sort of thing? I look at that, I  
8 listen to what you're saying, I can understand it but  
9 I'm just asking myself I wonder how they do it at Unit  
10 1.

11 MR. PEDERSEN: The FSAR, Watts Bar was  
12 originally submitted as a two-unit site with a common  
13 FSAR. We reviewed that up to a certain point as a  
14 common two-unit site. We actually wrote a safety  
15 evaluation, Supplemental Safety Evaluation 16 that  
16 addressed both units operating. What I'm reviewing  
17 are the changes that have happened since then. The  
18 Unit 1 design basis when it was licensed per the  
19 Supplement 16, we only assumed that last bullet there.  
20 We didn't address extended operation with steam  
21 generator leakage. This was added to the Unit 1 FSAR  
22 and then the Unit 2 FSAR was changed to come into  
23 conformance with that. The actual dose calculations  
24 are based on that normal operating mode with minimal  
25 or steam generator leakage less than the trip

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1 setpoint.

2 So the TVA recalculated the doses and we  
3 did an independent dose calculation as well which I'll  
4 get to. Other things that changed in that dose  
5 calculation were the population distribution around  
6 the site from the latest Census, I believe it was the  
7 2000 Census, and then the annual land use survey that  
8 they do. They also incorporated the changes to that.  
9 And they were minimal changes. They calculated the  
10 dose, we calculated the dose. There were slight  
11 changes to the actual numerical values but the maximum  
12 individual, exposure to individual didn't change. The  
13 maximum exposed organ which is in the child did not  
14 change. And those doses will be presented in the  
15 table in a slide here that I have in a few minutes.  
16 Next slide.

17 The changes made to the FSAR didn't impact  
18 the liquid effluents very much but there was a  
19 significant impact to the gaseous effluents. In  
20 addition to some minor changes to the source term the  
21 dilution of the boron recycle system had a minimal  
22 impact. The change from 22 purges per year to a  
23 continuous filtered vent had more of an impact on the  
24 source term and we incorporated that into our re-  
25 analysis as well as TVA incorporated that in their

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1 calculation as well.

2 The major changes though, however, were  
3 associated with the land use survey and the Census,  
4 the population distribution. Things have changed  
5 quite a bit around the plant since Unit 1 was licensed  
6 15 years ago. In particular, the critical milk  
7 animal, the cow and dairy farm that was previously the  
8 limiting pathway no longer was in existence so that  
9 changed. There are still dairies around. I believe  
10 two out the -- three out of the previous five, six  
11 dairies are still in existence but. And then a  
12 garden, a local garden has actually been moved up  
13 closer to the site so it turns out that that local  
14 garden becomes more of a critical dose pathway than  
15 the iodine milk child pathway.

16 In addition to that the meteorology was  
17 changed as you heard earlier. TVA recalculated their  
18 dispersion and deposition factors. And of course  
19 since the location has changed the turbine correction  
20 factors that would be associated with that dose  
21 calculation changed since they're location-specific.

22 The last bullet there, I mentioned that  
23 we, the staff, did an independent assessment.  
24 Supplement 16 to the FSAR was our original independent  
25 assessment and our original safety conclusion was

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1 documented in Supplement 16. We revised that, that  
2 initial staff independent assessment with our standard  
3 assumptions methods. We did use for the source term  
4 our own GALE code which is a slightly different code  
5 than what TVA used. We used, we calculated our own  
6 chi over Q's and D over Q's with a standard code  
7 called XOQ/DOQ which has been consistently used in  
8 licensing. And then we did our own dose calculations  
9 that are based on the GASPAR and LADTAP codes that  
10 have been around and been used in licensing since the  
11 '70s which are in fact different than the codes that  
12 Watts Bar used.

13 So this is the result. The first column  
14 there is the design objectives that are listed in 10  
15 CFR -- excuse me, Appendix I. The second column are  
16 the TVA-calculated doses and the third column there is  
17 the NRC-calculated doses for those various criteria,  
18 liquids, total body, any organ, noble gasses and the  
19 airborne effluents, and then the last one is the  
20 radioiodine and particulate. There's a 15 millirem  
21 criteria for any organ, all pathways.

22 There's general agreement between the TVA  
23 and NRC assessments within about 10 percent of each  
24 other. Both of them indicate that they're well within  
25 the design criteria, their respective criteria. And

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1 so there's not much of a problem there until you get  
2 to the last one. The 15 millirem for the airborne  
3 radionuclides and particulate, previously during the  
4 Unit 1 licensing was calculated out as 7.5 millirem  
5 per unit so there was a significant increase.

6 The significance is that TVA had committed  
7 to meeting RM 50-2. Go ahead and change the slide.  
8 RM 50-2 was actually the forerunner to 10 CFR 50  
9 Appendix I. It has very similar design objectives as  
10 Appendix I with the notable exception that in some of  
11 those design objectives they were given, even though  
12 the numeric value was the same they were given on a  
13 per-site as opposed to a per-unit basis. And when  
14 that change was made and Appendix I was finalized the  
15 requirement for the licensee to do a cost/benefit  
16 analysis in addition to meeting the specific design  
17 criteria that are listed there, licensees are also  
18 required to do cost/benefit analysis to see that if  
19 modifications to the rad waste system could actually  
20 attain what's called a beneficial cost/benefit ratio  
21 at \$1,000 per man-rem. However, there's an exception  
22 to that requirement that's built into Appendix I and  
23 that's for plants that received a construction permit  
24 between 1974 and '76 which TVA was. So Unit 1 was  
25 built to that exception.

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1           They did not provide a cost/benefit  
2 analysis. They demonstrated that they met RM 50-2.  
3 That can no longer be concluded from the dose  
4 calculations, either the staff's or the licensee's  
5 dose calculations. A maximum organ dose of 9.15  
6 implies a site dose of over 18 millirem which of  
7 course doesn't meet the 15 millirem requirement. So  
8 TVA was required to do the cost/benefit analysis.

9           We provide actually a very proceduralized  
10 analysis method in Regulatory Guide 1.110. It gives  
11 a list of what is considered technically feasible  
12 modifications, enhancements --

13           CHAIR RAY: 1975 dollars, are you kidding  
14 me?

15           MR. PEDERSEN: Yes. No, I'm not.

16           CHAIR RAY: Jiminy Christmas.

17           MEMBER STETKAR: When was Reg Guide 1.110  
18 last updated?

19           MR. PEDERSEN: 1976.

20           CHAIR RAY: I don't know if anybody can  
21 calculate 30 years ago.

22           MR. PEDERSEN: Actually, the document  
23 itself gives a list of enhancements, technically  
24 feasible enhancements and gives the cost, the capital  
25 cost in 1975 dollars of what that would be. It goes

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1 through an extensive procedure of taking the direct  
2 and indirect costs, adjusting them for capital --

3 CHAIR RAY: I know how to do it, I just --  
4 it's --

5 MR. PEDERSEN: -- and adding the --

6 CHAIR RAY: You're getting almost a half  
7 a century of discounting here and that's a big number.

8 MR. PEDERSEN: Yes, but --

9 CHAIR RAY: The inflation of the '80s.

10 MR. PEDERSEN: That's actually addressed  
11 in the document. The rationale was if you're doing  
12 the cost/benefit ratio, if you assume that inflation  
13 adjustment would impact both the costs and the  
14 benefits the same it doesn't make any difference, they  
15 cancel each other out. That's the rationale built  
16 into the document. That's why \$1,000 per man-rem  
17 hasn't been adjusted.

18 CHAIR RAY: All right, I see the point.  
19 Yes.

20 MEMBER RYAN: It makes it very hard to  
21 communicate what exactly it is you're doing, however.

22 MR. PEDERSEN: I agree, I agree.

23 MEMBER RYAN: I mean it's very arcane and  
24 I've got to tell you, I think about updating it.

25 MR. PEDERSEN: If it were me I would

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1 probably recommend that as well.

2 CHAIR RAY: Yes, because the \$1,000 would  
3 now be I don't know what but some big number.

4 MEMBER RYAN: A whole lot more.

5 MR. PEDERSEN: Well, NRR is actually in  
6 the process of trying to update that. The \$1,000 per  
7 man-rem standard assumption that was built into a lot  
8 of our cost/benefit analysis not just for plant  
9 licensing, but for --

10 MEMBER RYAN: At some point it's simply a  
11 metric. It means nothing whatsoever to do with  
12 regular money. It's just some metric number that  
13 you're using to assess this versus that.

14 MR. PEDERSEN: That's true.

15 MEMBER RYAN: So yes, one approach would  
16 be to drop the dollars.

17 CHAIR RAY: That's right.

18 MEMBER RYAN: And just call it the metric,  
19 you know, the figure of merit calculation, whatever  
20 you want to call it. It does not represent real  
21 dollars and it's very hard to explain that to anybody  
22 that's not familiar with the history and use of it.

23 MR. PEDERSEN: Actually, the reg guide  
24 itself, you're right. It leads you into putting both  
25 the cost and the benefit in terms of dollars. The way

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1 that TVA actually did the analysis and the way the  
2 analysis is being done these days in NRO I believe is  
3 consistent, in which instead of --

4 MEMBER RYAN: I challenge anybody to go  
5 try and teach a class of young engineers what it all  
6 means. You'd get done with it in a day.

7 MR. PEDERSEN: It took me more than a day  
8 to try to figure it out. I've never, I've licensed,  
9 I've done reviews in the past when we were doing quite  
10 a bit of reviews, in fact, I did the Chapter 12 review  
11 for Unit 1 15 years ago and this is the first time  
12 I've ever had to go through this, the cost/benefit.  
13 I understand NRO with the new reactors have in fact  
14 done a number of these assessments.

15 The way TVA did this assessment, instead  
16 of putting things in terms of dollars they put things  
17 in terms of person-rem, in terms of the collective  
18 dose. The calculating out a cost for an enhancement,  
19 if you've got \$20,000 that would imply that you'd have  
20 to have at least a 20 person-rem savings to come up  
21 with that beneficial cost/benefit ratio and so it was  
22 done in terms of dose saved and how much dose would  
23 have to be saved to benefit that. So that's how they  
24 did their analyses.

25 And they went through, it's \$1,000 per

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1 person-rem, that's both total body and person thyroid  
2 rem. So it's collective thyroid rem as well. The  
3 person-rem was fairly easy to demonstrate that the  
4 lease expensive modification listed in the guidance  
5 document would require more dose savings, total body  
6 dose savings than the operation of the unit actually  
7 results in.

8 MEMBER RYAN: So that raises another issue  
9 that having a separate individual organ dose when we  
10 have effective committed dose is another longstanding  
11 rule.

12 MR. PEDERSEN: Yes, you're right. We did  
13 not do this review in terms of effective committed  
14 dose. It's to demonstrate compliance with Appendix I  
15 which is based on ICRP 2. We did not make a  
16 conforming change.

17 MEMBER RYAN: For those that don't know  
18 ICRP 2 was written in 1959.

19 MR. PEDERSEN: Yes, yes. And it's one of  
20 the issues that we have right now that we have an  
21 ongoing process of trying to adopt the latest ICRP  
22 recommendations and making conforming changes,  
23 particularly to Appendix I is one of the main bullet  
24 items on the list.

25 So, as I said, TVA provided that

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1 assessment. I've reviewed it. My review is  
2 documented in Supplement 25 there. The staff did an  
3 independent assessment. We, as I said we had our own  
4 chi over Q's, our own offsite dose calculations based  
5 on our own set of standard assumptions. Our doses  
6 were slightly higher than TVA's in most cases and our,  
7 the costs were slightly lower and that's because  
8 within the document that capital recovery cost,  
9 there's a range of factors that are given in the  
10 guidance. TVA used a factor that's in the middle of  
11 the range. I used the low end of the range to  
12 minimize what the cost would be. And even by  
13 minimizing the cost and having slightly higher doses  
14 I did not come to a beneficial cost/benefit ratio. So  
15 I, you know, verified TVA's conclusion that no  
16 enhancements to the rad waste systems would be  
17 warranted.

18 MEMBER ABDEL-KHALIK: Doesn't this  
19 approach sort of constrain licensees and prevents them  
20 from taking advantage of advances in technology?

21 MR. PEDERSEN: I don't see the point --  
22 no, I don't see how it could constrain them.

23 MEMBER ABDEL-KHALIK: I mean, you know, if  
24 you can't do the cost translation correctly, if you're  
25 using obsolete numbers and something comes up that it

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1 an advance in technology, if you can't do the  
2 cost/benefit on apples to apples comparison you're  
3 sort of not allowing them to make that comparison.

4 MR. PEDERSEN: The licensees are free to  
5 add, to go way beyond what we require. It actually  
6 constrains the staff as to what we can.

7 CHAIR RAY: I think the way to think about  
8 it is it would be interesting to know what the heck is  
9 \$1,000 in 1975 dollars today. What is it?

10 MR. PEDERSEN: There was extensive bases  
11 for coming up with that at the time.

12 MEMBER RYAN: But it's out of date  
13 dramatically.

14 MR. PEDERSEN: I agree.

15 MEMBER RYAN: I mean, the dosimetry is 60  
16 years out of date and the financial basis is 40 years  
17 out of date.

18 CHAIR RAY: When you escalate the dollars  
19 from '75 to today using whatever the, there are  
20 different inflation factors you could pick, but when  
21 you do that what number do you come up with?

22 MR. PEDERSEN: As I said, NRR is going  
23 through that process right now. They haven't come up  
24 with a number. They are in the process of updating  
25 that \$1,000 per man-rem. Not for Appendix I because

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1 this guidance requires this process but the staff  
2 itself through the backfit rule if we have to backfit  
3 a licensee or backfit a requirement on a licensee or  
4 do rulemaking we have to do a cost/benefit analysis to  
5 justify that backfit.

6 CHAIR RAY: So one would think that you  
7 would know what the number is.

8 MR. PEDERSEN: So that updated value will  
9 be applied to our own analysis.

10 CHAIR RAY: I mean somebody here you would  
11 think would know what \$1,000 in '75 dollars is today.  
12 You guys know.

13 MR. BRYAN: This is Bob Bryan. TVA has as  
14 part of their design process a cost/benefit for  
15 looking at ALARA changes and we use \$25,000.

16 CHAIR RAY: Twenty-five? Okay. Well,  
17 that's a number that I wouldn't quibble with. It's  
18 just, you know, hard to -- if as Mike was saying, if  
19 you're talking to members of the public \$1,000 just  
20 doesn't make any sense, but \$25,000 which is the real  
21 number I presume that one gets when you escalate 1975  
22 dollars to --

23 MEMBER SIEBER: That's pushing it.

24 MR. PEDERSEN: There's a range of values  
25 that are used.

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1 MEMBER SIEBER: It's a factor of 10 maybe,  
2 but not 25.

3 MEMBER RYAN: It clearly costs a whole lot  
4 more to save a person-rem than \$1,000. Whether it's  
5 25 or 50 or some number in that range for various  
6 kinds of 1 rem savings I'm sure there's a range of  
7 numbers. It's not one number.

8 CHAIR RAY: Well, \$1,000 will translate  
9 into one single number depending on what escalation  
10 factors you want to use.

11 MEMBER RYAN: I understand that.

12 CHAIR RAY: I'm just asking the question  
13 what is the number.

14 MEMBER ABDEL-KHALIK: A lot less than  
15 \$25,000.

16 CHAIR RAY: Okay.

17 MEMBER SIEBER: Maybe 10.

18 CHAIR RAY: I'm not sure. That's a long  
19 time and if you compound the --

20 MEMBER ABDEL-KHALIK: Still a lot less  
21 than \$25,000.

22 CHAIR RAY: All right.

23 MEMBER STETKAR: The last 20 years  
24 inflation hasn't been --

25 CHAIR RAY: I just remember when it was

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1 running 18-19 percent. Anyway, but that was  
2 construction.

3 MEMBER ABDEL-KHALIK: So would you still  
4 use that \$25,000 per man-rem for things like  
5 evaluating zinc addition?

6 MR. BRYAN: If we follow our procedure  
7 yes, we would.

8 CHAIR RAY: Okay. I'm sorry to divert  
9 things.

10 MR. PEDERSEN: That's my last slide.

11 CHAIR RAY: All right. Now, you've got  
12 two colleagues here but it's now 2:30 and I assume you  
13 each have your presentations to make, John first and  
14 then Leta.

15 MR. POOLE: Well, actually John has his  
16 presentation on the accident dose.

17 CHAIR RAY: Right.

18 MR. POOLE: Leta is actually here just to  
19 support his review, so.

20 CHAIR RAY: All right. Well, I thought I  
21 saw her name here listed on the meteorology.

22 MR. POOLE: Correct, but in preparing the  
23 slides we just kind of lumped them all to one.

24 CHAIR RAY: All right, that's fine. Well,  
25 I hate to ask you to do this but if we go through your

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1 presentation we'll wind up running I'm afraid later  
2 than we should to take a break so I need to give  
3 people a break here and we'll do that for -- until 20  
4 minutes to the hour, and then we'll resume. For the  
5 balance of the day.

6 (Whereupon, the above-entitled matter went  
7 off the record at 2:27 p.m. and resumed at 2:41 p.m.)

8 CHAIR RAY: So let's do that and we have  
9 one more two-part presentation I guess from the staff.  
10 So let's proceed with that, Justin.

11 MR. POOLE: Okay. Yes, the next part of  
12 the presentation is to go over the status of the  
13 design basis accident dose consequence evaluations.  
14 With me I have John Parillo and Leta Brown who are  
15 both from the Accident Dose Branch. John?

16 MR. PARILLO: Okay. My review focused on  
17 identifying the difference between Watts Bar Unit 1  
18 and any changes that were made for Watts Bar 2. So  
19 basically I asked the applicant to identify for each  
20 accident all the major inputs and show, you know, in  
21 table form what that value is for Unit 1 and what it  
22 is for the Unit 2 and explain any differences. So  
23 that, they did that and kind of condensed the major  
24 differences on this slide. We've already talked about  
25 the updated atmospheric dispersion coefficients, chi

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1 over Q's, and of course the differences in the steam  
2 generators which affect mainly the releases from the  
3 secondary side. And of course this Unit 2 at least  
4 right now is not intended to be licensed for tritium  
5 production so that affects source term for the  
6 accidents. And the updated dose conversion factors  
7 which resulted in a lower dose equivalent iodine, that  
8 should say tech spec limitations on the primary  
9 coolant. And the other difference was that for Watts  
10 Bar Unit 2 they added some release scenarios,  
11 additional release scenarios for the fuel handling  
12 accident, and in those additional release scenarios  
13 they incorporated the insights from the alternative  
14 source term using Reg Guide 1.183.

15 MEMBER RYAN: John, can we just clarify  
16 the iodine point you made? The lower dose equivalent  
17 iodine coolant values means the concentration allowed  
18 in coolant is low.

19 MR. PARILLO: Is low.

20 MEMBER RYAN: Because the dose conversion  
21 factor went up.

22 MR. PARILLO: Because, yes, when -- if you  
23 have a given mixture -- and for dose equivalent iodine  
24 they restrict it to iodine-131 through -135, so you  
25 look at those five isotopes. And for a given mixture

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1 if you use the DCFs from ICRP 2 which is also what's  
2 in the old Technical Information Document 1844 you  
3 will come out with a higher dose equivalent iodine-  
4 131.

5 MEMBER RYAN: Per unit activity.

6 MR. PARILLO: Yes, for that same, and if  
7 you look at that same concentration and you use  
8 updated dose conversion factors you'll come up with an  
9 actually fairly significantly lower --

10 MEMBER RYAN: Lower dose.

11 MR. PARILLO: So when that translates you  
12 end up with a more restrictive tech spec. And they  
13 have actually which I was going to get to a little  
14 later is they have very restrictive coolant activity  
15 tech spec limits, both for the long-term operation and  
16 for the iodine spike, the short-term relative to many  
17 other plants.

18 MEMBER RYAN: Thanks for clarifying. I  
19 think it's very important for folks to get right  
20 what's getting bigger and what's getting smaller and  
21 all of that.

22 MR. PARILLO: Right. And of course that  
23 has -- as a reviewer to me I thought it was worthy to  
24 mention that the offsite dose, and this slide says  
25 just offsite but it's actually true for control room

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1 as well, that all of the dose consequences for Watts  
2 Bar 2 are low relative to the acceptance criteria.  
3 And there's a couple of reasons that I listed here in  
4 my notes for that. One of them is that they have a  
5 very effective dual containment design so that all of  
6 the containment leakage is captured and processed  
7 prior to release. And also the ice condenser system  
8 does have beyond the pressure-reducing characteristics  
9 there is also an iodine absorption that's used and  
10 some credit is taken for that as well.

11 CHAIR RAY: John, let me interrupt you a  
12 second. Let me ask the applicant, you still refer to  
13 this as the shield building though, rather than a  
14 secondary containment, don't you?

15 MR. BRYAN: Yes. This is Bob Bryan. We  
16 have a shield building that's the typical annulus  
17 secondary containment that is typical of many plants,  
18 but when you get out to the auxiliary building there's  
19 a large portion of the auxiliary building that is also  
20 maintained as a part of the secondary containment  
21 boundary. It's kept at a negative pressure relative  
22 to the outside and it has HEPA and charcoal filters on  
23 it. And so the leakage from the containment is  
24 apportioned 75 percent to the annulus and its  
25 filtration system, and the other 25 percent is treated

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1 by the auxiliary building gas treatment systems, and  
2 that's --

3 CHAIR RAY: Do you refer to that as the  
4 secondary containment?

5 MR. BRYAN: The whole thing we call the  
6 secondary containment boundary.

7 CHAIR RAY: You do? Both the shield  
8 building and the portion of the auxiliary building?

9 MR. BRYAN: Yes. And the design was set  
10 up so that we had no, at the time no unfiltered out-  
11 leakage from the plant.

12 CHAIR RAY: All right, thanks.

13 MR. PARILLO: Thank you, Bob, you just  
14 covered my next point which I was going to mention  
15 that not only is all of the things that Bob mentioned,  
16 but those filtration units are also very robust. They  
17 have two carbon beds in a series and per our  
18 regulatory guides are allowed to assume 99 percent  
19 removal. It's probably higher than that but we cap it  
20 at 99 percent. So, not only is all of the leakage  
21 processed but it's processed very effectively. And  
22 there's probably other reasons but those are the main  
23 reasons that I focused on.

24 So that, in this particular slide we're  
25 talking about a loss of coolant accident and the doses

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1 being well within 10 CFR 100.11. Now, when you use  
2 the term "well within" in the design basis accident  
3 dose nomenclature that actually is a defined number.  
4 It refers to less than 25 percent and that's usually  
5 applied to, or not usually, it is applied in a  
6 regulatory sense to, for instance, the fuel handling  
7 accident and also the rod ejection accident and that.  
8 So the key here is that for the LOCA that in some  
9 cases was -- used to be referred to as the maximum  
10 hypothetical accident. That's the accident that  
11 actually we're talking about in the regulation where  
12 the numbers are delineated, you know, a substantial  
13 core damage accident. So in the case of Watts Bar 2  
14 their maximum hypothetical accident, their LOCA  
15 analysis for dose consequences, their doses are  
16 actually less than 25 percent of the 10 CFR Part 100  
17 values. That becomes important for the next bullet  
18 down.

19           Incidentally then, getting back to their  
20 very restrictive coolant, tech spec coolant values  
21 helps them in terms of the main steam line break and  
22 the steam generator tube rupture. Their doses there  
23 are well below the applicable regulatory requirements.  
24 So, and that's directly related to the restrictive  
25 tech specs that they have on the coolant.

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1           Now, in terms of this next bullet on the  
2           rod ejection accident the applicant's statement was  
3           that the rod ejection accident was bounded by the  
4           LOCA. And of course in terms of the source term  
5           release that's an obvious, you know, obvious statement  
6           that you're going to have a much more, you know,  
7           energetic release in a LOCA. But the complication  
8           becomes in terms of in regulatory space, at least in  
9           the regulatory guide space is that the accepted  
10          criteria for the accident is different. For the LOCA  
11          we accept the full 100 value, but for the rod ejection  
12          accident we say it has to be well within. So that's  
13          why the first bullet is important, that the LOCA for  
14          Watts Bar 2 actually has doses that are well within.  
15          So if you go through the logic then their conclusion  
16          that the rod ejection accident would be bounded by the  
17          LOCA then makes sense both from the release of fission  
18          products and also the, you know, how that affects  
19          where you are in relation to the regulatory limit for  
20          the accident. So I hope I didn't confuse anybody on  
21          that.

22                   CHAIR RAY: No.

23                   MR. PARILLO: Okay. And the other  
24          difference had to do with the way Watts Bar 2 has  
25          looked at the fuel handling accident. And I was a

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1 little sloppy when I made this slide, so. The first  
2 bullet should read, the first scenario, release  
3 scenario should read, "The containment closed to the  
4 auxiliary building with credit for the reactor  
5 building purge ventilation system filtration" which is  
6 another filter system. They use very conservative,  
7 took credit but not much credit for that system  
8 because of concerns with humidity. So that, but that  
9 was using, when I say traditional assumptions I mean  
10 non-alternative source term assumptions and used the  
11 whole body and thyroid dose criteria. So that was the  
12 first release scenario and that was pretty much more  
13 akin to what's in the licensing basis for Watts Bar  
14 Unit 1.

15 Then the next two were additional  
16 scenarios that they evaluated. And for release in the  
17 spent fuel pool in the auxiliary building with no  
18 credit for filtration using the alternative source  
19 term assumptions and with the dose acceptance  
20 expressed in terms of total effective dose equivalent  
21 instead of the whole body and thyroid. And the third  
22 release, again this was -- should read "The  
23 containment open to the auxiliary building with no  
24 credit for filtration." And that was also done using  
25 the alternative source term and of course the TEDE

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1 acceptance criteria. And all of these scenarios meet,  
2 again, this is -- for fuel handling accidents we also  
3 use this well within, so less than 25 percent of the  
4 10 CFR 100.11 limits. And so that's, you can go to  
5 the next. So the conclusion is that design basis  
6 accidents predict doses within applicable regulatory  
7 acceptance criteria and that we didn't have any open  
8 items for this portion.

9 CHAIR RAY: All right. Any questions?  
10 Okay. Was there anything more to be said on the  
11 meteorology?

12 MS. BROWN: No.

13 CHAIR RAY: Okay.

14 (Laughter)

15 MS. BROWN: There were no questions as far  
16 as I understand it.

17 MR. PARILLO: She already asked him all  
18 the questions.

19 CHAIR RAY: Okay.

20 MR. PARILLO: Thank you.

21 CHAIR RAY: Thank you. Justin, do you  
22 have anything more before we turn to open items?

23 MR. POOLE: Not really. Take one minute  
24 here. Just the summary of what we have remaining, and  
25 we've kind of already gone over this for the most

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1 part. The staff review is nearing completion. Some  
2 of the future milestones are listed here on this  
3 slide, doing the SER and issuance of a license. I'm  
4 sorry, issuance of the final environmental supplement  
5 for the license. Completing our ACRS review. Going  
6 through ASLB and then some regional items regarding  
7 operational rate assessment and the certification of  
8 as-built.

9 For the next meeting, as we said before we  
10 have the next subcommittee meeting scheduled for April  
11 of 2012. The main focus will be fire protection and  
12 closure of open items. So I think at this time is  
13 probably a good spot that we.

14 CHAIR RAY: Yes, I want to review the open  
15 items and if there are any public comments open the  
16 phone line, and with that we'll probably be done. So  
17 if I could ask members to, and anybody else turn to HH  
18 in the SSER 25 appendix where the open items are  
19 listed. As Justin explained earlier the confirmatory  
20 items reflect staff agreement where some action is  
21 still required to be taken and the vast majority of  
22 items open simply to ensure that it is in fact done as  
23 agreed upon. So it's not my intention to focus on the  
24 confirmatory items but if anybody has anything they  
25 want to comment on about a confirmatory item please

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1 speak up. But all I want to do is go over the other  
2 open items and see in a little more pedantic way if  
3 there's anything here that needs to be on the agenda  
4 for the next and potentially final, but that'll have  
5 to be seen, subcommittee meeting.

6 So the first one I see that's not a  
7 confirmatory item is listed here, is 12 on page 2, and  
8 refers to an audit to verify implementation of some  
9 requirements. Thirteen, IST program before OL  
10 issuance. Normally we would not review that. Sixteen  
11 has to do with the environmental qualification and  
12 again presumably we are not concerned with any review  
13 there. Seventeen, similarly. Twenty-three is a  
14 confirmatory item. Twenty-five has to do with  
15 insurance, not a matter of concern to us. Twenty-six  
16 has to do with an accident in one unit, concurrent  
17 shutdown of the second unit without offsite power.  
18 Unit 2 pre-op testing will validate diesel response  
19 sequencing loads on Unit 2 emergency diesel generators  
20 and the staff will evaluate the status of this issue.  
21 Again, it appears the requirements are clear enough  
22 and this is really in the form of test performance.

23 Thirty has to do with degraded voltage  
24 relay setpoint dropout settings and the confirmation  
25 the tech specs are properly derived from those. Not

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1 something we would review I don't believe. Thirty-  
2 two, emergency diesel generator voltage and speed  
3 range and so on having to do with tech spec  
4 surveillance requirements. Nothing there I don't  
5 think. Next one is confirmatory item then there's 35,  
6 information concerning feedwater purity requirements.  
7 I don't have any interest in seeing that come here  
8 unless somebody else does. Then we've got a series of  
9 confirmatory items till you get over to 47 which is a,  
10 let's see. It's a water-sealed valve leakage test  
11 results and a discrepancy that existed needs to be  
12 resolved there. That doesn't appear to require ACRS  
13 further review.

14 Confirmatory items till you get to 59.  
15 ESF system materials with containment sprays and core  
16 cooling in the event of a LOCA is incomplete pending  
17 resolution of GSI-191 which raises a question I've  
18 been intending to find a place to ask and that is to  
19 direct to Justin. What's the outlook on 191 as far as  
20 Watts Bar 2? Why all this concern? Is it treated  
21 like an operating plant from the standpoint of 191?

22 MR. MILANO: Yes.

23 CHAIR RAY: Yes, Pat.

24 MR. MILANO: Yes, we are doing the review  
25 of GSI-191. Actually, the staff has already drafted

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1 a relatively complete safety evaluation for GSI-191.  
2 However, there is one outstanding issue as it relates  
3 to all the plants and that's the treatment of in-  
4 vessel effects. And that's what's been holding us up  
5 from issuing a safety evaluation to resolve that.  
6 What we, we have been in dialogue with TVA and we've  
7 been, not to say that this is going to be the staff  
8 approach but one of the things we're thinking about is  
9 as you've heard in the past TVA did a lot with the  
10 Unit 2 containment to remove all the fibrous material  
11 and basically we consider it to be a zero fiber plant.  
12 So the --

13 CHAIR RAY: Call it a low-fiber plant.

14 MR. MILANO: A low-fiber plant. And so  
15 one of the things that we have been conversing with  
16 TVA on is for them to come in with some type, barring  
17 the staff's ability to generically resolve the in-  
18 vessel effects issue and the methodology that TVA  
19 would come in and make an argument, you know, with  
20 regard to the minimal fiber and the fact that what its  
21 impact is on, you know, in-vessel effects. And that  
22 it's, that we could make some type of reasonable  
23 assurance decision in advance of, you know, of a more  
24 generic review of it. And that's one of the things  
25 we're thinking about doing but I can't say at this

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1 time for sure.

2 CHAIR RAY: All right. Let's identify 61  
3 as one that we'd like a status on at the next  
4 subcommittee meeting.

5 MR. SHUKLA: But I would note that Unit 2  
6 is different than Unit 1.

7 CHAIR RAY: Of course. Am I confusing  
8 them somehow?

9 MR. SHUKLA: No.

10 MR. POOLE: Just to clarify, you're  
11 actually talking about number 59.

12 MR. MILANO: Fifty-nine.

13 CHAIR RAY: Oh, was I? Okay. I've got my  
14 finger on the wrong thing here. I'm sorry. I was  
15 going to ask Said about 61, that's why.

16 MEMBER ABDEL-KHALIK: Well, we have a very  
17 large margin as far as the peak clad temperature for  
18 a large-break LOCA but I think it would still be  
19 interesting to find out what the result of that  
20 discrepancy will be.

21 CHAIR RAY: All right, so you'd like to  
22 treat it similar to 59 --

23 MEMBER ABDEL-KHALIK: Correct.

24 CHAIR RAY: -- which I meant to refer to.  
25 All right. Okay, that confirmatory item still 65.

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1 MEMBER BROWN: Sixty-three, even though  
2 it's a confirmatory item, it's -- I don't know how to  
3 differentiate between that and 93. They are both  
4 addressing the same issue so they kind of go hand in  
5 hand.

6 CHAIR RAY: Okay. Would you like  
7 discussion of that?

8 MEMBER BROWN: Well, yes.

9 CHAIR RAY: For a status?

10 MEMBER BROWN: Yes, it's hand in hand with  
11 93. I think if you do one you've got the other one.

12 CHAIR RAY: All right.

13 MEMBER BROWN: If I understand 93  
14 correctly. I don't know that 93 is, that's an NRR  
15 resolve. This one is a region. They're both -- 93 is  
16 also Region II. Yes, they ought to be lumped  
17 together.

18 CHAIR RAY: Okay. Now do you want to say  
19 anything more about what your interest is so that we  
20 get the right information?

21 MEMBER BROWN: Am I supposed to remember  
22 what I said earlier?

23 CHAIR RAY: Only if you want to.

24 MEMBER STETKAR: The answer is no, you  
25 don't want to say anything more.

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1 MEMBER BROWN: The answer is whatever I  
2 said in the transcript is what I'd like to hear about.  
3 I thought I was fairly complete.

4 CHAIR RAY: All right.

5 MEMBER BROWN: Some of that involves  
6 staff, I mean Region II and some of it involves staff.

7 CHAIR RAY: Enough.

8 MEMBER BROWN: Yes, enough.

9 CHAIR RAY: All right, 65 is the next  
10 item. I'm not sure what the heck it's about.

11 MEMBER BROWN: I was going to ask. I  
12 don't know what WCAP-13869 is, so.

13 MR. POOLE: All it was was there was a  
14 difference between -- I don't recall what the WCAP is  
15 either.

16 MEMBER BROWN: It's a check --

17 MR. POOLE: It's an I&C. Right. But  
18 there was just a difference between, and the Unit 1  
19 was using one revision and Unit 2 was using another.

20 CHAIR RAY: All right.

21 MR. POOLE: Staff has actually -- already  
22 has one closed for 36.

23 MR. SHUKLA: Gentlemen, I think Mr. Brown  
24 was interested in number 64 also.

25 MEMBER BROWN: That's a -- no. I looked

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1 at that. That's a test item. Somebody should read  
2 the results and they'll know whether it's okay or not.  
3 We don't need to see that.

4 CHAIR RAY: All right, thank you. Okay,  
5 moving on. Seventy --

6 MEMBER STETKAR: Sixty-seven, but that's  
7 kind of similar. That's the whole probable maximum  
8 flood thing. I mean this is, once you figure out what  
9 it is.

10 CHAIR RAY: I saw that and --

11 MEMBER STETKAR: That's -- I mean, I can  
12 go measure heights.

13 CHAIR RAY: I would think so, yes.

14 MEMBER STETKAR: I would think so.

15 CHAIR RAY: All right. Seventy, that  
16 doesn't appear to be anything requiring ACRS attention  
17 or review. Seventy-one I thought was kind of  
18 interesting but I don't want to ask for review here.  
19 Seventy-seven --

20 MEMBER BROWN: What's HRCAR? HRCAR  
21 monitors. Are those atmospheric? Are they radiation  
22 monitors?

23 MR. MILANO: High-radiation containment  
24 atmospheric monitors.

25 MEMBER BROWN: Okay.

1 MEMBER SIEBER: High-radiation containment  
2 area monitors.

3 MEMBER BROWN: All right.

4 CHAIR RAY: Okay. Pass on that?

5 MEMBER BROWN: Yes, I'll pass on that.

6 CHAIR RAY: Seventy-nine.

7 MEMBER BROWN: Unless Mike wants me to do  
8 something.

9 MEMBER RYAN: They're okay, Charlie.

10 MEMBER BROWN: You happy?

11 MEMBER RYAN: I'm happy.

12 MEMBER BROWN: Thank you.

13 CHAIR RAY: Okay, 79 deals with the same  
14 monitors. Any different comment there? I take it  
15 not.

16 MEMBER BROWN: No.

17 CHAIR RAY: And then there's a how do we  
18 meet this reg guide in number 80. Pass on that.  
19 Eighty-one, compliance with EPRI document here for  
20 staff review again wouldn't normally come to us I  
21 don't believe. Moving down to 91. This is one that's  
22 a little more interesting and do you want to say  
23 something, John, about it?

24 MEMBER STETKAR: No, I don't because I  
25 don't remember what it's all about.

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1 CHAIR RAY: All right. Let's add it to  
2 the list.

3 MEMBER STETKAR: We probably should hear  
4 about it.

5 CHAIR RAY: Yes. So 91 is something we  
6 want to hear about. Ninety-three we've covered, thank  
7 you. Ninety-four, you're satisfied with that?

8 MEMBER BROWN: Yes. These are roughly,  
9 we're going to go through the IEEE standards and  
10 confirm that they meet the specific requirements of  
11 the IEEE spec.

12 CHAIR RAY: Same on 98 and 101?

13 MEMBER BROWN: Because 93, 94, 95.

14 CHAIR RAY: There isn't any 95.

15 MEMBER BROWN: I'm sorry, 98, 101, 105,  
16 108. I went through these, I didn't see any reason to  
17 --

18 CHAIR RAY: Okay.

19 MEMBER BROWN: -- to pull harder on those.

20 MEMBER RYAN: That includes 110 and 111  
21 too.

22 MEMBER BROWN: Including 110 and 111.

23 CHAIR RAY: Yes, all right. Then we have  
24 confirmatory items down to 118. I don't know, it's --  
25 Said, do you have any interest in that? I'm not sure

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1 what the heck.

2 MR. MILANO: That's the wind size fixed in  
3 core probes.

4 CHAIR RAY: Yes. Would be operable  
5 following failure of SPMD. Care about that? All  
6 right. One twenty, John?

7 MEMBER STETKAR: No.

8 CHAIR RAY: All right. One twenty-one,  
9 no. One twenty-three, no. One twenty-five, no. EQ  
10 testing, yes. One twenty-six? Yes, that's right. It  
11 just didn't say -- it says environmental  
12 qualifications.

13 MEMBER STETKAR: They decided to spell it  
14 out.

15 CHAIR RAY: All right. One twenty-seven.

16 MEMBER STETKAR: No.

17 CHAIR RAY: Okay. One twenty-nine?

18 MEMBER BROWN: That's for minimally  
19 insulated cable on 127, right? Is that right? Is  
20 that what you're talking about, MI cable?

21 MR. MILANO: Yes.

22 MEMBER BROWN: Okay.

23 CHAIR RAY: One twenty-nine seems pretty  
24 far down in the weeds. One thirty-one. While I'm  
25 trying to ponder that one do you have some thought

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1 about it, 131?

2 MEMBER STETKAR: No, that's just making  
3 sure that --

4 CHAIR RAY: Yes. Got the right numbers.

5 MEMBER STETKAR: They've got the right  
6 numbers in the EOPs to take action.

7 CHAIR RAY: One thirty-two.

8 MEMBER STETKAR: Yes.

9 CHAIR RAY: Okay, add that to the list.

10 MEMBER STETKAR: That's the boron  
11 dilution, basically timing analysis.

12 CHAIR RAY: Okay, 132 is on. One thirty-  
13 three?

14 MEMBER STETKAR: I'd say 133 and 134  
15 together. They're part of the flood stuff.

16 CHAIR RAY: Yes, and again, there's both  
17 an interest in -- we've got the right action being  
18 taken but more profoundly why are we doing it the way  
19 we're doing it. And I think, I mean I could provide  
20 an answer but because we're putting in the Unit 2 OL  
21 stuff that the basis of which isn't there, it's  
22 elsewhere, we want to understand clearly are we doing  
23 the right thing here in adopting this time sequenced  
24 license condition that says at certain points in the  
25 future we're going to provide, basically change the

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1 licensing basis over time. And I think I understand  
2 all that I need to on that, I just want to make sure  
3 that I understand what the staff's thinking about it  
4 is, and for sure we're going to want to recognize this  
5 in the letter that we write and I want to get it  
6 right. Okay.

7 MEMBER ABDEL-KHALIK: Mr. Chairman, there  
8 is something I'm interested in. I don't know if  
9 you've had the opportunity to review it in the past  
10 since I haven't been attending these subcommittee  
11 meetings and that pertains to the turbine-driven aux  
12 feedwater pump room heat-up during station blackout.

13 CHAIR RAY: Certainly not. And the reason  
14 I said it the way I did was you said during station  
15 blackout. And you were thinking about the station  
16 blackout that is the existing licensing basis?

17 MEMBER ABDEL-KHALIK: Correct, correct.

18 CHAIR RAY: Okay.

19 MEMBER ABDEL-KHALIK: We just want to see  
20 whether that is actually limiting as far as station  
21 blackout coding time.

22 CHAIR RAY: So it's the heat up of the --

23 MEMBER ABDEL-KHALIK: Turbine-driven aux  
24 feedwater pump room.

25 CHAIR RAY: Interesting, okay. So make a

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1 note of that, Girija. All right, I think the last one  
2 here is 134 or did we cover that as part of the -- we  
3 did. Okay. So that's all the non-CI items in the --

4 MR. SHUKLA: Can I just go over quickly on  
5 the exact numbers?

6 CHAIR RAY: No.

7 (Laughter)

8 CHAIR RAY: Use the transcript. I'm not  
9 going to go through it again. I mean, you know, we do  
10 it once. I'm not going to do it again. So with that  
11 I think we're to the point where we'll ask whether  
12 staff or applicant have anything more, and we'll ask  
13 for any public comments before I quit. You guys have  
14 anything else?

15 MR. POOLE: We have nothing else.

16 CHAIR RAY: Applicant?

17 MR. KOONTZ: Mr. Chairman, this is Frank  
18 Koontz again. We do have one open question and that  
19 was the main steam line break pressure inside  
20 containment and it's 9.29 psig.

21 MEMBER ABDEL-KHALIK: Thank you.

22 CHAIR RAY: Okay. Girija, can we get the  
23 telephone line open in case there's somebody that's  
24 been sitting there wanting to speak to us. It's open,  
25 is it? Is there anyone on the phone line who would

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1 wish to make a comment to us?

2 MR. SHUKLA: There is only one staff  
3 person was online and he's not needed anymore.

4 CHAIR RAY: Okay. But you never know.

5 MR. SHUKLA: Yes.

6 CHAIR RAY: Somebody may call in. All  
7 right, and there's no one here in the audience who's  
8 asked for an opportunity to speak to the subcommittee?  
9 Okay, with that then let's go around the table here  
10 and see if we've captured everything that everybody  
11 wants to talk about and we'll adjourn. Charlie?

12 MEMBER BROWN: No.

13 CHAIR RAY: Mike?

14 MEMBER RYAN: Nothing further, Mr.  
15 Chairman.

16 CHAIR RAY: Okay. John?

17 MEMBER STETKAR: Nothing.

18 CHAIR RAY: Said?

19 MEMBER ABDEL-KHALIK: Nothing.

20 CHAIR RAY: Dick? Jack?

21 MEMBER SIEBER: Nothing to add.

22 CHAIR RAY: All right. I have nothing to  
23 add. With that we will adjourn.

24 (Whereupon, the above-entitled matter went  
25 off the record at 3:15 p.m.)

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ACRS Subcommittee Meeting Regarding  
Watts Bar Nuclear Plant Unit 2  
Status of Licensing and Inspection  
Docket No. 50-391

December 15, 2011

# Agenda Topics

- **TVA**
  - Construction Completion Status
  - Meteorology and Radiation Protection (FSAR 11 & 12)
  - Radiological Consequences of Accidents (FSAR 15.4)
  - Accident and Transient Analyses (FSAR Chapter 15)
- **NRC**
  - Status of Licensing and Construction Inspection
  - Status of Open Items
  - Supplements 24 and 25 to SER
  - Remaining Safety Review Activities

A large, stylized graphic of an atomic symbol, consisting of a central blue sphere and three intersecting elliptical orbits in shades of blue and white, positioned on the left side of the slide.

# Region II Presentation of Status of Construction Inspection Activities

## **Results of Inspection Program**

- Completed 2011 Mid-Cycle review. Overall acceptable performance noted. Three areas highlighted:
  - Inadequate corrective action for historical items (violation with four examples)
  - Resolution of Heinemann circuit breakers
  - No substantive cross-cutting issues
- Twelve (12) severity level IV violations identified in 12-month period. Violations included design control, corrective action, procurement, and procedural compliance issues.
- No escalated enforcement or civil penalties.

## **Inspection Program Updates**

- RII expended 17,279 staff hours on the project in FY11, an increase from 13,119 hours in FY10. Expect 2012 hours will be similar to 2011.
- Continuing with four (4) WB2 construction resident inspectors
- In addition to the resident inspectors, 41 inspectors performed inspections in 2011
- Four (4) positions in RII (team leader, project inspectors, and project manager) assigned to the WB2 inspection project
- Conducting periodic public meetings with TVA near the site (four meetings held in 2011)

## **Status of Inspection Activities**

- Approximately 532 construction inspection items in the Inspection Planning and Scheduling (IP&S)
- Closed 154 IP&S items
- Most of the remaining IP&S items have been inspected, but require additional effort to close
- Closed eight (7) Corrective Action Programs and Special Programs, many (8) sub-issues also closed
- TVA's scheduling uncertainties have challenged our inspection planning and staffing allocations

## **Pre-Operational Testing Inspections**

- Team leader focusing on planning for pre-operational testing inspections
- Two major sections: Testing and Operational Preparedness Inspections
- Lead inspectors assigned to mandatory tests (six) and primal test (nine) inspections
- Operational Preparedness inspections assess management controls and procedures. Examples: radiation protection; chemistry; security; fire protection, etc.

A large, stylized graphic of an atomic symbol, consisting of a central sphere and three intersecting elliptical orbits, is positioned on the left side of the slide. The top half of the slide has a blue background, and the bottom half has a white background, separated by a horizontal orange band.

# NRR Presentation of Status of Licensing Activities

## **Status of Operating License Application**

- TVA amendments to FSAR received (A92 to A107)
- Supplements to original Safety Evaluation Report
  - SSER 21 - identifies regulatory framework
  - SSER 22 – FSAR Chapters 2, 3, 5, 6, 8, 9, 10, 13, 14, 17
  - SSER 23 – FSAR Chapters 4, 7
  - SSER 24 – FSAR Chapters 2.4, 11, 12, 13.6.6, 15
  - SSER 25 – FSAR Chapters 15.4
- Major Review Areas Remaining
  - Fire Protection Report
  - Closure of open items from SER review

## **Status of Open Items**

- Total Open Items – 124 (some numbers never used)
- Open Items closed as of SSER 25 – 41
- Of the 83 that remain open
  - Items requiring NRC *confirmation* (e.g., updating FSAR): 43
  - Items requiring additional NRC *evaluation* (e.g., additional information required from TVA to complete staff review): 40

## **Safety Evaluation Report Supplements (SSERs)**

- SSER 24 Published September 2011
- SSER 25 Published November 2011

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# Status of Radiation Protection

## **Radiation Protection (CH 12)**

- Containment Airborne Estimates
- Area Airborne Monitoring in Aux. Bld.
  - Four portable monitoring channels vice fixed
- Area Monitor Operability Test frequency
  - 95% / 95% acceptance criterion
- Descriptions of HP Support Facilities
- Annual Dose Assessment & Vital Area access
- RPM Qualifications
  - Committed to RG 1.8 - 1987

## **Plant Effluents (Ch 11.1, 11.2, & 11.3)**

### **Liquid**

- S/G tube leakage added to liquid source term to meet concentration limits in 10 CFR 20 and RM 50-2.
  - Above  $3.65E-5$  uCi/cc : Blowdown processed (CD)
  - Above  $3.65E-5$  uCi/cc : processed (CD + MD)
  - Less than  $3.65E-5$  uCi/cc : unprocessed
- Updated calculations of doses from liquid effluents
  - Latest Census and Land-Use Survey
  - Minimal change to 10 CFR 50 App. I doses

## **Plant Effluents (Ch 11.1, 11.2, & 11.3)**

### **Gaseous**

- Update Plant Configuration
  - Continuous Containment Filtered Venting not  
22 Purges per year (Airborne Source Term)
  - Delete Boron Recycle System
- Updated calculations of doses from gaseous effluents
  - Latest Census and Land-Use Survey
  - Critical milk animal & garden locations
  - Meteorology (X/Q, D/Q values), terrain correction
- Staff independent assessment

## Annual Dose per Reactor Unit

	App. I	TVA	NRC
<u>Liquid Effluents</u>			
Total Body (mrem)	3	0.72	0.64
Any Organ (mrem)	10	1.00	1.49
<u>Noble-gas effluents</u>			
Gamma Dose in Air (mrad)	10	0.80	0.90
Beta Dose in Air (mrad)	20	2.71	3.59
Total Body (mrem)	5	0.57	0.51
Skin of an Individual (mrem)	15	1.54	2.60
<u>Airborne Radioiodines /</u>			
<u>Particulates</u>			
Any Organ	15	9.15	9.75

## **RM 50-2 Vs. ALARA Cost/Benefit**

- 10 CFR 50 App. I , II.D effluent treatment augmentation cost/benefit analysis
  - Exception for plants with 1974-1976 CPs
- RM 50-2 design criteria fore-runner to App. I
  - Ex.: Maximum Organ Dose - 15 mrem per site (RM 50-2) Vs. 15 mrem per unit (App. I)
- WBN organ dose is 9.15 mrem per unit (18.3 per site)
  - Meets App. I, not RM 50-2

## **Reg Guide 1.110 Cost/Benefit Analysis**

- Provides a list of radwaste system enhancements
- Annualized costs (capital, labor, operating, & maintenance)
  - Constant 1975 \$\$
- \$1,000 per person-rem saved
  - population within 50 miles of site
- Staff independent analysis
  - Slightly higher doses, slightly lower costs
  - Verified TVA conclusion; no augments warranted

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# Status of Design Basis Accident Dose Consequence Evaluations

## **Major Differences from WBN Unit 1 Licensing Basis**

- Updated Atmospheric Dispersion Coefficients
- Original vs. Replacement Steam Generators
- No Tritium-Producing Burnable Absorber Rods (TPBARs) since Unit 2 will not be licensed for tritium production
- Updated Dose Conversion Factors resulted in lower Dose Equivalent Iodine coolant values
- Fuel Handling Accident analyzed for different release scenarios using the Alternative Source Term (AST)

## **Off-site dose consequences are low relative to acceptance criteria**

- Loss of Coolant Accident (LOCA) doses are “well within” 10 CFR 100.11 values (<25%)
- Main Steam Line Break (MSLB) & Steam Generator Tube Rupture (SGTR) doses are a “small fraction” of 10 CFR 100.11 (< 10% ) for both pre-existing and accident generated iodine spike cases
- Control Rod Ejection Accident (CREA) bounded by LOCA; LOCA dose meets the acceptance criteria for CREA, “well within” 10CFR100.11 values (<25%)

## **Fuel Handling Accident (FHA) analyzed for three release scenarios**

- Closed Containment with credit for filtration using traditional assumptions with whole body and thyroid dose acceptance criteria
- Auxiliary building with no credit for filtration using AST assumptions with Total Effective Dose Equivalent (TEDE) acceptance criteria
- Open containment with no credit for filtration using AST assumptions with TEDE acceptance criteria
- All FHA scenarios meet “well within” (25%) for either 10 CFR 100.11 or 10 CFR 50.67 dose acceptance criteria

## **Conclusions**

- Design basis dose consequence analyses predict doses within applicable regulatory acceptance criteria
- No open items in the area of design basis dose consequence analyses

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# Section 15: Transient and Accident Analyses

## **Section 15, Transient and Accident Analyses**

- **Agenda Topics**
  - Review Procedures
  - General Results
  - Challenging Review Areas
  - Conclusions

## Review Procedures

- Reference the licensing basis of Watts Bar Unit 1
- Ensure that analytic methods are used within the limits of the staff's approval
- Compare results to similar plants
- Additional information was requested to aid in the review of challenging areas:
  - Several rounds of RAIs were issued
  - Additional analyses were requested
  - Two audits were conducted
    - First audit – March 15<sup>th</sup> in Rockville, MD
    - Second audit – June 28 through 30 in Cranberry, PA

## **General Results**

- Most results were acceptable w/o further information
  - Analyses performed using NRC-approved methodology
  - Analyses were continually reviewed since the Unit 1 application
  - Results acceptable with margin to acceptance criterion or regulatory limit
- Results for five accident analyses presented some review challenges

## **Challenging Review Areas**

- 1. Overpressure protection analysis
- 2. CVCS malfunction event
- 3. Inadvertent ECCS actuation at power
- 4. Boron dilution in Modes 3, 4, and 5
- 5. Main steam line break

# 1. Overpressure Protection

- SRP 5.2.2 specifies that adequate overpressure protection be demonstrated for the limiting event (loss of load)
- Analysis should be based upon a reactor trip from the 2<sup>nd</sup> trip signal
- Analysis was based upon reactor trip from 1<sup>st</sup> trip signal
- TVA re-analyzed the loss of load, assuming reactor trips on the 2<sup>nd</sup> trip signal
- Results of re-analysis show that RCS and MSS pressure safety limits are not exceeded

## **2. CVCS malfunction event**

- CVCS malfunction event was not in the FSAR (i.e., it was omitted)
- The event is listed in RG 1.70, Rev 2
- The event is not bounded by the inadvertent ECCS event
- TVA provided an analysis
- Results indicate there is adequate time for manual mitigation

### **3. Inadvertent ECCS actuation**

- Analysis was unacceptable, as explained in RIS 2005-029
- TVA provided a re-analysis
- Results indicate there is adequate time for manual mitigation

## **4. Boron Dilution in Modes 3, 4, and 5**

- RG1.70, Revs 0 and 1, required explicit Boron Dilution calculations in Modes 1, 2 and 6. Subsequent revisions RG 1.70 added requirements to consider in all 6 modes
- SRP 15.4.6 calls for analysis of event in all modes
- Analyses inconsistent with SRP since only Modes 1, 2, and 6 analyzed
- Open Item for TVA to provide analyses of boron dilution event that meet the criteria of SRP Section 15.4.6, including
  - Description of the methods and procedures used by the operators to identify the dilution path(s) and terminate the dilution in order to determine analyses comply with GDC 10
  - Time available for manual action begins at start of event

## **5. Main Steam Line Break**

- Results were too good (compared to similar plants)
- Results were inconsistent with the conclusions of WCAP-9226
- Results were deconstructed, at the 2<sup>nd</sup> audit, to explain the contribution of each key assumption and parameter
- A new limiting-case analysis was provided

## **Staff Review Conclusions**

- Staff draws a reasonable assurance conclusion with the same, or higher confidence, as compared to the Unit 1 review
- Some changes in the Unit 2 licensing basis must also apply to the Unit 1 licensing basis
- Westinghouse's steam line break analysis methods should be updated

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# Project Summary of Watts Bar Unit 2 Remaining Activities

## **Project Status**

- Staff review nearing completion
- Future Milestones
  - Complete SER and SFES-OL
  - Complete ACRS Review
  - Conduct hearing and ASLB provide decision
  - Operational readiness assessment
  - Certification of as-built construction

## **Expectations for Next Meeting**

- Scheduled for April 2012
- Fire Protection
- Closure of Open Items



# TENNESSEE VALLEY AUTHORITY WATTS BAR NUCLEAR PLANT UNIT 2



**WBN Unit 2 ACRS  
Presentation**

**December 15, 2011**

# Agenda

---

- Watts Bar Status Update - Dave Stinson
- Meteorology and Radiation Protection - Robert Bryan
- Radiological Consequences of Accidents (Chapter 15.4) – Robert Bryan
- Transient Analysis (FSAR Chapter 15) – Frank Koontz
- Questions

# **Watts Bar Unit 2 Status**

# WBN2 Completion Status

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- Project Status Update
  - Safety
  - Quality
  - Safety Conscious Work Environment
- Organizational Structure / Alignment
- Appendix HH Status

# SAFETY – Highlights

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- Highlights
  - Over thirteen million safe work hours since the last lost time accident (3/10/2010)
  - Fiscal Year 2011
    - Worked 7,409,301 hours with a total of eighteen recordable injuries (0.49 injury rate)
    - Over 28,426 Supervisor’s Safety Observation performed
    - The craft turned in 1,718 intervention cards

# Organizational Structure / Alignment

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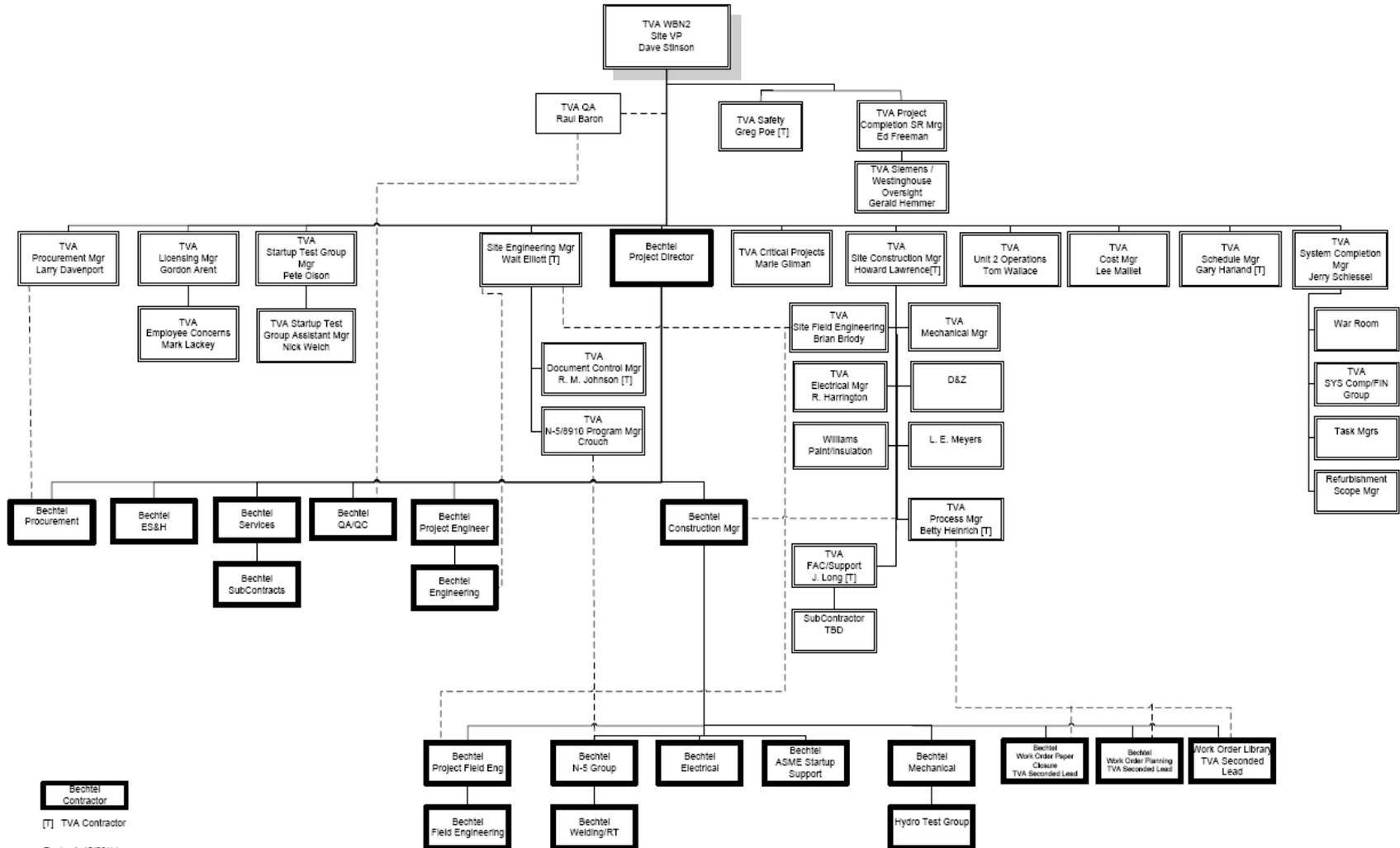


- The Bechtel and Williams Services contract facilitated a change to a new organization structure.
- Organization revised to reflect TVA's leadership role with responsibility for
  - Assigning work priority
  - Day-to-day direction
  - Schedule performance
- Key vacancies have been identified.
- Several highly experienced people recruited and on board
- Plan for remaining key vacancies has been developed and is in work in conjunction with Human Resources
- Next steps include Bellefonte Nuclear site transition plan

# Organizational Structure / Alignment



## WBN Unit 2



Bechtel Contractor

[T] TVA Contractor

Revised: 10/28/11

C:\Wbk\Org\Charts\Rev-5-Nick-Project Org Chart.vsd

# QUALITY



- 
- The Bechtel Quality Assurance Program and Manual remain in place for construction completion
  - Program includes all quality control inspections, quality assurance audits and surveillances
  - Inspection results are monitored by activity and craft for recognition of trends and required corrective actions
  - Document review results are monitored and fed back to originating organization
  - Line organizations develop corrective actions for recognized trends and common issues
  - TVA Quality Assurance manager provides oversight for the program

# SAFETY CONSCIOUS WORK ENVIRONMENT (SCWE)

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- Maintain improvements in the overall work environment
  - Communication - *from management to all employees*
  - Allowing time to listen - *keeping the door, and the ears, open*
  - Casual monitoring of the environment by Employee Concerns Program (ECP) - *monitoring by walking around and engaging people*
  - High visibility of ECP - *be seen in the plant and in meetings to develop familiarity that leads to trust*
- Ensure the SCWE message is rolled into the daily business focus with the same importance and acceptance as safety and quality – *weekly SCWE focus message for the project*
- Timely resolution of issues brought to the ECP

# SAFETY CONSCIOUS WORK ENVIRONMENT (SCWE)

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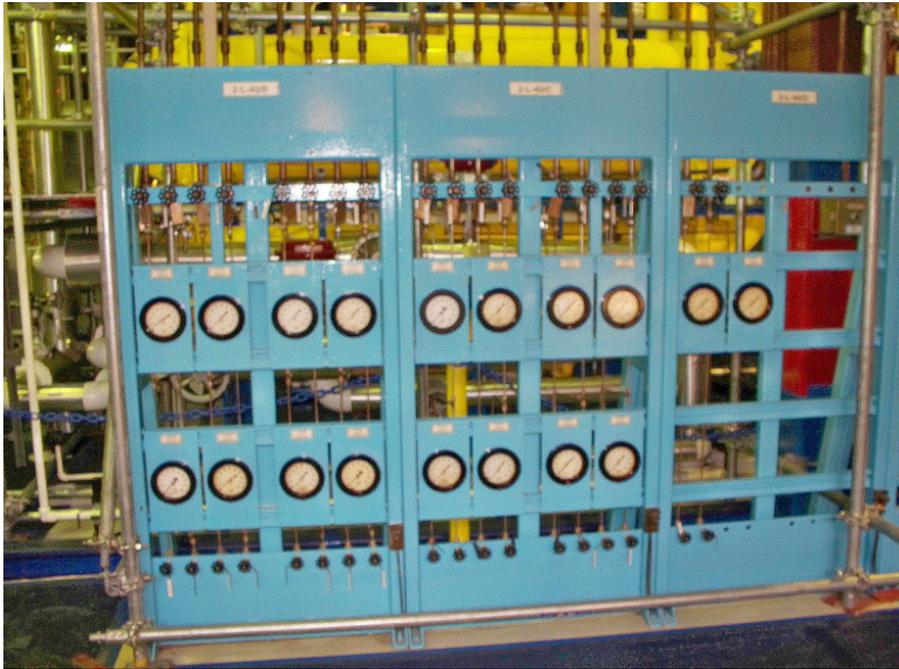


- Highlights
  - Improved Allegation Performance 2011 over 2010
    - Calendar Year 2010 – twenty-six onsite
    - Calendar Year 2011 – four onsite, as of 9/30/11
      - January – one
      - February – one
      - August – one
      - September – one

# TURBINE BUILDING PHOTOS



# TURBINE BUILDING PHOTOS



# TURBINE BUILDING PHOTOS



# TURBINE BUILDING PHOTOS



# STARTUP & TESTING - Goals

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- Developed a comprehensive testing program to demonstrate plant and system performance meet design requirements. The program ensures:
  - Regulatory requirements are met
  - Final Safety Analysis Report (FSAR) Chapter 14 requirements are met
  - Individual components are tested in accordance with industry standards and show readiness for pre-operational testing
  - Thorough demonstration of systems' performance against design requirements
  - Test conduct does not impact the operation of U1

# STARTUP & TESTING - Overview

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- Component level testing (circuit checks, valve strokes, motor runs, calibration)
  - Current count is 8316, currently 23% complete
  - Challenged by unit interface program restoration and support systems (control air)
- System flushing
- Preoperational test and Acceptance test performance
  - PTI governed by RG 1.68 and FSAR
  - 43 of 119 procedures approved, two test procedure performances completed
  - Overall procedure generation is 71% complete (20 in Joint Test Group (JTG) review cycle)
- All testing/flushing performed by Startup under New Generation Development and Construction (NGDC)
- Thirty-eight of eighty-six systems turned over to startup
- Four system turnovers completed to Nuclear Power Group, two more scheduled by end of year

# START-UP & TESTING - Current Status

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- Current Status
  - Refueling Water Storage Tank (RWST) and Primary Water Storage tank filled to pump suctions
  - Condensate and feed water in service via condensate hotwell pump, booster pump runs in progress
  - Condenser circulating water in service
  - Raw cooling water in service
  - Generator and Main Turbine oil systems placed in service weekly for turning gear operation
  - Annunciator and computer systems in service
  - Solid state protection / Eagle racks and Foxboro I/A ready for calibrations
  - Main feed water pump (MFWP) oil systems filled to support feedwater flushing
  - Control air flushing in progress and being placed in service to loads

# Transition to Operations

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- Management Review Meetings (Oversight by Chief Nuclear Officer (CNO), VP of Operations, Nuclear Safety Review Board (NSRB))
- Permanent Staffing Additions
  - Licensed and Non-Licensed Operators
  - Maintenance Craft
- Training
  - Dual Unit Licenses
  - Unit Differences Training
- Work Management
  - Preventive Maintenance
  - Surveillance Scheduling
  - Functional Equipment Groups (FEG's)
  - Schedule Convergence
  - Refueling Outage Infrastructure after Hot Functional Testing

# Transition to Operations

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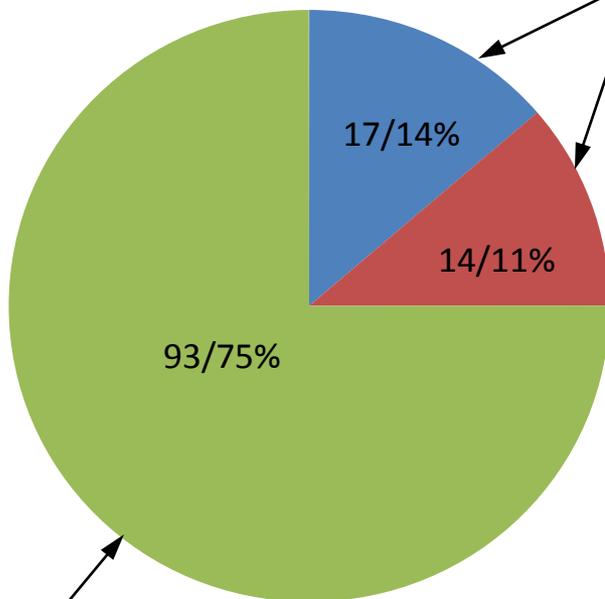


- Procedure Development/Revision
- System Turnover
  - System 30O (Turbine PMP and Space coolers)
  - System 30N (Turbine Bldg Exhaust Fans)
  - System 37 (Gland Seal Water) Complete
  - System 44 (Building Heat) Complete
  - TI-437 Lessons Learned
    - Operations Owns the Turnover Process
    - System Turnover Weekly Meeting for Near Term Systems
    - Turnover of In-Service Systems

# SSER (22-25) Open Items

## SSER Open Items (Appendix HH)

■ Inspections ■ NRR/RII ■ NRR

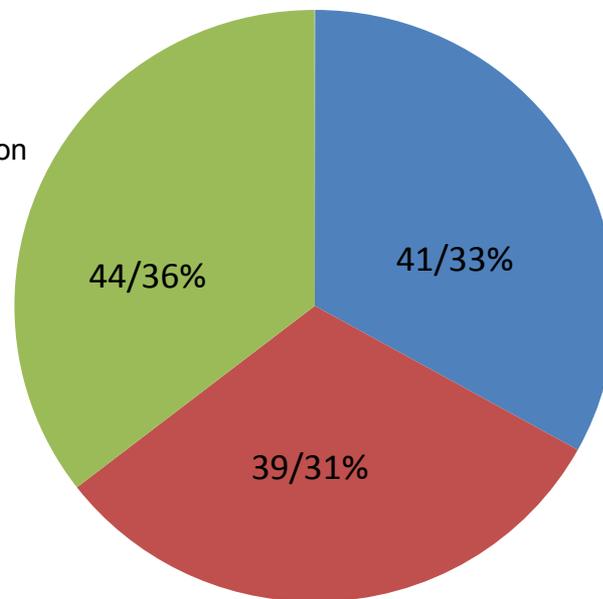


- Examples
- Verification of installed cable lengths
  - Verify Installation of GL 2008-01 Vents

- Examples
- FSAR Updates
  - Non-proprietary Documents

## SSER Open Item Status 12/9/11

■ Closed ■ Submitted ■ Open



# **Radiation Protection and Radiation Waste Management (FSAR Chapter 11 & 12)**

# Radiation Protection

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- WBN committed to ALARA principles
- Shielding features are the same as Unit 1
- Many features are shared between units
  - Labs, Counting Rooms, Access
  - Designed for two unit operation
- NUREG 0737 II.B.2
  - Post accident access and occupancy
  - Updated vital areas to include Unit 2

# Radiation Protection

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- Radiation Monitors
  - Coverage similar to Unit 1
  - Many Unit 2 monitors are used for Unit 1 Ops
  - 21 new Unit 2 monitors
  - Channel Op Tests extensions to be supported by experience
  - Local CAM previously replaced with portable monitors

# Radioactive Waste Management

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- Radwaste Systems are shared
  - Operational flexibility to manage releases
  - Condensate demineralizers usually bypassed
  - 100 CFM continuous filtered containment vent
- ANSI N18.1-1984 source term
- Updated Site Specific Parameters
  - 1986 – 2005 meteorology data
  - 2007 land use survey
  - Applied terrain adjustment factors 
  - 50 Mile population dose based on 2040 estimate

# Radioactive Waste Management (cont)

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- Liquid and gaseous releases
  - Well within regulatory limits
  - Unit 1 used RM 50-2
  - Appendix I for 2 unit operation
  - Cost benefit performed
- Unit 1 operating history
  - Actual releases small fraction of FSAR releases



# Chapter 11 and 12 SSER Open Items

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- Item 112, 113, 114, 115, 116
  - Update FSAR
  - Completed by FSAR Amendment 105
- Item 135 – Perform Radwaste System Cost-Benefit Study
  - Complete – Cost Benefit submitted
- Item 117 – update FSAR
  - Information previously provided
  - Open

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# **Transient Analysis (FSAR Chapter 15)**

# Chapter 15 Transient Analysis

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- Unit 2 Analyses Generally Similar to Unit 1 at OL
  - Original Steam Generators
  - No Measurement Uncertainty Recapture
- LBLOCA & SBLOCA have large margins to PCT Limit of 2200°F
  - ASTRUM vs. Appendix K Model

# Chapter 15 Transient Analysis

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- New Analysis
  - Overpressure Protection on Second Trip
  - CVCS Malfunction that Increases Reactor Coolant System Inventory
  - MSLB Analysis and Parameter Sensitivity Study
- Additional Analyses
  - Inadvertent ECCS – no Liquid Release from PORVs
  - Boron Precipitation
- Open – Boron Dilution Modes 3, 4, 5
  - Same as Unit 1
  - Providing additional information

# **Radiological Consequences of Accidents**

## **(FSAR Chapter 15)**

# Accident Dose

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- Dose Consequences less than 10 CFR Part 100 and Guidance Document Limits
- Analyses Based on
  - LOCA – Reg. Guide 1.4
  - Waste Gas Decay Tank – Reg. Guide 1.24
  - Fuel Handling Accident – Reg. Guide 1.25 and Reg. Guide 1.183
  - MSLB & SGTR – SRP 15.1.5
  - Loss of AC Power – Conservative Assumptions
  - Rod Ejection – Bounded by LOCA

## Accident Dose (Cont.)

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- Differences from Unit 1 Licensing Basis
  - Dispersion Coefficients based on 1991 – 2010 Meteorology Data 
  - Original Steam Generators
  - No Tritium Rods
  - Dose Equivalent Iodine reduced (T/S value)
  - Fuel Handling Accident based on Alternate Source Term

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Questions?