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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

October 22, 2008

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
SUBCOMMITTEE ON THE ESBWR COL APPLICATION
MEETING

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WEDNESDAY, OCTOBER 22, 2008

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The meeting came to order at 8:30 a.m. in
Two White Flint North, Room T2B3, 11545 Rockville
Pike, Michael Corradini, chairman, presiding.

PRESENT:

- MICHAEL CORRADINI CHAIRMAN
- CHARLES H. BROWN MEMBER
- JOHN W. STETKAR MEMBER
- WILLIAM J. SHACK MEMBER
- J. SAM ARMIJO MEMBER
- DENNIS C. BLEY MEMBER
- JOHN D. SIEBER MEMBER
- GRAHAM WALLIS CONSULTANT
- THOMAS S. KRESS CONSULTANT

T-A-B-L-E O-F C-O-N-T-E-N-T-S

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NRC presentation of SER Section 14.3 with Open
Items 101

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

8:30 a.m.

CHAIRMAN CORRADINI: Okay. Let's get started.

Our court reporter seemed to have gotten waylaid, so we are taping the session from the overhead mikes and the mikes on the table.

So let me start off we're going to essentially start off with sections 14.3 and Rick Wachowiak from GEH will start the conversation with us, the discussion with us. But let me remind everybody to identify yourself and speak with sufficient clarity and volume since our backup system works, but is not as precise as our main system.

Rick?

MR. WACHOWIAK: All right. Get started.

I'm Rick Wachowiak from GE Hitachi.

This morning we're going to talk about Section 14.3 and Tier 1 of the DCD for ESBWR.

Patricia Campbell is on the Tier 1 team with us. She's up here for support and also to cover the DAC closure process that we have. And Steve Kimura is also the I&C member of our Tier 1 team.

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1 CHAIRMAN CORRADINI: The one thing, I
2 guess I said it but I'll reenforce, given the fact
3 that we're all just being taped, I'd ask the members
4 and the consultants to identify themselves before
5 they make their questions or comments.

6 Go ahead.

7 MR. WACHOWIAK: So let's jump right into
8 it. We're going to talk about, as I said, the Tier
9 2 Section 14.3, which is basically our instructions
10 for how we plan on writing Tier 1. And then Tier 1
11 itself. And we're going to cover both of these in
12 tandem so we're not going to go through all the 14.3
13 and then go back and do Tier 1. So we'll try to
14 keep those sections altogether.

15 Basically the important part here is the
16 ITAAC for Tier 1. We talked about that yesterday
17 afternoon: What its supposed to do, what it is, why
18 its there. And we'll talk a little about that
19 today.

20 In the ESBWR application we have an
21 Appendix to 14.3 which is our interpretation of how
22 a DAC closure process would work. And we'll talk
23 about that toward the end of the presentation. A
24 couple of COL information items and then we'll wrap
25 it up.

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1 Go to the next slide.

2 So 14.3, I think I said this already, it
3 provides the overview of how the Tier 1 information
4 is put together. And then Tier 1 is basically
5 required by Part 52 to be, the way I like to call
6 it, the legal description of the plan. Some have
7 thought of it before as an executive summary, but
8 it's really more of a legal description. It says
9 what is the plant and its done in very concise
10 terms.

11 And the other thing that we noticed when
12 we were putting our schedule together for how we
13 would manage closure of the ITAAC, I was trying to
14 explain. Somebody asked yesterday did anybody
15 explain this to members of the public. And we had
16 to explain it to the people on the construction team
17 what is an ITAAC and what is it that we're going to
18 do with these. And I said think of the ITAAC as
19 ESBWR specific regulations. Because that's what
20 really the ITAAC are; it's a list of about a
21 thousand specific things that the ESBWR has to meet.

22 CHAIRMAN CORRADINI: I thought you were
23 going to say to construction people it's a punch
24 list. That's what they understand. They've got
25 their punch list. And until all the things are

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1 done, they can't turn over the building.

2 MR. WACHOWIAK: And that's right. And
3 that's the way they're thinking of it as the punch
4 list. But we have to add the extra piece. It's the
5 punch list with extra punch. Because there no
6 deviations from the punch list.

7 So let's go on with the rule.

8 DR. WALLIS: I'm Graham Wallis.

9 I'm asking you why are you presenting
10 GE's slides?

11 CHAIRMAN CORRADINI: Because he's GE.

12 DR. WALLIS: All right. I was confused.
13 I thought he was starting off with the staff. That's
14 all right.

15 CHAIRMAN CORRADINI: This is the GE
16 Hitachi presentation.

17 DR. WALLIS: Okay. Thank you very much.

18 CHAIRMAN CORRADINI: The staff will be
19 up here later.

20 DR. WALLIS: That clarifies everything.
21 Very good.

22 MR. WACHOWIAK: However, if you want to
23 give me that sign that --

24 DR. WALLIS: That's all right.

25 MR. WACHOWIAK: So we talked about this

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1 yesterday. But the ITAAC for a facility, this is
2 different than the DCD. The facility is the plant
3 and its basically everything addressed by the COL.
4 But there's ITAAC more than just what's in the DCD.

5 We have the design certification ITAAC
6 in Tier 1. Mainly what we're going to talk about
7 here is physical security ITAAC, that would be
8 supplied by the applicant, the COL applicant later.
9 Emergency planning ITAAC through the physical
10 security hardware. We're still trying to figure out
11 where that goes. It's been in the DCD and out of the
12 DCD, and I think currently it's in or at least parts
13 of it are in.

14 Emergency planning ITAAC, which is going
15 to be supplied by the applicant. And then other
16 site-specific ITAAC.

17 So when we're talking about ITAAC, it's
18 really the whole population. But for the
19 certification application we're really talking about
20 that first bullet there, which is the ITAAC
21 associated with things that are in the design
22 certification document.

23 MEMBER ARMIJO: The physical security,
24 is it going to be in the DCD and the COL or is that
25 -- where is going to wind up?

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1 MR. WACHOWIAK: That's one of the things
2 that we're trying to work out. Right now we have
3 the pieces of the physical security, the hardware
4 for physical security that's in the certified
5 design. And if through the industry workshops that
6 are still going on in this area it's determined that
7 we need to add something else to physical security,
8 it's likely that that's going to end up being in
9 that in the COL.

10 MS. CUBBAGE: This is Amy Cabbage with
11 the staff.

12 This is an ongoing issue right now with
13 industry. Just to the issue is that you cannot have
14 ITAAC in the DCD for futures that are not in the
15 DCD. So you need to divide the scope of what's
16 being handled in generic manner in certification and
17 then have ITAAC as appropriate for those features.
18 And any site-specific security features would have
19 to be addressed by the COL applicant in their ITAAC.

20 MEMBER ARMIJO: Okay. So it'll wind
21 that physical security will be in both DCD and COL?

22 MS. CUBBAGE: Could be in both.

23 MEMBER ARMIJO: And that's okay --

24 MS. CUBBAGE: And that's okay. Right.

25 The generic ITAAC will have to be adopted by all COL

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1 applicants and then supplement with their site-
2 specific ITAAC which will cover some aspects of the
3 physical security.

4 MEMBER ARMIJO: Thank you.

5 MR. WACHOWIAK: Back to Rick Wachowiak
6 from GEH.

7 In the end when we're closing ITAAC
8 whether it came from the DCD or whether it came from
9 the COL, it really doesn't matter. I think they're
10 all going to be handled the same way on the closure
11 side.

12 So back to our document. We've got
13 Section 14.3, just like any other section in the
14 DCD, its broken up into multiple sections and what
15 those are covered.

16 14.3.1 describes the introduction
17 material in Tier 1. And in Tier 1 Section 1 is
18 where we have that information. It's basically a
19 definition of terms. It talks about the general
20 provisions of the ESBWR, which it's just a short
21 description of what the plant is. And then we have
22 a legend in there for the figures that are contained
23 in Tier 1.

24 The Tier 1 document, as we said
25 yesterday, is going to end up being published as

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1 part of an Appendix to Part 52. We want to make
2 sure that it's enough stand alone there so that when
3 someone picks up and looks at the figures that are
4 in there, that the legend in the first part covers
5 what would be seen there. You wouldn't have to go
6 to a different document.

7 Go to the next one.

8 Okay. Now we're going to get into the
9 meat of Tier 1. And we talk about in Section 2,
10 which are the system-based information. And what
11 we've done is we've gone through the plant system-
12 by-system and put in a few things.

13 One is the design description is
14 required to be in Tier 1. And that's the up front
15 material. In the middle we'll talk about what is
16 the design description material.

17 And then the design description is
18 followed by the table of the ITAAC, which are the
19 design commitments, which parts off the title. The
20 design commitment, then the inspection tests and
21 analyses that would be used to verify the design
22 description. And then the acceptance criteria for
23 those.

24 The design description, which is what
25 I'll cover first, basically looks at the high level

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1 features and performance characteristics of each of
2 the systems. And I think I'll get to this on some
3 future slides here. But the purpose of that is to
4 capture the most safety significant parts of the
5 plan and put that into the Tier 1.

6 It contains descriptive text mostly
7 focusing on what's going to be upcoming in the
8 ITAAC. And then, as a matter of fact, when you see
9 the examples you'll see that the descriptive text is
10 exactly what's in the ITAAC. And there's reasons
11 why we did that.

12 And then there's some supporting figures
13 in tables that help out the closure of the different
14 ITAAC.

15 On to the next one.

16 So when we're deciding now what to put
17 into Tier 1 we have to decide what are the most
18 important or the things that describe the plant as
19 analyzed in the various safety analysis presented in
20 the DCD. So we have to have our disclaimer up on
21 front. You know, this all comes from Part 52 and is
22 required to be there. And now we'll talk about what
23 we had in there.

24 Anything safety-related, those features
25 should be described in Tier 1. So the safety-

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1 related features/functions are the things that are
2 used in the safety analysis. That's what makes them
3 safety-related is that they're used in the
4 deterministic safety analysis and those would all go
5 into Tier 1.

6 And the information that we put in the
7 ITAAC is based on how important that specific
8 feature was in the safety analysis. I think we'll
9 cover that in a little bit.

10 Then we also have some nonsafety-related
11 things that are in there, In an active plant such
12 as ABWR or System 80+, which was certified many
13 years ago, the safety-related features cover most of
14 what you would have to have in Tier 1. Because the
15 safety-related systems cover that broad range of
16 plant performance. In the ESBWR and other passive
17 plants we have our challenge because there's a
18 demarkation that was set up through the various
19 SECYs and other papers that the passive features
20 cover the first 72 hours and then we could use
21 appropriately qualified nonsafety systems to cover
22 things that happened later. So I think by its
23 nature I think in passive plants you'll end up with
24 more nonsafety things that are in Tier 1 because
25 it's the functions of the equipment that gets it

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1 into Tier 1 rather than some specific safety-related
2 versus nonsafety-related.

3 CHAIRMAN CORRADINI: So just to repeat
4 this a different way is that what you're saying is
5 as you go beyond 72 hours under design calculations,
6 design basis calculations, certain things are
7 brought in to still perform the functions that were
8 not need in the first 72? That's the reason they're
9 brought in from their safety function.

10 MR. WACHOWIAK: Yes, that's correct.

11 MEMBER STETKAR: A couple of questions
12 on that I want a clarified kind of understanding.

13 I noticed that you have, for example,
14 there are ITAAC for the main condenser, functions
15 for condensing steam during abnormal operating
16 events, main feedwater condensate systems for
17 supplying feed to the boiler. That's not strictly
18 post 72 hours. Do those come in due to the PRA? Do
19 they come in from good practice? How did those get
20 in. This has got to be a two part question, but I
21 want to understand the first part first.

22 MR. WACHOWIAK: Okay. There are many
23 ways that something that come in. And I think if we
24 looked at any plant, we would have things like the
25 main condenser for the steam condensing function and

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1 things like that.

2 Things can come in because of the safety
3 analysis, like you said. It could come in because
4 of the safety functions performed post-72 hours. It
5 can come in because of its importance in the PRA. It
6 can come in because its needed to support a myriad
7 of other regulations. Some of the things you're
8 talking about in the turbine are there to meet GDC-
9 60, I believe, for radiation releases during
10 operation.

11 So there are various ways that you can
12 get things into Tier 1. And it's supposed to be the
13 top level things that help us meet those specific
14 regulation. So there's multiple ways of getting in
15 there, not only the safety-related nature of things.

16 MEMBER STETKAR: The follow up on that,
17 I notice there are in -- and I can't remember
18 whether it's Section 14.2 or Tier 1, it doesn't make
19 any difference, there are a list of systems for
20 which -- they're classified in the SER. They're
21 called no entry systems. Basically they're just
22 listed as a system, the system exists in the plant
23 but there are no ITAACs specified for them.

24 A couple of them that came to notice in
25 regards to the first part of the question are the

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1 circulating water system and the turbine component
2 cooling water system are no entries. There are no
3 ITAACs for those systems. On the other hand, isn't
4 the circulating water system required to condense
5 the steam that goes into the condenser for that
6 steam condensing function of the condenser? And
7 isn't the turbine component cooling system required
8 to support the condensate and feedwater systems for
9 their feedwater functions?

10 So I don't understand why what we in the
11 PRA world call the front line systems are in ITAAC
12 and yet the required support systems are not. So
13 I'd like to understand how that functional decision
14 process works for getting things in or excluding
15 things.

16 MR. WACHOWIAK: We'll talk about this in
17 an upcoming side here.

18 MEMBER STETKAR: Okay.

19 MR. WACHOWIAK: But we use a graded
20 approach to putting things into Tier 1. And we have
21 to look at why the condenser is in Tier 1 and the
22 support systems for why its in there. So when we're
23 looking at the pieces of the ITAAC here, and I've
24 got it up here in front of me, one of the ITAAC is
25 played out for the dose calculations, which we

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1 talked about there, the circulating water it doesn't
2 effect that.

3 The anchors were the same for SSE,
4 that's to contain vision products. Now what you're
5 getting to is probably closer into number 2, the
6 capability of the condenser to accommodate the
7 bypass steam flow to mitigate abnormal events.

8 MEMBER STETKAR: Right.

9 MR. WACHOWIAK: And in this particular
10 case the abnormal events that we're talking about is
11 the feature of the condenser in those abnormal
12 events is it's not necessarily to be able to be
13 provided as the ultimate heat sink there. It's more
14 to maintain its integrity and stay intact.

15 MEMBER STETKAR: But it wouldn't without
16 condensing that steam. Not for very long, anyway.
17 It would rupture disks and --

18 MR. WACHOWIAK: That's right. And
19 that's accepted in ITAAC for six seconds.

20 MEMBER STETKAR: I'll ask you an easier
21 one then that's a little bit less nebulous. What
22 about condensate in feedwater with turbine component
23 cooling water that's required to cool the condensate
24 pumps and the feedwater pumps and keep them running?
25 You can't say that they only need to run for six

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1 seconds, do they?

2 And I would slow you down. I just
3 wanted to make the point that I think there needs to
4 be a little bit better description of rather than
5 looking at simply systems and equipment, you should
6 be looking at functions for the ITAAC. And those
7 functions may extend all the way out through those
8 support systems. And it wasn't clear to me going
9 down through the list of what's in and what's out
10 how that decision process has been made. But it
11 certainly doesn't seem to be documented. In other
12 words, there's nothing that I can read that says
13 this is excluded for the following reasons. It just
14 says it's exclude. It's just not necessary.

15 MR. WACHOWIAK: That's right. And one of
16 the examples that I have later shows it in a
17 slightly different form. And I'm trying to remember
18 where we came down on this because we talked with
19 the staff several times on how we should describe
20 the no entry systems. And our process that we went
21 through was if it didn't perform a safety-related
22 function, then that's a candidate for no entry.
23 Then we looked to see if it would have ended up --
24 if it made it onto the list for systems or equipment
25 that required whether to treat them in the --

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1 program, if it wasn't on that list, then it's a
2 candidate for no entry. And then we look at which
3 other specific regulations that it might be there to
4 dissolve. And if we didn't have any other specific
5 regulations, then it would get through that.

6 So the process that we're talking about
7 does go through and looks at the functions of those.
8 And sometimes things get on the list for what goes
9 into ITAAC on the front line systems because of the
10 question and answer process that we have with the
11 staff. So that may not go all the way back through
12 all the support systems.

13 I think --

14 MEMBER STETKAR: Just take it as an item
15 to kind of follow up.

16 MR. WACHOWIAK: Right.

17 MEMBER SIEBER: Yes, there are arguments
18 to support what they've done.

19 For example, the accidents are the
20 classic Chapter 15 accident, design basis accident.
21 You actually don't use feed pump during a design
22 basis accident, but it's nice if you have it. And
23 it's nice if you have all the equipment, then you
24 wouldn't have the accident.

25 But in this particular design, the

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1 design is passive and it doesn't require these
2 active components. And that's why they're not
3 safety-related.

4 MS. CAMPBELL: This is Patricia
5 Campbell.

6 Just to further expand on that, remember
7 that we're following the NRC. They set up the
8 status as this graded approach because the ITAAC
9 themselves are subject to the hearing process at the
10 end of construction. So, you know, we would
11 certainly having testing of these other systems as
12 part of preop. So it's not that they won't be
13 tested and that their function won't be verified.
14 It's just that they're not at the level considered
15 necessary for verifying at the plant safety systems
16 and risk significant systems as designed to meet the
17 requirements. And because it is at that level of
18 being subject to a hearing you just don't want to
19 put everything in there. We could certainly do
20 that, but then you know that would create problems
21 for our customers potentially.

22 CHAIRMAN CORRADINI: So let's just move
23 on. But you can understand what I think John's
24 after, some logical explanation of what's in and
25 what's out.

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1 MEMBER ARMIJO: I have another question
2 along those lines. I was looking at your tables for
3 the ITAACs and the systems and so on. And maybe I
4 misunderstand, but you have a system in there that I
5 thought certainly shouldn't be a Tier 1 system
6 because it's an optional next to the hydrogen water
7 chemistry. Now could you explain why it's in there
8 in your tables?

9 MR. WACHOWIAK: The hydrogen water -- is
10 it with a no entry system?

11 MEMBER ARMIJO: I don't remember, but it
12 said optional and I believe it had ITAACs and --

13 MR. WACHOWIAK: The hydrogen water
14 chemistry system is a no entry system. So it doesn't
15 have any ITAAC.

16 What we tried to do for this is we went
17 through all the systems that GE has in the master
18 parts list so that in the end when the COL applicant
19 looks at what thing they need to supply ITAAC for,
20 on some of these systems we prescreened them and
21 said that they're not going to need to add ITAAC for
22 that system. So that's our recommendation to them
23 that nothing needs to be put into their plant-
24 specific.

25 MEMBER ARMIJO: Okay. I understand.

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1 MR. OESTERLE: This is Eric Oesterle
2 from the staff.

3 Just a clarification on the terminology
4 "no entry." That has been a subject of discussion
5 amongst the staff. And that terminology is changing.
6 And what it really means is no ITAAC are required
7 for the system.

8 MEMBER ARMIJO: Yes. I understand that.

9 MS. CAMPBELL: We're going to make that
10 change.

11 MEMBER SIEBER: Still a good question.

12 MEMBER ARMIJO: Okay. But there's still
13 some cleanup.

14 MR. WACHOWIAK: All right. And then so
15 in general we'll try to get through the things on
16 here.

17 The performance characteristic. What's
18 supposed to be in the ITAAC is a configuration and
19 in some cases the performance characteristics of the
20 structure system components after we've completed
21 construction. And in general these are supposed to
22 be the fixed design features that remain in place
23 for the lifetime of the facility.

24 We'll talk a little bit more later on
25 the format of the three prong format of the ITAAC

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1 and how we handle things that we know are going to
2 change in the future and are controlled by some
3 other process. But we'll get to that.

4 Go to the next one.

5 This is our laundry list of things that
6 can go into the design description. And depending on
7 the system you have one or more of these things that
8 are in there. You know, we want to say what the
9 name of the system is or what it covers, why the
10 system is there, safety-related modes of operation,
11 classifications that are important things like
12 seismic, ASME, other things that would need to be
13 required.

14 For some systems it's where it's located
15 in the plant, if that's a critical characteristic
16 for it.

17 Most systems have a functional
18 arrangement and when we talk about our examples, the
19 functional arrangement is presented differently
20 depending on what kind of system it is. And we have
21 some examples some there.

22 Where it gets its power sometimes in
23 important for the system. And then also if there's
24 some kind of separation requirement, is there
25 independence in separation.

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1 Other functions that have been
2 determined to be important to meet:

3 Safety, which we knew from up front, but
4 then there are other regulations that we're looking
5 at meeting. In the most part, it's things
6 associated with preventing either operational or
7 post accident -- or mostly operational dose that
8 bring more systems in.

9 Go ahead.

10 So in terms of our graded approach I
11 think we covered this in a couple of questions here,
12 but let me try to clarify that again.

13 If we have something that safety-related
14 it's going to have a greater level of description
15 and it's going to have more performance related
16 ITAAC in the tables. If it's a nonsafety system,
17 then it could have less coverage in ITAAC and it's
18 basically the things that we have determined that
19 those portions of the system help support the
20 specific functions that brought it in.

21 And then nonsafety systems with no
22 relation to safety or these things, we would end up
23 having it as a identification, the system name, no
24 entry like we talked about.

25 DR. WALLIS: I go back to the question I

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1 asked yesterday. On these performance
2 characteristics that you're going to check of these
3 safety-related systems, some of them of the most
4 important safety-related systems seems to have
5 characteristics during accidents which you cannot
6 check by testing.

7 MR. WACHOWIAK: That's one of the --

8 DR. WALLIS: But when you do test, when
9 you look at them, seem to be what? They're sort of
10 obvious things, but they don't have much to do with
11 the accident situation.

12 Do you explore ways in which you could
13 do tests which were closer to the real accident
14 situation?

15 MR. WACHOWIAK: That is one of the great
16 challenges for ITAAC in general and specifically for
17 plants that use passive features to respond to
18 accident. Because we're relying on the actual
19 conditions during the accident to be the driving
20 force for making the systems work.

21 So we have to provide a balance of type
22 tests where we would test something in a laboratory
23 and then using the quality programs demonstrate that
24 the actually physically installed component matches
25 what was done in a type test. One of the examples

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1 that we talked about yesterday a little bit was the
2 isolation condenser. We did a prototype test, full
3 scale prototype test of the isolation condenser. And
4 we are relying on those test results.

5 The way that the ITAAC is written for
6 the isolation condenser is we need to go and measure
7 the critical dimensions and other characteristics of
8 the isolation condenser that we install and then
9 compare it back to the type test. And we would use,
10 in this case in the ITAAC inspection tester
11 analyses, we would use an analysis that takes those
12 as-built characteristic and then compares to what
13 was done in the laboratory to give us the confidence
14 that the as-installed equipment is going to perform
15 like we expect it to.

16 Main steam isolation valves are another
17 thing. And this is common to all plants, not just
18 passive plants. But the performance characteristic
19 of a main steam isolation valve is that it closes
20 within in a certain amount of time, there's a range,
21 under accident conditions. But we're certainly not
22 going to test our as-installed valves under accident
23 conditions. So we have to rely on laboratory tests,
24 type tests in our vernacular in Tier 1. And then
25 using the quality program show that the as-installed

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1 valves actually match what was tested in the
2 laboratory.

3 So to the extent possible, and remember
4 that all of the ITAAC are required to be satisfied
5 prior to fuel load, so we have to come up with ways
6 to do these tests that can actually be accomplished
7 with no fuel in the vessel. And in our particular
8 plant, that poses a challenge because the only heat
9 source to make steam or anything else really is the
10 fuel.

11 MEMBER SHACK: Or the aux boiler.

12 MR. WACHOWIAK: Or the aux boiler. But
13 the aux boiler is there to provide pressure. So we
14 do have pressure tests in the ITAAC that we're going
15 to use the aux boiler. But if we're going to talk
16 about anything associated with rated steam flow, the
17 aux boiler is not going to do it. Unless we had a
18 nuclear aux boiler, but then we'd have to run with a
19 different facility to put that in. And I think it
20 might take longer.

21 MEMBER SIEBER: You do.

22 MR. WACHOWIAK: What was proposed what
23 John was doing. We had to come up with a way to
24 test, in this case here, one of my examples here,
25 test the GDCS system without having the actual

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1 conditions that we expected to operate in. And we
2 rely on as-built dimensions and the as-built test
3 results that we'll run in the test. And we'll have
4 to combine with enough -- an analysis to show that
5 we have the confidence that the systems will perform
6 under those accident conditions.

7 MS. CUBBAGE: This is Amy Cabbage, NRO
8 staff.

9 And we also need to keep in mind that
10 the process doesn't stop there. This is just for
11 the authorization to load fuel. There'll be in-
12 service testing, there'll be tech specs, there'll be
13 the preop startup; all of those other test programs
14 that are overlaid to give the assurance that the
15 systems that will operate as needed when they're
16 required.

17 MR. WACHOWIAK: Okay. What I have in
18 the next few slides here, they're not in your
19 handouts but you do have them in Tier 1. They're
20 excerpts from Tier 1. And I want to go through and
21 talk about some examples of what's in our design
22 description at this point and how we present this.
23 So these pages come directly out of Tier 1, so you
24 all have them.

25 The first example system that I wanted

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1 to bring up was the gravity-driven cooling system.
2 Okay. We have, as we said before, the name of the
3 system is there so it uniquely identified.

4 We have a short description of the
5 system, what its purpose. And then we go through and
6 we start listing what our design descriptions are.
7 And each of these design descriptions are actually
8 paired one-to-one with the ITAAC that we'll see
9 later.

10 So in almost all cases the first design
11 description entry is something to verify the
12 functional arrangement. In a couple of more slides
13 here I'll get to -- well, back. Stay on this one.
14 I'll talk about how we define the functional
15 arrangement in Tier 1.

16 Then next we have a bunch of other
17 commitments. In this particular example we'll see
18 for piping systems a set of information about ASME
19 class requirements for the piping in the system and
20 for the components in the system.

21 Then down past those we start getting
22 into some specifics about whether it needs to have a
23 seismic capability or not. And then we'll move to
24 the performance characteristics. And they go on --
25 this one, I think there's maybe two or three pages

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1 of design commitments.

2 So we're on our next page. A lot of the
3 places in the design commitment we refer to tables
4 that are in there. And the tables are there to
5 identify which specific components we are talking
6 about in this system. When you go into the nuclear
7 plant for this system, you have the main components
8 and then you have a lot of other things. There's
9 vents and drains and test connections and all sorts
10 of other things that really aren't the principal
11 part of the design description in Tier 1. So what
12 we've tried to do with the tables is focus
13 specifically to which components we're talking about
14 that are going to be validated in the different
15 tests.

16 So if you kind of think forward to how
17 we would be closing these things, for each one of
18 those ASME entries it says for the components listed
19 in Table 2.4.2-1 you do the following. One of the
20 entries in this table corresponds to one test or one
21 inspection analysis test that have to be performed.
22 So when I say there's thousands of these things to
23 do it's because we're expanding to cover the things
24 on the tables.

25 So we say in text what their component

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1 is. If there's a figure in the section, we will
2 describe how the component is shown on the figure.
3 In our particular application we don't have tag
4 numbers listed in Tier 1 or, in most cases, in Tier
5 2. So this is just meant to identify how you find
6 things on the figure and then the characteristics of
7 this.

8 In this particular system we've got ASME
9 code equipment. We have some or all of our equipment
10 which is seismic category 1 and our information that
11 relate to how we would go about closing the
12 different ITAAC.

13 Go on to the next one. And I think this
14 is the figure. So it's back at the backend of this
15 section, but we've referred to that and you can see
16 there's little circles there that identify what
17 we're talking about, a pipe or a valve or something
18 else.

19 And these are the high level
20 characteristics of the system that are going to be
21 verified for the functional arrangement. So the
22 things that are on this figure are the things that
23 are going to be verified that they exist and that
24 they are in this approximate configuration.

25 So we would verify: There's the line on

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1 here which says that the GDCS pool has a stainless
2 steel liner. Part of the functional arrangement is
3 to verify that it in fact does have a stainless
4 steel liner.

5 The check valve comes before the squib
6 valve is another part of the functional arrangement.
7 And that we have one pipe that branches into two
8 that connect into the vessel. Those are the types
9 of things we'll be verifying in that functional
10 arrangement.

11 Yes?

12 MEMBER BROWN: That's a nice simple
13 system. It's a good figure. You can see what you're
14 doing. Just to expand this to an area that's a
15 little more complex, if you'll look -- I look for
16 DCIS ITAAC section, and that's two lines. It says
17 its subsumed under the ITAAC for ten, eleven or
18 twelve other systems: nuclear monitoring, you know
19 there's a shopping list of all the kind of stuff.

20 Now I didn't look at the figures yet,
21 but as it starts I've got a figure here and a figure
22 there, but nothing that pastes those together. But
23 I'm just trying to relate a nice simple, easily
24 understood example which you've used, which is fine,
25 with a somewhat more complex integrated system which

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1 is really touched by ten independent systems which
2 then all get cobbled together. And that interface
3 it's got to be difficult to define as to what you
4 do.

5 That was question one.

6 MR. WACHOWIAK: Okay.

7 MEMBER BROWN: Question two was just for
8 the simpleminded like me, there are -- I don't know
9 how many systems there are in this. I lost count,
10 somewhere over 50 going through pages of stuff.
11 Then we talk about some that are subject and some
12 that aren't. Is there a compiled or consolidated
13 list that says here's all the systems in the plant
14 and they're subject to ITAAC or they're not. Is
15 that in here so that we don't have to derive that?
16 Is it in there?

17 MR. WACHOWIAK: There is in Tier 1.

18 MEMBER BROWN: I didn't see it. So if
19 it's there, I'd just like to know where it is,
20 that's all.

21 MR. WACHOWIAK: It might be in Tier 2.

22 Is it in the Tier 2?

23 MS. CAMPBELL: Table of contents.

24 MEMBER STETKAR: When I came up the
25 turbine compound cooling water, there was a line

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1 item that looked at that system and said nothing
2 required.

3 MEMBER BROWN: I was looking for a table
4 that says here's all the systems. Here's a column
5 that says ITAAC, no ITAAC. You know, it's kind of
6 the entry whatever you change the words are that we
7 use, entry/no entry.

8 MR. OESTERLE: Eric Oesterle, staff.

9 There is a table that's provided at the
10 end of the staff's SER with open items. And that's
11 where you may have seen it and where we did identify
12 where the systems had contained no entry.

13 MR. WACHOWIAK: Yes.

14 MR. OESTERLE: Correct. Keep going.

15 MEMBER BROWN: And there's a table?

16 MR. OESTERLE: That's it right there.

17 Appendix A to the SER --

18 MEMBER BROWN: That is a list of every
19 system and for the business of whether there's ITAAC
20 or not. Are these just the systems covered by
21 ITAAC, that will have ITAAC? What about the ones
22 that don't say "no entry."

23 MEMBER BROWN: So that's a cute little
24 word, that "no entry."

25 MR. OESTERLE: Yes. And where there's an

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1 SRP section number identified those systems do have
2 ITAAC.

3 MEMBER BROWN: Okay. That's fine.
4 Thank you.

5 And back to my first question. He
6 answered my second question, although I don't know
7 why it wouldn't be in here as opposed to in the SER
8 for the --

9 MR. WACHOWIAK: This is Wachowiak.
10 For the second question we needed to
11 give the staff something to do.

12 MEMBER BROWN: Why didn't I figure that
13 out.

14 Anyway, back to the first question --

15 MR. WACHOWIAK: But, no, our document
16 does not include some concise list that says this
17 has ITAAC and this doesn't.

18 MEMBER BROWN: Okay.

19 MR. WACHOWIAK: But our list is all of
20 the systems that are associated with the design
21 certification. And I think it's closer to a 100 or
22 so systems that are in our master parts list.

23 MEMBER BROWN: Okay. Question one.

24 MR. WACHOWIAK: So question one is how
25 do we do this for an I&C system?

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1 MEMBER BROWN: Well, a or a collation or
2 a consolation of a bunch that are then put under
3 this umbrella of a Q-DCIS or a -- is it, an NBCS
4 that's the nonsafety stuff?

5 MR. WACHOWIAK: Right. I have some
6 examples coming up on that on one of the systems
7 from Q-DCIS. I think I put the Q-DCIS system. But
8 I do want to say, though, and this just is a
9 historical thing, Q-DCIS and NBCIS are virtual
10 systems in this plant. There are no components that
11 are labeled C-63 for Q-DCIS.

12 MEMBER BROWN: I gathered that.

13 MR. WACHOWIAK: It's all in these other
14 systems and they're just grouped as a Q-DCIS. And
15 that's why that particular system shows up --

16 MEMBER BROWN: Oh, I understand that.

17 MR. WACHOWIAK: That's why.

18 MEMBER BROWN: But my concern then is
19 how since I've got this 10, 12 and there's a list of
20 systems covered.

21 MR. WACHOWIAK: Right.

22 MEMBER STETKAR: And there's a table
23 that lists all those under the Q-DCIS paragraph.
24 And there's a table that's right after that that
25 says here's the stuff that's included in that. But

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1 they're each individual systems, yet they do
2 communicate in some cases each other, in some cases
3 some other system which may be not included under
4 this particular umbrella. And since it was not
5 clear from the information as to how you throw that
6 into the --

7 MR. WACHOWIAK: The particular systems
8 are listed in other sections, and we do have an
9 example of how that's presented in a functional
10 arrangement and other things that we'll get to for
11 one of those systems.

12 Hold off on that particular piece of the
13 question.

14 In terms of how they touch other
15 systems, I think this gets back to a couple of
16 different things that we talked about yesterday.
17 One of the things that we talked about yesterday was
18 how it interfaces with the mechanical part.
19 Because, you know, the instrument and control system
20 can't do anything unless it's got some kind of
21 sensor that connects into it, right? Or it's got
22 some valve or other component that has to actuate.
23 And those particular interfaces are covered in
24 2.2.15 right under the IEEE 603 compliance sections
25 where we identify that the specific interfaces have

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1 to meet the different -- the requirements
2 independent, separation, all those kinds of things.

3 If you want to look at how the I&C
4 system interfaces with the mechanical components,
5 that's where you would look.

6 If we look at the individual I&C
7 systems, there are many places in the ITAAC that are
8 meant to demonstrate that these individual,
9 especially in the safety-related I&C systems, that
10 they don't communicate with the other systems.

11 MEMBER BROWN: I understand. That would
12 be good.

13 MR. WACHOWIAK: So I think we have those
14 interfaces covered. And if we wanted to go through a
15 specific example, and I think we've done this with
16 the staff several times, where we take a thread and
17 we follow it all the way through all the different
18 ITAACs and we hit everything that we need to to get
19 to with this.

20 But you're right that especially in the
21 I&C system and especially because so much of it is
22 covered under this DAC, design acceptance criteria
23 where we don't have all of the final detail design
24 available that it takes some work to get through and
25 demonstrate that the ITAAC that are in Tier 1

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1 actually covers everything that's needed for the
2 system.

3 But we've gone through that with the
4 staff on several of these things where we've pulled
5 the thread, taken a vertical slice down through and
6 looked to make sure that we have everything that we
7 need.

8 MR. OESTERLE: Eric Oesterle from the
9 staff.

10 I just want to let you know that we do
11 have several RAIs that are outstanding and open
12 regarding some of the issues that we're still
13 working with GEH on to resolve.

14 MR. WACHOWIAK: The specifics, yes.

15 And one of the things is in the area of
16 the IEEE 603, the question came up as how exactly do
17 we make sure that all of the requirements in that
18 standard are covered. And we've gone back and
19 reformatted that section. So in Rev. 6 it's not
20 going to look exactly like what you have there based
21 on the interaction.

22 MEMBER BROWN: You build a standard
23 compliance matrix?

24 MR. WACHOWIAK: Yes.

25 MEMBER BROWN: Or something like that.

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1 MR. WACHOWIAK: Compliance matrix. And
2 the format of that is being updated to make it a
3 little more transparent to what we intend to
4 actually--

5 MEMBER BROWN: And where will that be?

6 MR. WACHOWIAK: That's going to be in
7 2.2.15

8 MEMBER BROWN: Of Tier 1?

9 MR. WACHOWIAK: Of Tier 1. That's an
10 open item yet that Eric will talk about.

11 Okay. So we need somebody who has a
12 password. Okay. All right.

13 So let me get through some of these.
14 And, hopefully, when we go through in my examples
15 from Tier 1, we did select one of the I&C systems to
16 cover in this presentation.

17 And we go to the next one, which is a
18 containment system. It's similar to the mechanical
19 systems in how its presented, but its slightly
20 different.

21 We have the design and the description
22 up front what the system is supposed to do. And
23 then the design commitments, many of them are
24 associated with our codes and things here on the
25 first page. That's similar to what we had before.

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1 And for those that are trying to find on
2 their computer, 2.15 is the system that I have up
3 now.

4 Then look at the next page. I included
5 the entire list here.

6 Next page. We have a table. And in
7 this particular system the table is associated with
8 the containment isolation valves. And so we have a
9 table that lists all of the containment isolation
10 valves that have Tier 1 requirements on them,
11 similar to what we had in the GDCS with the
12 components.

13 Go to the next page.

14 And the functional arrangement. In this
15 functional arrangement you'll notice that there's a
16 bunch of notes on the bottom. And the notes here are
17 in the containment systems are where the cylindrical
18 dimensions of these systems would be. So, for
19 example, in our safety analysis the dimensions of
20 the vent system in the pressure suppression
21 containment are very important to the performance of
22 that system. So on the functional arrangement we
23 listed the number and diameter of the vertical vents
24 in the flow area of the horizontal vent.

25 MEMBER BLEY: So those are the numbers

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1 down there in number 13 or something?

2 MR. WACHOWIAK: Yes. And so these would
3 be the important characteristics of this. And --

4 MEMBER BLEY: Why aren't some of these
5 referenced something like above the wetwell floor?
6 Is there a reference when you build the wet well
7 floor that at the time there is reference points
8 from which people measure?

9 MR. WACHOWIAK: Yes.

10 MEMBER BLEY: Do they just put a good
11 old family ruler and make a -- on the end and pull
12 it up and say, oh, okay, that's 6.3 or whatever?
13 This isn't the reference point?

14 MR. WACHOWIAK: The reference --

15 MEMBER BLEY: Because that floor's not
16 going to be flat.

17 MR. WACHOWIAK: That's right. And
18 absolutely. I'm sorry, but I don't have example in
19 here, but that's a very good point. Not
20 everything's going to be flat, not everything's
21 going to be perfect. And I'll hold that in my head
22 for a second.

23 The reference is the inside -- how is it
24 specified? The bottom invert of the vessel head
25 inside, something like that. Anyway, so -- right

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1 here is zero. And so everything's measured --

2 MEMBER BLEY: From the inside.

3 MR. WACHOWIAK: Yes, from inside the
4 vessel.

5 MEMBER BLEY: So you measure from the
6 inside the vessel outside the wall and down to the
7 floor?

8 MR. WACHOWIAK: Yes. That's the
9 reference. And later what I'm sure will happen is
10 that, like any existing plant, there will be various
11 reference markers placed in the building so that
12 when you go and do measurements you measure from the
13 reference points that already set.

14 MEMBER BLEY: Is there an ITAAC that
15 covers the certifications for the reference point?

16 MR. WACHOWIAK: That's a good question.
17 And, no. However, there is an ITAAC that says that
18 the floor on the suppression pool needs to be at a
19 specific elevation. And in closing that ITAAC you
20 would have to -- the documentation that concludes
21 that would be to include the method for how you
22 calculated that and you got to that point.

23 It's like going ahead on my
24 presentation, everybody has read the ITAAC --

25 MEMBER STETKAR: Right. Absolutely.

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1 MR. WACHOWIAK: It's parts of the
2 ITAAC--

3 MEMBER STETKAR: All 689 pages of it.

4 MR. WACHOWIAK: That's right. And
5 you'll see that each one of those tests is typically
6 is one sentence, sometimes there's two sentences.
7 That is not the extent of the instruction for how
8 you would do that test. Someone has to write a
9 procedure that says how you would specifically get
10 to the conclusion that you want to get to. And that
11 procedure is going to be part of the closure
12 package. So that review that says here's the floor,
13 it's at this elevation would go all the way through
14 to the process, the procedure and how that would
15 measure. And those are all the things that the
16 inspectors can challenge when they go back and look
17 at the closure of that ITAAC.

18 One of the other sections I'll mentioned
19 here I don't have an example of the building ITAAC,
20 mainly because the building section contains
21 sensitive -- unclassified, but sensitive material.
22 And since we're in an open meeting I didn't want to
23 put anything on the slides that would cause us to go
24 closed.

25 Almost everything in the ITAAC has a

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1 tolerance on it. And it's especially prevalent in
2 the containment section where it says the walls need
3 to be this thickness plus or minus whatever. And
4 that's what this was doing here.

5 Can you go down to 2.15 and let's see
6 where -- because I don't have the --

7 MS. CAMPBELL: For the building?

8 MR. WACHOWIAK: Yes, 2.15.

9 Okay. It's hard to do on the screen
10 there. But in this particular case the horizontal
11 vent it says greater than or equal to. So the
12 tolerance is set up, it's a one-sided tolerance. It
13 would have to be at least size.

14 MEMBER STETKAR: Up at the top where it
15 was just X number meters above the wetwell floor? I
16 understand the greater then or equal to.

17 MR. WACHOWIAK: Right.

18 MEMBER STETKAR: That sets its own
19 standard.

20 MR. WACHOWIAK: It's just that one
21 says--

22 MEMBER STETKAR: I'm just asking
23 physical tolerances, and I didn't see one.

24 MR. WACHOWIAK: And what we tried to do
25 in all of these is that we would have something or

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1 there wouldn't be an absolute number. What I saw
2 there was a greater than on it.

3 MEMBER STETKAR: I'm just looking at the
4 next three items two bullets below.

5 MR. WACHOWIAK: Okay.

6 MS. CUBBAGE: This is Amy Cabbage.

7 If you're looking for an example, Table
8 2.16.5-1 has the nonload dimension and then has a
9 tolerance in the far right column of a plus/minus.

10 MEMBER STETKAR: I don't disagree. It's
11 just that it seemed to be absent here, that's all.

12 MS. CUBBAGE: Oh, no. I --

13 MEMBER STETKAR: Wherever it's supposed
14 to be, it's --

15 MR. WACHOWIAK: Okay.

16 CHAIRMAN CORRADINI: You can proceed.

17 MR. WACHOWIAK: We'll proceed. I
18 understand your question. The idea there was that
19 we would have tolerances on these things so that
20 when they're actually constructing something, you
21 know we're not constructing a computer model which
22 can be very accurate. We're constructing an actual
23 building, which is a little less tolerant.

24 So let's go on then to the next page.
25 This is one of R&C system and how it's presented.

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1 This is in 2.2.13.

2 MR. KIMURA: Steve Kimura.

3 2.2.13 is one of the one of the Q-DCIS
4 systems. Q-DCIS by itself is a very complex system
5 and comprises both the reactor protection system and
6 the engineered safety features safety system --

7 MEMBER BLEY: I'm trying to find it.

8 MS. CAMPBELL: It's 2.2-102.

9 MR. WACHOWIAK: That's the page.

10 I found yesterday that almost everybody
11 had a copy of Tier 1 with them either on their
12 computers or in hard copy. So I didn't really worry
13 about putting extra paper.

14 CHAIRMAN CORRADINI: Keep going.

15 MEMBER BLEY: Start over. I missed the
16 first part trying to find it.

17 MR. KIMURA: So Q-DCIS comprises two
18 different parts. There's the reactor protection
19 system, there's the engineered safety features
20 system. The SSLC is the engineered safety features
21 system part of Q-DCIS. And it performs various
22 functions.

23 There's multiple ways to try to kind of
24 describe how this system works, and we thought the
25 best way and probably the most straightforward way

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1 would be by arranging this section in a series of
2 tables.

3 The first table, Table 2.2.13-1, is the
4 functional arrangement. And it says the SSLC
5 comprises four redundant, safety-related, Seismic
6 Cat 1, divisions of trip logics and trip actuators.
7 But what we've been talking about here are really
8 the command features. There are sense features, the
9 senses that have to come into the system, obviously.
10 And there are execute features, the actuators, that
11 also have to be manipulated by the command features.

12 MEMBER STETKAR: Are they independent?

13 MR. KIMURA: They're independent.

14 MEMBER STETKAR: It didn't say that in
15 the table, that's why I asked. It said they're
16 redundant but it didn't say they were independent.

17 MR. KIMURA: Right.

18 MEMBER STETKAR: They do not go hand-
19 and-hand in all circumstances?

20 MR. KIMURA: Yes. The design criteria
21 for the safety systems follow the requirements IEEE
22 Standard 603. And a demonstration of compliance
23 with 603 is done in a separate section of Tier 1.
24 In section 2.2.15. And that was done because there
25 is a whole myriad of requirements that had to be

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1 applied to each of the safety systems in various
2 degrees.

3 MEMBER STETKAR: Yes, but 603 says it
4 needs to be redundant also.

5 MR. KIMURA: Right. It says that it has
6 to meet --

7 MEMBER STETKAR: -- high level structure
8 or--

9 MR. KIMURA: It has to be independent.
10 It has to be of sufficient quality. It has a whole
11 bunch of other things. It has to be qualified for
12 the environment in which to operate.

13 MR. WACHOWIAK: Just to make sure that
14 we're all on the same page with this, this
15 particular entry there for the redundant power
16 supplies is within the division. The redundant
17 power supplies within the division do not have the
18 same independence requirements as the power supplies
19 amongst the divisions.

20 MEMBER STETKAR: And a division means
21 one of the four --

22 MR. WACHOWIAK: One of the four. So
23 what we're saying here is that --

24 MEMBER STETKAR: I'm glad you said that
25 because it wasn't obvious.

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1 MR. WACHOWIAK: Yes. Each one of the
2 four divisions has two power supplies.

3 MEMBER STETKAR: That's fine. That's
4 okay.

5 MR. WACHOWIAK: So the independence
6 requirements under IEEE 603 is different than
7 amongst --

8 MEMBER STETKAR: Either from Train-to-
9 train or division-to-division, channel-to-channel
10 however you want to phrase it?

11 MR. WACHOWIAK: Yes.

12 MEMBER STETKAR: As long as you don't
13 shift the power from -- allow the power from channel
14 A to be used in channel B?

15 MR. WACHOWIAK: And that's correct. And
16 we verified that under the IEEE 603 that A doesn't
17 get shared with B or one doesn't get shared with
18 two.

19 MEMBER STETKAR: Okay. I guess I would
20 have shown four redundant independent. But you say
21 it's assumed in 603 --

22 MR. WACHOWIAK: Redundant safety-related
23 power supplies are provided for each division. So
24 each division has two power supplies is what we're
25 trying to say there.

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1 MEMBER STETKAR: That doesn't mean
2 they're independent downstream of that in the
3 operational functional stages.

4 MR. WACHOWIAK: Right.

5 MEMBER STETKAR: Which is also a
6 requirement of IEEE 603. And that's why I used the
7 word "independent" more broadly because if you mix
8 the occasion from channel-to-channel depending on
9 how that's done, you can compromise the independence
10 and the redundancy of those independent trains
11 theoretically.

12 MR. WACHOWIAK: Yes. And that's actual,
13 it's happened before.

14 MR. KIMURA: The power supplies are also
15 discussed in greater detail in another section of
16 Tier 1. So in this section the requirement for the
17 system is that there be redundant safety-related
18 power supplying the safety-related system by
19 division. And by redundant in this case is two
20 banks of 36 hour batteries that are tied together to
21 give you the 72 hour power that we required.

22 MEMBER STETKAR: So you have to have
23 both?

24 MR. KIMURA: You need both to get 72
25 hours.

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1 MEMBER STETKAR: But of the redundant
2 power supplies to get the full 72 hours?

3 MR. KIMURA: Right. So in that sense
4 these two power supplies are not truly independent.
5 But they are independent for the division.

6 MEMBER STETKAR: No, I understand.

7 MR. KIMURA: Because we have eight sets
8 of batteries for the entire SSLC. So each division
9 will operate for 72 hours.

10 MEMBER STETKAR: Are you saying that the
11 power supplies can't supply the full functionality
12 is why?

13 MR. KIMURA: Right.

14 MEMBER STETKAR: So in reality you have
15 technically as one power supply? You've got a half
16 a power supply for half the time?

17 MR. KIMURA: Right.

18 MEMBER STETKAR: Because fundamentally
19 they're not redundant if they're not full
20 capability. So that word is kind of inappropriately
21 used in that case. I'm not sure, you know, if you
22 have one power supply that's just rated to supply
23 the whole thing, that's probably okay also. Because
24 you've got four channels as long as you maintain
25 their independence. And you only need two out of

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1 the four or something like that to do what you're
2 going to do.

3 MR. WACHOWIAK: But there are other
4 technical reasons why we want to do the way that
5 we==

6 MEMBER STETKAR: That's fine. That's
7 okay. I'm not arguing with that.

8 MR. WACHOWIAK: And this is not say
9 whether --

10 MEMBER STETKAR: I'd be advertising
11 where they're not fully redundant.

12 MR. WACHOWIAK: And this will tell what
13 we've done and why.

14 MR. KIMURA: Yes. But when you look at
15 it, there will be two.

16 So the functional arrangements are
17 intended to be inspection only item. You look at,
18 you can see that it's there. That these features
19 exist in the system.

20 In the next table, 2.2.13-2 representing
21 really the essence of the safety-related functions
22 that this system has to perform. And we have three
23 columns in this table.

24 The first one is the safety-related
25 function. Initiation of, say, GDSC injection is one

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1 of the functions that SSLC does.

2 It's initiators would be the reactor
3 pressure vessel water level low, level 1.

4 And there are interfacing systems. And
5 the interfacing systems are where you will find some
6 of the other parts, either the sense for the NBS
7 system, the sensors would be in NBS, and then the
8 interfacing actuators would be in GDCS. So if you
9 wanted to go look and see where the actuators are
10 tested, you'd go back to the GDCS section that we
11 just covered a few minutes ago.

12 But this table kind of encapsulates and
13 just distills down the things that this box has to
14 do.

15 The next table, 2.2.13-3 delves into
16 some of the more esoteric features of the system.
17 Some of the manual control features, some
18 interlocks. One of the interlocks you have to do
19 before you actuate GDCS is you have to depressurize
20 the reactor pressure vessel. So we have interlocks
21 that open the various groups of the safety-related
22 valves or the safety relief valves or the
23 depressurization valves. And those occur based on
24 certain kinds of layers that are described in Tier
25 2.

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1 And then there are operational and
2 manual bypasses of the safety-related functions. And
3 so those are listed here as well.

4 MR. WACHOWIAK: So one of the things to
5 remember from this is the I&C systems we don't use a
6 figure to describe the arrangement. We use tables of
7 the features for the systems to describe the
8 arrangement.

9 This example that I've put up here is an
10 example of one where we don't have any ITAAC. And
11 as Eric mentioned, it's still in discussion about
12 how we present this material. The way its presented
13 in this particular system goes to that thought
14 process that we have. Its not safety-related, it
15 doesn't meet the requirements, therefore it doesn't
16 need to have any ITAAC. But specifically how we
17 present this information is still under discussion.

18 MEMBER SHACK: Presented in terms of
19 explaining what you just said or presented in terms
20 of the bottom line?

21 MR. WACHOWIAK: In terms of the bottom
22 line. What needs to go into the Appendix of Part
23 52. The thought process is described in 14.3 in the
24 DCD.

25 MEMBER BROWN: Somebody, one of you,

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1 made the comment earlier that says no ITAAC are
2 required for the system. Okay. You've now answered
3 part of the question as to how you know yes or no.
4 But somebody made the comment that there is or there
5 are tests on acceptance criteria. Somewhere this
6 system has to be tested.

7 MR. WACHOWIAK: That would be tested in
8 the startup test program.

9 MS. CAMPBELL: In preop or startup.

10 MEMBER BROWN: So there's no test prior
11 to operation for this system?

12 MEMBER SIEBER: There's construction
13 tests. Construction tests make sure that the
14 equipment performs as a function. But there's not
15 necessarily -- some systems aren't necessarily
16 complete. They don't necessarily prove their pump
17 can pump to a certain head or something like that.
18 It does prove that when you turn it on, water comes
19 out of that pipe over there, so to speak.

20 So everything gets tested in some way or
21 another.

22 MEMBER BROWN: But there's got to be
23 acceptance criteria for that also. For certain
24 things. You got to have a flow rate, and you got to
25 have a response, no more than -- blah, blah, blah,

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1 all that kind of good stuff.

2 MR. WACHOWIAK: That's outside of the
3 ITAAC process. Because there are other tests other
4 than ITAAC.

5 MEMBER SIEBER: Right.

6 MR. WACHOWIAK: These are supposed to
7 prove the most safety significant portions of the
8 certified design.

9 Okay. Let's move off of the design
10 description phase and let's go into the ITAAC phase.
11 We covered most of this yesterday, so I'll probably
12 go through quickly on this.

13 The ITAAC defines the things that we
14 want to confirm. Okay.

15 The table format for the ITAAC is three
16 columns. This was described in all the guidance
17 there.

18 We have the design commitment. And as I
19 mentioned before, the way we present this is the
20 design commitment exactly mimics those numbered
21 bullets from the design description. So there's no
22 question of did we cover everything in the design
23 description in the ITAAC. We did because they're
24 exactly the same.

25 We have the inspection, tests or

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1 analyses description in the second column.

2 And then the acceptance criteria in the
3 third column.

4 And like we said, all of this needs to
5 be completed, the entire set of them, prior to the
6 loading fuel.

7 Next page.

8 Okay. This comes back to some of the
9 things that we talked about earlier. When we're
10 going to do the tests, if there is a test involved
11 there, we're going to make sure that that test is
12 contained in the initial test program that we talked
13 about earlier. So we talked about that overlap. The
14 procedures will be handled in the same way that
15 we've described in the initial test program. So if
16 you don't see a description of the specific ITAAC,
17 we didn't mean they would all be described there.
18 But the process for doing the test program would be
19 the same.

20 CHAIRMAN CORRADINI: Just to make sure,
21 just to say it back to you so I get it right. Your
22 basic point is that somewhere in the test program
23 there must be a one-to-one mapping of if there's
24 going to be a test, it'll fit somewhere in the ITP
25 that we saw under 14.2? But those were that

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1 inspections will be inspections. Those that are
2 analyses, there might be a separate subtest -- I
3 don't want to say subtest, but a separate test which
4 then analyses will satisfy the ITAAC?

5 MR. WACHOWIAK: I think that that's
6 mostly correct with one possible exception here.
7 The initial test program itself may not -- the thing
8 that you saw on 14.2 may not cover everything that's
9 in the ITAAC. But when we put the actual list of
10 tests together and write the procedures for the
11 test, it's going to be all handled the same way with
12 the same process that's ascribed in 14.2

13 MS. CAMPBELL: Right. The point here is
14 that we won't put the plant in any condition that's
15 not already in alignment with procedures. In other
16 words --

17 CHAIRMAN CORRADINI: But to satisfy an
18 ITAAC?

19 MS. CAMPBELL: Right, to satisfy an
20 ITAAC.

21 CHAIRMAN CORRADINI: Yes.

22 MS. CAMPBELL: It's not that if you go
23 to 14.2 that you're going to see every ITAAC test
24 in--

25 CHAIRMAN CORRADINI: No, I didn't expect

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1 that. But conversely what I guess I'm saying is
2 somewhere in the ITP there will be a set of tests or
3 smaller tests that fit in with analyses that will
4 have to essentially satisfy your --

5 MR. WACHOWIAK: Yes, that's correct.
6 And we're working with our partners right now to
7 figure out how to layout all the inspections and
8 tests. Because you have to be able to get to the
9 things you're going to inspect and test. And if one
10 of the things that you need to inspect is a pipe
11 that ends up being buried in the ground or something
12 like that, you have to inspect it before its buried
13 or else you'd have other issues.

14 So all that is going to be described in
15 that process. And like Patricia said, we'll try to
16 do these ITAAC, inspections and tests when the ITP
17 has the conditions in the plant for doing those
18 tests.

19 MEMBER BROWN: I guess I'm trying to
20 take the ITAAC part that we were talking about and
21 if you look at 14.2 there's a set of construction
22 tests, preop tests and doing startup tests. You
23 know, there will be a fuel loading and doing the
24 startup tests. All of the ITAAC has to be done
25 before completed, signed off and blessed before fuel

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1 load. At least that's the way it read.

2 MR. WACHOWIAK: That's the logic.

3 MS. CAMPBELL: That's the requirement.

4 MEMBER BROWN: Now is it my
5 understanding then that as the ITAAC, the
6 requirements specified, the acceptance criteria for
7 the inspections and tests will be accomplished
8 during either preoperational tests or actually
9 specified functional inspections? I mean you have
10 to generate the results with some type of a test,
11 and the only test I see prior to startup are the
12 preoperational tests and/or the construction tests,
13 which occurred before then. So my interpretation of
14 that was that these acceptance criteria and the
15 tests that you specified to do that have to be
16 subsumed or incorporated into either construction
17 tests to satisfy -- having signed off by the time
18 you get up--

19 MR. WACHOWIAK: Yes. That's not only
20 signed off, its signed off and submitted --

21 MEMBER BROWN: Yes. It's verified --
22 seal of approval, whichever ones are required. So
23 that's where these fall in? I mean, there's not a
24 separate set of ITAAC specified --

25 MS. CAMPBELL: Yes.

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1 MEMBER BROWN: -- test procedures? They
2 are encompassed within the existing construction and
3 preop test program

4 MS. CAMPBELL: Not necessarily.

5 This is Patricia Campbell.

6 There could be tests in the ITAAC that
7 are not in the specified initial test programs
8 identified in 14.2. It's not a one-for-one match. In
9 other words, there are initial tests in the ITP that
10 will verify some of the ITAAC. Like we may have a
11 100 --

12 MEMBER BROWN: That's different than
13 preop tests?

14 MS. CAMPBELL: I mean, we mentioned the
15 NEI guidelines document, and I've been working on
16 that as GEH's rep for how do we close the ITAAC. And
17 certainly there will be portions of the initial test
18 program testing, maybe three or four pages would be
19 pulled out as one ITAAC verification. And that would
20 be the documentation that would verify that ITAAC.
21 But there may be ITAAC testing on measurements or
22 inspections that will not be identified as part of
23 the ITP. There may be special tests.

24 MEMBER BROWN: But that's what I said.
25 If those items that are measurements of inspections,

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1 obviously, just accomplished in some -- via some
2 different mode.

3 MS. CAMPBELL: But what this bullet
4 means is that we won't violate any of the conditions
5 of the initial test program if we do any of those
6 special tests. But that's really what this bullet
7 means is that we would write any of these special
8 ITAAC tests in accordance with the initial test
9 program.

10 So I mean what you're saying kind of is
11 true in that it won't violate any of those types of
12 conditions.

13 MEMBER BROWN: Well you can't have
14 underground test program that's running on the side
15 while you start this construction prep test. I
16 mean that just doesn't make --

17 MS. CAMPBELL: What we --

18 MR. WACHOWIAK: I think where we are
19 right now in this part of the conversation is
20 discussing how we're going to implement the total
21 set of ITAAC closure and that's not really the scope
22 of the design certification at this point. As we
23 can see, it's a very interesting conversation and
24 there are many industry representatives dealing with
25 how we're going to do this. You bring up a great

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1 point. You don't want to have two programs running
2 at the same time to do similar sorts of things. On
3 the other hand, what you do with the acceptance
4 criteria for things that are in ITAAC could be
5 different than the way you would disposition things
6 in the initial test program. So we'll have to
7 coordinate that, and that will be done. But that's
8 really not a topic for certification.

9 MS. CUBBAGE: The bottom line is they
10 have to do both. And if there are things that are
11 overlapping, it would be hard to believe they
12 wouldn't take credit for the preop tests to fill in
13 the ITAAC.

14 MEMBER BROWN: I'm looking there's got
15 to be something that's formal, that's understood,
16 laid out, people expect you're supposed add more,
17 the NRC staff will look at it --

18 MS. CUBBAGE: And there's a whole effort
19 going on outside of this program with what's going
20 on here today.

21 MEMBER BROWN: I just don't see that. I
22 see ITAAC as kind of sitting off on the side with
23 maybe something being caught up in the initial test
24 program. In whatever form it is, construction,
25 preop, whatever.

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1 CHAIRMAN CORRADINI: I think we're going
2 to have to proceed, but I think what I hear from you
3 and staff is that you guys are aware of the fact
4 that there are places where they mesh and there are
5 places where they might not necessarily mesh. And
6 you're discussing on how to property mesh them And
7 in some sense it's out of scope for the
8 certification.

9 MS. CUBBAGE: Yes. The certification
10 says what and that question gets to how.

11 MEMBER BROWN: Well, I would argue it's
12 outside the scope of the certification. If you don't
13 have a formal method, in other words, if I call it
14 an underground sidebar testing process, then that
15 means you can't put the Betty Crocker Good
16 Housekeeping Seal of Approval on it very well. I
17 mean, something has to be within the control
18 documents of how the plant was tested, period.

19 MR. WACHOWIAK: Absolutely.

20 MEMBER BROWN: It can't have something
21 different. And that's part of scope of
22 certification as far as I'm concerned. If you
23 can't certify it, it doesn't work.

24 MS. CUBBAGE: The certification --

25 MEMBER BROWN: I understand you got to

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1 get to a closure process. But you can't have
2 certification of this stuff that people are dabbling
3 with on the sides. I use that word carefully.

4 MR. OESTERLE: Eric Oesterle.

5 MEMBER BROWN: Maybe it's not carefully
6 enough.

7 MR. OESTERLE: If you recall the
8 discussions yesterday afternoon, it's the COLs that
9 have the responsibility to implement the ITAAC and
10 to demonstrate that they have successfully closed
11 them out. So we anticipate that the COLs will
12 establish an integrated management program for
13 closing out all of the ITAAC which would cover how
14 they take credit for portions of initial test
15 procedures and preop procedures, construction
16 procedures to verify that certain ITAAC have been
17 closed out.

18 And so staff agrees with that GEH have
19 made that that aspect of it is really the
20 responsible of the COL applicant, not for design
21 certification.

22 CHAIRMAN CORRADINI: Okay. Thank you
23 very much.

24 MR. WACHOWIAK: All right. The last
25 thing I want to point out here is something we've

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1 talked about before. We do have to do some analysis,
2 conversion, extrapolation sometimes to get to the
3 acceptance criteria.

4 We'll go on to the next one here. This
5 is taken out of our document. It's the definitions
6 of what the inspections, tests or an analysis would
7 be.

8 I don't know that if we go through in
9 detail on this. Let's go on to the next one here to
10 the examples that we have from the document of some
11 of these ITAAC.

12 You see the three column format that we
13 have. Remember I said that they match one-to-one.
14 And we did our best to make that all match up. And
15 in Rev. 6 definitely will. There were some places
16 where -- not many by Rev. 5, but there was a lot of
17 it.

18 The first one would be the functional
19 arrangement. It's normally specified as an
20 inspection. You go and you look and you measure
21 things. And you check it in accordance with the
22 figure.

23 Go onto the next page here, 8a which is
24 one of them that I think we talked about yesterday a
25 little bit. That the function of the system, as a

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1 functional ITAAC, it's supposed to provide
2 sufficient water to keep the core above the fuel for
3 72 hours following the LOCA. The inspection is one
4 of the longer ones here. It's a couple of seconds
5 description of a test that would be performed and
6 then the acceptance criteria is, since this one has
7 to be translated using an analysis, the acceptance
8 criteria is the report that takes analysis and
9 confirms that we've met requirements.

10 DR. WALLIS: It seems to me that these
11 analyses of the test which will be performed are a
12 key element.

13 MR. WACHOWIAK: Yes.

14 DR. WALLIS: That's where, you know, we
15 presume we don't have any input. But that's the
16 key. If you analyze it appropriately and relate it
17 to the safety function, you haven't really proved
18 that it works.

19 CHAIRMAN CORRADINI: I guess, Graham, if
20 I understand your worry I think in the COL is where
21 we will have --

22 DR. WALLIS: The COL will see that, yes.

23 CHAIRMAN CORRADINI: Is in the COL is
24 where we're going to have to ask more detail of how
25 the--

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1 DR. WALLIS: Are you going to analyze
2 the tests.

3 CHAIRMAN CORRADINI: -- test is going to
4 be connected with the analysis.

5 DR. WALLIS: Right. Right.

6 MS. CUBBAGE: No.

7 MEMBER SHACK: These are resolved before
8 fuel load after COL. We will not see that.

9 MS. CUBBAGE: The content of the ITAAC
10 is being resolved in certification. Yes, and the
11 actually fulfillment of them is post-COL issuance.
12 So --

13 CHAIRMAN CORRADINI: There will be no
14 discussion of the ITAACs during the COL?

15 MS. CUBBAGE: Only the site-specific
16 ITAAC that are added in the COL phase. So there
17 should be adequate information in Tier 2 to support
18 the basis for the ITAAC and, hopefully, for us to
19 understand how you would fulfill this ITAAC.

20 MEMBER BROWN: The table that said the
21 GDCS injection lines provide sufficient flow to
22 maintain water coverage for 72 hours. That presumes
23 you have to assume some drainage or some water
24 escaping somewhere, I guess, or evaporating whatever
25 the case may be.

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1 MR. WACHOWIAK: Yes.

2 MEMBER BROWN: But there's nothing in
3 here talking about what that flow rate is. And
4 where are the explicit acceptance criteria for this
5 particular design? Are they located somewhere? Are
6 they to be --

7 MR. WACHOWIAK: Yes. That's in Tier 2 in
8 the safety analysis we describe the flow rates from
9 the analysis that are in the system.

10 MEMBER BROWN: Shouldn't that reference
11 those?

12 MR. WACHOWIAK: Well, you don't make an
13 explicit reference back to Tier 2 from here. And
14 there is legalistic reasons for why that is. If we
15 make that reference from here into Tier 2, when this
16 gets published in as an Appendix if it references
17 that it would reference somehow get a different
18 pedigree.

19 MEMBER BROWN: Well then why not put the
20 numbers in?

21 MR. WACHOWIAK: Because it depends on
22 the condition.

23 MEMBER BROWN: Or an acceptance factor--

24 MR. WACHOWIAK: If we have accident
25 scenario, you might need one flow rate, in a

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1 different accident scenario you might need a
2 different flow rate. It depends on what the pressure
3 distributions are.

4 She's saying how we would look at this
5 in terms of you would get the flow rate and then you
6 would take it back to analysis.

7 In this particular case the conditions
8 are quite different in the plant from what the
9 conditions in the safety analysis are. So what
10 we're doing is we're measuring the flow rate and the
11 characteristics of the system and then taking that
12 back to the safety analysis computer code that we
13 used in tier 2. And using the same sort of a
14 simulation you would demonstrate that the
15 characteristics of the system as measured from this
16 test meet the characteristics of the system that you
17 have in safety analysis.

18 This one relies on analysis. Now I want
19 to --

20 MEMBER BROWN: I have no problem with
21 the analysis. I just want to make one -- but I
22 presume staff, I presume the NRC gets to see and
23 understand what those numbers are, right? That you
24 agree and approve with whatever you approve based on
25 what you see in that analysis? If this is the only

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1 legal thing, and so I'm just saying you know three
2 or four or five years the second site comes along
3 and somebody decides to use a different number, how
4 is that controlled? Because there's no reference,
5 there's nothing that puts it in --

6 MS. CAMPBELL: This one doesn't have a
7 number because you obtain the number by the test.
8 And then you do --

9 MEMBER BROWN: That's not what it says.

10 MS. CAMPBELL: Yes. You do the flow
11 rate and you measure the flow rate. And then you
12 take the flow rate over here in the acceptance
13 criteria, just take that flow rate, you observed
14 rate and then you analyzed it to make sure that you
15 can cover the top of --

16 DR. WALLIS: This is backwards.

17 MEMBER BROWN: No. It gets converted.

18 DR. WALLIS: It seems to me it's
19 backwards. You've already used your LOCA analysis
20 to predict what the flow rate needs to be in the
21 test.

22 MEMBER BROWN: Otherwise you don't have
23 a pump that works.

24 DR. WALLIS: You have a measurement
25 which is direct of what you're actually measuring

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1 because otherwise it's a very remote connection.

2 MR. WACHOWIAK: That's all correct. And
3 the thing that we have here on analysis is it gets
4 back to what we talked about risk in terms of
5 getting to the end.

6 MEMBER BROWN: I'm not arguing the
7 analysis part. Maybe I didn't say it clear enough.
8 The point being is that you said it, we accept it
9 and now some years later somebody, another applicant
10 who builds another plant and he starts using a
11 different number. There's no control over that
12 number. That acceptance criteria that was put in
13 place is now changed without anybody ensuring on the
14 government side, NRC side, that that new number
15 actually satisfies the requirements for that plant.

16 MS. CUBBAGE: Well it did change.

17 MEMBER BROWN: It's up to the licensee
18 and GEH.

19 MS. CUBBAGE: In this case the
20 acceptance criteria is that the top of that core
21 would be covered if you achieved that flow rate
22 that's measured.

23 MEMBER BROWN: But would you get to see
24 it in the second or third round, that's my
25 understanding?

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1 MS. CUBBAGE: I don't know --

2 MR. WACHOWIAK: Every plant has to
3 satisfy the --

4 CHAIRMAN CORRADINI: I think that's the
5 disconnect. I think that's the disconnect that I'm
6 hearing in the conversation. I think this
7 acceptance criteria is generic to the design so that
8 means every applicant in every build will have to
9 show a test or a test analysis protocol that staff
10 will look at and approve to go forward.

11 MEMBER BROWN: I didn't think they had
12 to do all of those things --

13 MR. WACHOWIAK: This is why. It was
14 only the first of a kind thing that don't get
15 repeated.

16 MEMBER BROWN: But that's not --

17 MR. WACHOWIAK: This is not a first kind
18 of thing.

19 MR. OESTERLE: Everyone of these is done
20 by every plant.

21 MEMBER BROWN: Everyone of them approved
22 by NRC?

23 MR. OESTERLE: Yes.

24 CHAIRMAN CORRADINI: Let me just
25 interject. As I understand it there were three or

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1 four or five, I don't remember the number, that are
2 first of kind. Except for those, all of these must
3 be done every time a new applicant comes up with a
4 COL.

5 MS. CUBBAGE: This is Amy Cabbage.

6 Those first of a kind fall under 14.2
7 the initial test program. All of the ITAAC apply to
8 every plant.

9 MEMBER BROWN: Every time?

10 MS. CUBBAGE: Every time.

11 MR. WACHOWIAK: And every one of these
12 is subject to inspection in every plant.

13 MEMBER BROWN: If you got a standard
14 plant why do you have a different number on some
15 subsequent COL holder?

16 CHAIRMAN CORRADINI: Just to verify that
17 in fact he put the plant together properly.

18 MEMBER BROWN: So I understand that
19 point. But you got to have something to say it's
20 okay. Why would the number be a 100 gallons per
21 minute this time, and it'd be a 150 some other time
22 and maybe only 50 the time after that? How do you
23 walk your way through that?

24 MEMBER STETKAR: I don't think that's
25 what you're saying.

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1 MR. WACHOWIAK: Yes. What we're trying
2 to say is that in this particular case and in many
3 of the cases where we used something like this there
4 are many parameters that influence whether or not
5 you meet the requirements. And what we tried to do
6 in these cases is if we had gone through and said
7 that the pipe has to have this diameter and the run
8 can't be any longer than X, and --

9 MEMBER BROWN: That's too detailed. I
10 agree with that.

11 MR. WACHOWIAK: And we get through all
12 those details and we miss one of those, but we can
13 still keep the core covered, then that should still
14 be accepted. So what we tried to do here is to say
15 what the acceptance is. So you do this test and the
16 combination of all the as-built parameters. As long
17 as that demonstrates that we meet the objective,
18 then the individual components that we get to there
19 is satisfied.

20 One of the things that I was talking
21 about risk in this is if someone wants to challenge
22 this particular ITAAC, this is a more easily
23 challenged ITAAC because you can challenge the test,
24 you can the methodology, you could challenge the
25 calculations when you're looking at whether or not

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1 we've met that versus the other ones if we said the
2 pipe has to be this diameter, well that's hard to
3 challenge. Because you can measure the diameter.
4 But the pipe length to the run can't be any greater
5 than this. Okay. Those are much more certain. But
6 it turns out where do we want to have the certainty
7 of this thing.

8 MEMBER BROWN: You got to understand,
9 I'm not challenging that part of it. I'm just --
10 it's the right way to do it. I mean, you want to
11 keep the core covered. That's the right acceptance
12 criteria. My disconnect was how after the initial
13 plant and you do subsequent standard and you'll get
14 different COL holders or applicants apply, they get
15 their permits and off they go, how do you ensure
16 that the same -- the analysis, the results of the
17 system's design? Are they going to design the
18 system differently than the previous guy --

19 MR. WACHOWIAK: But as we talked about
20 before, there's construction tolerances --

21 MEMBER BROWN: -- we evaluate it every
22 time.

23 MS. CAMPBELL: And remember we are
24 saying it only has to provide sufficient flow. That
25 flow could be a lot more --

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1 MEMBER BROWN: I understand. Yes, I
2 understand --

3 MS. CAMPBELL: And what we're really
4 trying to verify --

5 DR. WALLIS: Can I have a follow on
6 question?

7 CHAIRMAN CORRADINI: Not yet. Not yet. I
8 want to make sure we're clear.

9 So I think you see his concern. But I
10 think at least the starting answer is that every
11 applicant must meet the ITAACs.

12 MR. WACHOWIAK: Yes.

13 CHAIRMAN CORRADINI: The analysis may
14 differ, but then staff is going to have to have a
15 conversation with the applicant. Because if first
16 plan up, and GEH with that first plan has a certain
17 analyses procedure, I would be guessing that the
18 next one might want to follow that procedure if the
19 first one's successful. So I think there will be a
20 history developed. But I don't think it's reflected
21 in the acceptance criteria except at this top level.

22 MR. WACHOWIAK: That's correct.

23 MS. CAMPBELL: Well, some of the
24 acceptance criteria are written --

25 CHAIRMAN CORRADINI: I think you should

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1 say yes and let's move on.

2 MR. WACHOWIAK: Yes.

3 CHAIRMAN CORRADINI: Okay.

4 MR. WACHOWIAK: I think that's the
5 correct concept there is that that's what would be
6 done.

7 DR. WALLIS: As a follow up to the same
8 question. I'm confused about this first of a kind
9 nature of the GDCS and PCCS. Because when the read
10 SER, the earlier section 14.2, the staff seemed to
11 be claiming that the GDCS and PCCS system tests are
12 first of a kind tests.

13 MR. WACHOWIAK: There are.

14 MS. CUBBAGE: There are.

15 MR. WACHOWIAK: And those have been
16 completed actually.

17 DR. WALLIS: Well I thought you had just
18 said that they work.

19 MR. WACHOWIAK: They were completed in a
20 test facility.

21 MR. OESTERLE: There are first of a kind
22 tests associated with the ITAAC.

23 MR. WACHOWIAK: But that's not these.

24 DR. WALLIS: But they're not these.

25 MR. WACHOWIAK: These are not first of a

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1 kind. These are each of a kind tests.

2 DR. WALLIS: So they are first of a kind
3 in some other context, but not in --

4 CHAIRMAN CORRADINI: Right. Yesterday
5 as we went through it they identified specifically
6 they're saying for first of a kind. But these will
7 occur every time.

8 MR. OESTERLE: Right.

9 DR. WALLIS: So these are not first of a
10 kind?

11 CHAIRMAN CORRADINI: Right. There are
12 other ones. For example, there was something to do
13 with -- but they went through specifically. There
14 were four. I can't remember the ones for the
15 isolation condenser and et cetera.

16 MR. WACHOWIAK: These are done every
17 time. Because what we're verifying here is that the
18 as-built plant meets the requirements set forth in
19 the certified design. So it has to be verified
20 every time. And we tried to write these so that
21 they could be verified every time. And I hope we
22 succeeded because you can't load fuel.

23 We'll go to the next page here. And I
24 think we're at one that was more traditional. We
25 talked about this before. FAPCS is a pump system.

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1 It's a little easier to come up with a flow rate for
2 a pump and easy to test. And we'll see in 7a there,
3 in 7a and 7b we put down some conditions and we
4 actually have measured flow rate there for the pump.

5 So this applies less on the natural
6 forces that are going to be influencing what the
7 flow rate would be.

8 DR. WALLIS: That's an extraordinarily
9 accurate measurement 1998.42 gallons per minute.

10 MR. WACHOWIAK: Yes.

11 DR. WALLIS: It's extraordinarily
12 precise.

13 (Simultaneous speakers.)

14 MR. WACHOWIAK: I understand. And if
15 you look through you'll see some other things. I
16 think we have our feedwater nominal flow rate has
17 something like eight significant figures on it.

18 DR. WALLIS: Just --

19 MR. WACHOWIAK: Understood.

20 Let's move on to the next page. And I
21 put an example of something for a power system.
22 Once again I think the one that I was looking at was
23 number four at the bottom here. And this was meant
24 to show that the independence here when you put a
25 test signal in on one division that the output only

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1 shows up in that division. It doesn't show up
2 anywhere else.

3 MEMBER SIEBER: I'm still trying to find
4 it, so you're way ahead of me.

5 MR. WACHOWIAK: Oh, that's 2.13.1.

6 MEMBER SIEBER: I got the page now. I
7 finally was able to read it.

8 MR. WACHOWIAK: So that was the intent
9 here is to show that we do have these independent
10 tests scattered through the different ITAAC.

11 MEMBER STETKAR: You got figures in
12 there that -- there's some figures following this.
13 Are those intended to reflect your independence or
14 redundancy or --

15 MR. WACHOWIAK: That's their functional
16 arrangement.

17 MEMBER STETKAR: So that the detail is
18 not sufficient, is that what you're saying?

19 MR. WACHOWIAK: That's meant to show the
20 basic layout of the system. You wouldn't find that
21 detail.

22 MS. CAMPBELL: This is a test.

23 MR. WACHOWIAK: And this is -- so go on
24 to the next one. I think the next one is -- it is
25 containment. Once again we have tests to confirm

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1 the different things that are in the design
2 commitment. One particular here that I want to talk
3 about was the number 8. And this one is a
4 structural integrity test and will be basically
5 pumping up the containment to 115 percent as
6 required by the ASME code. And demonstrating that
7 we maintain the structural integrity.

8 MEMBER STETKAR: I wish you hadn't
9 pointed to that. I had a question on PCCS.

10 MR. WACHOWIAK: Okay.

11 MEMBER STETKAR: The acceptance criteria
12 for PCCS require that same pressure. You have to
13 verify that it maintains integrity up to --
14 containment design pressure, that's the way it's
15 written.

16 MR. WACHOWIAK: Right.

17 MEMBER STETKAR: This is kind of a PRA
18 question trying to understand a little bit how the
19 PRA works. Does the PRA take credit for the PCCS
20 that's higher than design containment pressure?

21 MR. WACHOWIAK: Yes.

22 MEMBER STETKAR: But there's no way to
23 verify that it operates at higher than design
24 pressure through the ITAAC anyway?

25 MR. WACHOWIAK: That's a conundrum that

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1 we have in this because in order to do that test you
2 would have to put the plant -- it would possibly be
3 considered destructive test. Because it takes --

4 MEMBER STETKAR: Well, you could
5 probably get a better way to hydro the PCCS line in
6 the heat --

7 MR. WACHOWIAK: Right. But we're
8 counting in the PRA --

9 MEMBER STETKAR: You're not pumping up
10 the containment.

11 MR. WACHOWIAK: Without pumping.
12 Definitely you wouldn't want to pump up containment.
13 But once again we're counting on the PCCS to operate
14 in a regime that is outside of the code. And so,
15 for example, we count on the reactor pressure vessel
16 to maintain its integrity in severe accident
17 conditions at a higher pressure than what the code
18 requires. And we don't test the pressure vessel to
19 those things because we'd end up introducing more
20 problems than it would be testing --

21 MEMBER STETKAR: No, I just wanted to --
22 I was just a little curious about that.

23 MR. WACHOWIAK: And you have to consider
24 that. One of the things that we look at is
25 performing any of these tests going to do something

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1 to damage the equipment in the plant. And we can't
2 do that.

3 MEMBER STETKAR: Yes. Like I say,
4 you're can have a hard time with your code case
5 after you pump the PCCS up to --

6 MR. WACHOWIAK: Yes. The next one.

7 MEMBER STETKAR: It's just you're the
8 same with -- appropriate pressure. You put down
9 number 8 right?

10 MR. WACHOWIAK: Yes.

11 MEMBER STETKAR: I mean, is that the
12 maintain pressure for some period of time?

13 MR. WACHOWIAK: Yes.

14 MEMBER STETKAR: Is that in here?

15 MR. WACHOWIAK: I'm trying to remember
16 where that test is. The leakage test, there is a
17 leakage requirement and I don't remember which ITAAC
18 that specifically is.

19 MEMBER STETKAR: It's not into the
20 containment system?

21 MEMBER BLEY: It's 7, isn't it.

22 MR. WACHOWIAK: That says Appendix J. So
23 I'm pretty sure that that's it then.

24 MS. CAMPBELL: That's it. Yes.

25 MR. WACHOWIAK: I didn't search for that

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1 particular question beforehand.

2 Yes, the Appendix J program defines what
3 the acceptable containment leakage is. And so you
4 have that test --

5 MEMBER STETKAR: I missed that when I
6 was going through.

7 MEMBER SIEBER: Can you make an attempt
8 to identify where in this criteria --

9 MR. WACHOWIAK: Yes. You identify where
10 it is and then --

11 CHAIRMAN CORRADINI: I'm doing a time
12 check. You have ten minutes.

13 MR. WACHOWIAK: We started ten minutes
14 late. We have 20.

15 CHAIRMAN CORRADINI: We'll compromise.
16 Fifteen.

17 MR. WACHOWIAK: So let's move to the
18 next one.

19 We do have in some cases, not very many,
20 but in some cases we have a table that helps us
21 identify the acceptance criteria. In this
22 particular case we had all of those containment
23 isolation valves. They have a timing associated
24 with them. And we didn't want to put all those
25 specific times in the ITAAC table, so this table is

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1 considered part of the ITAAC table.

2 And the next one.

3 This is the I&C ITAAC. And I don't know
4 if in the interest of time if we need to go through
5 these particular ones. Should we just move on.

6 CHAIRMAN CORRADINI: Move on.

7 MR. WACHOWIAK: Okay. Nonsafety-based
8 material are the things that are associated with --
9 they cover more systems than just one.

10 Go to the next slide.

11 These are the lists of the places where
12 we have nonsystem-based things. Design and piping,
13 systems and components. It's requirements that are
14 broad based to go across all systems. Software
15 development, human factors engineering. They cover
16 multiple systems.

17 Go on to the next one.

18 Here we're going to give some examples
19 of how we did the piping system for -- we'll try to
20 get to this one and get to the 14a stuff, so let's
21 go to the next -- keep going. This is the example
22 of how its presented. And I just have another
23 example on -- go ahead. Next one. Next. And one
24 more. A few more.

25 The next section here is the interface

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1 material. If there's any specific features of the
2 plant that we took credit for in any of the safety
3 analyses that are not part of the scope of the
4 certified design, this is where we would identify
5 what those features are to be tested.

6 One of the things that we had that's in
7 Rev. 5 there was only one thing that was identified.
8 It was the capacity of the plant service water
9 system. In the PRA we took credit for the ability
10 of that system to remove heat for seven days without
11 makeup. And so we had to specify that when they
12 designed their system, which is outside the scope of
13 the certified design, it had to have that
14 capability.

15 And we're in discussion now on the
16 connection to the offsite power and how that needs
17 to be done in the interface.

18 CHAIRMAN CORRADINI: This is the
19 discussion we had yesterday.

20 MR. WACHOWIAK: Yes.

21 Okay. The next page is the site
22 parameters. In the document there's a list of
23 parameters that we use as the envelop for our design
24 analysis. And there are some things that are
25 associated with slow loads and maximum winds and

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1 temperatures and things like that. The assumptions
2 that we made in our various analyses.

3 There's no ITAAC associated with these
4 in particular. However, every licensee is required
5 to demonstrate that their site fits in the envelop
6 described or defined by the table.

7 Go on to the next one. As to the
8 example from that, we don't need to go through the
9 example.

10 And this brings us to things that are
11 back in to the DCD and Tier 2 on the design
12 acceptance criteria closure process.

13 MS. CAMPBELL: And what we've done in
14 Section 14.3A is talked about a process for closing
15 DAC. And the first part is an introduction. It
16 talks about the regulatory requirements. We'll just
17 skip over that. And then we've really covered the
18 next slide in Eric's presentation yesterday.

19 When we get to the part where we discuss
20 the three different options to close DAC, our 14.3A
21 really discusses that third one. For the ESBWR
22 based on the way that the schedule works out we'll
23 be closing the DAC through ITAAC after the COL is
24 issued. And then we discussed that process in
25 14.3A?

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1 MEMBER STETKAR: Where is that in 3A.
2 You've already got five or six pages in 3A.

3 MS. CAMPBELL: That's discussed in early
4 part of Section 3A.

5 MEMBER SHACK: 14.3A1

6 MS. CAMPBELL: Yes, 14.3A. It general--
7 it focuses on what's in NRC guidance. So all of
8 that's really pulled from NRC guidance. And the NRC
9 identifies that in their regulatory guidance 1.206.

10 And what happens then after the first
11 ESBWR is that, you know, we'll have the information
12 that was used for the first of a standard group. If
13 we change it later, we'd probably like another
14 version of the ESBWR for DAC purposes. But they
15 would adopt that if they chose to. And that would be
16 under the NRC's concept. It's also described in
17 their guidance. But the one issue, one review, one
18 position.

19 Next slide.

20 And so what we've proposed in Section
21 14.3A is that we would use a topical report process.
22 You know, we're still considering that because it
23 would give us additional finality and subsequent
24 licensees could reference the LTRs.

25 Does anyone have any questions on that?

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1 Okay. Let's go to the next one.

2 What we've done in the piping is a
3 little different from the approach that's being used
4 in the earlier certifications. We're going to go all
5 the way through to the code data sheets. And we'll
6 be completely in accordance with ASME code at that
7 point so that the NRC doesn't have to review any
8 interim analyses.

9 And what we would provide are the ASME
10 code reports. And then after that is closed out, we
11 would have the implementation ITAAC, so we would do
12 a reconciliation of the as-built against those ASME
13 code reports. So that's really a more complete
14 process.

15 Okay. For digital I&C. We've described
16 the NRC's process that's discussing their guidance
17 where it would be a phased approach. I'll talk about
18 the process, but if you have specific questions
19 about that phased report, I'd like to Steve Kimura.

20 But basically as each phase s completed
21 we would notify the NRC. And, of course, in the
22 meantime they're going to be aware of all the
23 activities that are ongoing. And they can come in
24 and audit us at any point during that development.
25 But at that point once one phase is completed, and

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1 that would be this life cycle approach that was
2 mentioned yesterday by Mr. Oesterle. But we would
3 at that point say okay, this phase is complete if
4 you want to come in and look at it or if we rolled
5 all those activities into a description in a topical
6 report, then we would notify the NRC at that point
7 that that phase is complete.

8 And the way the NRC describes that in
9 their guidance is that they would like that
10 opportunity to be back to come in and look at that
11 particular phase and identify if they have any
12 problems before we have completed the next phase.
13 We'd go ahead and move into the next phase, but
14 before we complete it they'd like to get feedback to
15 us. And we would hope that that works out.

16 Yes, sir?

17 MEMBER BROWN: There's a statement in
18 here that says on the digital I&C that these
19 subsequent standard ESBR using the standard
20 approach, in other words you've passed the cert
21 first unit, may use the summaries report for design
22 completion elements that were developed to complete
23 the first standard ESBR under the one issue, one
24 review, one position approach. So that in this
25 matter the standard ESBWR plants may be based on the

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1 same set of results and design elements for digital
2 I&C. Now somebody comes along three or four years
3 later, and we talked about this a little bit
4 yesterday, and chip sets will change. But
5 functional design requirements don't necessarily
6 change. The software changes.

7 I mean my experience has been in about
8 20 years we went through five different software
9 languages in order to provide software-based
10 computer controlled monitoring, instrumentation,
11 control and protection systems. And each of those,
12 every time you change the software, the language in
13 which its codes, whether it's C, C Plus, PLC what I
14 would call if you really want to get down, it's --
15 code basic fundamental computer geek stuff where you
16 can use memory -- data goes in it - well, you're
17 telling it everything in order to achieve an end.
18 But all those top level languages, there's been five
19 or six of them, and I can remember when the rage was
20 C and then it was C plus and tomorrow it will be D
21 minus/minus or whatever the heck it might be.

22 That's tough to say that you can get --
23 okay, we'll just recompile this because nobody -- you
24 can't compile the old code anymore. If the numbers
25 for the software don't maintain their compilers,

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1 then you have to do something different. And as
2 soon as you start compiling differently, you can
3 have different results from the code. That's an
4 actual fact based on real experience.

5 So I'm not quite sure how to handle this
6 in terms of being able to pass it on to subsequent
7 plants. But I'm sure you all will have some basis
8 for saying it's perfectly okay and you can wave
9 your hands and all that's in the plug and play
10 world, right?

11 MR. KIMURA: Yes. The development of
12 high quality digital I&C systems really depends on
13 the process. It is less focused on the final
14 results because you can get a box, it can look
15 pretty, it can function nominally as you think it
16 should function and it could be a piece of garbage
17 because they used imprecise ramshackle type
18 development process.

19 What we describe in Section 3.2 is a
20 software development process that controls both the
21 software and hardware development through the life
22 cycle phases described in --

23 MEMBER BROWN: In 3.2 of the?

24 MR. KIMURA: 3.2 of Tier 1.

25 MEMBER BROWN: Okay.

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1 MR. KIMURA: The life cycle process
2 described in Branch Technical Position 14. 7-14.

3 CHAIRMAN CORRADINI: But just to
4 interject to move us along, I think I'm sensing that
5 Charlie's question should be directed to the staff
6 because based on what you've read, they're going to
7 have to come up with some interpretation of what
8 they do on the stuff and --

9 MEMBER BROWN: No, I understand that.
10 But I mean it's in 14.3A which says how we intend
11 this to be executed.

12 CHAIRMAN CORRADINI: Right.

13 MEMBER BROWN: That's why I read it, and
14 I agree with really the NRC has to address this.
15 But there's been -- and there are staff positions.
16 There are some other documents that try to talk
17 about this, but yet it's not real clear. And my
18 concern is that software gets redone and then what
19 level of testing is specified. And it's not real
20 clear to me what gets done after that.

21 CHAIRMAN CORRADINI: All right.

22 MEMBER BROWN: So I understand what
23 you're talking about.

24 MR. KIMURA: So the ITAAC for the
25 software development process is divided into really

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1 three parts. The first part is the design acceptance
2 criteria or the DAC part, which actually will
3 encapsulate the requirements that the software has
4 to perform on a system level, which means that if we
5 have to perform certain safety-related functions, we
6 capture that in the requirements.

7 What happens after the requirements
8 phase is the design phase, the implementation phase,
9 test phase. But you define the languages in the
10 lower phases but you've already captured the
11 requirements of what that software has to do in
12 order to maintain safety of the plant in the
13 requirements phase.

14 Whether you change the language in the
15 future, you're relying on the process that takes the
16 requirements and translate that into appropriate
17 machine code that then gets loaded into the machine
18 and tested.

19 MR. WACHOWIAK: So to sum that up, the
20 part you're asking about, the DAC part, which is
21 what 14.3A covers is the requirements part of the
22 software. That could be done once. The change of
23 the compiler would be done under the ITAAC portion,
24 which whether they change the compiler or not needs
25 to be done for every ESBWR.

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1 MR. KIMURA: And then in the ITAAC
2 phase--

3 MS. CAMPBELL: That would be done on
4 everything.

5 MR. WACHOWIAK: Every time.

6 MR. KIMURA: Right. The ITAAC phase
7 will then confirm that, yes, on level 1 we actuate
8 the GDCS injection valve.

9 MS. CUBBAGE: I'd also just like to
10 clarify. You mentioned 3.2 having a description.
11 That's of course the Tier 1 high level description.
12 Tier 2 Chapter 7 provides additional information and
13 references a couple of -- once the topical reports
14 the staff's reviewing and you'll be hearing about.
15 I think it's going to be planned for the January
16 Subcommittee meeting. So I didn't want you to leave
17 with the impression that the only description is
18 what you're seeing in Tier 1. And that process will
19 be binding for the life of the facility. If they
20 were to install new software, they would have to use
21 that process that the staff's going to review and
22 approve or come in for approval of an alternate
23 process.

24 MEMBER SIEBER: The industry practice on
25 that is when you buy a machine and it does safety-

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1 related calculations or control functions and so
2 forth, you buy the compiler and all that with it.
3 And you train your staff to be able to operate and
4 maintain that system.

5 If you decide that you want to change
6 the language, for example, or the method of
7 operation of the control system, that becomes a
8 design change and you go through the entire design
9 change process which ultimately gets documented in
10 the SSAR. And the design has to meet the original
11 criteria. It has to be tested and so forth before
12 its installed and put into service. And there are
13 regulatory requirements for NRC review under certain
14 cases for that occur. But generally speaking the
15 design is frozen once its accepted for the
16 commercial plant and it can't be changed until you
17 go through the entire design change process which
18 has regulatory requirements attached to it.

19 And over the years I've been involved in
20 those kinds of changes. And the process, if done
21 properly and in accordance with the regulations, are
22 orderly and not disruptive.

23 MR. KIMURA: The design process that Amy
24 described was in the LTRs. And the LTRs are going to
25 marked Tier 2 star. So that will be fixed and would

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1 require full staff review if the process would ever
2 change.

3 CHAIRMAN CORRADINI: Are you --

4 MR. WACHOWIAK: Essentially we're done.
5 The next slide covers the COL information items that
6 we've provided the COL. They're basically the things
7 that we've talked about here before; the emergency
8 planning ITAAC, site-specific ITAAC and then the
9 schedule for the closure of the DAC.

10 In summary, 14.3 we describe our process
11 for putting together Tier 1. And Tier 1 contains
12 the ITAAC. We're in the middle to late stages of
13 the review from the staff on that. There's a few
14 open items left that Eric will explain and you can
15 decide if "few" is the right term after he's done.
16 But we're in the process of addressing all of those
17 open items and ultimately the document that you see
18 in front of you with some cosmetic changes to make
19 the wording consistent and more legalese, I guess,
20 is coming in Rev. 6. But we had input from the
21 construction inspection folks on how to make it so
22 that their process can more easily and generically
23 close out each of these items. So we've also had
24 feedback not just from the technical staff, but from
25 the inspection staff as well.

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1 MEMBER BLEY: Rick, Dennis Bley. One
2 question back over things you've gone through.

3 All of the DAC are the items that have
4 design acceptance criteria written in the tables in
5 Tier 1, that's right?

6 MR. WACHOWIAK: Yes.

7 MEMBER BLEY: And the DAC is right now
8 in Rev. 5 pretty well complete or is there --

9 MR. WACHOWIAK: The topics for DAC are
10 pretty well complete. I think we have one extra one
11 that's in there, something in the radiation
12 protection was marked as DAC and wasn't supposed to
13 be. So we've already let the staff know that.

14 MEMBER BLEY: Okay.

15 MR. WACHOWIAK: But the topics for DAC
16 are pretty much complete. The exact format of some
17 of the things in the software in the HFE, we're
18 rearranging that based on staff comments. But the
19 topics that are covered under the DAC should be the
20 same.

21 MEMBER BLEY: Okay. And one specific
22 question on the ITAAC items on EQ. The way I read
23 the acceptance criteria, they're kind of written
24 broadly and that my experience in the past is that
25 acceptance criteria on EQ is one item passes the

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1 physical test. And when I read these they call for
2 following tests, reports the document all of the
3 results and provide something with more than that
4 indication of the ability to survive the
5 environment. So it seems a little more fairer than
6 in the past. Is that true, at least the way you
7 think about it?

8 MR. WACHOWIAK: I think it's an
9 interpretation of what you're looking at, what the
10 ITAAC needs to do. In the EQ program you're correct.
11 Whatever the configuration of the thing is that
12 you're testing, one thing has to pass.

13 MEMBER BLEY: Yes.

14 MR. WACHOWIAK: Then what this ITAAC is
15 then doing is confirming that the as-installed
16 equipment matches the tested configuration. That's
17 what we intend to do with that particular ITAAC.

18 MS. CAMPBELL: We wrote that so it sets
19 up nicely to just develop what the EQ program will
20 contain only for a operating base.

21 MEMBER BLEY: Okay. Thank you. I guess
22 I was hoping it went a little further. Because I
23 can read the words that way, but it doesn't. Okay.

24 MR. WACHOWIAK: No.

25 CHAIRMAN CORRADINI: Thank you very

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1 much.

2 The staff will begin their discussion of
3 14.3 after break. So let's get back here at five
4 of.

5 (Whereupon, the above-entitled matter
6 went off the record at 10:41 a.m. and resumed at
7 10:56 a.m.)

8 CHAIRMAN CORRADINI: Okay. Let's get
9 started.

10 So I'll turn to Eric to kick us off on
11 the staff's presentation.

12 Eric.

13 MR. OESTERLE: Okay. Thank you. Eric
14 Oesterle, NRO staff. Lead Project Manager for Tier
15 1 on the ESBWR review.

16 The purpose of this presentation is to
17 brief the Subcommittee on the staff's review of the
18 Tier 1 document and Tier 2 Section 14.3. That
19 review was performed on Rev. 5 of the DCD. We're
20 answer the Subcommittee's questions.

21 Next slide.

22 The review of Tier 1 and Section 14.3
23 really cut across the entire staff. And so I listed
24 the divisions and the technical branches that looked
25 at that Tier 1 and ITAAC. And if you forgot what

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1 any of those acronyms mean or didn't know in the
2 first place, there's a list of them. I'm not going
3 to go through all of them.

4 All right. So the outline of this
5 presentation, we're going to cover the applicable
6 regulations as far as the status of RAIs.
7 Approximately 440 RAIs were issued on Tier 1 and
8 Section 14.3. About 365 have been resolved.

9 What I want to point out is that there
10 is a list of open RAIs at the end of the SER with
11 open items. It's a snapshot in time, okay? We are
12 still or have been developing more RAIs and,
13 hopefully, that list includes all of them.

14 The SER does not discuss all of the open
15 items or RAIs into the text merely because we had to
16 put a freeze on it at some point in time to get it
17 through the lengthy process. If you saw that list
18 of branches earlier in the slide, we had to go
19 through all of those branches for concurrence. So
20 essentially we started in early September in the
21 concurrence process for this.

22 So there were RAIs that were generated
23 after this document went into the concurrence
24 process and they are being tracked in our database.
25 And some of those we can discuss.

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1 MEMBER STETKAR: Eric?

2 MR. OESTERLE: Yes.

3 MEMBER STETKAR: You may have mentioned
4 it, I didn't hear it. The SER that we have, is it
5 linked to a particular revision of the DCD?

6 MR. OESTERLE: Yes. Rev. 5.

7 MEMBER STETKAR: Rev. 5?

8 MR. OESTERLE: Yes.

9 MEMBER STETKAR: And I was curious about
10 that because there seemed to be some discrepancies,
11 for example in instrument air systems where they
12 changed the design between Rev. 3 and Rev. 4 and yet
13 the SER still talks about those systems as if
14 they're Rev. 3 sort of version systems. And the SER
15 only occasionally and vaguely mentions like the
16 ancillary diesels, which popped up between Rev. 4
17 and Rev. 5.

18 So I was curious as I bounced back and
19 forth, it was hard for me to understand where frozen
20 in time this SER is relative to the DCD moving
21 targets.

22 MR. OESTERLE: All right. Well, that's a
23 good question and let me address it this way: The
24 review of Tier 1 is an interactive process. So it
25 always has to go back to and match any changes

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1 that's been made to the Tier 2 information.

2 And in terms of timing, if there were
3 changes that were made to Tier 2 as a result of
4 responses to RAIs, 14 and Tier 1 has to kind of
5 catch up. So maybe some of those things you were
6 looking for hasn't caught up. And there are a number
7 of RAIs that were issued after this SER with open
8 items got put into the concurrence process. They're
9 listed in the back. The majority of them are
10 associated with electrical and I&C and HFE, a lot of
11 DAC type stuff.

12 MEMBER STETKAR: Okay.

13 MR. OESTERLE: But I just wanted to
14 point that out.

15 MEMBER STETKAR: Yes. Go on.

16 MR. OESTERLE: Next slide.

17 The regulations that pertains to ITAAC
18 for a plant certification is 10 CFR 52.47(b)(1). As
19 I discussed yesterday afternoon, there's a companion
20 regulation, so to speak, in 52.80 with respect to
21 the requirements for a COL applicant and their
22 inclusion of ITAAC and also incorporating by
23 reference the ITAAC that a design certification had.

24 There is regulatory guidance for
25 applicants, RG 1.206. It's really written for COL

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1 applicants, but it does discuss design acceptance
2 criteria and the various forms of ITAAC for design
3 certification application and COL applications in
4 terms of site-specific ITAAC versus planning ITAAC
5 and for the design features ITAAC.

6 The review guidance that the staff had
7 for ITAAC has been stated in SRP 14.3. And that is
8 broken in several different sections, and they're
9 all listed there.

10 And one thing I want to point out is
11 that the way our review guidance is organized is not
12 a system structure and component basis. And so
13 there is not a one-to-one match up with the table of
14 contents in the ESBWR Tier 1 document. So we had to
15 come up with a way to figure out what branches
16 reviewed what sections of Tier 1. And I'll show you
17 that in just a minute.

18 Briefly want to discuss the review of
19 Tier 2 Section 14.3 that GEH covered this morning.
20 That contains a selection criteria and methodology
21 that the GEH had used to identify what system
22 structures and components from Tier 2 that they
23 wanted to include in Tier 1. And in our review of
24 that section we found that it generally complied
25 with our guidance. There is an open RAI on that

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1 section in which we asked GEH to provide the cross
2 reference tables of key aspects analyses and
3 features of the design for inclusion in ITAAC. And
4 that's discussed in SRP 14.3.

5 If you've looked at the AP-1000 DCD
6 there are tables. Those are the same kinds of
7 tables that we're looking from GEH. They talked
8 about what key assumptions that were used in the
9 plant flooding analysis or the shutdown analysis or
10 other types of crosscutting analysis.

11 Also there's a COL action item on DAC
12 closure schedule. An RAI on that which was addressed
13 this morning.

14 We talked about the no entry ITAAC, we
15 looked at those and found that those systems id not
16 indeed rise to the level of safety significance
17 where we felt that ITAAC needed to be included for
18 those systems.

19 The initial test program did not require
20 any ITAAC because that program stands on its own.
21 One point I want to point is that for closing out
22 ITAAC, that ITAAC closure process can take credit
23 for portions of or entire procedures that are
24 already part of the initial test program to close
25 out those ITAAC. But they are separate.

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1 MEMBER BROWN: They can or can't?

2 MR. OESTERLE: Can.

3 MEMBER BROWN: Okay.

4 MEMBER SHACK: I heard improperly, too.

5 MEMBER BLEY: Would you mind commenting
6 on the question that Mr. Stetkar raised this morning
7 if a front line system manages to be worthy of
8 having an ITAAC, why wouldn't the supporting systems
9 that are needed to make it performance functions
10 also be ITAAC?

11 MR. OESTERLE: Well, it depends on the
12 function that that system performs. And what I can
13 do to try to address that is share with you the
14 guidance that we're looking at in what gets included
15 in ITAAC.

16 The other thing to remember is that for
17 ITAAC there's a graded approach. So some of these
18 functions may not fall into the upper tier or
19 safety-related function or safety significant
20 function, or risk significant function. And so those
21 support functions may not be required to support
22 those functions that the front line system needs to
23 perform and that also needs a criteria for being
24 included in Tier 1 ITAAC.

25 MEMBER BLEY: The second one part seems

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1 clear.

2 MR. OESTERLE: Okay.

3 MEMBER BLEY: But I think we had an
4 example where one of the functions they said it was
5 in ITAAC for needed -- so your position would be --
6 well, maybe you're even using sometimes a different
7 criteria than they would. Maybe something they'd
8 put in ITAAC you might not have required to be
9 there. Could that be true?

10 MR. OESTERLE: What we found was that
11 GEH followed the staff's guidance on what needed to
12 be included in ITAAC. So we're not using any
13 different criteria.

14 There's an ITAAC an design reliability
15 assurance program which we have an open RAI on.
16 That's a special kind of ITAAC similar to DAC.

17 And we also looked at the interface
18 materials discussed in Section 14.3 We also have an
19 open item on that with respect to offsite power.
20 We'll discuss that a little bit later.

21 And 14.3 also contains this section on
22 where it addresses what needs to be done for site
23 parameters.

24 In general the staff's review of Section
25 14.3 determined that GEH was generally in compliance

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1 with the staff's guidance.

2 As I mentioned briefly before, the Tier
3 1 documents that GEH provided was based on a system
4 organization level. And our SRPs to review that
5 document was not aligned in the same manner. But
6 that wasn't an issue. We just needed to figure out
7 how to get that all reviewed. And I'll show you that
8 matrix in just the next slide.

9 MEMBER BLEY: Relative to the DAC, you
10 seemed to have moved off of that, but there was a
11 statement in your alls SER on page 4 which said that
12 the applicant chose resolution after COL issuance
13 and its proposed implementation of the DAC ITAAC
14 from the first standard. Does that mean -- there was
15 a resolution, what do you mean by that? It's by an
16 operating license holder?

17 MR. OESTERLE: Yes.

18 MEMBER BLEY: The COL holder does all of
19 that?

20 MR. OESTERLE: Yes.

21 MEMBER BLEY: And it says it's going to
22 apply for subsequent plants as well. How does staff
23 get involved in that at that level? And it appears
24 it's for all ITAAC -- I'm sorry. For the three DAC
25 area.

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1 MR. OESTERLE: Right. For the three
2 DACs. But the proposal that we reviewed was the one
3 that was discussed this morning by GEH. And that
4 envisioned that closure of DAC would be for the
5 design but they would provide -- closeout DAC would
6 be in the form of a topical report and that we could
7 review that once --

8 MEMBER BLEY: That's a GEH function,
9 though, not a COL function. A COL doesn't prepare
10 the topical reports, do they?

11 MR. OESTERLE: At that point it could
12 be-- we haven't resolved that completely yet and
13 we're still working on that. So it's either GEH or
14 the licensee.

15 MS. CUBBAGE: Regardless of who prepares
16 the documents, it's the COL licensee's
17 responsibility to fulfill that obligation for the
18 ITAAC. So they may be doing it with the support of
19 documents provided by GE-Hitachi, but they're not
20 the licensee.

21 MR. OESTERLE: It is a proposal that
22 we're still considering. We're working out the
23 details on implementation.

24 There was no review performed for SERP
25 14.3.10 because that included emergency planning and

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1 that's provided by the COL applicants not the design
2 cert applicant.

3 Also the review for statistical security
4 hardware, as Rick indicated this morning, is still
5 ongoing. So that's an open item for this review.

6 The next slide shows the a portion of
7 the matrix that we developed to determine which
8 branches should review which sections in Tier 1.
9 That table appears as Appendix A in the SER with
10 open items so that you knew exactly which section
11 was reviewed by which branch and in accordance with
12 which SRP section.

13 CONSULTANT KRESS: Does each branch
14 review each section? For example, you got three
15 branches and three sections and all three of them
16 review all three or does one branch --

17 MEMBER STETKAR: Or do they split it up?

18 CONSULTANT KRESS: Do they split it up?
19 How do they work that?

20 MR. OESTERLE: Each branch is not
21 required to review each and every ITAAC for that
22 system. Only those ITAAC that apply to them and
23 which are governed by the SRP scope.

24 There is one or two branches that just
25 look at all of the ITAAC, one of them being the

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1 construction and inspection branch. And one of them
2 a nontechnical branch, DNRL.

3 We did look at all of those ITAAC.

4 MEMBER BROWN: Is this a complete list
5 or is this just an example?

6 MR. OESTERLE: That's just an example.
7 The complete list is in the SER.

8 MEMBER BROWN: That's a sample.

9 CHAIRMAN CORRADINI: It's in their
10 section --

11 MEMBER BROWN: Yes, I just now found the
12 thing back in the back.

13 MR. OESTERLE: Okay. A couple of things
14 that we wanted to point out as lessons learned from
15 previous design certification reviews that we
16 applied on the ESBWR review was that because of the
17 point in the process in which we're reviewing the
18 ESBWR we had the benefit of having several former
19 senior resident inspectors involved who are
20 currently involved in the development of the NRC's
21 ITAAC inspection program and documentation
22 requirements for ITAAC closeout. To be involved in
23 the review of the ESBWR ITAAC. And they had
24 provided a lot of very constructive and beneficial
25 comment in terms of technical comment with respect

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1 to how are you going to close that out from a
2 construction standpoint to format and consistency
3 issues to make sure that there is no
4 misunderstanding or second guessing amongst various
5 inspectors that are looking at different ITAACs and
6 on different systems.

7 One of the big improvements that was
8 made was in moving away from the basic configuration
9 type of ITAAC that existed early on with the ABWR.
10 If you looked at that basic configuration of ITAAC,
11 it really consisted of five or more separate items
12 including functional arrangement, seismic Category 1
13 qualifications, ASME code welds, the ASME
14 hydrostatic pressure boundary testing and equipment
15 qualification.

16 So in terms of being able to inspect
17 closeout of that ITAAC, let alone the capability or
18 the ability of a utility to closeout that one ITAAC,
19 it was much more practical to break that up into
20 several individual components.

21 We also had a comment to specifically
22 identify those ITAAC which are design acceptance
23 criteria and GEH has done that by annotating the
24 ITAAC items with DAC in the code brackets.

25 So moving on, the first section of the

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1 SER, I'll had it over to David Chang to talk about
2 SRP 14.3.2.

3 MR. CHANG: I am David Chang. I belong
4 to the safety engineering branch at NRO. I did
5 cover this SRP Section 14.3.2 Chapter. Particularly
6 we emphasized our review on the safety-related
7 structure such as the reactor building, containment
8 structure, fuel building, auxiliary building and the
9 cell. We went through this mostly, and we did raise
10 some qualifications. And some of the chief issues
11 are in the following.

12 We got the containment testing. The
13 applicant originally proposed obtaining every test,
14 which is type A testing. But they did not include
15 the type B test. So we will request that the
16 applicant include most type A, B and C tests in the
17 ITAAC for the containment structure.

18 Another point that we raised was about
19 the containment structure, just a background floor,
20 which separates the wetwell versus suppression pool.
21 And we wanted to clarify what kind of a differential
22 pressure they are going to pay for, especially
23 because if the pressure is needed and they do not
24 make it clear in their application, so we suggested
25 they make it clear and clearly indicate in the

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1 ITAAC.

2 And the same issue was raised on the
3 vent walls which are against the -- probably between
4 the wetwell and drywell. And when a LOCA occurs, the
5 pressure pushes through the vent wall into the
6 suppression pool. And the test pressure ought to be
7 that pressure of the containment design.

8 So these two points were raised in the
9 RAI and the applicant complied.

10 The next item is pertaining to the
11 propriety of the test pressure. There are some,
12 usually, language which says that the design
13 pressure be above. And we insisted that any
14 difference in test pressure should be specific and
15 clear.

16 So, for instance, the relationship
17 between the design pressure and the test pressure
18 was 1.15 factor. You have the design pressure 45
19 psig, but when you test the containment it test to
20 1.15 of the exam pressure. So we made that clear and
21 they rectified that, the presentation in the ITAAC
22 table, which was an important point.

23 And then we tried to ensure credit with
24 regarding the statement of the particular code of
25 the table into different ITAAC items. The codes

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1 which are the ASME Section 3 Revision 2 codes for
2 the containment structure and the concrete structure
3 is the Revision 2 for the containment and the ACI
4 349 for the concrete structure, and ACI for the
5 steel structure.

6 So these references the codes have been
7 fully clarified and the current ITAAC table provides
8 clear cut information.

9 Another point that we raised was about
10 the terminology cited. They used some nuclear
11 structure, nuclear island and seismic structure and
12 they came to the conclusion that they're not clearly
13 defined. So we requested that the applicant use a
14 consistent terminology. And the solution was to
15 refer to seismic Category 1 structure to reflect
16 those serious unclear usage of the terminology.

17 So at this point everything was fully
18 adjusted by the applicant.

19 MEMBER SHACK: What versions of the code
20 will they be held to? Will that be the design, when
21 the DAC are resolved?

22 MR. CHANG: For which version of the
23 codes, I think that is the case for the present
24 structure. For instance, in the case of a SRP 384
25 type of the other Category 1 structure, and we do

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1 refer to N50 1994 with supplement, too. So the SRP
2 provides -- definition of which code, too.

3 MR. OESTERLE: In fact, this may be an
4 area where this mimics the specific codes.

5 MR. CHANG: Okay. And the last item I
6 will ask GEH regarding the fuel handling machine aux
7 hoist to what loading they have tested. And they
8 clarified that they're going to take to 1.25 times
9 the design rated.

10 So all these questions are raised and
11 properly addressed by the applicant. And the bottom
12 line is no open RAIs for Section 14.3.1.2

13 MS. DIXON-HERRITY: My name is Jennifer
14 Dixon-Herrity. I'm the Chief of Engineering
15 Mechanics Branch Two. The Engineering Mechanics
16 Branch led the review for 14.3.3 dealing with piping
17 system and components.

18 In doing this review we looked at all of
19 the ITAAC associated with those components and the
20 piping system design and verification. We also were
21 the branch responsible for looking at how the
22 applicant plans to address the piping DAC and
23 completion of the piping design.

24 Specific to piping DAC, I know that one
25 of the concerns was understanding what the

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1 difference was between how this applicant is dealing
2 or how we dealt with it in this review as compared
3 to past reviews. Similar to past reviews, all of
4 the methodology for the piping design is called out
5 in Section 3 of the DCD.

6 In this particular application they
7 determined that they were not going to address the
8 design through COL information items. So they have
9 come up with the DAC ITAAC that were discussed
10 earlier today so that the design would be addressed
11 through specific ITAACs for addressing the design.
12 And in addition to that, they have the ITAAC in
13 place that were used previously to address the as-
14 built reconciliation.

15 In addition to this, in looking at the
16 previous design they didn't really go through and
17 address how the design would be addressed in the
18 future. GEH has provided us with a plan in Chapter
19 14 on how it can be addressed and a COL information
20 item that provides an opportunity for us to
21 understand the timeline for when it will be
22 addressed. Those have yet to be defined because it
23 would be provided by the COL applicant.

24 In looking at what RAIs we have, we have
25 a number RAIs. The significant ones that were

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1 opened right now deal with -- well they went through
2 and provided the DAC ITAAC. At first it was
3 nonsystem based. In going through and doing
4 Revision 5 they broke those up so they went from
5 being nonsystem based one set of ITAAC to system
6 based. So you had a collection of piping design
7 ITAAC and component design ITAAC with each of the
8 systems. In doing that, they noted after they
9 submitted it that they had a number of errors and
10 they corrected those errors. We've gone through and
11 looked at that. We identified other errors so we've
12 opened an RAI to have them look again to make sure
13 there are no other corrections that need to be made
14 so that the ITAAC that are in place are similar
15 across the board and address all the concerns that
16 DCIP had previously brought up.

17 The other significant item that we have
18 open deals with pipe break hazard analysis report
19 ITAAC that's in place. Previously there was a level
20 of detail there that had them back to Section
21 3.6.2.5 and 3.6.2.5 really defines what is expected
22 to be in the pipe break analysis report. When they
23 went through and they put together the ITAAC that
24 was left out. We have asked them to put that level
25 of detail back in so that we have an understanding

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1 that documents that we'll be reviewing will cover
2 the level of detail called for in 3.6.2.5.

3 COL action items still available in this
4 section deal with the schedule input that we're
5 looking for from the applicant. They're also looking
6 for the COL applicant to clarify how they intend to
7 complete this.

8 That's all I had.

9 MEMBER SHACK: On your previous slide,
10 on that COL item, so the past ones left for the COL
11 to find those DAC, is that what you were saying?

12 MS. DIXON-HERRITY: The COL applicant
13 will need to define how they're going to provide the
14 piping signs. They can either use the --

15 MEMBER SHACK: No. It's the next to the
16 last bullet, which would be --

17 MS. DIXON-HERRITY: In previous designs,
18 for example AP-1000. They had a COL information
19 item in place that had them provide design reports
20 and design specifications for both components and
21 piping. But part of the DAC, part of the design
22 could have been addressed through the COL
23 information item.

24 In this case we don't have a COL
25 information item. They've taken the COL information

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1 item and made it a design ITAAC. It's determined up
2 front that they're not going to address this during
3 the COL review period, they'll address it during
4 construction.

5 MR. OESTERLE: All right. The next
6 review section was 14.3.4 reactor systems. And I
7 agreed to go through these slides as long as the
8 staff showed up to rescue me if I got in ice here.

9 The Reactor Systems Branch reviewed the
10 ITAAC to ensure that important input parameters
11 using transients and actions analyses were verified
12 by the ITAAC. And here's some examples here for
13 you.

14 Significant systems design features are
15 verified by the ITAAC. The staff reviewed the ITAAC
16 to make sure that was done. And there are some
17 examples there for you as well. And some of those
18 that you have already asked about during these
19 discussions today.

20 Also fuel and control rods design
21 criteria are designated as Tier 2 star information
22 and can't be change without staff approval. There
23 are some ITAAC on those as well, not as specific as
24 others that we have available.

25 A couple of these significant open items

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1 that are still under review by the staff and which
2 RAIs have been written for include questions about
3 locations of source arrangements on monitors, power
4 range monitors and neutron sources where they're
5 going to be located in the core and what the impacts
6 on other core parameters may be.

7 Another open item on ITAAC acceptance
8 criteria for the flow induced vibration testing of
9 the fuel bundles.

10 We are still waiting for responses from
11 GEH on these RAI.

12 The next SRP section is 14.3.5 on
13 instrumentation and controls. And Hulbert Li will
14 address those slides.

15 MR. LI: For Instruction Control Branch,
16 Division of Engineering.

17 The typical I&C for ESBWR is all over
18 the place. But the safety-related covers the
19 reactor protection system in control in that
20 situation, and how is that monitoring. And then
21 another safety will cover most ever system requiring
22 documentation.

23 But our emphasis is on the design
24 process of the digital I&C system that covers
25 hardware and software. And the ITAAC area is

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1 Section 3.2 identified as design process and then
2 they identify the ITAAC for every phase of this
3 part.

4 We also emphasized the IEEE 603 design
5 criteria. IEEE 603 is part of the regulation. So
6 every application has to meet some requirements.

7 Because some of the detailed designs are
8 not available at certain times, so we use this next
9 process to occur, including the event process and
10 requirements.

11 For the Tier 1 19 sections involve I&C.
12 And basically tried to determine whether the ITAAC
13 has adequate information for the ratification of
14 design requirements, detailed requirements are
15 discussed in Tier 2. Tier 1, the purpose of Tier 1
16 is to verify those design requirements are complete.
17 And this process is still ongoing. The next three
18 RAI is just a sample.

19 For those three we are having discussion
20 with GEH and we will get some agreement, but only
21 waiting for the formal documentation upon request.

22 The first one is relate to the level of
23 detail. What we want to see is the reactor
24 protection system have some high level, broad
25 diagrams that have some indication showing the new

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1 one.

2 MEMBER STETKAR: I noticed that RAI is
3 specifically targeted on the RPS. Why wasn't there
4 a similar request for a similar level of detail on
5 things like safeguard evacuation, which is probably
6 much more important in a general sense to overall
7 plant safety?

8 MR. LI: But this morning the
9 instrumentation, I think it's a little bit contract
10 to show in the -- that amount of time. So they
11 table format.

12 MEMBER STETKAR: Well, reactor --

13 MR. LI: Yes. It's a gentleman's call.

14 The second question is -- was when we
15 reviewed the Revision 5 in Tier 2. They're adding
16 these -- loss of aux feedwater as anticipatory trip,
17 but it's not reflected in the Tier 1. So we asked
18 the question and they are putting in the 2.2.7 Tier
19 1.

20 The third question relates to the
21 augmentation of diversity requirements, 2.2.14. And
22 they identify redundant and independent, but never
23 the word diversity, so we bring up that question and
24 they agreed to put in the diversity to one section.

25 The big area for I&C Tier 1 is

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1 discussing Chapter 7 SER. Summary for the software
2 design process and it's Section 4.18 and we request
3 that Tier 1 provide all specific areas planned.
4 Right now it's kind of just template to how they
5 approach. But for the ESBWR we have two platforms
6 that could be different -- platform has different
7 things. So it has to be clearly identified in the
8 Tier 1 so we can verify when the design's complete
9 to make sure it cover all the requirements.

10 MEMBER BROWN: What do you mean by two
11 platforms?

12 MR. LI: For the active trip system they
13 use the NUMAC system.

14 MEMBER BROWN: Use what? Excuse me?

15 MR. LI: NUMAC.

16 MEMBER BROWN: Okay. GE systems?

17 MR. LI: Yes. And then in the new
18 safety features they use Triconex

19 MEMBER BROWN: I've heard of that.

20 MR. LI: Design certification is platform
21 neutral. We just have to have the requirement. But
22 they can put in the specific hardware to satisfy the
23 design requirement.

24 MEMBER BROWN: I'm still lost? NUMAC is
25 the one you said, right?

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1 MR. LI: Right.

2 MEMBER BROWN: Did I say that right? Is
3 it NUMAC or NUMAR?

4 MR. WACHOWIAK: NUMAC.

5 MR. LI: NUMAC.

6 MEMBER BROWN: NUMAC, okay. And then
7 the other one was what tronic?

8 MR. LI: Triconex.

9 MEMBER BROWN: It's a form of platform,
10 is that --

11 MS. CUBBAGE: What Hobert was trying to
12 say is that we envision that they're planning to use
13 Triconex but the DCD is actual platform neutral.
14 They're not locked into that platform.

15 MEMBER BROWN: So you don't want to be--

16 MS. CUBBAGE: Right. So we speak about
17 Triconex, that's an example of one that they might
18 use.

19 MEMBER BROWN: So the platform is kind
20 of generic, I mean and it's just a nice word? What
21 does it encompass? Is it an entire system that's
22 already designed? In other words it's a nuclear
23 monitoring system? Is it a control system. Is it a
24 reactor protection system? Does that refer to the
25 stuff inside of the box.

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1 MR. LI: Function or requirement already
2 specified in the DCD. So you have the increment that
3 function all the time and is part of the ITAAC to
4 verify. So how to implement those functional
5 requirements it has to be -- they supply in the
6 hardware software specification documentation. That
7 is in the back closure process. We want a chance to
8 review those documents when they submit the topic on
9 how to implement those.

10 MEMBER BROWN: Okay. Let me ask this
11 another way.

12 Is the intent in the DCD then to lay out
13 a set of functional requirements. This is whatever,
14 I guess it's in Tier 2 Chapter 7, is that's where
15 that's going to be?

16 MR. LI: Right. Yes. Chapter 7 has got
17 the detail functional requirements.

18 MEMBER BROWN: Okay. But those
19 functional requirements are being developed based on
20 having several different systems already --

21 MR. KIMURA: This is Kimura, GEH.

22 MEMBER BROWN: Oh, hi. You're well
23 hidden back there.

24 MR. KIMURA: I'm hiding behind Sam here.
25 But we have really several systems that

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1 we're planning to use and our requirement is one of
2 diversity. We didn't want to have the same
3 computing platforms to perform both the reactor
4 protection system function and the engineered safety
5 feature system. So we have a requirement to have
6 diverse computing platforms that implement those
7 function.

8 The NUMAC system is a GE design that's
9 currently used in existing plants as part of neutron
10 monitoring. They do like the LRPMS and other neutron
11 monitoring function.

12 That thing is going to be used as the
13 basis for performing the SCRAM function of the
14 reactor protection system.

15 We have another diverse platform which
16 has been slated to be a Triconex platform, but it as
17 Amy said, the DCD is platform neutral at this point.
18 But it will be diverse, which means that it will
19 have different processor, it will have a different
20 board structure. It will have a different memory
21 structure. It will have a different programming
22 structure than the NUMAC platform.

23 MS. CUBBAGE: I'd also like to suggest
24 at this time that we're going to come back to you
25 with Chapter 7 in its entirety. So we're really

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1 getting into the details of that chapter.

2 I think we need to move forward because
3 we don't have much time left. So let's wrap this up.

4 MEMBER BROWN: You telling me to be
5 quiet?

6 MS. CUBBAGE: No, but I'm telling you
7 that we'll be able to give you -- you know --

8 MEMBER BROWN: I was trying to address
9 this on the DAC ITAAC level.

10 MS. CUBBAGE: Right.

11 MEMBER BROWN: And when you said two
12 platforms, what I was trying to figure out how were
13 they developing the DAC ITAAC requirements for these
14 platforms.

15 MS. CUBBAGE: Well when we come back on
16 Chapter 7, we can't talk about Chapter 7 without
17 talking about this again. You know, you can't talk
18 about Chapter 7 without talking about the DAC.

19 MEMBER BROWN: I agree.

20 MR. LI: It's still ongoing so we will
21 come back to you with more details.

22 MR. OESTERLE: I think in summary what
23 we can say is that you have to establish the
24 requirements first to make sure that the platforms
25 fit those requirements.

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1 MEMBER BROWN: No, I understand that.
2 It's just when somebody says they're going to base
3 the design on NUMAC, okay, for this one particular
4 function, the first licensee may not want to use
5 NUMAC.

6 MR. OESTERLE: Right.

7 MEMBER BROWN: Isn't that right? He can
8 take some other platform and some other platform for
9 the safeguard system? And the functional
10 requirements back in ITAAC have to be -- really non-
11 platform specific, but whatever. Assuming you talk
12 that out. I wouldn't have thought about that. I
13 would have thought the functional requirements DAC
14 and ITAAC independent, you get platforms, these are
15 what the system has to have for ESBWR. I don't care
16 who makes it.

17 MR. KIMURA: One of the things that we
18 are doing in Section 3.2 of Tier 1 is to clarify
19 that there will be different plans for the different
20 platform types. And we'll also clarify what the
21 platforms are by various function. So the RPS will
22 be part of a platform. SSLC which also implements
23 the LDIMS and monitoring and ADS and other
24 functions, will be the SSLC/ESS platform. And then
25 that will be clarified so that when we do have DAC

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1 the DAC will clearly show that there'll be separate
2 software plans produced for each of those platforms.

3 MR. OESTERLE: Thank you, Steven. That
4 really addresses what we've been in discussion with
5 GE on the schedules for resolution of those items.

6 So if we could move on to the next group
7 of presenters, please.

8 Looking for Amar, Jean-Claude, Charlie
9 Hinson and Jim Bongarra, and Hanry Wagage. And
10 while they're coming up here, I want to let you know
11 that there had been ongoing discussions between the
12 staff and GEH with respect to digital I&C, a
13 challenging area. We're making progress. We have
14 been down to the Wilmington facility to do an audit
15 and discuss further how to move forward to resolve
16 some of the fuzziness in the digital I&C area.

17 The next section that we're going to
18 address is the 14.3.6 review on electrical systems.
19 And I would ask the reviewers just to quickly
20 summarize their slides.

21 MR. PAL: I'm Amar Pal from the safety
22 engineering branch. We looked at the ITAAC for the
23 electrical system based on the SRC 14.3.6. And we
24 have several open items. I'm talking to talk about
25 two significant item, one of them based on the RAI

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1 issued for Chapter 8, 8.2-14 which talks about the
2 effect of the UPS, which is the most important piece
3 of equipment in the ESBWR plan. But it didn't have
4 any mode of operation, it wouldn't have the high
5 voltage -- the high voltage of the UPS.

6 They responded to that RAI and saw a
7 need for coordination for the objectives and
8 monitor. If they are not coding it properly, we may
9 lose the UPS rectifiers. So, we thought it would be
10 a good idea to have enough ITAAC to verify that
11 coordination is there.

12 MEMBER STETKAR: A fair transient? What
13 do you mean like a power going away and coming back
14 for milliseconds or something like that?

15 MR. PAL: Due to the fault and not
16 operation on each operation of protective device. So
17 we're talking about two milliseconds, two cycles.

18 MEMBER STETKAR: A spike? These are
19 spikes or these are total power variations from
20 normal to zero and back or above, or what?

21 MR. PAL: No, it's because of the
22 initial operation of this particular device. So it
23 will operate maybe after a while, but it will be
24 there for some time for the few milliseconds. And
25 the UPS system predicts that is measures --

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1 MEMBER STETKAR: So these are voltage
2 transient outside the input band that the UPS for
3 which its designed, is that correct?

4 MR. PAL: Yes. The other item is the
5 interface requirement for the offsite power system.
6 We found that they did not have this interface
7 requirement for offsite power systems, so we asked
8 that to be included. And we're still working with
9 GE for coming up with some technical requirements
10 for this particular applicant.

11 MR. OESTERLE: Thanks, Amar.

12 The next section is on 14.37 plant
13 systems. And I agreed to go through this slide real
14 quickly.

15 There were no open RAIs regarding plant
16 systems with the exception of a couple of plant
17 protection RAIs submitted on seismic classification,
18 end pipe booster pump and station coverage inside
19 containment. And I think we've received response on
20 one of those.

21 Our next presenter will be Jean-Claude
22 on rad waste management systems under 14.7.

23 MR. DEHMEL: Thank you. I'm with the
24 Health Physics Group, NRO.

25 The work here -- my presentation

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1 integrates the role of balance-of-plant branch, the
2 I&C branch as well as containment ventilation and
3 building ventilation branch.

4 My review focused on liquid waste
5 management and some of the gaseous waste management
6 and some solid waste management and the process,
7 radiation monitoring system all described in Chapter
8 11 of the DCD and SRP.

9 So the focus of my review looked on
10 system that I used to monitor and control liquid
11 effluent releases. It also address some of the
12 requirements that are not associated with safety-
13 related aspects, but that are there to meet specific
14 requirements of Part 20 and Part 50. And then
15 basically the RAI provides design description,
16 functional arrangement basis of acceptance criteria
17 and tests. And try to resolve and reconstruct some
18 inconsistencies between Tier 1 and Tier 2
19 information.

20 A total of 16 RAIs were submitted to the
21 applicant.

22 Next slide, please.

23 So here the major RAI topics are that
24 were essentially covered.

25 Confirming the description and

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1 functional arrangements of the system;

2 Confirming the scope of the test
3 criteria on initiation of valve closure and
4 controlling effluent releases.

5 Verifying nominal capacity of solid
6 waste management system;

7 Verifying installation of liners in
8 rooms with adequate waste management system are
9 located, and;

10 Confirming the initial installation of
11 filtration media in the gaseous waste management.

12 And all RAIs are closed as of now.

13 That's what I have.

14 MR. OESTERLE: Thank you, Jean-Claude.

15 MR. HINSON: My name is Charlie Hinson.

16 I work in the same branch, Protection Health Physics
17 in NRO.

18 And I looked primarily at Chapter 12,
19 Tier 2, Chapter 12 Radiation Production. And I
20 looked at the Standard Review Plan 14.3-H radiation
21 protection ITAAC.

22 The main items I looked at that are
23 covered by ITAAC in this section are the ventilation
24 system with respect to providing containment of
25 airborne radioactive materials and ensuring that

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1 concentrations of airborne radionuclide and maintain
2 the levels consistent with access requirements for
3 the areas where people will be.

4 Looked at the area radiation monitoring
5 system. This system should continuously monitor
6 gamma radiation levels within the plant based on
7 accessibility and it should have alarms both locally
8 and in the main control room to the level -- in case
9 that radiation level is reached.

10 I looked at the radiation shielding.
11 The plant design provides radiation shielding from
12 room, corridors and operating areas where personnel
13 would be present. And the shielding should along
14 with the occupancy requirements of those particular
15 areas.

16 And then the ITAAC the way this was
17 covered the plants are divided into various zones
18 and the occupancy requirements are based on the
19 radiation level of various zones.

20 And then the fourth area that I looked
21 at just covered by ITAAC is airborne rad activity
22 monitors. And these are provided in those normally
23 occupied areas of the plant where there's a
24 significant potential for airborne contamination.

25 And, again, these systems are not

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1 safety-related, but the systems are used to ensure
2 compliance with various sections of Part 20 and Part
3 50.

4 Okay. I have had six RAIs in this area.
5 Two of them were open. However, I received responses
6 last Thursday on these RAIs, and I'm in the process
7 of looking at these responses. But they look like
8 they're pretty much what may close out the remaining
9 issues I had.

10 Thank you.

11 MR. OESTERLE: Thank you, Charlie.

12 MEMBER SIEBER: I do have a question on
13 this. Part 20 prescribes what kind of doses,
14 whether it's airborne or whether radiation can be
15 given to workers and requirements to minimize that,
16 but it doesn't say anything about where monitors of
17 any type are located. On the other hand, it seems
18 from what you've told us here that you're looking
19 into the details of where the radiation monitoring
20 that's proposed by the applicant, General Electric.
21 What basis do you decide whether that's okay or not?

22 MR. HINSON: You talking about the area
23 or the airborne? Well, the area monitor --

24 MEMBER SIEBER: The area and whether
25 it's ionizing radiation or airborne contamination.

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1 MR. HINSON: Okay. The airborne
2 monitors, we make sure that they're able to --
3 there's sensitivity requirements in the ITAAC based
4 on the limits. And so we make sure that they're able
5 to detect concentrations in all susceptible areas of
6 the plant.

7 MEMBER SIEBER: They would provide a
8 dose?

9 MR. HINSON: Right. And if they can't do
10 it with the fixed monitors, then they have to have
11 portable airborne monitoring systems that they will
12 bring in for special function.

13 And for the area monitors we look at
14 areas that are high radiation zones and areas that
15 have high occupancy. And we have like a list of
16 certain areas that we look at to make sure that
17 these areas, like the fuel handling areas, et
18 cetera, that have airborne and area.

19 And GE has provided a large number of
20 the area radiation monitors throughout the plant.
21 And we've looked at those locations and feel that
22 they're prudent.

23 MEMBER SIEBER: Well, let me refine my
24 question. IF the applicant in the design of the
25 plant did not have radiation monitoring in a certain

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1 area, what would be the basis for they have to say
2 you ought to have monitoring here?

3 MR. HINSON: Well, we've --

4 MEMBER SIEBER: Here's the whole
5 regulation for whatever says you ought to have it.

6 MR. HINSON: Okay. If it's an area
7 where you're going to have hibernation, I mean we
8 want to ensure that the people do not exceed the
9 Part 20 limit. And if it's an area that is going to
10 be a high dose area that have frequent occupancy, we
11 base it on Part 20 limits.

12 I mean, if it's --

13 MEMBER SIEBER: Yes. I know what Part 20
14 says. And general good health as a practice would
15 say -- a plant health physicist would say that you
16 need portable instruments for this job, I need fixed
17 instruments --

18 MR. HINSON: Right.

19 MEMBER SIEBER: But I don't recall that
20 being in the regulation anyplace. It's a matter of--

21 MR. HINSON: Well, that's part of the--

22 MEMBER SIEBER: -- professionalism of the
23 radiation technicians.

24 MR. HINSON: It's a part of radiation
25 protection to operate, the 12-5 the radiation

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1 protection operating which NEI has come up with as
2 template for it that describes the access and when
3 you place monitors, portable monitors to supplement
4 the area.

5 MEMBER SIEBER: Is that endorsed by the
6 staff?

7 MR. HINSON: Yes.

8 MEMBER SIEBER: Are they a requirement?

9 MR. HINSON: It's a --

10 MEMBER SIEBER: Or this is a way to do
11 it?

12 MR. HINSON: As far as an operating
13 code, that is one of the operating functions. It's
14 endorsed by the staff. Yes, we've been working with
15 NEI for the last few years to come up with the
16 operational aspects. And so, you know, you've got
17 fixed area monitors and then you've got guidance on
18 where there other radiation protection monitors are
19 at to implement portable monitors.

20 MR. OESTERLE: I think that aspect of
21 the discussion is really dealt with the COL in terms
22 of implementation of the operational programs, the
23 radiation protection program and its governed by a
24 license condition.

25 MS. CUBBAGE: This is Amy Cubbage. The

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1 intent --

2 MEMBER SIEBER: I'll drop it at this
3 point so that we can move on.

4 CHAIRMAN CORRADINI: Good. I think we
5 need to move on.

6 MEMBER SIEBER: Okay.

7 MR. OESTERLE: Thank you, Charlie.

8 The next section of review is human
9 factors engineering. And this has the similar
10 challenges to digital I&C in that it contains DAC.
11 And so, Jim, in the interest of time I'll ask you to
12 just discuss in summary level the RAIs that you have
13 on the next four or five slides.

14 MR. BONGARRA: I'm Jim Bongarra on the
15 human factors engineering review of the Chapter 18
16 of the ESBWR review.

17 We started out with 13 initial RAIs that
18 were rated to the Tier 1 ITAAC in the area of human
19 factors engineering. We have six of them that are
20 essentially still open. And five of the six, and
21 they're all listed here on the list so in case you
22 wanted to look at them in detail. Five of the six
23 are really more clarification related and editorial
24 in nature, administrative in nature.

25 The first one that's identified here is

1 a little bit more detailed. I'm sorry, not the
2 first one, but the next slide on --

3 CHAIRMAN CORRADINI: Which slide?
4 Minimum inventory.

5 MR. BONGARRA: It is the first one.
6 Pardon me. 14.3.4.36. And the bottom line to this
7 one it's really going back to the discussion that
8 was had earlier this morning with the Subcommittee
9 in terms of safety-related versus nonsafety-related.
10 And we're kind of in the same territory here. We
11 want to make sure that the human factors engineering
12 program is not just focused on safety-related human
13 system error basis, but it encompasses essentially a
14 wider inventory. So that's really what we're trying
15 to get across here in this RAI that we've asked.
16 It's still an open issue.

17 I might just mention one thing real
18 quick, and that is to say that on these six RAIs
19 that we have remaining in human factors aren't
20 necessarily the only of the six that be remaining.
21 Because we, as Charlie just mentioned, just received
22 a response from GEH in the past that relates to Tier
23 2 material. And we have a great deal of effort left
24 to do here, over 300 pages of information that has
25 been submitted to us to address several of the Tier

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1 2 level RAIs.

2 So from that review of the remaining
3 Tier 2 material there may be some additional RAIs
4 that we may identify that relate to Tier 1.

5 Unless the Committee has questions, I'll
6 turn this over then to the next presenter.

7 MEMBER STETKAR: Is there any attempt,
8 and this is part of ITAAC, to try to quantify an
9 acceptance criteria relative to the volume of
10 critical data necessary for the operators to manage
11 the plant versus less critical data? And I ask that
12 question relative to I guess you have to go back to
13 TMI when one of the complaints, and it was in the
14 Commission report, was that the operators were
15 constantly deluged with alarms for the elevator not
16 working. I mean very unimportant nonrelevant types.
17 I don't know whether that's an ITAAC or whatever it
18 is. But somewhere do we address the stuff that the
19 operators have to look at and what does he need to
20 really control, protect, shutdown, take action if
21 necessary if he sees something. You won't think
22 about that at all as part of this ITAAC process?
23 And I'm sure you do, but -- I wasn't trying to say
24 you don't. I apologize for that.

25 MR. BONGARRA: Let me just mention two

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1 things quickly. There is an alarm prioritization
2 team that not just GEH has come up with, but it's a
3 strategy essentially that used as a result of the
4 issue with TMI where essentially alarms are
5 segregated, prioritized by their importance and
6 their effect on different safety systems. So that's
7 one aspect that's essentially come from the TMI
8 event.

9 The second thing is is that we have
10 embedded technically within the overall human system
11 error based inventory what's the minimum inventory
12 of alarms, controls and displays. And this is an
13 area that we're working with GEH on and the industry
14 as well in a large scheme.

15 The minimum inventory of alarms,
16 controls and displays is aimed at identifying those
17 alarms, controls and displays that are necessary
18 essentially to safely shutdown the plant in case of
19 a loss of all digital systems and maintain the plant
20 in a safe shutdown condition. And there are
21 specific attributes, characteristics if you will
22 that apply to not only the development of those
23 human system interfaces, the alarms, controls or
24 displays but to determine their location, their
25 accessibility to the operators so that they can

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1 immediately take the necessary actions that are
2 required.

3 So hopefully that addresses --

4 MEMBER STETKAR: Well, that addresses
5 part of it. I mean -- because there's other key
6 parameters. You use the words "display," so I
7 presume that would include such things as the
8 operator primarily being in his view, stuff like the
9 reactor power, pressure, temperature; those items,
10 the particular ones that are critical to know where
11 he is relative to his operating band and/or some
12 display format that allows him to see something is
13 getting out of bounds fairly easily. So that was the
14 only purpose of the comment is does that roll into
15 your alls process and is there an acceptance
16 criteria protocol for when you say okay, here's the
17 final thing we're looking at. When somebody builds
18 a plant that they're going to adhere to the protocol
19 that you all feel is satisfactory. So that was the
20 purpose of my question.

21 I just want to -- does it go up and down
22 or this way or whatever. You gave me plenty of
23 answers.

24 MEMBER SIEBER: But let me add something
25 to your question and give some explanation.

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1 CHAIRMAN CORRADINI: We're getting to
2 the end and I want to make sure we have time for
3 comments from all the members.

4 MEMBER SIEBER: The TMI action plan, one
5 of the action items was to require a safety
6 parameter display system.

7 MR. BONGARRA: I remember that clearly.

8 MEMBER SIEBER: It was separate from the
9 regular control system. And it displayed six
10 categories of high level signals in a human factored
11 way so that an operator could tell from that display
12 when he was getting out of bounds in a certain area.

13 As far as I know, SPDS systems are still
14 required, even in the ESBWR. And the independence
15 requirements so that John and I are behind on
16 acquiring data on prioritization is already built
17 into that system. And so far that's been good
18 enough. I presume that's what you're requiring the
19 staff, the staff is requiring, compliance with--

20 MR. BONGARRA: SPDS function is they're
21 still requiring it for design certification.

22 MEMBER BROWN: Yes. But the first ones
23 I saw were a kind of a box or something that just a
24 guy looked at and the spots moved outside the box
25 and there's just something --

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1 MR. OESTERLE: We need people so we need
2 that.

3 MEMBER BROWN: Yes. I'll stop right
4 here.

5 MR. OESTERLE: We'll move on to the last
6 remaining section of the containment system.

7 MEMBER SHACK: Question for Jim. Why?

8 A couple of these open items you have
9 you're asking GEH what do you mean by things will be
10 delayed until later in human factors engineering.
11 Are there aspects of the HFE you think maybe should
12 be more complete at this time? Is that where those
13 are pushing or just for clarification.

14 MR. OESTERLE: The short answer to that
15 is?

16 MR. BONGARRA: The short answer to that
17 is yes, there are.

18 DR. WALLIS: No, they're not.

19 MR. OESTERLE: Let's go back to the
20 final category --

21 DR. WALLIS: This is the section in
22 which I have some question. I know you want to get
23 us to lunch.

24 CHAIRMAN CORRADINI: I want to get us
25 done.

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1 DR. WALLIS: This is the only section in
2 which I have serious questions. These four areas.
3 I'm just warning you ahead of time. Maybe you can
4 cut me off. I just want to --

5 CHAIRMAN CORRADINI: I probably will.
6 But ask them anyway.

7 DR. WALLIS: Let's go. I think
8 containment is a rather important area to
9 investigate?

10 CHAIRMAN CORRADINI: I agree.

11 MR. WAGAGE: My name is Harry Wagage.
12 I'm from Containment and Ventilation Branch to
13 Division of Systems Safety and which actually is
14 part of NRO.

15 Our main focus was to verify the systems
16 accredited for containment analyses. This slide
17 shows the RAIs we issued to access some of these
18 persons. All of these RAIs correspond to these
19 added ITAAC. I think because of the time concern
20 I'll go to the last item. The last item was--

21 DR. WALLIS: Can I talk about the debris
22 issue. The debris issue.

23 MR. WAGAGE: Yes.

24 DR. WALLIS: You seemed to have closed
25 the debris issue?

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1 MR. WAGAGE: No. The debris issue is not
2 closed in this --

3 DR. WALLIS: So it's closed?

4 MR. WAGAGE: No.

5 DR. WALLIS: Just the important
6 information is closed?

7 MR. WAGAGE: Important information I
8 define given in the --

9 DR. WALLIS: Well, I read your report.
10 It said that GE had not supplied information on
11 their analysis. And you've closed it simply on a
12 promise on GEH to supply analysis assumptions. I
13 would think it would matter what those assumptions
14 are and how complete the response is before you
15 closed that issue.

16 MR. BONGARRA: I identified the onset
17 that GEH is going to verify some features which
18 minimize debris generation. For example, water GDSC
19 have stainless steel liner.

20 DR. WALLIS: It's a big issue. I don't
21 understand how you close an issue just on a promise
22 to supply information. You've got to see the
23 information itself.

24 MR. WAGAGE: We have not closed the
25 debris issue. We closed this item only that this

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1 item is specifically identified here. The one is
2 that stainless steel liners in GDCS pool and --

3 DR. WALLIS: Okay. So leave that.

4 Now how does this effect in ITAAC? I
5 mean what do you do about these strainers? Do you
6 just look at them and see that they're manufactured
7 as designed? Is that the only thing that they do in
8 the ITAAC?

9 CHAIRMAN CORRADINI: Are you trying to
10 tie this back to the generic issue?

11 DR. WALLIS: Well, no. The debris on
12 strainers is an issue that we have written on. It's
13 important.

14 CHAIRMAN CORRADINI: Right.

15 DR. WALLIS: And as far as I can make
16 out you accept GE's promise to analysis, but what on
17 earth do you inspect or test or do in the ITAAC
18 process to these strainers? Do you just look at
19 them?

20 MS. CUBBAGE: There are two issues that
21 we're looking at. In Chapter 6 Henri's looking at
22 the design of the strainers. And that's an open
23 issue. There's additional work that needs to be
24 done. GE has to respond. We have to review that to
25 ensure that they've factored in the appropriate

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1 design considerations.

2 And then your second question about the
3 ITAAC verifications that are appropriate for this
4 discussion, and I believe this RAI was closed
5 because GE has committed to verify the features that
6 Henri was --

7 DR. WALLIS: What are the features?
8 Just look at it? What is it you look for when you
9 an ITAAC on a strainer? Do you look for the spacing
10 or something? All you can do, it seems to me,
11 without a test is to simply see its made as
12 designed. That's all you can do.

13 MEMBER STETKAR: And is the design to
14 the staff.

15 DR. WALLIS: Yes.

16 MS. CUBBAGE: We have to determine the
17 design is acceptable before we can certify it.

18 DR. WALLIS: What's different --

19 MS. CUBBAGE: There are two issues. And
20 then they have to verify when they built the plant
21 that they have installed --

22 DR. WALLIS: Installed as designed.

23 MS. CUBBAGE: Exactly.

24 DR. WALLIS: That's all I wanted to
25 know.

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1 MR. WAGAGE: The last item I have here
2 is the Committee raised an issue with --

3 DR. WALLIS: Okay. Now PCCS, I don't
4 understand how you're going to verify that it
5 removes 11 megawatts.

6 MR. WAGAGE: PCCS has the capacity of 11
7 megawatts and is supposed to be working at 45 psi --

8 DR. WALLIS: Well, it's designed for
9 steam at a pressure of 48. Are you going to test it
10 with a team --

11 MR. WAGAGE: No, no.

12 DR. WALLIS: So what are you going to do
13 in the ITAAC process?

14 MR. WAGAGE: They are going to analyze,
15 there will be analysts' reports verifying these --

16 DR. WALLIS: But that's the design
17 itself.

18 MR. WAGAGE: This involves analysis,
19 too.

20 CHAIRMAN CORRADINI: But I think, if I
21 might just break in, Graham, I think you're linking
22 it back but in this case the functional -- there's
23 no way to functionally test it without putting it in
24 the containment. So they're going to verify that
25 it's built as it should be and therefore based on

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1 that in connecting back to analysis of past test of
2 their separate effects that it is as it should --
3 that's the only thing I can imagine they would do.

4 MR. SNODDERLY: This is Mike Snodderly
5 from the staff. That's exactly what we're going to
6 do. We have assure ourselves that the PCCS that is
7 installed can be tied back to the test program. And
8 they're going to be looking at for inlet diameters.
9 But what I think Graham has identified is what I'll
10 a risk is that in lacking specific -- there's two
11 ways to attack this problem.

12 One was to put very specific aspects of
13 the PCCS design. The other was to reference back to
14 the test. So that gives more latitude to
15 inspectors. They'll be looking at the test report
16 and all aspects of the test report. But the point
17 is that you need to verify. You need the PCCS
18 installed. Could remove 11 megawatts active graded--

19 DR. WALLIS: The way it's written in the
20 SER is the focus of ITAAC is intended to do a
21 verification of numeric performance values.

22 MR. SNODDERLY: That's right.

23 DR. WALLIS: Not the way its made, but
24 the way it works.

25 MR. SNODDERLY: You have the numeric

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1 performance measures, right? Based on this is a
2 test program that was conducted by GEH that showed--

3 DR. WALLIS: That's not a test. That's
4 not an ITAAC, is it --

5 MR. SNODDERLY: Okay. But that's the
6 test -- so you're going have to -- we're going to
7 have link and assure ourselves that the PCCS
8 installed can be -- it is sufficiently similar to
9 the one that was part of the test program.

10 DR. WALLIS: That it be the same, yes.
11 So there's no real ITAAC. You're just checking that
12 it's built the way that it was tested.

13 MR. SNODDERLY: Yes.

14 DR. WALLIS: That's all.

15 MS. CUBBAGE: No. At the certification
16 stage --

17 DR. WALLIS: There's all kinds of other
18 stuff here you say you're going to check, but you're
19 not going to check.

20 MR. OESTERLE: Some cases they're going
21 to test function, some cases they can -- they can't
22 test function and they will test -- they will do
23 analysis.

24 DR. WALLIS: See, it's not written that
25 way. That's very confusing.

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1 MS. CUBBAGE: And we're not about to
2 leave any test for later to confirm that this design
3 is an acceptable design. That all has to be done
4 before certification so that's why they did the
5 PANDA test, et cetera, et cetera to support
6 certification.

7 DR. WALLIS: Well, let's move on.

8 CHAIRMAN CORRADINI: Are you done?

9 DR. WALLIS: I'm not done with my
10 questions.

11 CHAIRMAN CORRADINI: Well why don't you
12 go ahead because I think they're done.

13 DR. WALLIS: Did you have another slide?
14 I had a question on the next slide.

15 MR. WAGAGE: Oh, excuse me. Go to next
16 slide.

17 DR. WALLIS: This bypass leakage test
18 there. I'm completely unclear about how that-- and
19 it's a difficult test to really do. Very unclear
20 about how that's going to be done.

21 MR. WAGAGE: Yes.

22 DR. WALLIS: But then there's another
23 thing you say here is that there's going to be some
24 sort of measurement of whether or not its open.
25 Right? Whether or not the vacuum breaker is open.

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1 And you complained that GE had a measurement of
2 whether it was fully opened. That wasn't good
3 enough. They need to have a proximity sensor to
4 tell if its open. Well, what is open? Open can be
5 anything from a tiny little thing to an enormous.
6 What do you mean by a proximity sensor which says
7 that its open?

8 MR. WAGAGE: Open, mean that its going
9 to have leaking more than the design leakage.
10 That's what --

11 DR. WALLIS: It doesn't say that. So
12 it's going to measure if its open or not to have a
13 leakage? The opening which gives the leakage more
14 than the design leakage is very tiny.

15 MR. WAGAGE: Breakers are designed to
16 have a leakage capacity of 0.02 centimeters --

17 DR. WALLIS: Very small. Very small.

18 MR. WAGAGE: By open means it's open to
19 give more than the leakage capacity. That's what
20 needs to be identified.

21 CHAIRMAN CORRADINI: But if I might
22 defer this. We haven't seen the last of the vacuum
23 breakers.

24 DR. WALLIS: No.

25 CHAIRMAN CORRADINI: So I would say

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1 we're going to see this again.

2 DR. WALLIS: I'm sure we're going to see
3 this again. We're going to see all this again.

4 CHAIRMAN CORRADINI: That's an open item
5 that we've yet to even close and --

6 DR. WALLIS: I think the problem is the
7 ITAAC review it seems to be so superficial such
8 important parameters, so I don't understand how it
9 contributes anything to assuring me that this is
10 going to work. That was my -- maybe I'm completely
11 wrong. It's just in reading the documents I get
12 that impression.

13 MR. OESTERLE: We appreciate the
14 comments, Dr. Wallis. And I think the best way to
15 address this is that the first thing we have to do
16 is convince the Committee of the Tier 2 material and
17 that there's adequate basis. And really this is the
18 way this is supposed to work. And then we talk about
19 the subset of the important parameters that we're
20 going to verify and how we're gong to verify them.
21 And in this stage --

22 CHAIRMAN CORRADINI: And we're still in
23 the process of being convinced of the Tier 2.

24 DR. WALLIS: As a matter of fact a gap
25 in relation to these.

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1 CHAIRMAN CORRADINI: Right.

2 So I'm going to thank the staff. And in
3 the interest of time, go around the group. I've
4 already lost someone of the Committee. So I'm going
5 to turn to Graham and we want to go around and get
6 summary comment briefly. And I will try to capture
7 all of it between Harold and I.

8 I just want to go around for everybody.

9 DR. WALLIS: Well Dr. Kress said that he
10 agreed with everything I'm going to say.

11 CHAIRMAN CORRADINI: Okay. Good.

12 DR. WALLIS: I think I've said it
13 already. I mean, I can understand that you want to
14 verify very, very carefully that things are put
15 together the way they're designed. And if you can
16 check that they will work as designed, you do. But
17 there are a lot of these sort of safety systems
18 where you can't check that they work. You have to
19 go back to the tests. And it's really mysterious to
20 me what is actually going to be checked and what is
21 actually going to be measured about some of these
22 safety systems, which is going to give a
23 contribution to assuring that they will work. And
24 I'm not quite sure what that is because it seems to
25 be just open a valve and water comes out or

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1 something. That's not much of a check.

2 So until I know the tests, until I know
3 how they're going to be interpreted and what they're
4 asking, I can't really tell if they're going to tell
5 me anything useful. That's the biggest question I
6 have.

7 CHAIRMAN CORRADINI: I got it.

8 DR. WALLIS: And the rest of it, I
9 understand that there's process which is somewhat
10 opaque to the uninitiated observer, though I have
11 some faith that its actually being carried out
12 appropriately.

13 CHAIRMAN CORRADINI: And Dr. Kress
14 agrees with you? I wrote that down.

15 Charlie?

16 MEMBER BROWN: One edit list of open
17 items and it terminates at 14.3, status 435 is an
18 open RAI, 14.3.438 is listed as open in your
19 presentation.

20 So I don't know, maybe it's closed. But
21 the two lists don't add up.

22 The other point is just what I talked
23 about earlier, it's still not clear to me. I'm still
24 nervous about the closeout process, you know the
25 ITAAC, how it gets into the integrated test plan.

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1 We've already been through that. Don't need to milk
2 it.

3 I have a little disagreement with the
4 claim that it's outside scope. But not
5 disagreement, I'm comfortable with the statement
6 that that is outside of the scope of the design cert
7 which was pointed up to by staff. And I'm not
8 criticizing it. I'm just not comfortable with that
9 at this particular point.

10 So that's it for me.

11 CHAIRMAN CORRADINI: Stetkar briefly.

12 MEMBER STETKAR: I think the only thing
13 that's a take away is that I'd like to understand a
14 bit better the process that was used to make
15 decisions about what specific systems and functions
16 are included in ITAAC, what are excluded and why the
17 ones that are excluded are excluded. And maybe an
18 open item on that, I don't want to go into detail.
19 I'll just stop there.

20 CHAIRMAN CORRADINI: Is that your
21 support system point?

22 MEMBER STETKAR: No, it's just in
23 general. I'll leave it in general.

24 CHAIRMAN CORRADINI: Yes, what I wrote
25 down, because I figured John was going to say this,

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1 it criteria for graded approach and what system
2 structures or components are included and what level
3 do they stop at and why.

4 MEMBER STETKAR: There are examples in
5 the SER and GEH documents that say things like --
6 it's clear everything is safety-related in there,
7 but we used the PRA, we used decisions about RTNSS,
8 we used these decisions but we made graded
9 decisions, but we made this kind of decision. But
10 nowhere does it explain what decisions were made and
11 why they were made. Why is something in one column
12 in one column and something else in another column.

13 CHAIRMAN CORRADINI: Dennis?

14 MEMBER SHACK: It's related to John's --
15 you know, completeness is always the issue here. You
16 know, we have the ITAAC, obviously. They describe
17 the system. You know, deciding whether you've got
18 enough description is always the sort of difficult
19 point.

20 I did go back and look at the AP-1000.
21 The cross reference table would be very helpful I
22 think in answering John's question and maybe making
23 the rest of us feel better about the completeness
24 issue that you've really highlighted the features
25 that you need to identify.

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1 CHAIRMAN CORRADINI: And it is an open
2 issue.

3 MEMBER SHACK: We want to make sure
4 there is an open item.

5 MEMBER ARMIJO: I just think that it's
6 unfortunate that we're reviewing this section kind
7 of out of sequence. We haven't reviewed the detail
8 design well enough to be comfortable that the design
9 will work. So a lot of the questions that come up I
10 just base the fact that we're doing this thing, in
11 my opinion, out of sequence.

12 For example on piping I don't think
13 there's any issues on piping that the Committee has.
14 It's instruction and control of these kind of things
15 that either the design isn't mature enough or we
16 haven't reviewed it in sufficient detail that we
17 come to all these issues.

18 So I think it's just a symptom of the
19 way we're doing this piecemeal review.

20 MS. CUBBAGE: I want to acknowledge what
21 you're saying. And just so you understand that we
22 did put some thought in that and this was to be the
23 last of the SER with open items chapter. We had some
24 difficulties with Chapter 7 that have caused it to
25 be deferred. But this is the SE with open items,

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1 this is the tailend of it.

2 MEMBER ARMIJO: Yes.

3 MS. CUBBAGE: And we tried to put this
4 last. So I understand your concern.

5 MEMBER BLEY: I especially agree with
6 what John and Bill said. And, of course, this
7 comment here.

8 The thing that's been pestering me all
9 through this and yesterday helped a whole lot is how
10 this process really works. And I'm happier than I
11 have been.

12 The DAC area is the part that I'm still
13 struggling with here. And I guess one part of it
14 that I asked a lot about yesterday I've rationalized
15 now. And it just seems to me that if great care is
16 taken in defining these acceptance criteria some of
17 the issues maybe get better. And I found one real
18 simple example just that I'll mention to say why
19 that seems it may be better than I thought it was.

20 There's one ITAAC here for feedwater
21 isolation valve, it talks about the test. But the
22 acceptance criteria is a report that documents that
23 the valves close upon command. Now when the DAC
24 comes through under control system there are other
25 control systems that control this valve and the

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1 review raises some issues. Those issues could be a
2 refinement of what it takes to meet that acceptance
3 criteria. And I think that you legitimately picked
4 up pretty well. So that makes me a little happier.

5 When I go back and read the original
6 documents about where the DAC came from, it's really
7 as everybody said that it was those things were
8 supposed to be acceptance criteria, very objective,
9 measurable, testable. The thing I just read it's
10 kind of that way, but it's going to take more
11 significantly to do, and even at the end of that
12 document it points out that because of this process,
13 you can open up a hearing right prior to the end.

14 The thing that bothers me, the way the
15 DAC's working those DAC issues -- I'm real
16 comfortable with the rest of the testing and ITAAC
17 being setup the way it is and the reasons following
18 what the licensee does. But on DAC because that's
19 part of the basic design that's getting verified not
20 until that late point, I don't see why we're not
21 involved and I don't see anything in the rule --

22 CHAIRMAN CORRADINI: I was waiting for
23 you to say something about that.

24 MEMBER BLEY: I just can't see how we
25 avoid looking at that. That's where I end up.

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1 CHAIRMAN CORRADINI: Well, let's hold
2 that thought because I --

3 MEMBER BLEY: And it's not just for
4 ESBWR. It's a general issue.

5 CHAIRMAN CORRADINI: I agree. It's a
6 generic issue. Yes.

7 MEMBER SIEBER: Okay. I'll be real
8 short.

9 CHAIRMAN CORRADINI: Good.

10 MEMBER SIEBER: But I think it's
11 difficult for engineers to deal with high level
12 documents like we've been doing for the last couple
13 of days. Because we all want to know all the
14 details. And the details aren't in the high level
15 documents and we're relying on another level of
16 staff management and licensee management, and the
17 vendor to fill in those details.

18 The only question that I have is that we
19 are relying on the safety of this plant based on
20 analyses that's been performed by GEH, by the
21 prototype testing to confirm the portions of
22 analysis that may have some question involved,
23 construction testing just to make sure that water
24 comes out the end of the pipe, preop testing which
25 says that it's important the way you're supposed to,

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1 startup testing which involves itself with the
2 reactor and how it functions and all of that.

3 It's not totally clear to me that every
4 aspect of the safety of the plant is covered by one
5 of these facets. I presume -- I would hope that
6 somebody has done that someplace along the line.
7 You know, we're seeing in the high level document a
8 lot of detail. But the ultimate question for us is
9 is everything covered.

10 So that would be my only --

11 CHAIRMAN CORRADINI: Let me end off,
12 because the last two comments I guess that you guys
13 just had, I've detected a theme. And I guess I'd
14 put the theme like this, which is I think we're
15 going to have to live it. But I can tell that
16 people aren't happy about it, which is with the DAC
17 as -- and so it's not -- and I guess I'm expressing
18 what I thought I heard but summarizing.

19 I think in 14.2, since there is a 14.1,
20 in 14.2 I have no problem. If anything, I think this
21 is a bit stronger than the current legal requirement
22 or 10 CFR 50. But in 14.3 what I hear is that we,
23 the group we, are uncomfortable because: (a) we
24 might not be or are not -- will not be involved, so
25 that gets us all nervous. And (2) I'm sensing, and

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1 I could be wrong about this, I kind of want to
2 understand how the headquarters staff that is doing
3 the design certification is going to fold into the
4 inspection relative to the DAC in the region that's
5 going to do this. Because it seems to me you're now
6 worried about certain things and you're -- I'll use
7 the word "worry," but you are focused and involved
8 in certain things and that's going to be a passoff.
9 And since some of these things are to be designed
10 from an ITAAC and within the ITAAC process that's
11 what I sense your concern is.

12 Your concern is that we're not in it,
13 but I want to make sure those that are cognizant of
14 certification are heavily involved in the
15 inspection, testing, analysis part.

16 MEMBER BROWN: Yes. That's pretty good
17 and pretty close. And I guess the one thing when I
18 read the original language about DAC, it's talking
19 about limited. You know, it should be limited.
20 When you have something like this whole control
21 system and power and it's very limited. That's run
22 the whole machine.

23 CHAIRMAN CORRADINI: That brings up a
24 generic question that Charles brought up. I've
25 written it down. It's not for these guys, but it's

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1 what I wrote down was the generic question is: Do
2 we agree with the need for DAC going forward for
3 rapidly changing topics such as piping, ESIC and
4 human factor?

5 So that's a question that was brought
6 up. But I think as a group we've got to discuss it.
7 Because that's where it comes down.

8 MEMBER BROWN: And this came out at a
9 time rapidly moving forward with saying between now
10 and six or ten years off when the plant's going to
11 be here. Plants are coming.

12 CHAIRMAN CORRADINI: Right. Okay.

13 MEMBER SIEBER: Maybe I'll add one last
14 comment.

15 CHAIRMAN CORRADINI: Briefly.

16 MEMBER SIEBER: I've been through three
17 construction, startups and operating processes,
18 three different plants. And I would say that this
19 concept of regulation is better than the old Part 50
20 concept as far as defining what everybody says to
21 do.

22 I'm not as nervous as I might appear to
23 be.

24 CHAIRMAN CORRADINI: You look very
25 nervous. I know that you have to leave.

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Thank you all.

Adjourned.

(Whereupon, at 12:27 p.m. the meeting
was adjourned.)

CERTIFICATE


This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on
Reactor Safeguards

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.


Eric Hendrixson
Official Reporter
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Presentation to the ACRS Subcommittee

ESBWR Design Certification Review

Tier 2, Section 14.3, and Tier 1

Presented by NRO

October 21, 2008

**ACRS Subcommittee Presentation
ESBWR Design Certification Review
Tier 2, Section 14.3, and Tier 1**

Purpose

- Brief the Subcommittee on the staff's review of ESBWR DCD, Revision 5, Tier 2, Section 14.3, and Tier 1
- Answer Subcommittee's questions
- Tier 2, Section 14.3: Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)
- Tier 1: Design Descriptions and ITAAC, Non-System Based Material, Interface Material, Site Parameters

**ACRS Subcommittee Presentation
ESBWR Design Certification Review
Tier 2, Section 14.3, and Tier 1**

Review Team:

- **Lead PM**
 - Eric Oesterle (DNRL)
- **Technical Reviews**
 - DE: SEB2, CIB2, ICE2, EMB2, EEB
 - DSRA: SRSB, SBPB, SBCV, SFPT, SPLB
 - DSER: RSAC, RHEB, RGS,
 - DCIP: CHPB, COLP, CCIB*

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

Division of Engineering (DE):

SEB2 = Structural Engineering Branch

CIB2 = Component Integrity, Performance & Testing Branch

ICE2 = Instrumentation, Controls and Electrical Branch

EMB2 = Engineering Mechanics Branch

EEB = Electrical Engineering Branch

Division of Safety System & Risk Assessment (DSRA):

SRSB = Reactor Systems, Nuclear Performance & Code Review Branch

SBPB = Balance of Plant Branch

SBCV = Containment & Ventilation Branch

SFPT = Fire Protection Team

SPLB = PRA Licensing, Ops Support & Maintenance Branch

Division of Site & Environmental Engineering (DSER):

RSAC = Siting & Accident Consequences Branch

RHEB = Hydrological Engineering Branch

RGS = Geoscience & Geotechnical Branch

Division of Construction Inspection & Operational Programs (DCIP):

CHPB = Health Physics Branch

COLP = Operator Licensing & Human Performance Branch

CCIB = Construction Inspection & Allegation Branch

**ACRS Subcommittee Presentation
ESBWR Design Certification Review
Tier 2, Section 14.3, and Tier 1**

Outline of Presentation

- **Applicable Regulations**
- **RAI status - 437 RAIs issued/364 resolved**
- **Significant Open Items**
- **Staff review of Tier 2, Section 14.3**
- **Staff review of Tier 1**
- **Discussion / Committee questions**

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

Regulations:

- 10 CFR 52.47(b)(1) - requires inclusion of ITAAC in an application for design certification

Review Guidance:

SRP 14.3: Inspections, Tests, Analyses, and Acceptance Criteria

- SRP 14.3.2, Structural and Systems Engineering
- SRP 14.3.3, Piping Systems and Components
- SRP 14.3.4, Reactor Systems
- SRP 14.3.5, Instrumentation and Controls
- SRP 14.3.6, Electrical Systems
- SRP 14.3.7, Plant Systems
- SRP 14.3.8, Radiation Protection
- SRP 14.3.9, Human Factors Engineering
- SRP 14.3.10, Emergency Planning
- SRP 14.3.11, Containment Systems
- SRP 14.3.12, Physical Security Hardware

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

Review of Tier 2, Section 14.3:

- Selection criteria and methodology determined to be consistent with guidance in SRP 14.3 - **RAI 14.3-405** issued to provide cross-reference tables of key aspects, analyses, and features of the design for inclusion in ITAAC
- COL Action Item on DAC closure schedule
- “No Entry” ITAAC
- ITAAC for Initial Test Program - NR
- ITAAC for Design Reliability Assurance Program - **RAI 14.3-437** issued for clarification
- Interface materials - PSWS and offsite power - **RAI 14.3-394**
- Site parameters

**ACRS Subcommittee Presentation
ESBWR Design Certification Review
Tier 2, Section 14.3, and Tier 1**

Review of Tier 1:

- Organization of Tier 1 information was not in alignment with SRP - resulted in development of “Review Responsibility Matrix” - (Appendix A to SER 14.3 w/OI)
- No review performed for SRP 14.3.10, Emergency Planning: EP - ITAAC not provided in DC application as this is COLA specific
- Review for SRP 14.3.12, Physical Security Hardware, is on-going

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

ITAAC Section	DCD Tier 1 Section Title	SRP Section	Branch(es)
2.1.1	Reactor Pressure Vessel System	14.3.2 14.3.4	CIB2, EMB
2.1.2	Nuclear Boiler System	14.3.3 14.3.4	EMB, CIB2, SRSB
2.2.1	Rod Control and Information System	14.3.5	ICE2
2.2.2	Control Rod Drive System	14.3.3 14.3.4 14.3.5	SRSB, CIB2, EMB
2.2.3	Feedwater Control System	14.3.4 14.3.5	ICE2
2.2.4	Standby Liquid Control System	14.3.3 14.3.4 14.3.5	SRSB, EMB, CIB2

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

Review of Tier 1:

- Examples of lessons learned from previous DC reviews
 - review by former Senior Resident Inspectors involved in development of the NRC's ITAAC inspection program and documentation requirements for ITAAC closeout (NEI working group)
 - format and consistency (e.g., ASME Code)
 - "basic configuration" ITAAC (ABWR design) uncoupled to result in individual ITAAC entries for verifications of functional arrangement, welding, seismic qualification, environmental qualification, MOV functions
 - identification of individual ITAAC entries that constituted design acceptance criteria {DAC}

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.2, Structural and Systems Engineering:

- Issued ITAAC RAIs Related to:
 - Cont. Type B and C Press. Tests
 - Diaphragm Floor/Vent Wall Diff Press Test
 - Cont. Design and Test Pressures (45 psi vs 1.15xDesign Press.)
 - Compliance to ASME Sec III Div 2, ANSI/AISC N690, SRP 3.7/3.8 Requirements
 - Definition of Nuclear island/Seismic Struc.
 - Load Test of Fuel Handling Machine Aux. Hoist

No open RAIs for 14.3.2

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.3, Piping Systems and Components:

- Review of the ITAAC relative to design and verification of piping and components.
- Review of the approach for addressing the piping design.

Piping DAC:

- Piping and support design and analysis methods are defined in DCD Section 3 similar to previous applications.
- As opposed to including a COL Information Item, piping DAC ITAAC define design commitment, inspection, testing, analysis (ITA), and Acceptance Criteria (AC).
- COL information item will provide NRC staff with information on the applicants plan to address piping DAC.

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.3, Piping Systems and Components:

Open RAIs:

- **RAI 14.3-414** requested GEH to correct the errors identified by staff, as well as other errors may exist in Section 2
- **RAI 14.3-131 S02** requested that the ITAAC be modified to request the Pipe Break Analysis Report as defined in DCD Section 3.6.2.5.

COL Action Items:

- COL Info Item 14.3A-1-1 - Establish a Schedule for Design Acceptance Criteria ITAAC Closure
- Each COL Applicant identify whether the standard DCD approach will be used and provide a Design Acceptance Criteria ITAAC closure schedule in the COL application.

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.4, Reactor Systems:

- Important input parameters used in transient and accident analyses are verified by ITAAC (e.g., pressure loss coefficients for steam separator, fuel bundle, etc., and ICS minimum drainable liquid volume)
- Significant systems design features are verified by ITAAC (e.g., GDACS pool elevation related to GDACS injection to RPV, CRD scram time, and SRV capacity)
- Fuel and Control Rods design criteria are designated as Tier 2* and hence cannot be changed without staff approval

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.4, Reactor Systems (cont'd):

- Significant open items
 - **RAI 14.3-397** on location of SRNMs, LPRMs, neutron sources and spare sources in the core
 - **RAI 14.3-398** on ITAAC acceptance criteria for FIV testing of fuel bundles

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.5, Instrumentation and Controls:

- I&C systems involving reactor protection and control, ESF actuation, and other systems using I&C equipment
- Design process of digital I&C systems (hardware & software)
- Emphasis on IEEE-603 design criteria
- Using design acceptance criteria (DAC) to make safety determination when detailed design is not available due to rapidly change in technology such as in digital I&C area (per SECY-92-053)

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.5, Instrumentation and Controls (cont'd):

- 19 Tier 1 sections were reviewed to determine the adequacy of the ITAAC for verification of the design requirements. Following are some of remaining open items:
 - **RAI 14.3-259** related to level of detail
 - **RAI 14.3-403** related to documentation of an anticipatory trip in ITAAC
 - **RAI 14.3-404** related to documentation of diversity requirement in ITAAC

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.5, Instrumentation and Controls (cont'd):

The following items are addressed in Ch. 7 SER w/OI:

- **RAI 14.3-418:** No DAC/ITAAC items are explicitly established for the specific project plans and no ITAAC closure activities are clearly described
- **RAI 14.3-265:** Tier 1 Section 2.2.15, Table 2.2.15-1 has not identified certain IEEE-603 criterion that should be in DAC/ITAAC verification process
- The staff has held discussion with the applicant on schedule/plan for resolution based on the established RAI response schedule

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.6, Electrical Systems:

Significant Open Items

RAI 14.3-413: In response to RAI 8.2-14 regarding the effects of voltage spike on the electrical distribution system components after loss of the electrical grid during islanding, GEH stated that fast transients on the alternating current input to the UPS input rectifiers and battery chargers can result in high direct current voltages and if the rectifiers and inverter trips are not coordinated, subsequent inverter trips and loss of power to the safety-related loads can occur. Since trip coordination of battery chargers and UPS under excessive ac input voltage conditions during islanding mode, an ITAAC is necessary to verify the trip coordination of safety-related battery chargers and UPS input rectifiers with inverters.

ACRS Subcommittee Presentation

ESBWR Design Certification Review

Tier 2, Section 14.3, and Tier 1

SRP 14.3.6, Electrical Systems (cont'd):

RAI 14.3-394: DCD Tier 1, Section 4, “Interface Material,” states that an applicant for a COL that references the ESBWR certified design must provide design features or characteristics that comply with the interface requirements for the plant design and ITAAC for the site-specific portion of the facility design, in accordance with 10 CFR 52.79(c). However, the applicant identified no interface requirements for the offsite power system in the certified design.

As indicated in DCD Section 8.1.5.2.4, the ESBWR standard design complies with the requirements of GDC 17 with respect to two independent and separate offsite power sources. Therefore, the NRC staff requires an ITAAC to verify that the required circuits from the transmission network satisfy the requirements of GDC 17 with regard to its capacity and capability, regardless of its low risk significance in the ESBWR design. The applicant should revise DCD Tier 1, Section 4, to include interface requirements for the offsite power system.

ACRS Subcommittee Presentation

ESBWR Design Certification Review

Tier 2, Section 14.3, and Tier 1

SRP 14.3.7, Plant Systems:

- 24 Fire protection RAI's submitted – 2 Remain Open
 - **RAI 14.3-395** on seismic classification of the standpipe booster pump
 - **RAI 14.3-396** on hose station coverage requirement to include all areas containing equipment important to safety

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.7, Plant Systems –Radwaste Management (1):

- Review focused on systems used to control and monitor liquid and gaseous effluent releases
- RAI focused on non-safety related systems but used to comply with Part 20 and Part 50, Appendix I
- RAIs addressed design descriptions, functional arrangements, basis of acceptance criteria and tests, and Tier 1 and Tier 2 technical inconsistencies
- 16 RAIs submitted on radwaste management systems and associated effluent radiation monitoring system

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.7, Plant Systems –Radwaste Management (2):

- Major RAI topics:
 - Confirming descriptions and functional arrangements
 - Confirming test criteria on initiation of valve closures in controlling effluent releases
 - Verifying nominal capacities of SWMS equipment
 - Verifying installation of steel liners in rooms where LWMS equipment are located
 - Confirming initial installation of absorbent and filtration media in GWMS/OGS and LWMS equipment
- All RAIs are closed

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.8, Radiation Protection:

Review focused on the radiation protection aspects of the design, including the following:

- Ventilation system provides containment of airborne radioactive materials and ensures that concentrations of airborne radio-nuclides are maintained at levels consistent with personnel access needs
- Area radiation monitoring system continuously monitors gamma radiation levels within the plant and alarms (both locally and in the MCR) when preset radiation levels are reached
- Plant design provides radiation shielding for rooms, corridors, and operating areas commensurate with their occupancy requirements
- Airborne radioactivity monitoring is provided for those normally occupied areas of the plant in which there exists a significant potential for airborne contamination (issue still open and action underway to resolve)

ACRS Subcommittee Presentation

ESBWR Design Certification Review

Tier 2, Section 14.3, and Tier 1

SRP 14.3.8, Radiation Protection (cont'd):

- 6 RAIs submitted on shielding and radiation monitoring systems (2 RAIs remain open)

Significant Open Item

- **RAI 14.3-174:** Provide an ITAAC for those airborne radioactivity monitors which are used to monitor airborne radioactivity levels for those normally occupied areas of the plant in which there exists a significant potential for airborne contamination

ACRS Subcommittee Presentation

ESBWR Design Certification Review

Tier 2, Section 14.3, and Tier 1

SRP 14.3.9, Human Factors Engineering:

- **RAI 14.3-436:** Revise DCD Tier 1, Rev. 5 to remove the limitation or apparent limitation to only safety-related items.

DCD, Rev. 5, Tier 1, Section 3.3 states that “The ITAAC for the Human Factors Engineering process address the ESBWR safety-related systems described in Table 2.2.10-1 and their associated safety-related functions.” Table 2.2.10-1 is titled “Systems and Functions Comprising the Q-DCIS.” Each of the HFE element ITAAC items in Table 3.3-1 has had a similar statement added in Rev. 5 of Tier 1 that was not in Rev. 4. This apparent limitation of the HFE ITAAC to safety-related items from Table 2.2.10-1 is not appropriate and does not agree with the scope of HFE defined in the DCD Tier 2, Chapter 18, in the Tier 2* HFE implementation plans, and in regulatory guidance (SRP Chap. 18 & NUREG-0711).

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.9, Human Factors Engineering (cont'd):

- **RAI 14.3-421:** Explain relationship of minimum inventory paragraph on p 3.3-1 to context of the information preceding and following the paragraph.

Please explain why, on page 3.3-1, of Tier 1 of DCD Rev 5, sections discussing “applicable facilities, HSIs, procedures, training,” etc., were removed from the Design Description. Please also explain why the paragraph for minimum inventory was inserted as it was; is it meant to be a “Program Goal?” Is it an “HFE design goal?” The paragraph appears simply to have been inserted with an ambiguous relationship to the previous and subsequent material on page 3.3-1 and 3.3-2.

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.9, Human Factors Engineering (cont'd):

- **RAI 14.3-422:** Explain relationship of item listing on p 3.3-2 to context of the information preceding and following the list.

Page 3.3-2, of Tier 1 of DCD Rev 5, lists 11 items, beginning with “operating experience review” and ending with (on page 3.3-3), “the strategy for the Human Performance Monitoring process...” Please explain how this list relates to the previous and subsequent paragraphs.

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.9, Human Factors Engineering (cont'd):

- **RAI 14.3-423:** Clarify meaning of details of the HFE design will not be completed by design certification.

Page 3.3-3 of Tier 1 of the DCD Rev 5: please clarify the meaning of, "... details of the HFE design will not be completed before the NRC issuance of a design certification." Specifically, what is meant by "details of the HFE design?" Are the details those items identified in the acceptance criteria column of Table 3.3-1, e.g., "The scope of the OER" is a "detail" that will not be completed before design certification?

ACRS Subcommittee Presentation

ESBWR Design Certification Review

Tier 2, Section 14.3, and Tier 1

SRP 14.3.9, Human Factors Engineering (cont'd):

- **RAI 14.3-211:** ITAAC Table 3.3 1 contains 11 items, one for each element of NUREG-0711, “Human Factors Engineering Program Review Model,” Revision 2, issued February 2004, and the corresponding ESBWR element implementation plan. However, the design commitment column in ITAAC for each element refers to the overall man-machine interface system and the HFE Implementation Plan rather than to the specific implementation plans of the pertinent elements. The staff requested that the applicant update the 11 design descriptions provided in Tier 1 to refer to the applicable implementation plans. The applicant responded in a letter dated May 15, 2008, stating that, “GEH will revise the design commitment column in ITAAC Table 3.3 1 in DCD Tier 1, Revision 5, ...to reference the respective implementation plans.” The staff is continuing to evaluate the GEH response of May 15, 2008. Therefore, RAI 14-211 is being tracked as an open item.

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.9, Human Factors Engineering (cont'd):

- **RAI 14.3-271:** In this RAI, the staff requested the applicant to update the ITA and AC columns in Table 3.3 1 to ensure that they accurately reflect the methodology described in the final versions of the implementation plans, following revisions to address the staff's concerns identified in Chapter 18 of the SER. In addition, the staff asked the applicant to review all of the items in the AC column to ensure that the text is complete. For example, in Table 3.3 1, Item 1, the AC states, "Summary report documents that:
 - a. The OER team members and backgrounds.
 - b. The scope of the OER.
 - c. The sources of the operating experience reviewed and documented results.
 - d. The process for issue analysis, tracking and review."

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.11, Containment Systems:

Significant Closed Items

- Information important for addressing containment debris issue (**RAI 14.3-230**)
- PCCS design parameters (**RAI 14.3-238**)
- PCCS vent line submersion (**RAI 14.3-240**)
- PCCS to GDCS piping should be designed to minimize the possibility of forming gas pockets (**RAI 6.2-181**) (ACRS question)

ACRS Subcommittee Presentation ESBWR Design Certification Review Tier 2, Section 14.3, and Tier 1

SRP 14.3.11, Containment Systems (cont'd):

Significant Open Items

- Suppression pool bypass leakage testing:
 - Test acceptance criteria (**RAI 14.3-229**, which is linked to RAI 6.2-145)
 - Test pressure (**RAI 14.3-438**)
- Schedule/plan for resolution

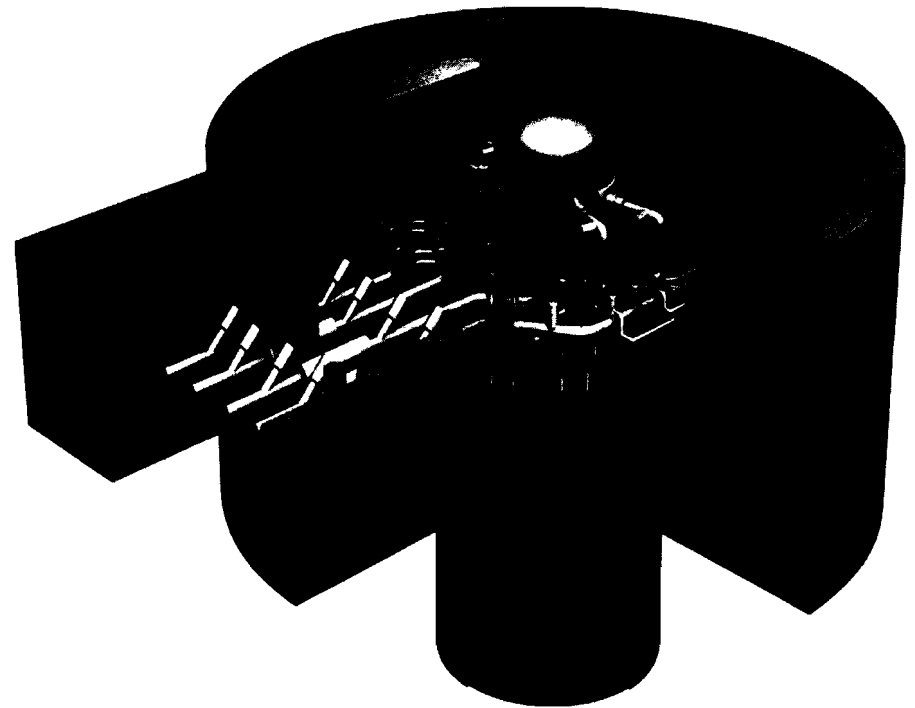
**ACRS Subcommittee Presentation
ESBWR Design Certification Review
Tier 2, Section 14.3, and Tier 1**

Discussion/Committee Questions

ESBWR DCD Tier 2 Section 14.3 and Tier 1, Inspections, Tests, Analyses and Acceptance Criteria

**Advisory Committee
on Reactor Safeguards**

Rick Wachowiak
Patricia Campbell
October 22, 2008
GE Hitachi Nuclear Energy



Presentation Content

- DCD Tier 2 Section 14.3 and Tier 1
 - > Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)
 - > 14.3A, Design Acceptance Criteria ITAAC Closure Process
- COL Information
- Summary



Section 14.3 - Overview

- Section 14.3 provides selection criteria and processes used to develop Tier 1 information and ITAAC
- Tier 1 information provides design bases and design characteristics that are certified by the 10 CFR Part 52 rulemaking process
 - > Types of information and level of detail in Tier 1 are based on a graded approach commensurate with the safety significance of the structures, systems, and components



Overall ITAAC For A Facility

- The entire set of ITAAC for each facility consists of the following four parts:
 - > Design Certification ITAAC (Tier 1 ITAAC)
 - > Physical Security Hardware ITAAC
 - > Emergency Planning ITAAC
 - > Site-specific ITAAC



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Section 14.3 – Tier 1 Section 1

- Tier 1 Section 1 – Introduction
 - > Defines terms used in Tier 1
 - > General Provisions
 - > Figure Legends



HITACHI

Section 14.3 – Tier 1 Section 2

- Tier 1 Section 2 – Design Description and ITAAC
 - > Contains design description and ITAAC material for individual ESBWR systems, and includes an entry for every system
 - > Design Descriptions address the top-level design features and performance standards that pertain to safety of the plant
 - descriptive text (focusing on ITAAC)
 - supporting figures



HITACHI

Key Selection Criteria – Design Description

- Selection criteria reflects the Commission directive in Statement of Consideration for Part 52
- Safety-related features and functions of SSCs
- Some nonsafety-related SSCs are discussed in Tier 1 design descriptions only to the extent they perform safety significant functions or have features to prevent a significant adverse effect upon the safety-related functions of other SSCs
- Focus on physical characteristics of the facility that will be verified by ITAAC
 - > Configuration and performance characteristics that the SSCs will have after construction is complete
 - > Fixed design features expected to be in place for the lifetime of the facility



Design Description

- Tier 1 utilizes system-by-system report structure
- The following information (as applicable) is provided in design description entries:
 - > System name and scope
 - > System purpose
 - > System safety-related modes of operation
 - > System classification (i.e., seismic category, ASME code)
 - > System location
 - > Functional arrangement
 - > Types of electrical power
 - > Electrical independence and physical separation
 - > Other features or functions significant to safety or important for meeting certain NRC regulations



Graded Treatment in Tier 1

System Type	Scope of Design Description and ITAAC Design Commitment
Safety-related systems that contribute to plant performance during design basis events (e.g., emergency core cooling systems).	Design features and performance characteristics.
Nonsafety-related systems involved in special events (e.g., station blackout).	Design features and performance characteristics affecting the safety of the plant's response to the event(s).
Nonsafety-related systems with no relationship to safety or any influence on overall plant design.	No discussion except identification of the system title.



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ITAAC

- Define activities that confirm the plant as constructed conforms to design features and characteristics defined in the Design Description
- Provided in Tables with the following three-column format:
 - > Design Commitment
 - > Inspections, Tests, Analyses
 - > Acceptance Criteria
- Must be completed and the acceptance criteria satisfied prior to fuel load



HITACHI

Key Selection Methodology - ITAAC

- Selected most direct method for verification
 - > Inspection
 - > Test
 - > Analysis
- Where testing is specified, appropriate conditions for the test will be established in accordance with Initial Test Program (ITP)
- Conversion or extrapolation of test results from test conditions to design condition may be necessary to satisfy certain ITAAC



Key Definitions for ITAAC

ITA Approach	Application
Inspection	To be used when verification can be accomplished by visual observation, physical examinations, review of records based on visual observations or physical examinations that compare the as-built structure, system or component condition to one or more Tier 1 design description commitments.
Test	To be used when verification can be accomplished by the actuation or operation or established of specified conditions, to evaluate the performance or integrity of the as-built structures, system or components. The type of tests identified in the ITAAC tables are not limited to in-situ testing of the completed facility but also include (as appropriate) other activities such as factory testing, special test facility programs, and laboratory testing.
Analysis	To be used when verification can be accomplished by calculation, mathematical computation or engineering or technical evaluations of the as-built structures, systems or components. (In this case, engineering or technical evaluations could include, but are not limited to, comparisons with operating experience or design of similar structures, systems or components.)



Section 14.3 – Tier 1, Section 3

- Tier 1, Section 3 – Non-System Based Material
 - > Includes Tier 1 design descriptions and their associated ITAAC for design and construction activities that are applicable to more than one system



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Non-System Based Material

- Design of Piping Systems and Components
- Software Development
- Human Factors Engineering
- Radiation Protection
- Initial Test Program
- Design Reliability Assurance Program
- Post Accident Monitoring Instrumentation
- Qualification of Mechanical and Electrical Equipment



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Design of Piping Systems and Components

- Piping design section of Tier 1 defines the processes by which ESBWR piping is designed and evaluated
- Includes ITAAC for consequential effects of pipe rupture such as jet impingement, potential missile generation, pressure/temperature effects



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Qualification of Mechanical and Electrical Equipment

- Includes electrical and mechanical components in a harsh environment
- Includes safety-related digital I&C in mild environment
- Addresses methods for identifying environmental conditions and methods for testing, type testing, and analyses

Tier 1 Section 4 – Interface Material

- Interface requirements may apply to:
 - > Systems entirely outside the scope of the design certification
 - > Out-of-scope portions of those systems that are only partially within the scope of the design certification
- Site specific ITAAC design features implement the interface requirements; therefore, Tier 1 does not include ITAAC for interface requirements



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Tier 1 Section 5 – Site Parameters

- Represent envelope of bounding site conditions for any license application referencing the ESBWR design certification
 - > No ITAAC included and section limited to defining ESBWR site parameters
 - > Compliance with site parameters are verified as part of issuance of a COL



Section 14.3A–Design Acceptance Criteria ITAAC Closure Process

- General ITAAC closure process is set forth in NRC regulations (i.e., 10 CFR 52.99)
- 10 CFR 52.99 (a) requires licensee to submit an initial schedule for completing ITAAC and then to submit periodic updates throughout the construction phase
 - > The initial schedule within one year of issuance of the COL, or at the start of construction, whichever is later
 - > Schedule updates are submitted every 6 months thereafter up to one year prior to the scheduled fuel loading date when the licensee submits the updates



every 30 days
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Section 14.3A–Design Acceptance Criteria ITAAC Closure Process (Cont.)

- Design Acceptance Criteria are a special type of ITAAC and consist of a set of prescribed limits, parameters, procedures, and attributes upon which the NRC may rely in making a final safety determination to support a design certification (ref: SECY 92-053)
- ESBWR includes Design Acceptance Criteria for:
 - > Piping
 - > Digital Instrumentation and Controls (I&C)
 - > Human Factors Engineering (HFE)



Section 14.3A–Design Acceptance Criteria ITAAC Closure Process (Cont.)

- There are typically three options to close Design Acceptance Criteria ITAAC:
 - > Resolution through amendment of a design certification rule
 - > Resolution through the COL application review process
 - > Resolution through Design Acceptance Criteria ITAAC after COL issuance
- The third option would be implemented for the first standard ESBWR plant and initially reviewed, inspected or audited by the NRC for closure
- Treatment in subsequent standard ESBWR plants may be based on initial closure of Design Acceptance Criteria ITAAC under the concept of “one issue, one review, one position”



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Section 14.3A–Design Acceptance Criteria ITAAC Closure Process (Cont.)

- GEH may submit Licensing Topical Reports (LTRs) supporting Design Acceptance Criteria ITAAC closure
 - > Subsequent licensees could reference the LTRs and NRC closure documents for Design Acceptance Criteria ITAAC closure unless the design certification rule has been amended to reflect the design information
 - > Each COL Applicant will provide a Design Acceptance Criteria ITAAC closure schedule in COL application and identify whether the standard approach will be used



Section 14.3A–Design Acceptance Criteria ITAAC Closure Process (Cont.)

- Design Acceptance Criteria ITAAC for Piping Design

- > Consists of both Piping/Piping Component Analysis and the Pipe Break Analysis for safety-related ASME Code piping
 - Identified in separate Design Acceptance Criteria ITAAC
 - ASME Code prescribes certain procedures and requirements that are to be followed for completing the piping design
 - Reconciliation of the applicable safety-related as-built piping systems is covered in an as-built ITAAC to demonstrate that as-built piping reflects the design, as reconciled



Section 14.3A–Design Acceptance Criteria ITAAC Closure Process (Cont.)

- Design Acceptance Criteria ITAAC for Digital I&C
 - > Phased Design Acceptance Criteria ITAAC closure process for the digital I&C design
 - RG 1.206, Section C.III.5 describes a phased Design Acceptance ITAAC process for digital I&C
 - The ESBWR digital I&C Design Acceptance Criteria ITAAC identify the process and requirements necessary to develop the design information and acceptance criteria for various stages of design and subsequent construction and testing
 - The COL licensee should develop procedures and test programs necessary to demonstrate the the Design Acceptance Criteria ITAAC requirements are met at each



phase
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Section 14.3A–Design Acceptance Criteria ITAAC Closure Process (Cont.)

- Design Acceptance Criteria ITAAC for HFE
 - > Phased Design Acceptance Criteria ITAAC closure process for HFE
 - RG 1.206, Section C.III.5 describes a phased Design Acceptance ITAAC process for HFE
 - The ESBWR Tier 1 Design Description and Design Acceptance Criteria ITAAC delineate the process and requirements to develop the design information required in each area of HFE, as described in NRC NUREG-0711, “Human Factor Engineering Program Review Model”
 - HFE implementation plans are reviewed as part of the design certification review and are designated as Tier 2* information



COL Information

- 14.3-1-A Emergency Planning ITAAC
 - > The COL Applicant shall provide Emergency Planning ITAAC, based on industry guidance
- 14.3-2-A Site Specific ITAAC
 - > The COL Applicant shall provide Site Specific ITAAC for systems not evaluated in the DCD
- 14.3A-1-1 Establish a Schedule for Design Acceptance Criteria ITAAC Closure
 - > Each COL Applicant will provide a Design Acceptance Criteria ITAAC closure schedule in the COL Application and identify whether the standard approach will be used



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Summary

- DCD Tier 2 Section 14.3 provides accepted approach for development of Tier 1 information and inspections, tests, analyses, and acceptance criteria (ITAAC)
 - > Section 14.3A depicts the closure process for Design Acceptance Criteria ITAAC items
- DCD Tier 1 ITAAC provide design bases and design characteristics of the ESBWR
- GEH is currently addressing remaining Open Items



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