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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

US-APWR SUBCOMMITTEE

+ + + + +

WEDNESDAY

NOVEMBER 20, 2013

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear
Regulatory Commission, Two White Flint North, Room T2B1,
11545 Rockville Pike, at 8:30 a.m., John W. Stetkar,
Chairman, presiding.

COMMITTEE MEMBERS:

JOHN W. STETKAR, Subcommittee Chairman

J. SAM ARMIJO, Member

CHARLES H. BROWN, JR. Member

HAROLD B. RAY, Member

PETER C. RICCARDELLA, Member

STEPHEN P. SCHULTZ, Member

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1 DESIGNATED FEDERAL OFFICIAL:

2 GIRIJA S. SHUKLA

3

4 ALSO PRESENT:

5 EDWIN M. HACKETT, Executive Director, ACRS

6 SARDAR AHMED, NRO

7 MARK BIERY, MNES

8 PERRY BUCKBERG, NRO

9 THERESA CLARK, NRO

10 JOHN CONLY, Luminant

11 JENNIFER DIXON-HERRITY, NRO

12 TODD EVANS, Luminant

13 DENNIS GALVIN, NRO

14 RAUL HERNANDEZ, NRO

15 THOMAS HICKS, MNES

16 JOHN HONCHARIK, NRO

17 MASASHI ITO, MNES

18 PAUL KALLAN, NRO

19 PETER KANG, NRR

20 RON LAVERA, NRO

21 RENEE LI, NRO

22 ATSUSHI MATSUMOTO, MHI

23 YOSHIHIRO MINAMI, MHI

24 STEPHEN MONARQUE, NRO

25 MASATOSHI NAGAI, MNES

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- HIROKI NISHIO, MHI
- YUKIHIRO NISHIZAWA, MHI
- RYAN NOLAN, NRO
- HIKARU OGASAWARA, MHI
- RICHARD SAMPLES, MNES
- THOMAS SCARBROUGH, NRO
- RYAN SPRENGEL, MNES
- ANGELO STUBBS, NRO
- YOSHIHIRO TAKAYAMA, NRO
- LARRY WHEELER, NRO
- DONALD WOODLAN, Luminant

*Present via telephone

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

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

(8:33 a.m.)

CHAIRMAN STETKAR: The meeting will now come to order. This is the meeting of the United States Advanced Pressurized Water Reactor Subcommittee, I'm John Stetkar, Chairman of the Subcommittee Meeting.

ACRS members in attendance are Pete Riccardella, Harold Ray, Steve Schultz, Sam Armijo, and Charles Brown. I'm not sure whether we'll be joined by Ron Ballinger or not.

Mr. Girija Shukla of the ACRS staff is the designated Federal Official for this meeting. The Subcommittee will discuss Chapter 3, Design of Structure Systems, Components, and Equipment, except for Sections 3.7 and 3.8 of the Safety Evaluation Report associated with the US-APWR design certification and the Comanche Peak Combined License Application.

The Subcommittee will also discuss Chapter 9, Auxiliary Systems for the Comanche Peak Combined License Application. We will hear presentations from Mitsubishi Heavy Industries, Mitsubishi Nuclear Energy Systems and the NRC staff, and Luminant.

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for

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1 deliberation by the full committee.

2 The rules for participation in today's
3 meeting have been announced as part of the notice of this
4 meeting previously published in the Federal Register.
5 Parts of this meeting may need to be closed to the public
6 to protect information proprietary to Mitsubishi or
7 other parties.

8 I'm asking the NRC staff and the applicant
9 to identify the need for closing the meeting before we
10 enter into such discussions and to verify that only
11 people with the required clearance and need-to-know are
12 present.

13 So if we do tread into proprietary
14 information, please alert me and we'll make sure that we
15 close the meeting. I'll rely on you to do that. A
16 transcript of the meeting is being kept and will be made
17 available as stated in the Federal Register Notice.

18 Therefore, we request the participants in
19 this meeting use the microphones located throughout the
20 meeting room when addressing the Subcommittee. The
21 participant should first identify themselves and speak
22 with sufficient clarity and volume so they may be readily
23 heard.

24 A telephone bridge line has also been
25 established for the meeting. To preclude interruption

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1 of the meeting the phone will be placed in a listen-in
2 mode during the presentations and committee discussions.

3 We'll open it up if you need any assistance form anyone.

4 Please silence your cell phones and we'll
5 now proceed with the meeting and I'll ask NRC Management,
6 Jennifer?

7 MS. DIXON-HERRITY: Yes.

8 CHAIRMAN STETKAR: Thank you.

9 MS. DIXON-HERRITY: Good morning. My name
10 is Jennifer Dixon-Herrity. I'm the Chief of the
11 Licensing Branch that's overseeing the NRC review for the
12 US-APWR Design.

13 To summarize the US-APWR review to this
14 point, staff has issued Safety Evaluation Reports with
15 open items addressing 16 chapters of the Application.
16 Of those issued chapters all but today's partial, Chapter
17 3, Chapter 6, and Chapter 7, have been presented to the
18 ACRS Full Committee. Chapters 6 and 7 are going to be
19 presented on December 5 of this year.

20 Today's meeting will cover the partial
21 Chapter 3 with SE with open items. The partial Chapter
22 3 was issued because the evaluations for Section 3.7 and
23 3.8 are currently on critical path for this review and
24 were separated to allow this Chapter to move forward.

25 And with that, we can probably move on.

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1 CHAIRMAN STETKAR: Great. Thank you very
2 much and I guess I'll turn it over to Ryan Sprengel of
3 MNES.

4 MR. SPRENGEL: Thank you, good morning
5 everyone. Once again, I think we're all glad to be back
6 for another meeting. As most or many of you know, MHI
7 has recently communicated to the staff that there will
8 be a slowdown of the US-APWR Design Certification effort.

9 MHI does remain committed to the US-APWR
10 Design Certification and we will maintain activities
11 going forward, albeit at a slightly different pace. We
12 do continue to make significant progress and I think
13 we've had many, many meetings, and many positive
14 meetings, and we do want to maintain this effort and
15 continue to interact with both the staff for the reviews
16 and the ACR Subcommittee and Full Committee.

17 Right now we're still in the discussion and
18 planning mode, both internally and with the staff, so I'd
19 request that we delay any detail discussion on any
20 potential impacts.

21 We'll maintain communication with the ACRS
22 going forward and communicate where we stand in the
23 future.

24 CHAIRMAN STETKAR: Yes, and we, as long as,
25 you know, we get far enough warning we can accommodate

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1 your schedule in our Subcommittee meetings and Full
2 Committee meetings, so we'll just adjust as necessary as
3 we go forward.

4 MR. SPRENGEL: Thank you. So there may be
5 a few times in the meeting when some activities or items
6 come up for discussion and we'll identify them clearly
7 and let you know what the situation is, but we may not
8 have all the answers right now.

9 CHAIRMAN STETKAR: Sure.

10 MR. SPRENGEL: Okay. I'll go ahead and
11 turn it over to Tom Hicks.

12 MR. HICKS: Great, thanks, Ryan. Good
13 morning, my name is Tom Hicks. I'm with MNES Licensing.
14 I'm joined by Nagai-san from MNES and Ogasawara-san and
15 Nishio-san from MHI.

16 As was discussed, we'll be presenting
17 US-APWR DCD Chapter 3 today with the exceptions of 3.7
18 and 3.8. I'll be discussing Sections 3.1, 3.2, and 3.11,
19 and then we'll do some seat switching and Mark Biery will
20 step up and present the remaining Chapter 3 sections that
21 we're going to talk about today.

22 We will change some of the MHI support staff
23 as we proceed through the presentation. We'll try not
24 to be disruptive when we do that, but thanks a lot.

25 These are the, the list of the people that

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1 we'll be calling upon possibly during the meeting and the
2 various sections in Chapter 3 that we'll be discussing
3 today.

4 And 3.1 is the first section that we'll talk
5 about which is NRC General Design Criteria, Performance
6 with those Criteria. Section 3.1 of the DCD provides a
7 high-level description of how the general design
8 criteria are met and what specific DCD sections provide
9 further technical discussion regarding each of those
10 criteria.

11 In general, conformance with the applicable
12 GDC criteria discussed in each individual section.
13 There are no open items in Section 3.1. Next Section is
14 3.2 which is Classification of Structured Systems and
15 Components.

16 The US-APWR DCD Section 3.2 describes
17 classification of SSCs according to nuclear safety
18 classification, seismic category, quality groups,
19 quality assurance classification, and codes and
20 standards.

21 Subsection 3.2.1 describes the
22 classification of SSCs in terms of seismic category.
23 Subsection 3.2.2 describes the various equipment
24 classifications which segregates systems and components
25 based on safety classification, seismic category,

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1 quality groups, quality assurance classification, and
2 applicable codes and standards.

3 And there is one open item associated with
4 Section 3.2 that we'll discuss at the end. The DCD uses
5 the guidance provided in the NRC Reg Guide 1.29 to meet
6 GDC 2 for identifying and classifying those SSCs and will
7 have design to withstand the effects of earthquakes
8 without loss of capability to perform safety functions.
9 These SSCs are classified as Seismic Category I.

10 SSCs that are not required to remain
11 functional following an SSC, but whose failure could
12 degrade performance of safety-related SSCs to an
13 unacceptable safety level are classified as Seismic
14 Category II.

15 And Seismic Category II SSCs are designed
16 and constructed to maintain their structural integrity
17 under seismic loading from an SSC. A description of the
18 specific analysis test performed for Seismic I and II
19 SSCs is in 3.7 which we're not going to get into today.

20 Other systems that fall outside the
21 standard Seismic Category I and II definitions but
22 receive special seismic design requirements are also
23 specified in the DCD.

24 Some of these special seismic requirements
25 are driven by NRC Regulatory Guides, and these systems

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1 include the safety-related instrument lines which refers
2 to, which gets requirements from Reg Guide 1.151, fire
3 protection systems, which has requirements in Reg Guide
4 1.189, rad waste management systems, Reg Guide 1.143, and
5 then the diverse automatic actuation system.

6 SSCs that are not classified either Seismic
7 Category I and II are classified as non-seismic, or NS.
8 Quality groups, under 50.55(a), Codes and Standards,
9 certain systems and components of nuclear power reactors
10 must be designed, fabricated, erected, and tested in
11 accordance with the standards for Class I, II, and III
12 components given in Section III of the ASME Code, or an
13 equivalent standard.

14 Class I components are designated as
15 Quality Group A. Reg Guide 1.26 describes the quality
16 classification system related to specific National
17 Standards that may be used to determine quality standards
18 applicable to the NRC for satisfying GDC 1.

19 And for other safety-related components
20 containing water, steam, radioactive material in light
21 water cold nuclear power plants. Class II components
22 are included in Quality Groups B and Class III included
23 in Quality Group C.

24 Quality Group D includes water and steam
25 containing components that are not part of the reactor

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1 coolant pressure boundary or included in Quality Groups
2 B or C, but are part of systems, or portions of systems,
3 that contain or may contain radioactive material.

4 Subsection 3.22 of the DCD describes how Reg
5 Guide 1.26 is applied to the US-APWR, and the Quality
6 Group Classifications described in the DCD meet Reg Guide
7 1.26.

8 Equipment classification designation is
9 used to identify the quality and code requirements
10 applicable to a specific component. Systems and
11 components are assigned to an equipment class based on
12 safety function, quality group designation, seismic
13 requirements, quality assurance requirements, and
14 impact on plan availability.

15 Safety-related equipment is designated as
16 Equipment Classes I through III. Water and steam
17 containing non-safety-related components that are not
18 part of the reactor coolant pressure boundary are not
19 included in Quality Groups B or C or the rad waste
20 management systems, are part of systems or portions of
21 systems that contain or may contain radioactive material
22 and require augmented quality or designated Equipment
23 Class IV.

24 Some Quality Group D components are
25 included in this category. The codes and standards

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1 identified in Reg Guide 1.26 for Quality Group D are
2 assigned to these components.

3 Augmented quality assurance requirements
4 for non-safety-related SSCs, as described in the Quality
5 Assurance Program, are applied to Equipment Class IV
6 SSCs. Equipment Class V components include those that
7 are risk significant are designated to meet special
8 seismic requirements such as Seismic Category II, or
9 perform functions that address ATWS or station blackout
10 and are not within the purview of Equipment Classes IV,
11 VI, VII, and VIII.

12 Augmented quality assurance requirements
13 are applied to Equipment Class V SSCs. Codes and
14 standards apply to these components are defined in the
15 DCD for each system.

16 Equipment Class VI is assigned to the
17 non-safety-related components of the rad waste
18 management system and parts of the steam generator
19 blowdown system which are outside the containment
20 isolation valves.

21 Augmented quality assurance requirements
22 are applied to Equipment Class VI SSCs. Codes and
23 standards identified in Reg Guide 1.143 are applied to
24 these components. Equipment Class VII is assigned to
25 non-safety-related components of the fire protection

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1 system.

2 Augmented quality assurance requirements
3 are applied to Equipment Class VII SSCs and the codes and
4 standards identified in Reg Guide 1.189, Section 1.7 and
5 NFPA-804 are applied to this system.

6 Equipment Class VIII is assigned to
7 non-safety-related components that contain, or may
8 contain, radioactive materials that are classified as
9 Quality Group D, but not included in Equipment Classes
10 I through VII and do not require augmented quality.

11 Applicable codes and standards are the same
12 as those applied to Equipment Class IV which come from
13 Reg Guide 1.26. Equipment Classes IX and X include
14 non-safety-related components in structures that do not
15 fall into any one of the Quality Groups A through D or
16 Equipment Classes I through VIII.

17 And components that have impact on
18 continuous power generation, those are in Class IX and
19 then all the other components are in Class X. DCD Table
20 3.2-2 provides a summary of the equipment classes,
21 quality assurance classification, applicable codes and
22 standards, and seismic category for US-APWR mechanical
23 and fluid systems, components, and equipment.

24 As I said earlier, there is one open item
25 in Section 3.2, it has to do with providing information

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1 to the staff regarding when certain design basis
2 documents will be ready for staff audit and MHI is
3 currently preparing a response to the staff regarding
4 this particular open item.

5 CHAIRMAN STETKAR: Tom, before we leave
6 Section 3.2, this is in some sense a general question,
7 but I'd like to use specific examples to illustrate it.

8 How do the equipment classifications,
9 you've summarized this morning kind of the basis of the
10 ten different groups, if you will, and different quality
11 attributes and seismic classifications, how do you treat
12 important to safety equipment as identified in Table
13 17.4-1 of the DCD, which is the Table that identifies,
14 it's called Risk Significant --

15 MR. HICKS: Risk Significant, right.

16 CHAIRMAN STETKAR: -- Equipment there, but
17 it's essentially the set of structures, systems, and
18 components that are included in the Design Reliability
19 Assurance Program, and I started to try to understand how
20 that equipment was treated by going through Table 3.2-2
21 and I must admit I did not look at every line item in that
22 Table, but, for example, the alternate AC gas turbine
23 generators are assigned to Equipment Class V, which
24 seemed consistent.

25 They're assigned to Quality Assurance

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1 Classification A, which seemed consistent, and yet
2 they're non-seismic, they're not assigned to Seismic
3 Category II, so I was curious about that.

4 And then I started to think of other
5 systems, and I used the main feed water system,
6 condensate, and all of their support systems as an easy
7 example, and none of that equipment is categorized as
8 either Quality Assurance Classification A, Equipment
9 Class V, or a Seismic Category II, yet the main feed water
10 system is listed as a risk significant system in Table
11 17.4-1.

12 So I'm really curious about how that
13 equipment was treated.

14 MR. HICKS: Risk significant equipment
15 that's in the Table, 17.4-1, if it's not already
16 safety-related in some way, I, II, or III, it should be
17 classified as Equipment Class V.

18 CHAIRMAN STETKAR: Okay. You should take
19 a look at that because none of, in Table 17.4-1, I mean
20 it just may be just a typo for the alternate AC gas turbine
21 as far as the seismic category because it is listed as
22 non-seismic.

23 MR. HICKS: Well because it's Equipment
24 Class V and risk significant doesn't necessarily require
25 a seismic qualification. The seismic qualification is

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1 driven by the Reg Guide 1.29, okay?

2 CHAIRMAN STETKAR: If you look at the third
3 check mark on the slide that's up in front of us, it says
4 Class V, Non-Safety-Related Components --

5 MR. HICKS: What that means is --

6 CHAIRMAN STETKAR: -- and the second
7 sub-bullet says it's designed to meet the seismic
8 requirements such as Seismic Category II.

9 MR. HICKS: What that means is that
10 equipment that is designed to meet Seismic Category II
11 is put into the Equipment Class V category, it doesn't
12 necessarily mean that all Equipment Class V is Seismic
13 Category II.

14 CHAIRMAN STETKAR: Oh, okay. I guess I --
15 I mean I read the, you know, the words in the report and
16 --

17 MR. HICKS: Maybe this slide is confusing.
18 This was intended to list the things that are included
19 in Class V, not necessarily the reverse.

20 CHAIRMAN STETKAR: The reverse. Well, let
21 me ask you then, why are the alternate AC gas turbine
22 generators not Seismic Category II since one of the
23 events that could give me a station blackout is an
24 earthquake.

25 MR. HICKS: I think the simple answer is

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1 that they don't fall within the Reg Guide requirements
2 under 1.29 for being seismically qualified. I think
3 they probably have, you want to answer the alternate AC,
4 the specific design requirements for the alternate AC for
5 seismic?

6 They're not classified as II or I because
7 they don't meet the criteria to be II or I.

8 CHAIRMAN STETKAR: Okay.

9 MR. HICKS: And that's kind of the short
10 answer I think. You want to elaborate on that all?

11 MR. NISHIO: No, we don't think we can call
12 these a Fukushima related requirement. So the plant
13 revision, plant specification we don't think that the
14 Fukushima related requirement. No, we are discussing
15 with the NRC.

16 CHAIRMAN STETKAR: Okay.

17 MR. HICKS: Fukushima related requirements
18 are sort of outside of this.

19 CHAIRMAN STETKAR: Okay. So it may
20 transition after the --

21 MR. HICKS: It may be one of those special
22 systems that we apply seismic --

23 CHAIRMAN STETKAR: You know, I had
24 Fukushima related issues in the back of my mind, but quite
25 honestly, I tried to pick and choose a few of what I felt

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1 were obvious examples and make sure I understood the
2 classification scheme.

3 And, indeed, one of the first ones that I
4 looked at were the alternate AC gas turbines and that got
5 me thinking about should they be Seismic Category II and
6 then I started to look for others.

7 The bigger concern in terms of the overall
8 population though, to my mind, seems to be related to,
9 not just the feed water system, because the problem is
10 that Table 17.4-1 just has a single line item and it says
11 "main feed water system."

12 It doesn't list pumps, it doesn't list, it
13 just says "main feed water system" and it's classified
14 as safety-related, or not safety-related, I'm sorry,
15 risk significant, and in the Design Reliability
16 Assurance Program.

17 Now if that's the case, and it's classified
18 for the function of delivering water to the steam
19 generators. So in order to accomplish that you need, not
20 only the main feed water part of the system, you need the
21 condensate system, you need the turbine cores cooling
22 water system, you need the nonessential service water
23 system, because all of those things support the main feed
24 water pumps and the condensate pumps.

25 MR. HICKS: I guess it would depend on how,

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1 what drove it to be put in the Table from the PRA and what
2 assumptions --

3 CHAIRMAN STETKAR: It says delivering
4 water to the --

5 MR. HICKS: Yes.

6 CHAIRMAN STETKAR: -- steam generators.
7 So that means you have to get water through the pumps from
8 point A to the steam generators.

9 MR. HICKS: I think what we'll have to do
10 is look at that one.

11 CHAIRMAN STETKAR: Okay.

12 MR. HICKS: We'll have to look at that and
13 maybe get back to you on --

14 CHAIRMAN STETKAR: Okay. I just thought
15 maybe there was some general thing that I was missing.

16 MR. HICKS: I don't think so.

17 CHAIRMAN STETKAR: Okay.

18 MR. SPRENGEL: One clarification, the AACs
19 will not change seismic classification.

20 CHAIRMAN STETKAR: They will not?

21 MR. SPRENGEL: So how we --

22 CHAIRMAN STETKAR: Okay.

23 MR. SPRENGEL: -- design, and treat, and
24 evaluate those may be adjusted in terms of our Fukushima
25 mitigation strategy.

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1 CHAIRMAN STETKAR: But they will remain
2 non-seismic?

3 MR. SPRENGEL: The classification
4 themself, yes. So we're right now in discussion with the
5 staff on additional commitments for the evaluation of
6 those, but that does not necessarily mean it will change
7 the seismic classification itself.

8 (Crosstalk)

9 CHAIRMAN STETKAR: There seems to be a fine
10 point, but I guess we'll ask the staff about that.

11 MR. HICKS: Well I think it's kind of like
12 some of these special systems that I listed earlier that
13 we're going to apply some special design requirements to
14 them, but we don't actually classify them as Seismic
15 Category I or II.

16 MEMBER ARMIJO: The proposed special
17 treatment, isn't de facto meet Seismic Category II?

18 MR. HICKS: I don't know how you interpret
19 de facto, but --

20 MEMBER ARMIJO: Well I'm trying to say, you
21 know, what's your objective as far as this equipment?

22 MR. HICKS: Of which? The AACs?

23 MEMBER ARMIJO: Yes.

24 MR. HICKS: The objective of the equipment?

25 MEMBER ARMIJO: Well, you know, in the

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1 event of a severe seismic event that you want this
2 equipment to continue to operate and function.

3 MR. SPRENGEL: I'm in the Fukushima
4 analysis now and I --

5 MEMBER BROWN: Category II doesn't
6 requirement them to continue to operate, just they're
7 designed and constructed to maintain their structural
8 integrity and then they're failure could degrade
9 performance, but they're not required to remain
10 functional and I mean --

11 MR. HICKS: And that's for a design basis
12 events, yes.

13 MEMBER BROWN: Yes.

14 MR. HICKS: Right.

15 MEMBER BROWN: So I guess I was a little
16 puzzled in response to the response to John's question
17 on the AACs that, and I guess I forgotten how we covered
18 the SBO circumstance. I don't remember --

19 MEMBER ARMIJO: I don't remember either,
20 but --

21 MEMBER BROWN: -- we probably talked about
22 that in one of the other meetings and I just don't
23 remember.

24 MR. HICKS: They're not required to be
25 seismic, so --

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1 CHAIRMAN STETKAR: Well we know what
2 they're there for, you know, their function, but this is
3 the only time that we have actually seen pieces of
4 equipment thrown into boxes, if you will.

5 MEMBER BROWN: Exactly.

6 CHAIRMAN STETKAR: That's fine. We've got
7 an answer. We'll ask the --

8 MEMBER BROWN: Yes.

9 CHAIRMAN STETKAR: -- staff what they think
10 now, but I certainly don't understand all of the nuances
11 about, I understand the differentiation between Category
12 I and II in terms of what a piece of equipment --

13 MEMBER BROWN: Yes.

14 CHAIRMAN STETKAR: -- is supposed to
15 satisfy. It's my understanding that if something is
16 non-seismic it basically can fall apart in a design basis
17 earthquake.

18 MEMBER BROWN: Yes, if it's not required to
19 remain functional following an SSC --

20 CHAIRMAN STETKAR: Right. And if it does
21 fall apart it doesn't hit anything that's safety-related
22 --

23 MEMBER BROWN: Exactly.

24 MALE PARTICIPANT: Yes.

25 CHAIRMAN STETKAR: Which is clearly true

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1 for the alternate AC gas turbine generators based on
2 where they're located they can't hit anything
3 safety-related, but --

4 MEMBER BROWN: Yes. They maintain
5 themself with integrity, which is key to that not
6 becoming a missile.

7 CHAIRMAN STETKAR: But if they're
8 non-seismic they don't even need to maintain their
9 structural integrity.

10 MEMBER BROWN: That's, for Category II it
11 does.

12 CHAIRMAN STETKAR: If they're non-seismic
13 they don't even need to maintain their structural
14 integrity.

15 MEMBER BROWN: Oh, okay, right. I'm
16 sorry. Yes, I was in seismic --

17 CHAIRMAN STETKAR: And the alternate AC gas
18 turbine generators are classified as non-seismic.

19 MEMBER BROWN: Non-seismic.

20 CHAIRMAN STETKAR: They can --

21 MEMBER BROWN: They're not Category II.

22 CHAIRMAN STETKAR: -- fall apart, in
23 pieces, on the floor, and that's okay because, you know,
24 according to the II versus I Category they meet the
25 requirement that they will not impact a piece of

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1 safety-related equipment if they fall apart in pieces on
2 the floor.

3 MR. HICKS: As was noted, there may be some
4 special design requirements though applied to the
5 alternate AC generators --

6 CHAIRMAN STETKAR: Yes.

7 MR. HICKS: -- outside of the seismic --

8 CHAIRMAN STETKAR: And the nuances between
9 why those special design requirements don't get a II in
10 this particular box is beyond me. Apparently people who
11 have law degrees are involved in that rather than
12 engineers.

13 MR. SPRENGEL: I think it comes back to the
14 perspective and I don't think we'd argue with a de facto
15 Category II auto classification, but if we look at it of
16 how we identify and put them into Seismic Cat I and
17 Seismic Cat II, the AAC does not fit in Seismic Cat II.

18 So we agree with elevating our evaluation
19 and testing and that, but we're not going to give it that
20 classification because that's not what it's for.

21 CHAIRMAN STETKAR: Thank you.

22 MR. HICKS: Should we go to the next section
23 or?

24 CHAIRMAN STETKAR: Anybody else have any
25 questions about the categorization because we'll ask on

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1 -- Pete?

2 MEMBER RICCARDELLA: I have a question
3 about the seismic analyses in general. Are we going to
4 cover more of that later?

5 MR. HICKS: Well the actual seismic
6 analysis is in 3.7 and 3.8 and we're not covering those
7 today. They're going to be covered in a separate
8 meeting.

9 MEMBER RICCARDELLA: Okay.

10 MR. HICKS: Okay, we'll go to 3.11 then.

11 MR. GALVIN: This is Dennis Galvin. There
12 will be a session on seismic qualification, but not
13 seismic analysis. If you're question's on
14 qualification --

15 MR. HICKS: Oh, right.

16 MEMBER RICCARDELLA: Just a general
17 question, I mean, the NRC and the USGS, they're updating
18 their seismic ground motion requirements in the U.S.
19 Are you using these updated ground motion definitions?

20 MR. HICKS: I think the ground motion
21 requirements are going to be in 3.7.1, right? And so I
22 don't think we have anyone here that can really speak to
23 it, but --

24 CHAIRMAN STETKAR: I think, Pete, the
25 answer is we'll have to pick that up when we cover 3.7,

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1 whether it's, it's certainly not covered in any of the
2 sections that we're reviewing today.

3 MEMBER RICCARDELLA: Okay.

4 CHAIRMAN STETKAR: In terms of the ground
5 motion spectra and whether it's a, I think it's 3.7?
6 It's not a Chapter 2 issue --

7 MR. HICKS: No, 3.7.1 is the ground motion
8 response spectra, I believe.

9 CHAIRMAN STETKAR: But today's session
10 does cover whether something is I, II, or non-seismic in
11 terms of Table 3.2.

12 MR. GALVIN: Yes, 3.2.

13 CHAIRMAN STETKAR: Yes. Thank you.

14 MR. HICKS: If there's no other questions
15 then we'll got to, the next section is 3.11 that I'll
16 cover and then we'll jump back to 3.3 when Mark Biery
17 comes back up here.

18 Section 3.11 is the environmental
19 qualification of mechanical and electrical equipment.
20 This section describes the EQ Program. The
21 Environmental Qualification Program demonstrates and
22 documents in compliance with the requirements of 10 CFR
23 Appendix A and general design criteria of IV and X, and
24 10 CFR 50.49.

25 The scope of the program, as described in

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1 DCD Section 3.11, is consistent with the NRC approved
2 guidance in SRP Section 3.11 and Reg Guide 1.206. One
3 of the open items that we'll discuss later has to do with
4 the scope description.

5 The program complies with applicable
6 requirements delineated in Reg Guide 1.89 and
7 environmental conditions which equipment qualification
8 process addresses include the environment, seismic,
9 chemical, radiation performance, and synergistic
10 effects which has to do with system interactions.

11 Okay, in this section the term
12 environmental qualification means the verification of
13 design limited to demonstrating that mechanical,
14 electrical, or I&C equipment are capable of performing
15 their safety function under significant environmental
16 stress that is in, you know, harsh environments resulting
17 from design basis events in order to avoid a common cause
18 failure.

19 For active mechanical equipment meeting the
20 equipment scope definition and located in a harsh
21 environment, compliance with the environmental design
22 provisions of GDC-4 are achieved by demonstrating that
23 the nonmetallic parts and components are suitable for
24 postulated design basis environmental conditions.

25 For electrical and active mechanical

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1 devices located in mild environments, compliance with
2 the environmental design provisions of GDC-4 are
3 achieved and demonstrated by proper incorporation of
4 relevant environmental conditions into the design
5 process, including equipment specifications.

6 And vendors will typically test this
7 equipment using typically a nationally recognized
8 testing agencies like Underwriters Lab and certify use
9 in mild environments by using industry recognized
10 ratings such as NEMA 1 or 3R.

11 The safety-related computer based I&C
12 systems located in mild environments are qualified in
13 accordance with Reg Guide 1.209. The general
14 requirements for the environmental design and
15 qualification can be summarized as follows.

16 Equipment is designed to have the
17 capability of performing its design safety functions
18 under all anticipated operational occurrences in normal
19 accident and post-accident environments for the length
20 of time for which the function is required.

21 The environmental qualification of
22 equipment located in harsh environments is demonstrated
23 by appropriate testing and/or a combination of testing
24 and analysis.

25 And then the last component is a QA Program

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1 that meets 10 CFR, Appendix B. Equipment qualified by
2 the EQ Program is listed in DCD Table 3D-2, along with
3 equipment addressed by the Equipment Qualification
4 Program, that is, in other words, the Equipment
5 Qualification Program is broader and includes things
6 that are functionally qualified as described in Section
7 3.9 and also the seismic qualification requirements.

8 So the Equipment Qualification Program is
9 the broad program and the environmental qualification
10 piece is included in that. The equipment is identified
11 by system, location, type, environment, and associated
12 environmental parameters, and Appendix 3D provides a
13 brief explanation as how this equipment and associated
14 analysis was performed to establish the required
15 environmental parameters.

16 For brevity, the DCD Table 3D-2 only
17 identifies the associated equipment by device, tag, or
18 instrument loop. However, the associate of the
19 component sensor supports the mechanical piping valves,
20 cables, penetrations, devices, and similar items needed
21 for a fully functional device are also qualified in the
22 EQ Program.

23 Technical Report MUAP-0805 is the equipment
24 qualification of electrical mechanical equipment and it
25 addresses the relevant environmental design and

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1 qualification requirements of 10 CFR 5049 and 10 CFR
2 Appendix A, GDCs, and Appendix B, the Quality Assurance
3 Criteria.

4 With respect to systems and components
5 being designed to withstand the effects of and being
6 capable of performing their functions in the
7 environmental conditions associated with the normal
8 maintenance, testing, and accident conditions.

9 This report also addresses seismic
10 qualification as described in Section 3.10 and
11 functional qualification of active mechanical
12 components as described in Section 3.9, which will be
13 discussed later, and this is done as in integral US-APWR
14 Equipment Qualification Program.

15 And the implementation of the Environmental
16 Qualification Program is addressed, as I said, as part
17 of that integral program. All right, there are eight
18 open items in Section 3.11. This slide shows three in
19 the first row and these, the first row has to do with the
20 radiation dose and equipment locations assumed in the
21 qualification process.

22 Changes were incorporated to address this
23 item in DCD Rev 4 and these changes are under review by
24 the staff. Second row item, has to do with equipment
25 qualification data package template that has been

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1 included in the MUAP.

2 The staff gave us some feedback on that
3 template and MHI is currently revising the format of that
4 template to address the NRC's comments.

5 These two items on this slide have to do with
6 the scope of equipment addressed in the Program and the
7 use of the term "important to safety" in DCD Section 3.11
8 and the MUAP Report.

9 MHI revised the scope description in DCD
10 Section 3.11 to include text from the NRC approved
11 guidance documents, and this item is still under
12 discussion with the staff, between MHI's.

13 Next slide. The first item on this slide
14 relates to ensuring that ITAAC adequately verify the EQ
15 of electrical active mechanical components. Again,
16 changes were made to the DCD ITAAC to address staff
17 comments and the NRC staff is currently reviewing those
18 changes.

19 The second item involves commercial grade
20 dedication process. There was a comment about how that
21 process was described in the MUAP and MHI is in the
22 process of clarifying that description in the MUAP to
23 address the comments provided by the staff.

24 And that concludes Section 3.11. Are there
25 any questions? After this Section we're going to switch

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1 players a little bit here, but we'll take any questions
2 now for Section 3.11.

3 CHAIRMAN STETKAR: Questions?

4 MALE PARTICIPANT: Not me.

5 CHAIRMAN STETKAR: Switch players.

6 MR. HICKS: Thank you.

7 (Pause)

8 CHAIRMAN STETKAR: Mark?

9 MR. BIERY: Good morning, gentlemen. My
10 name is Mark Biery, MNES, and I will be presenting the
11 rest of the Chapter 3 sections covered today. Go on to
12 the next slide, please.

13 We're going to first start with Section 3.3,
14 Wind, Tornado, and Hurricane loadings. There are no
15 open items for this DCD Section. Wind loadings, the
16 design basis wind loadings are determined in accordance
17 with the American Society of Civil Engineers and
18 Structural Engineering Institute, made on design loads
19 for buildings and other structures.

20 The US-APWR severe wind speed is 155 miles
21 per hour with an annual probability of exceedance of
22 0.01. In this Table here we give tornado and hurricane
23 loadings, including maximum wind speed, exceedance
24 frequency, missile types evaluated, and applicable right
25 guides.

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1 CHAIRMAN STETKAR: Mark? Something that
2 always is curious to me, and I really don't understand
3 it, so perhaps you could explain it. And since we got
4 through the first session in record speed we are now way
5 ahead of schedule, so I can afford to ask you this.

6 MR. BIERY: Yes, sir?

7 CHAIRMAN STETKAR: The previous slide said
8 that a 155-mile per hour design basis wind speed has an
9 exceedance frequency of 0.01 per year, means it occurs
10 once in 100 years.

11 This Table tells me that a 160-mile per hour
12 happens to be associated with a hurricane, wind speed has
13 a frequency of ten to the minus seven per year, once in
14 ten million years.

15 For a 5-mile difference wind speed having
16 five orders of magnitude difference in frequency to me
17 just doesn't sound, I can't find the word, I will just
18 say right. It does not sound right.

19 So could you explain to me how a 155-mile,
20 3 second peak gust wind speed at ten meters has a
21 frequency of one event in a hundred years when I can then
22 increase the wind speed and call it a hurricane and
23 suddenly it only happens once in ten million years?

24 It's kind of hard to even measure a 3-second
25 gust peak wind speeds within an accuracy of five miles

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1 per hour depending on the measurement technology because
2 there are certain different philosophies of how you do
3 that, so I'm really curious about this five orders of
4 magnitude difference in the frequency.

5 It comes into play, by the way, and I don't
6 know whether, I didn't look forward, ahead in your
7 slides, but, for example, you say that you design the
8 turbine building such that the siding remains intact in
9 a 155-mile per hour design basis wind, but it blows off
10 in 160-mile per hour wind so that it does not, you don't
11 have differential pressure during hurricane wind
12 loading.

13 That's a pretty good structural design,
14 too, to differentiate with a 5-mile per hour wind gust.
15 So I'm really curious about this. And, by the way, I
16 don't like to hear people just refer to I picked this
17 number out of this book, because I can pick, I used to
18 have a telephone book and I could pick any number out of
19 that book that I could find.

20 So I'm interested in a fundamental,
21 engineering perspective how this can be because it is
22 your design basis.

23 MR. NAGAI: Okay.

24 CHAIRMAN STETKAR: You know, if you want to
25 think about it and get back to us, you know, that's

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1 perfectly fine. This is kind of a complicated question
2 and answering it on the fly may be a little bit difficult.

3 But if you do want a caucus during a break
4 or even get back to us tomorrow that's fine. I don't
5 necessarily, this is a pretty difficult issue, so --

6 MR. NAGAI: We'll take an action --

7 CHAIRMAN STETKAR: Okay, thanks.

8 MR. NAGAI: -- and get back to you.

9 CHAIRMAN STETKAR: That's probably the
10 best approach.

11 MR. NAGAI: Thank you.

12 MR. BIERY: Let us get back to you on that.

13 CHAIRMAN STETKAR: Yes.

14 MR. BIERY: The tornado and hurricane
15 velocity pressure loads are computed in accordance with
16 procedures accepted by SRP 3.3.2. No tornado wind speed
17 adjustment applies for spectra height.

18 Tornado atmospheric pressure loading is
19 computed for maximum pressure drop and there is no
20 pressure drop effect evaluated for a hurricane. Load
21 combinations are in accordance with procedures accepted
22 by SRP 3.3.2 and are supplemented with the design
23 criteria of procedures provided in Bechtel Topical
24 Report, BC-TOP-3-A.

25 And again, there are no open items in this

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1 DCD section, however, we will get back to you on your
2 question though.

3 CHAIRMAN STETKAR: Yes, I'd appreciate
4 that.

5 MR. BIERY: Sure.

6 CHAIRMAN STETKAR: Because it's, I'll ask
7 the staff about it also because there are no open items
8 on it, so that's kind of telegraphing, the staff may want
9 to muster their forces for when they come up. Let me see
10 my other notes, and another thing I did want to ask you
11 regarding the, make sure I'm not ahead of myself, where
12 are we?

13 Sometimes, you'll have to bear with me, I
14 get lost. Okay. I was reading the section about the
15 effects, 3.3.2.3, talks about the effects of failures of
16 structures in components not designed for tornado and
17 hurricane loads, and that's why I came across this
18 statement that said "sections of the turbine building
19 siding are designed," the entire turbine building is
20 designed to withstand 155 miles per hour with no damage.

21 And then there's a statement that says
22 "portions of the siding would be blown off in the event
23 of a design basis tornado or a design basis hurricane,"
24 which means at 160 miles per hour your design to blow off
25 sections of the siding to vent the turbine building so

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1 that you don't have any differential pressures.

2 There is also a statement that says "any
3 items, including the turbine building siding, which
4 might become dislodged and become missiles under the
5 maximum tornado or maximum hurricane conditions do not
6 warrant further evaluation because they are considered
7 to be enveloped by the missiles addressed in Subsection
8 3.5.1.4."

9 What I was mostly curious about is that the,
10 if I go back to, again, this Table that I keep referring
11 to, 17.4-1, for risk significant equipment, that Table
12 lists the main transformers and the reserve auxiliary
13 transformers as risk significant equipment, in
14 particular, reserve all auxiliary transformers 3 and 4
15 because they're the normal supplies to the safety busses.
16 Main transformers because they can affect overall power.

17 The question I had is, because you're not
18 evaluating damage from wind damage to the turbine
19 building siding and because the transformers are located
20 adjacent to the turbine building, can the siding damage
21 those transformers?

22 And I know generally where the transformer
23 yard is located adjacent to the turbine building, and I
24 was curious whether or not if the siding comes off you
25 can short out all of those transformers.

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1 And if you can, why it was deemed not
2 necessary to evaluate the effects from that?

3 MR. BIERY: So if the siding is dislodged
4 from the turbine building and it affects the
5 transformers, did we evaluate it and --

6 CHAIRMAN STETKAR: Right. I mean,
7 essentially, my understanding is that you determined
8 that you didn't need to do an evaluation of any wind
9 related damage to the turbine building, including the
10 siding, because that damage would not affect any, you
11 don't use the term safety-related equipment here, it's
12 kind of vague, let me just call it important equipment.

13 And, as I said, the equipment that I could
14 identify were those transformers because they are listed
15 as risk significant back in that Table 17.4-1. And I was
16 curious whether you thought about that and if you have
17 an evaluation of why the siding can't damage the
18 transformers, that's okay, that's good.

19 If it can damage the transformers I was
20 curious why that's not important. And that's, again,
21 something that you may want to take back.

22 MR. OGASAWARA: Yes. This is Ogasawara
23 speaking. So wind and tornado design is a protective
24 equipment. Equipment means structure on system on
25 component. The target of the protective SSCs are just

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1 Seismic Category I and the safety-related equipment.

2 So non-safety-related equipments and SSCs
3 are not a target of tornado design except as a concept.

4 CHAIRMAN STETKAR: Okay. Okay, I'll ask
5 the staff then why that's okay. Thank you.

6 MR. BIERY: The next section we'll discuss
7 this morning is Section 3.5, Missile Protection. This
8 section provides outline information on missile
9 protection.

10 We define structure systems components be
11 protected, credible missile selection, and design for
12 protection from missiles, and we have two open items for
13 this DCD Section.

14 Six types of missiles are considered for the
15 US-APWR Missile Protection Design. Internally
16 generated missiles, both inside and outside of
17 containment, turbine missiles, missiles generated by
18 tornados and hurricanes, site proximity missiles, except
19 aircraft, and, of course, aircraft hazards.

20 Protection for internally generated
21 missiles is provided. The COL applicant is to identify
22 site specific SSCs to be protected from turbine missiles
23 and assessed turbine generator orientation, including
24 other units at multi-unit sites.

25 The design basis spectrum of tornado and

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1 hurricane missiles conforms to that defined in their
2 applicable regulatory guides. The applicant will
3 verify site interface parameters with respect to
4 aircraft crashes and transportation accidents.

5 CHAIRMAN STETKAR: Before we get to turbine
6 missiles, because I'm going to have several questions
7 there, there me ask you about several statements.

8 I have a long list of things here and rather
9 than going through the long list let me preface it by
10 saying the general concern. There are numerous
11 statements throughout Section 3.5 regarding internally
12 generated missiles.

13 They can be missiles from pipes, they can
14 be missiles from pieces of equipment, pumps, turbines,
15 gas turbine generators. It can be missiles from things
16 being dropped, et cetera.

17 And there's a global statement in pretty
18 much every one of those paragraphs that says "the
19 probability of occurrence is therefore maintained less
20 than ten to the minus seven," ten to the minus seven is
21 a really, really small number.

22 If I look at things like, give you an
23 example, in the main steam and feed water piping tunnels,
24 you know, there's a statement that says it's less than
25 ten to the minus seven per year, yet if I look at the PRA,

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1 frequencies of main steam line breaks outside the
2 containment are on the order of once in a hundred years.

3 Frequencies in main feed water line breaks
4 outside the containment are on the order of three times
5 in a thousand years, three times ten to the minus three.
6 So I was curious what type of analyses you did to justify
7 the fact that you're claiming that the frequencies of
8 missiles from these breaks is less than ten to the minus
9 seven per year.

10 Statements saying probability of missiles
11 from a gas turbine generator is less than ten to the minus
12 seven per year. Where are the analyses that you
13 performed to justify those exceedingly low frequencies?
14 They are extremely small.

15 MR. BIERY: So with regard to the global
16 statement?

17 CHAIRMAN STETKAR: I mean there are
18 statements throughout this document where you do
19 systematically go through a long list of potential
20 missile sources, as I said, anywhere from piping
21 generated missiles to locating equipment generated
22 missiles to drop type missiles.

23 And in each of those sections the missile
24 risk or threat, or however you want to characterize it
25 is uniformly dismissed with a simple statement saying the

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1 probability is less than ten to the minus seven.

2 And I can accept that if I can see an
3 analysis to justify why that's so. I cannot accept it
4 on face value with just saying it's less than ten to the
5 minus seven, because ten to the minus seven is a very,
6 very, very small number.

7 So to justify that somebody must have done
8 an analysis. You can't just say it. I mean you might
9 as well say it's less than ten to the minus 100 if you're
10 going to say a number.

11 MR. OGASAWARA: Well my understanding is
12 that we have no, those numbers are coming from the
13 practice, general practice barriers.

14 CHAIRMAN STETKAR: General Practice? So
15 we have ten million years of operation of this equipment
16 without any generation of a missile? We don't.

17 One example is, I personally, I have stood
18 next to the chunk of steel that was thrown through the
19 casing of a circulating water pump at an operating
20 nuclear power plant which shall renamed unnamed, that
21 went through the casing, through the wall of the room,
22 and went out skidding and embedded itself in the ground
23 several meters from the outside of the building,
24 fortunately missing the alternate AC gas turbine
25 generator which was a few feet from where it landed.

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1 I have seen this. Since I have seen it, it
2 is probably more frequent than ten to the minus seven per
3 year and yet there's a statement saying "missiles from
4 non-safety-related rotating equipment is less than ten
5 to the minus seven per year.

6 Now maybe I was unlucky, you know --

7 MEMBER ARMIJO: Or you're very, very old.

8 CHAIRMAN STETKAR: I'm feeling older every
9 day. But that's, you see my sense here, is if you're
10 making frequency arguments to justify dismissing
11 something --

12 MALE PARTICIPANT: You better --

13 CHAIRMAN STETKAR: -- I'd really like to
14 see your technical justification for those frequency
15 arguments. If you're making qualitative arguments
16 based on other considerations, then just admit they're
17 qualitative arguments based on other considerations.

18 But as soon as you start putting those
19 numbers to things, I'd really like to see justification
20 for those numbers.

21 MR. BIERY: Sure.

22 MR. OGASAWARA: Yes, ours was a
23 justification, basically as is described in DCD's
24 Chapter 3.5, pipings and valves, those are designed in
25 accordance with ASME Code, Section III and our conclusion

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1 of our DCD description is based on the, the design is
2 based on the ASME so those probabilities are less than
3 ten to the minus seven.

4 CHAIRMAN STETKAR: I, you know, I read
5 that, and if that's the case since the main steam and main
6 feed water piping are also designed to those same codes,
7 how come their break frequencies are on the order of once
8 in a hundred years?

9 Why is the large LOCA frequency much larger
10 than ten to the minus seven per year? Simply by saying
11 that something is designed to a certain set of standards
12 does not necessarily guarantee that the frequency is less
13 than ten to the minus seven per year.

14 And that's my whole point. I mean the claim
15 in general is that if something is designed to the
16 standards, essentially you're saying it won't break and
17 yet we have experienced that things designed according
18 to standards occasionally do break.

19 MR. SPRENGEL: Okay, well --

20 CHAIRMAN STETKAR: Not very frequently,
21 but you get my point. I mean --

22 MR. SPRENGEL: Yes. The important thing
23 is not focusing on one or the other, it's understanding
24 why there's differences in terms of how we're looking at
25 that frequency or probability.

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1 CHAIRMAN STETKAR: That's right. It's,
2 that's right. My only concern, I have to be careful in
3 terms of making my own conclusions because I indeed read
4 about each of those things and I have questions about each
5 one individually.

6 They tend to focus on this ten to the minus
7 seven number, but for other qualitative reasons for
8 particular pieces of equipment they sounded like a
9 reasonable qualitative basis.

10 But as I said, as soon as you start relying
11 on a number there ought to be justification for that and
12 because we have evidence that things do indeed fail,
13 despite the fact that they're designed to codes and
14 standards, you need to address that if you're going to
15 rely on those numbers.

16 MR. SPRENGEL: Okay. We'll follow up on
17 that item.

18 CHAIRMAN STETKAR: Thanks. Now we can
19 talk about turbine missiles.

20 MR. OGASAWARA: And also, I will check up,
21 basis of the probability of Chapter 19 because Chapter
22 19 basis may be different from Chapter 3, so I will check
23 that point.

24 You mentioned the probability of Chapter 19

25 --

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1 CHAIRMAN STETKAR: Right. Chapter 19 is
2 the PRA and Chapter 19 is supposed to be a best estimate
3 analysis for evaluating, initiating event frequencies
4 and that best estimate analysis in many cases is informed
5 either by actual experience data, in other words,
6 counting up failures and dividing by a number of exposure
7 years, or in some cases like large LOCA frequency, it's
8 based on analyses that people have done, because we
9 haven't had any large LOCAs.

10 And, you know, as I mentioned, those
11 frequencies, pipe break frequencies in particular, are
12 much higher than ten to the minus seven. Now not
13 necessarily every pipe break will generate a damaging
14 missile, but a large pipe break will probably, of a high
15 energy line, will probably generate some amount of
16 missiles.

17 How large they are? How energetic? You
18 know, that might be part of your analysis if you had an
19 analysis. But other statements, as I said, you know,
20 just a simple statement that says non-safety-related
21 equipment, rotating equipment, cannot generate missiles
22 at a frequency higher than ten to the minus seven per
23 year, maybe I was not lucky then.

24 MR. BIERY: I think we understand your
25 concern and we'll definitely look into that for you.

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1 CHAIRMAN STETKAR: Yes.

2 MR. BIERY: We'll now move on to turbine
3 missiles. Two categories of turbine failures are
4 evaluated. The first, design over-speed failure
5 associated with brittle fracture as well as destructive
6 over-speed failures associated with ductile failure.

7 And two supporting technical reports have
8 been submitted by MHI, the first is probability of
9 missile generation from low-pressure turbines and the
10 second is probabilistic evaluation of turbine valve test
11 frequency.

12 The design basis spectrum of tornado and
13 hurricane missiles --

14 MALE PARTICIPANT: Sorry.

15 MR. BIERY: Oh, I'm sorry. That's better.
16 Turbine missile generation probabilities, particularly
17 from a brittle fracture within the range less than design
18 over-speed is less than ten to the negative five per year,
19 unless the in-service inspection intervals exceed 20
20 years.

21 And destructive over-speed, less than ten
22 to the negative five per year by quarterly turbine valve
23 test frequency.

24 MEMBER BROWN: In other words you test it
25 every quarter? Is that what that means, you're going to

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1 be running a test every quarter on over-speed? In which,
2 you say the words "less than ten to the minus five
3 quarterly turbine valve test frequency," and I guess I
4 don't understand the less than ten to the minus fifth,
5 that's consistent with Chapter 10 under your turbine
6 rotor integrity discussion.

7 But you through in this bi-quarterly, but
8 I don't understand what that means.

9 MR. BIERY: So the quarterly turbine valve
10 test frequency is your question? It will be done
11 quarterly.

12 MEMBER BROWN: Well, I mean, how that's
13 related to the, if the destructive over-speed is less
14 than ten to the minus fifth per year, bi-quarterly
15 turbine valve test.

16 MR. SPRENGEL: Yes. The frequency of the
17 testing feeds into the probability evaluation.

18 MEMBER BROWN: So that's part of the
19 analysis calculation? I mean it's part of the --

20 MR. SPRENGEL: Yes.

21 MEMBER BROWN: -- it's an input into the
22 calculation?

23 MR. SPRENGEL: Yes. And so we're just
24 qualifying that because that's what's there for the
25 design certification. You know, off in to the future

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1 specific plans could change their test frequency based
2 on other plant conditions and redo their evaluation.

3 MEMBER BROWN: But that assumes that
4 somebody's run some, I mean if you're doing it by some
5 test frequency, I'd assume somebody's run some tests, I
6 presume, or is this just an analytical construct based
7 on the design of the turbine, and in other words how do
8 you arrive at that?

9 MR. SPRENGEL: Currently it's only
10 analytical, yes, and that feeds into the report material
11 in Chapter 10.

12 MR. BIERY: SRP 3.5.1.3 prescribes that the
13 P1 of the favorably oriented turbine to be less than ten
14 to the negative four and that gives us a P4 with an
15 acceptable risk screen of ten to the negative seven per
16 year.

17 The US-APWR turbine is favorably oriented
18 with the turbine access aimed at the reactor building.
19 The reactor building, the containment, and the power
20 source building and safety-related and
21 non-safety-related SSCs within these structures are
22 located such that the turbine generator is favorably
23 oriented.

24 And P1 for the US-APWR turbine is maintained
25 to be less than ten to the negative five by using a proper

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1 rotor design material selection, pre-service and
2 in-service inspection programs, and redundant
3 protection and control system, and we give these details
4 in Chapter 10.

5 CHAIRMAN STETKAR: Okay. Are you going to
6 be addressing this discussion, the effects of turbine
7 missiles on the other unit or not?

8 MR. BIERY: I believe that's the COL,
9 response to --

10 CHAIRMAN STETKAR: Okay, that's the COL.
11 I'll ask the COL when we come up to that one. I read
12 through MUAP-07029 and I understand how the analyses in
13 that document were performed.

14 I have numerous questions about the
15 analyses in that document. The first question that I
16 have, and it's actually a statement, those analyses are
17 not complete.

18 Those analyses evaluate only failures of
19 the main turbine stop valves, the main turbine control
20 valves, the reheat stop valves, and the intercept valves.

21 They do not evaluate failures in the
22 hydraulic system. They do not evaluate failures in the
23 over-speed protection control system, including the
24 over-speed instrumentation. They are simply not
25 included.

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1 So the first observation is that the turbine
2 over-speed frequency is underestimated. By how much?
3 I'm not going to speculate on that because that's not my
4 job to do. I could speculate. I have equations. I did
5 a little analysis, I can make up some numbers, but the
6 analyses are not complete.

7 This is a typical problem, because what
8 you've done is you've had someone look at the turbine as
9 if it's in isolation with the rest of the world and
10 ignored everything in between.

11 So I would recommend that you go back and
12 somehow, somewhere, account for the, everything from the
13 speed pickups on the shaft of the turbine all the way
14 through the electronics that processes those signals
15 through the solenoid valves that have to dump hydraulic
16 fluid and the valves that you've evaluated so far.

17 And I don't know, in the interest of time,
18 I have a lot of questions about how you derived your
19 failure frequencies for the turbine stop valves and
20 turbine control valves, because in many cases you didn't
21 have any operating experience.

22 And in those cases it wasn't at all clear
23 to me how you derived the failure rate for the piece of
24 equipment based on no operating experience. I think
25 that I understand how you did it, but it's not described

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1 very well in the report.

2 So I'd like a little bit better information
3 about how you derived those failure rates for pieces of
4 equipment with no actual observed failures.

5 You do, the report does list very well as
6 a matter of fact, better than most people do, the data
7 that you used, the operating experience data from the
8 Japanese units that you used to develop the failure
9 rates.

10 MR. BIERY: Sure.

11 CHAIRMAN STETKAR: And as I said, the
12 cases, and I understand where you did have failures, I
13 reproduced the failure rates and I understand how you did
14 that. I don't understand how you did it for the cases
15 where you had zero events.

16 And that could be important because a lot
17 of the equipment had zero events.

18 MR. BIERY: Okay.

19 CHAIRMAN STETKAR: So that's also a general
20 comment. And I think I'll leave it at that. The others
21 are way too detailed for this forum.

22 MR. BIERY: So to --

23 CHAIRMAN STETKAR: So anyway, to recap, at
24 least at this stage, what I'm interested in is for the
25 equipment that you did model, the valves basically, how

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1 you derived the failure rates, the basis for the failure
2 rates that you used for the valve types for which there
3 were no observed failures in your experience database.
4 So that's one issue.

5 And then the second issue is just this
6 general statement that there's the equipment from the
7 speed pickups through the valves that dump the hydraulic
8 fluid that's basically not considered in the model.

9 MR. BIERY: So your overall concern is just
10 --

11 (Crosstalk)

12 CHAIRMAN STETKAR: The concern is, and I
13 don't know how much that middle equipment would
14 contribute to your estimated over-speed frequencies
15 here.

16 MR. BIERY: I think we'll look into that,
17 sir.

18 CHAIRMAN STETKAR: Okay. Thank you.

19 MR. MINAMI: I'm sorry. I have one
20 comment. At the beginning of your question you said that
21 our technical report is incomplete and do not deal with
22 the probability of the failure of control and protection
23 system, right?

24 CHAIRMAN STETKAR: Yes.

25 MR. MINAMI: And we provided two technical

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1 reports. The first one is the report dealing with the
2 probability of the turbine rotor failure, turbine rotor
3 failure.

4 CHAIRMAN STETKAR: 028.

5 MR. MINAMI: Right.

6 CHAIRMAN STETKAR: That's correct.

7 MR. MINAMI: And the other one is analysis.

8 CHAIRMAN STETKAR: 029.

9 MR. MINAMI: Right, 29, and then dealing
10 with the probability of the failure of protection and
11 control system. And I don't understand why our report
12 is incomplete? Because we provided it to --

13 CHAIRMAN STETKAR: Okay, 07029. 07028
14 deals with things that I don't personally understand that
15 other of my colleagues do understand and that is mainly
16 materials types issues, crack growth --

17 MR. MINAMI: Right.

18 CHAIRMAN STETKAR: -- crack propagation,
19 it's a mechanical failure of the turbine under different
20 types of load cycling conditions under different
21 over-speed conditions.

22 Normal speed, 110 percent over-speed, 120
23 percent over-speed, okay, that's what I would
24 characterize as mostly a materials oriented report. The
25 second report, MUAP-07029, is the report that estimates

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1 the frequency at which an over-speed will occur, at which
2 the over-speed protection system will not trip the
3 turbine before an over-speed occurs.

4 The second report is the one that I'm taking
5 issue with and that report simply evaluates as best as
6 I can tell, now maybe I'm missing something, but I think
7 that I reproduced all of the equations, evaluates only
8 failures of the main turbine stop valves, the main
9 turbine control valves, the intercept valves, and the
10 reheat stop valves, and their associated logic.

11 And the data, I understand the data that's
12 developed for the valves is developed on a valve type by
13 valve type basis. That study does not evaluate any
14 contribution from the instrumentation and control system
15 or the hydraulic system from the instrument pickups on
16 the turbine shaft all the way through the over-speed
17 protection control logic, solid state stuff, you know,
18 the digital, all the way through the solenoid valves that
19 eventually drop fluid.

20 That system, that end-to-end part of this
21 system from the speed pickups through the valves that
22 drop the fluid pressure, is not part of the turbine
23 control valve and stop valve. Data or model?

24 So what's missing from the MUAP-07029
25 analyses are an evaluation of how frequently, what's the

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1 contribution from failure of everything from the speed
2 pickups up to and including the solenoid valves that dump
3 hydraulic fluid.

4 That's just simply missing. It would add
5 to the frequency that's calculated from simply failures
6 of the end use devices which are the stop valves and
7 control valves themselves.

8 And you can't argue that it's included in
9 those stop valves and control valves because in my
10 experience the designs of the electronic systems and the
11 hydraulic systems differ from plant to plant.

12 They may be standardized in Japanese
13 plants, but they also have common cause failures and in
14 a sense that failures of, I think, I'd have to look up
15 equations, I think it would require failures of two
16 solenoid valves, but if those two solenoid valves fault,
17 none of the turbine stop valves and control valves would
18 close.

19 In other words fluid would not be drained.
20 So they're not something that you can say, well failure
21 of the solenoid valve was somehow included in the stop
22 valve or control valve because the functional effects are
23 different.

24 So that's the report, to answer your
25 question, that MUAP-07029 is the report that I'm taking

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1 issue with in terms of completeness of the analyses.

2 MR. MINAMI: I understand what you said.

3 CHAIRMAN STETKAR: Okay. Thanks.

4 MR. MINAMI: But when I investigate our
5 experience in Japanese PWR plants and we investigated
6 every failure of the turbine control system, which
7 include the valve and the actuator, valve or sensing
8 around control systems.

9 And if the, I'm not sure at this moment, but
10 if some solenoid failed to function the turbine should
11 be tripped, right. And if the turbine tripped occurred,
12 this event, this included in this analysis.

13 So my intention is that I didn't explicitly
14 show the incident of the, for example, for the pickup or
15 for the micro-CPU or for the cable or something like that,
16 not divided into the detail, but I included all the
17 component included in the turbine control and protection
18 system.

19 And if any failure in that system occurred,
20 this incident is counted in the Table and MUAP-07029.
21 And I think it, for me, for us, it's very difficult to
22 find out which component failed or which component did
23 not function during the operation.

24 So I believe, in my sense, every component
25 failure have been incorporated in our analysis. So this

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1 is my understanding --

2 CHAIRMAN STETKAR: I hear what you're
3 saying. I took some time to look at the design
4 information about the over-speed protection circuits.
5 I took some time to look at the design of the hydraulic
6 fluid circuits and I took some time to write up, I didn't
7 actually develop fault trees, but I wrote up some
8 algebraic equations that has and or logic in it to at
9 least describe my understanding of the logical
10 combinations of failures that could result in a failure
11 to trip, and I came up with a large number of potential
12 failures.

13 In particular, if I look at the hydraulic
14 system there are one, two, three, four, five, six, seven,
15 eight combinations of two solenoid failures, two
16 solenoid valve failures, that could result in failure.

17 Now your experience base may never show a
18 failure of the turbine to trip because failure of only
19 one of those solenoid valves would not cause a failure
20 of the turbine to trip. You would need failure of at
21 least two.

22 MR. MINAMI: Right.

23 CHAIRMAN STETKAR: Okay. On the other
24 hand, you've never had an over-speed failure either.
25 You've only had single failures of turbine stop valves

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1 and control valves.

2 You never had two of them fail, at least in
3 my understanding looking at your data. Ten to the minus
4 five per year is a really, really small event. You would
5 not have expected to see any of these events in the entire
6 operating history of all the Japanese nuclear power
7 plants.

8 You would require many more hundreds of
9 years of operation to even get into that range. So just
10 by saying we haven't seen it doesn't mean that that
11 justifies that it's smaller than ten to the minus five.

12 I mean that's basically why we do risk
13 assessments, basically why we develop these models.

14 MEMBER SCHULTZ: It doesn't mean that that
15 shouldn't be modeled in the overall evaluation --

16 CHAIRMAN STETKAR: That's right.

17 MEMBER SCHULTZ: -- and when you're looking
18 at how test frequency would impact the system.

19 CHAIRMAN STETKAR: Right. If, for
20 example, the analysis did include, or does include, and
21 I missed it somehow, the solenoid valves in the hydraulic
22 unit in the, you know, hydraulic fluid system, if for some
23 reason their failure rate is such that it would justify
24 a more frequent testing, you know, the analysis should
25 identify that.

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1 Because those solenoid valves would also be
2 tested by, you know, the operation would be tested by some
3 of the tests that are performed.

4 MR. MINAMI: Yes.

5 CHAIRMAN STETKAR: Anyway, I'll just leave
6 it at the table, we've spent a reasonable amount of time.
7 If you can show me where, you know, where those things
8 are included or where, either in the model, and I don't
9 think they're included in the model, or in the data, I'd
10 be happy.

11 I just don't think they're there because I
12 used your data and I used your model and I pretty much
13 reproduced your results, so I --

14 MR. MINAMI: Yes.

15 CHAIRMAN STETKAR: I'm curious.

16 MR. MINAMI: Yes, I understand, yes. In
17 our system, one single failure doesn't lead to the
18 triggers, but --

19 CHAIRMAN STETKAR: There are no single
20 failures anywhere that I could find and it's obvious.

21 MR. MINAMI: Right, right. It's all
22 right, but we design so that single failure did not lead
23 to --

24 CHAIRMAN STETKAR: True.

25 MR. MINAMI: -- the turbine trip, so --

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1 CHAIRMAN STETKAR: And everything that I
2 could find in things that I looked at, end to end,
3 confirmed that. There is, I could not find a single
4 failure.

5 MR. MINAMI: So what --

6 CHAIRMAN STETKAR: I can find common cause
7 failures of two solenoid valves, I can find large
8 numbers, as I said, at least eight combinations of two
9 failures of valves --

10 MR. MINAMI: Right.

11 CHAIRMAN STETKAR: -- in addition to the
12 ones that you evaluated that can lead to failure.

13 MR. MINAMI: So what I want to say here is
14 that a single failure of a component cannot lead to the
15 turbine trip and this event did not jeopardize the
16 turbine system, main turbine system.

17 So this is a purpose, why we design the
18 component to be turned to turbine type divergent or
19 something like that. So I think we do not need to
20 consider single failure on a single failure into this
21 analysis.

22 It's my understanding why to, I'm not sure
23 at this moment.

24 CHAIRMAN STETKAR: Let me just reiterate.
25 In the investigations, let me call it that, that I

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1 performed, I couldn't, I agree with you completely. I
2 could not find any single failures --

3 MR. MINAMI: Right.

4 CHAIRMAN STETKAR: -- that would result in
5 failure of the turbine to trip, but that's, and that's
6 good. I mean if I had found a single failure I would have
7 phrased my initial concern a lot differently.

8 I could not find a single failure.
9 However, the purpose of the analyses in MUAP-07029, one
10 of those purposes is to examine whether or not there are
11 single failures.

12 The other purpose is to identify an
13 appropriate testing frequency for that integrated system
14 to give you assurance that the failure rate of the turbine
15 over-speed protection system, integrated failure rate
16 end-to-end, remains low enough so that your turbine
17 missile frequency, P1, is less than ten to minus five per
18 year.

19 And that testing frequency is determined by
20 the integrated reliability from the speed sensors all the
21 way out through the actuated valves, and if there's
22 something missing in that and if the missing equipment
23 is more important than the actuated valves, then your
24 testing frequency may be, or the interval, may be too
25 long.

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1 Because the way the failure rates are
2 derived, they're integrally related, linerally related
3 to the testing interval.

4 MR. NAGAI: We will go back and take a look
5 at details and I think after we have --

6 CHAIRMAN STETKAR: I have my own, as I said,
7 I don't want to speculate about how important the
8 equipment in between may be, I have my own opinions, but
9 that's just based on numbers I have and it's not
10 worthwhile to speculate here.

11 It's more important to understand whether
12 or not the analyses are complete.

13 MR. MINAMI: Let me have one comment.

14 CHAIRMAN STETKAR: That's fine.

15 MR. MINAMI: In addition to the quarterly
16 valve test we usually do the component test, online test,
17 for example, solenoid valve is tested once a month,
18 right.

19 And if we carry out such kind of component
20 testing on the line we can assure that this component is
21 still all right or not. So if we consider such facts into
22 the analysis or assessment, at this moment I am not sure,
23 but I don't think we need to consider the single failure
24 into this analysis, but that we would consider --

25 CHAIRMAN STETKAR: Okay. I mean monthly

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1 testing, it's basically a question about how many
2 failures of each component have you seen given the
3 typical testing interval for those components because
4 that's the way the failure rates are derived.

5 So if you do monthly testing of the solenoid
6 valves, how many failures of those solenoid valves have
7 you seen given that monthly testing interval and that
8 would then, that failure rate would then be reflected in
9 your model to generate the over-speed protection, the
10 integrated over-speed protection failure.

11 MR. MINAMI: I'm not sure I can get such
12 kind of data, but I will --

13 CHAIRMAN STETKAR: Well that's okay. The
14 second question addresses the issue of you had failure
15 rates for pieces of equipment that you have zero observed
16 failures, so, you know, not having data available didn't
17 stop you from estimating failure rates for certain types
18 of valves.

19 I think we've probably discussed this
20 enough, but --

21 MR. MINAMI: Okay.

22 CHAIRMAN STETKAR: We can have more
23 discussions offline if you want to discuss some details.

24 MR. MINAMI: Right.

25 MR. BIERY: Okay. The structure systems

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1 and components are protected from external missiles by
2 the reinforced concrete external walls and roof of the
3 safety related reactor building and power source
4 building.

5 Components, protective shields, and
6 missile barriers are designed to prevent damage to
7 safety-related components by absorbing and withstanding
8 missile impact loads.

9 A target SSC shields and barriers are
10 evaluated for both local effects and overall structural
11 effects through these impacts. And again, we have two
12 open items for this section. The first, MHI is requested
13 to provide an analysis assessing the local effects of an
14 automobile missile in all Seismic Cat I structures.

15 A response was submitted in April and the
16 staff is reviewing this response. The second open item
17 is with regard to ITAAC. The first concern being key
18 design features, information regarding the turbine
19 orientation being included in DCD Tier 1.

20 MHI went ahead and revised Tier 1 to include
21 the description of the turbine being favorably oriented
22 with respect to the nuclear island. The second concern
23 was the acceptance criteria of the ITAAC Table stating
24 that the turbine missile probability analysis exists and
25 conclude the probability is less than ten to the negative

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1 five per year.

2 And MHI went ahead and revised the
3 acceptance criteria and the RAI associated with that
4 concern is under review by the staff.

5 MEMBER RICCARDELLA: Is the staff
6 reviewing your document that performs the analysis to
7 demonstrate this ten to the minus fifth probability?

8 MR. BIERY: I missed a part of --

9 MR. SPRENGEL: The answer is yes. Yes, as
10 part of the Chapter 10 review primarily.

11 MEMBER RICCARDELLA: Okay.

12 CHAIRMAN STETKAR: By the way these are
13 organized, Pete, because you haven't been involved in a
14 lot of this review, MHI or MNES collectively develops,
15 there's two types of reports that they develop.

16 One is a topical report which the staff
17 reviews and writes a separate safety evaluation for, for
18 example, the advanced accumulators. They also produce
19 many technical reports that provide details of analyses
20 --

21 MEMBER RICCARDELLA: Right.

22 CHAIRMAN STETKAR: -- which are then
23 summarized in the formal design control document.

24 MEMBER RICCARDELLA: Those are the --

25 CHAIRMAN STETKAR: The two that we were

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1 talking about, the 028 and 029 are technical reports, the
2 staff reviews those as part of their review of the section
3 of the design certification documents.

4 MEMBER RICCARDELLA: Okay.

5 CHAIRMAN STETKAR: So the staff should have
6 reviewed those reports as part of this.

7 MEMBER RICCARDELLA: Yes, I've looked at
8 the 028 Report --

9 CHAIRMAN STETKAR: Yes.

10 MEMBER RICCARDELLA: -- and I have
11 questions on it --

12 CHAIRMAN STETKAR: Okay.

13 MEMBER RICCARDELLA: -- and I'm just not
14 sure how to get those --

15 CHAIRMAN STETKAR: If they're questions
16 regarding the actual analysis, it's time to ask them to
17 MHI right now because that's what we're talking about.

18 MEMBER RICCARDELLA: And I'm looking at the
19 analyses that predicted the probability of failure due
20 to low-cycle fatigue in the 028 document and I really
21 don't see how you've gotten to the probability of
22 failure.

23 I see, you know, some general statements
24 about the variability, for example, of the NNC parameters
25 in the Paris equation and in the very next table is

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1 probability of rupture due to low-cycle fatigue and I
2 just can't see that the chain, how you got to there.

3 It's just not described very well, but it
4 might be something that I could discuss with the staff.

5 CHAIRMAN STETKAR: Either way. I mean if,
6 MHI did the analyses --

7 MEMBER RICCARDELLA: Yes.

8 CHAIRMAN STETKAR: -- so they should have
9 an answer for how the values were developed.

10 (Off the record comments)

11 MR. MINAMI: Just a moment, please.

12 CHAIRMAN STETKAR: If it takes some time to
13 find that answer, you know, you may want to wait and get
14 back. Do you understand the question based -- okay.

15 MEMBER BROWN: There's another --

16 CHAIRMAN STETKAR: Before we ask a --

17 MEMBER BROWN: Oh, I'm sorry.

18 CHAIRMAN STETKAR: -- separate question,
19 let's see if --

20 MEMBER BROWN: Well it's not separate, it's
21 related, so go ahead.

22 MR. NAGAI: There's a separate slide that
23 we prepared --

24 CHAIRMAN STETKAR: Okay.

25 MR. NAGAI: -- that may answer his

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1 question.

2 CHAIRMAN STETKAR: Okay.

3 MR. NAGAI: I'm not sure if it is
4 appropriate timing to --

5 CHAIRMAN STETKAR: Let me ask you this,
6 we're getting close to time for a break. If you want to
7 discuss this during the break we can come back to it after
8 the break.

9 MR. NAGAI: Okay.

10 CHAIRMAN STETKAR: It'll give you a little
11 bit of time to decide, you know, if you do have a slide
12 that's been prepared to address it that would be great.

13 In the interest of completeness since
14 Charlie did say that he had a question related to this
15 general topic --

16 MEMBER BROWN: It's not, no, to help,
17 there's another topical report on probability of missile
18 generation from low pressure turbines, is that related
19 to this, where they talk about low-cycle SSCs --

20 CHAIRMAN STETKAR: Just to make things
21 clear, that we're all communicating, you're talking
22 about Report MUAP-07028-P, correct?

23 MEMBER BROWN: Yes, I've got that.

24 CHAIRMAN STETKAR: And you're talking
25 about the same report?

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1 MEMBER BROWN: No, 10005-P, and it's a
2 probability of missile generation from low pressure
3 turbines and there is some discussion in there on the
4 probability of low pressure turbine brittle rupture due
5 to low-cycle fatigue during startup, shutdown cycles, et
6 cetera.

7 Now I didn't know if that was related, I
8 wasn't sure whether you had that report, it's one I've
9 had for three years.

10 CHAIRMAN STETKAR: What's the date on that?
11 I don't even --

12 MEMBER BROWN: REV 0 is what I've got.

13 CHAIRMAN STETKAR: What's the report
14 number, Charlie?

15 MEMBER BROWN: It's MUAP-10005-P.

16 CHAIRMAN STETKAR: Huh? I don't happen to
17 have that report so I'm, I haven't even looked at it.

18 MEMBER BROWN: And it's Probability of
19 Missile Generation From Low Pressure Turbines it's
20 called.

21 CHAIRMAN STETKAR: I wonder if that has
22 been superseded by, REV 2 of MUAP-07028-P and the title
23 of that report is, curiously, Probability of Missile
24 Generation From Low Pressure Turbines --

25 MEMBER BROWN: Yes.

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1 CHAIRMAN STETKAR: -- is dated June 2013.

2 MEMBER BROWN: Yes. This one I got back in
3 July 25th roughly of 2011, so it's the report I got.

4 MR. MINAMI: Excuse me. I have answer.
5 We have two technical reports regarding the one low
6 pressure turbine missile analysis --

7 CHAIRMAN STETKAR: Okay.

8 MR. MINAMI: -- and the first one is
9 analysis for the low pressure turbine rotor with 74-inch
10 class rotating blade and --

11 CHAIRMAN STETKAR: Okay. But --

12 MR. MINAMI: -- a 74-inch class rotating
13 blade. And the 10005 is an analysis for the low pressure
14 turbine with 54-inch class rotating blade. So that --

15 MEMBER BROWN: Okay.

16 CHAIRMAN STETKAR: So it's for a different,
17 it's a different turbine design then?

18 MR. MINAMI: The design is different.

19 CHAIRMAN STETKAR: If the one that's
20 referred to in the DCD is --

21 MR. MINAMI: 07028 --

22 CHAIRMAN STETKAR: -- 07028, right. Okay.
23 So that's the one that you --

24 MEMBER RICCARDELLA: That's the one I have
25 a question --

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1 CHAIRMAN STETKAR: Yes.

2 MEMBER RICCARDELLA: Okay.

3 MEMBER BROWN: Don't ask me why I have it,
4 it just, it was sent to me, and goes into the topical
5 report file.

6 CHAIRMAN STETKAR: Technical report.

7 MEMBER BROWN: Technical report file in
8 this case, yes.

9 CHAIRMAN STETKAR: Okay. So for --

10 MEMBER BROWN: Sorry for the interruption.

11 CHAIRMAN STETKAR: That's fine because I
12 didn't even see that one. So anyway, let's do this,
13 let's take a break and let MHI caucus among themselves
14 to see if they can provide a little bit more elaboration
15 on the low-cycle fatigue failure probability to answer
16 Pete's question.

17 MEMBER RICCARDELLA: Yes. Just to --

18 CHAIRMAN STETKAR: Do you have any other
19 ones that you want to get on the table, too?

20 MEMBER RICCARDELLA: Well, no, my question
21 is specifically about Section 3.3 of the 07028 Report.

22 CHAIRMAN STETKAR: Okay.

23 MR. MINAMI: Yes.

24 CHAIRMAN STETKAR: Good. Let us take a
25 break and because we're a little ahead of schedule and

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1 because --

2 MR. OGASAWARA: I think --

3 CHAIRMAN STETKAR: I'm sorry, go on.

4 MR. OGASAWARA: Before going to the
5 question, can I answer to the question in Section 3.3 the
6 wind speed 155 and also 160 questions?

7 CHAIRMAN STETKAR: Sure.

8 MR. OGASAWARA: Could you show the
9 presentation, Page 30? One hundred fifty-five is the
10 probability of ten to the minus two per year. This is
11 a severe wind and 160 miles per hour is a ten to the minus
12 six, that is extreme wind and in our DCD we call it as
13 hurricane.

14 And those numbers are not related to each
15 other and those are defined independently. So if we
16 calculate and come up a number of 155 that probability
17 of ten to the minus two, to the probability of a ten to
18 the minus six, the number would not be 160 miles per hour.

19 But severe wind and extreme wind, those
20 numbers are calculated base on a calculator and those
21 numbers different rotor combinations calculation of
22 missile, and those rotor combinations are shown in
23 Chapter 3.8.

24 And the coefficient provide to the severe
25 wind and also the coefficient numbers to the extreme

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1 winds are different. And also we have the core items for
2 severe wind and also extreme wind.

3 If in the site conditions the winds are
4 higher than 155 or the number is higher than 160, the COL
5 applicant have to show, has the responsibility for the
6 design.

7 CHAIRMAN STETKAR: I understand the, I
8 certainly understand the second part. The first part,
9 I'm still, both of those wind speeds, to me, and I'm not
10 a structural engineer, but both of those wind speeds are
11 characterized as a 10-meter, 3-second gust wind speed if
12 I read the report.

13 And I understand that, well I'm not sure
14 that I understand why an extreme wind of 160 miles per
15 hour that's called a hurricane should be considered
16 differently from a severe wind of 155 miles per hour which
17 is called a severe wind.

18 Because if they're both 3-second straight
19 lined wind speeds, a hurricane doesn't have any
20 rotational force. I don't know why they're treated
21 differently because, as I said, I'm not a structural
22 engineer.

23 My basic curiosity is why a 5-mile per hour
24 difference in wind speed results in five orders of
25 magnitude difference in the estimated recurrence

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1 interval or frequency. To me that is curious.

2 MR. SPRENGEL: We'll take some more time --

3 CHAIRMAN STETKAR: Yes.

4 MR. SPRENGEL: -- and come back to you on
5 that.

6 CHAIRMAN STETKAR: Thanks.

7 MR. SPRENGEL: We can even --

8 CHAIRMAN STETKAR: Thank you.

9 MR. SPRENGEL: Sure.

10 CHAIRMAN STETKAR: Anything else? Let's
11 take a break. I actually need to take a break, I was
12 trying to get to this, and let's make it for 20 minutes,
13 let's reconvene at 10:35 a.m.

14 (Whereupon, the foregoing matter went off
15 the record at 10:16 a.m. and went back on the record at
16 10:36 p.m.)

17 CHAIRMAN STETKAR: Back in session. Mark,
18 it's yours.

19 MR. BIERY: Yes, sir. Up front I'm now
20 joined by Masashi Ito, we shuffled seats again while we
21 were on break. As far as the outstanding questions are
22 concerned, we're going to go ahead and we're going to
23 answer some of those after lunch.

24 CHAIRMAN STETKAR: Good.

25 MR. BIERY: So, for now, we're just going

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1 to push on to Section 3.4.

2 CHAIRMAN STETKAR: That's fine, you know,
3 we've done this a lot and that seems to be a good model.
4 If you can get back to us with some answers sometime in
5 the next, you know, before the end of the day tomorrow,
6 that would great.

7 And as always, MHI has always been very,
8 very good on following up on questions, so it's mostly
9 for us to get the question out on the table, make sure
10 that we understand the question mutually and then get
11 back to us when you can. Thank you.

12 MR. BIERY: Sure. With that we move on to
13 Section 3.4, Water Level Design. US-APWR is designed to
14 accommodate the effects of external or internal
15 flooding.

16 Protection of plant nuclear safety
17 functions during and after internal and external
18 flooding events is addressed in Subsection 3.4.1.
19 Design conditions for Seismic Cat I structures to
20 withstand a hydrostatic/dynamic loads from design basis
21 flood or ground water conditions is addressed in
22 Subsection 3.4.2.

23 External flood protection, water sources
24 that are considered are listed here, in particular,
25 probable maximum precipitation and ground water.

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1 Design basis flooding level for US-APWR Standard Design
2 is one foot below the plant grade and site specific
3 external flood conditions will be addressed by the COL
4 applicants.

5 Key design features include thick
6 reinforced concrete external walls and base mats,
7 penetration with flood protection features as well as
8 sloped roofs with drainage systems.

9 Site specific design features, again,
10 addressed by COL applicants. Internal flood
11 protection, water sources considered include
12 earthquakes, which is failure of non-seismic components,
13 pipe breaks and cracks, in accordance with Section 3.6.2,
14 firefighting ops, and pump mechanical seal failures.

15 Key design features for internal flood
16 protection include physical separation of
17 safety-related SSCs by protective barriers, watertight
18 doors, and penetration seals to preclude simultaneous
19 loss of redundant systems.

20 Enhanced piping design is used to minimize
21 postulated flooding water sources and placement of
22 safety-related SSCs above internal flood levels is used.
23 The NRC staff conducted an audit of these design
24 documents in this past April.

25 And office procedures, these discuss

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1 flooding effects to Seismic Cat I structure design and
2 Section 3.8 provides the design and analysis procedures
3 used to transform the static and dynamic effects of the
4 design basis flood level and ground water levels applied
5 to these Seismic Cat I structures.

6 Again, Section 3.7 and 3.8 we're going to
7 discuss at a later date. We have some open items for this
8 DCD Section. The first, this RAI asked MHI to provide
9 the basis for assumptions made for evaluating flooding
10 due to the firefighting operations and how to discuss
11 high and moderate energy line breaks and cracks being
12 accounted for in the flooding analyses.

13 An RAI response was submitted in July 2013
14 after the technical audit this past April, and the staff
15 is evaluating this response. Updates and changes have
16 been incorporated into DCD Rev 4 to reflect this.

17 The next open item, MHI was asked to update
18 Figure 3K-5 to show flood barriers at the main control
19 room vestibule. A response was submitted in October of
20 2012 stating that the figure would be updated in
21 accordance to the closure plan for seismic and structural
22 analyses. The updated figure is also in DCD Rev 4.

23 The next open item, MHI requested to further
24 clarify the use of 0.7 as the coefficient of friction at
25 the soil concrete interface. MUAP-12002 Rev 1, which

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1 utilized this new coefficient of friction 0.5 was
2 submitted in January of '13.

3 And revised responses to these RAI
4 questions were submitted in March of '13 and are being
5 reviewed by the staff.

6 CHAIRMAN STETKAR: I have a few questions
7 about the flooding analyses. First of all a general
8 question, does MHI or the COL have responsibility for
9 evaluating flooding from sources in the essential
10 service water pipe tunnel and the essential service water
11 pipe chases?

12 As I read through the DCD it's not clear who
13 owns those things, because they seem to be part of the
14 standard design, but there's a lot of statements saying
15 it's basically the COL's responsibility to evaluate
16 them.

17 MR. BIERY: So your question is --

18 CHAIRMAN STETKAR: My question is who --

19 MR. BIERY: -- the division of
20 responsibility?

21 CHAIRMAN STETKAR: In particular for, I
22 mean in general for those, but in particular, because
23 we're talking about flooding, for flooding from those
24 sources.

25 MR. ITO: Okay. I'm --

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1 CHAIRMAN STETKAR: I didn't see any, they
2 weren't addressed in the DCC as far as I could tell, but
3 I was just curious. At one level I'm concerned that they
4 don't fall in the proverbial crack that the DCD presumes
5 that the COL applicant will evaluate them while the COL
6 applicant says, well they were part of the certified
7 design so they've been evaluated over there.

8 So that's just sort of a general question.
9 If you have a quick answer that's fine.

10 MR. ITO: I'm Masashi Ito. The variation
11 of the ESWPT and the ESWPC is in COL applicant.

12 CHAIRMAN STETKAR: ESWPT, okay.

13 MR. ITO: Yes.

14 CHAIRMAN STETKAR: That's pretty clear.
15 How about the ESWPC, the pipe chases?

16 MR. ITO: ESWPC is also in the COL
17 applicant.

18 CHAIRMAN STETKAR: That's also COL, okay.
19 Thank you. Let me just make a note here because
20 otherwise I will forget. I was pretty sure the PT was
21 part of the, the PT is acronym for the pipe tunnel, was
22 part of the COLA applicant because that's connecting the
23 ultimate heat sync to the pipe chases.

24 I really wasn't sure about the pipe chases,
25 so, and you're saying they're both COLA, okay. So I'll

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1 weigh on those questions now. Here are some details, and
2 I just wanted to understand.

3 If I look, and I'll give you the reference
4 so you can look it up, in DCD Section 3.4.1.5.2.1, that
5 in particular addresses flooding in the reactor building
6 radiological controlled area at elevation minus 26-feet,
7 four inches down in the basement.

8 It's noted that the break in the charging
9 piping on the West side of the radiological controlled
10 area is the limiting flood, especially for the West side
11 of that area.

12 You divide it up East and West and look at
13 the flooding sources in the East and West and on the West
14 side the charging line is the limiting flood. There's
15 a statement saying that the water volume in that event,
16 for the charging line failure, is calculated on the
17 assumption that the release of water from the charging
18 piping continues without being limited by the pump
19 capability until the letdown line is automatically
20 isolated.

21 And I read that and I thought about the
22 system design and it's not clear to me why isolation of
23 the letdown line will stop the flood from the charging
24 line, because it's my understanding of the plant design
25 that on low, low level in the volume control tank, the

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1 suction of the charging pumps is automatically
2 transferred to the refueling water storage pit so that
3 when letdown is isolated the charging pumps will pump
4 down the volume control pump, low, low level will occur,
5 you'll transfer suction to the RWSP and those pumps will
6 keep pumping water out that broken line for a long time
7 until somebody turns off the pumps.

8 So I was curious about the justification
9 that the volume of the flood in that particular location
10 was limited by automatic isolation of the letdown line.
11 You may want to double check that, or perhaps my
12 understanding of the system design is not correct.

13 But I did, the reference that I looked at
14 is Section 9.3.4.2.1 of the Design Certification
15 Document, is what told me that the suction was
16 transferred to the RWSP. So that's one question that I
17 had about that flooding area.

18 And I'll let you take notes if you want to
19 take notes because I'm a slow writer, also. On the East
20 side of the non-radiological controlled area in the
21 reactor building that contains the pump rooms basically,
22 the analysis is done, it calculates a water depth of, I've
23 forgotten what it is, 0.4 feet roughly, about five or six
24 inches on the floor from flooding events over on that side
25 of the building.

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1 And it's noted that the assumption is made
2 that water will flow from that portion of the
3 non-radiological controlled area into the power supply
4 building because the doors between the power supply
5 building and that part of the non-radiological
6 controlled area are apparently not designed to be
7 watertight doors.

8 And, therefore, the flooding scenario, as
9 best as I can tell, because if I look at the power supply
10 building, the flood water depth is exactly the same
11 height.

12 So what you've done is you've taken a
13 flooding event of a certain duration, a certain volume,
14 and you've distributed that volume, water volume, over
15 the entire floor area of the non-radiological controlled
16 area of the reactor building plus the floor area in the
17 power supply building, as best as I can tell.

18 And I was curious whether that actually, on
19 one level it sounds like it's conservative because
20 flooding in either place will result in water in both
21 places. On the other hand it may be non-conservative if
22 those doors actually allow water to accumulate in one
23 area.

24 So I was curious whether the conclusions
25 regarding flooding in either area, either the power

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1 supply building side of the door or the non-radiological
2 controlled area side of the door, if those conclusions
3 would be affected if you assumed those doors were
4 watertight.

5 In other words, dividing those volumes and
6 looking at the flooding sources. I don't know, you know,
7 whether that's the case. I didn't try to do any
8 calculations, but that's a question that I had.

9 This is a case where from one perspective
10 an assumption that might sound like it's conservative
11 could lead to non-conservatism if indeed those doors are
12 fairly effective in terms of blocking communication,
13 unless they're actually designed, I mean if they're
14 designed to have, you know, large gaps underneath to
15 allow water to transmit, that's a different story.

16 MR. BIERY: So your concern is uneven
17 flooding levels?

18 CHAIRMAN STETKAR: My concern is, you know,
19 you say those doors are not designed to watertight, well,
20 suppose they are pretty darn good, let's call them not
21 designed to be absolutely watertight, but pretty darn
22 good, would that allow a water depth to accumulate in
23 either of those areas if they were analyzed as individual
24 compartments looking at the flooding sources in each such
25 that the equipment might be compromised.

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1 And the reason that I'm concerned, I'm
2 actually more concerned about the non-radiological
3 controlled area because those spaces contain two
4 divisions of the component cooling water system and I've
5 forgotten what else is in there, but I know that at least
6 the component cooling water pumps are in there.

7 So if you flood out one of those areas that
8 communicate to one another you could take out two
9 divisions of equipment. And then the question is, if
10 that occurs, can you safely shutdown if you assume one
11 of the other divisions is out of service for maintenance
12 and all of that kind of stuff?

13 So I was actually a little more concerned
14 about the reactor building side of that door.

15 MR. BIERY: Do you want to answer now or do
16 you want to wait?

17 CHAIRMAN STETKAR: And again, you may want
18 to look into it, you know, this, you need to look at
19 flooding sources and volumes.

20 MR. BIERY: Okay. I think we'll need to
21 follow up --

22 CHAIRMAN STETKAR: Yes.

23 MR. BIERY: -- with you on those questions.

24 CHAIRMAN STETKAR: Yes. These tend to be,
25 you know, we have a long history of doing this. You get

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1 the kind of question out on the table and a lot of them
2 are enough detail that they can't be answered in quick
3 fashion.

4 I finally got it, yes, those common areas
5 include two trains of the emergency feed water pumps and
6 two trains of the component cooling water pumps. So it's
7 the A/B trains in one area and the C/D trains in the other
8 area.

9 When I looked at the flooding analyses in
10 Appendix 3K, and again, I focused a little bit on those
11 basement areas in the reactor building only because
12 they're one of the few locations where you do have two
13 trains of safety-related equipment in a common flooding
14 area that's not isolated within itself by watertight
15 doors or particular flood barriers.

16 And it's not clear to me, actually it is
17 fairly clear to me that they're not considered, a couple
18 of the flooding sources that I could think about in those
19 areas, one notable source, is the essential service water
20 connections to the component cooling water heat
21 exchangers.

22 That's a large, potentially large volume of
23 water because it's essentially a very large basin supply
24 so you're limited, the amount of water that you put into
25 to a compartment is limited basically by the amount of

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1 time that the pump remains running.

2 And it wasn't clear whether the analyses
3 accounted for flooding from that source. I don't think
4 they do. And another potential source is the suction
5 piping for the emergency feed water pumps from the
6 emergency feed water storage pits which are up in a high
7 elevation, but they're also large volumes of water.

8 So that, for example, if you had a break or
9 a leak in that piping at the suction line to the emergency
10 feed water pump, it seems like you could drain the whole
11 emergency feed water pit into that room and it's not clear
12 that those are evaluated either.

13 And if there's a reason for that I'd like
14 to know.

15 MR. BIERY: So flooding from essential
16 service water to the component cooling water heat
17 exchanger and then suction piping from the emergency feed
18 water pump feeding from the feed water pit?

19 CHAIRMAN STETKAR: From the original feed
20 water pit, you know, upstairs. Now I know, before you
21 say well this all safety-related, seismically qualified
22 piping, I know that.

23 If I look at actual flooding events that
24 have occurred in real operating experience, in many cases
25 the floods have been associated with not necessarily

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1 spontaneous failures or even seismic failures of piping
2 or equipment, they've been associated with human errors
3 during maintenance and things like that.

4 People have indeed put water from point A
5 to point B under very creative ways because they forgot
6 to open a particular drain valve or they forgot to isolate
7 something.

8 So when I think about these flooding
9 analyses I don't necessarily restrict myself to thinking
10 about, you know, spontaneous failures of piping or things
11 like that, which is another reason why I'm asking about
12 this.

13 Because you can do maintenance during power
14 operation on one division of equipment, you could indeed
15 during power operation to have people working on those
16 component cooling water heat exchangers or the emergency
17 feed water pumps during power.

18 MR. BIERY: I think then --

19 CHAIRMAN STETKAR: So that's a different
20 question.

21 MR. BIERY: I think we need to get back to
22 you at a later time with that.

23 CHAIRMAN STETKAR: Okay. And that's all I
24 had I think at that level on the flooding analyses.
25 Anybody else have any questions? Any of you can speak

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1 up at any time you want to. Okay, I'm sorry, go on, Mark.

2 MEMBER BROWN: Well I did have one minor
3 question, very minor question, because as I look at the
4 resolution of the RA on the main control room doors, the
5 flooding --

6 MR. BIERY: Yes.

7 MEMBER BROWN: -- that was on Page 55, and
8 I was trying to figure out, you all said you all updated
9 the figure between the last revision in Rev 4 and I guess
10 that was difficult to understand.

11 Some steps were added in Figure 4 into the
12 two entrances into the main control room, it showed the
13 steps and a little black line was put across the steps
14 almost as if you anticipated opening the door with the
15 hallway flooded but you could walk up the steps and have
16 a little walkover and then get into the main control room
17 without having any water come in.

18 So I have no idea what that Figure
19 represented. This is not complex, I was just trying to
20 understand how you all resolved that issue of providing
21 a faux flow flood barriers at the main control room
22 vestibule because both of them had watertight doors, the
23 last Revision 3 as well as Revision 4.

24 And the only change is a little bit of a
25 black line going up the stairwell area, or in the walk-in

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1 area and now there's steps shown with a black line across
2 it.

3 So is that, I'm just trying to figure out
4 the philosophy, I mean, obviously, if you open the door
5 in the main control room while there's water out there
6 it would run in so I can understand having a watertight
7 door and a small barrier walled entrance vestibule where
8 you walk up something so that you maintain it above some
9 height.

10 And I just wanted to know the philosophy of
11 how you incorporated that?

12 MR. ITO: This is Masashi Ito of MNES. I
13 think you are talking about the Figure 3K-5 --

14 MEMBER BROWN: 3K-5, yes.

15 MR. ITO: Okay.

16 MEMBER BROWN: And I looked at Rev 3 and I
17 looked at Rev 4 --

18 MR. ITO: Yes.

19 MEMBER BROWN: -- trying to look at what the
20 differences meant.

21 MR. ITO: Yes. So that black line added
22 and up the stair, is the boundary of the flooding analysis
23 --

24 MEMBER BROWN: I didn't get that.

25 MR. ITO: All right. The black line --

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1 MEMBER BROWN: Open the door --

2 MR. ITO: Yes.

3 MEMBER BROWN: There's a watertight door
4 off the hallway --

5 MR. ITO: Yes.

6 MEMBER BROWN: -- and now you show steps --

7 MR. ITO: Yes.

8 MEMBER BROWN: -- and then a little
9 barrier, a little black line, goes across the stairwell.

10 MR. ITO: Yes. So in that 3.4 flooding
11 analysis, that black line is the boundary of the --

12 MEMBER BROWN: What do you do step up over
13 that or something? It's not another door. Is it a
14 raised level?

15 MR. ITO: It's --

16 MEMBER BROWN: It's above the floor, it's
17 above the hallway level enough to cover your flooding
18 analysis?

19 MR. ITO: Correct.

20 MEMBER BROWN: Okay. If somebody opens
21 the door, all right. Just trying to understand the
22 schematic depiction.

23 CHAIRMAN STETKAR: I did have one more. I
24 tend to look through my notes, given enough time.

25 MEMBER BROWN: I'll never do this again.

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1 CHAIRMAN STETKAR: Hmm?

2 (Crosstalk)

3 CHAIRMAN STETKAR: No, thank you.
4 Sometimes I need some delays. In the main steam feed
5 water piping area in the reactor building at, I guess it's
6 elevation 76, five inches, but anyway, it's the main
7 steam feed water piping area.

8 The statement is made that there are
9 doorways from that area to the other part of the
10 non-radiological controlled area and it says that the
11 bottom of the doorways is at elevation 76, five inches,
12 which is 11-feet, five inches above the floor elevation
13 of 65 feet, zero inches, and the conclusion is the
14 doorways are located at a level that's higher than the
15 flooding level estimated in those areas and, therefore,
16 flood waters will not propagate into the other part of
17 the reactor building.

18 The analyzed flood in that area is caused
19 by a nominal one square foot break in the main feed water
20 piping that accounts for eventual isolation of the main
21 feed water line from whatever automatic signals will
22 occur.

23 And I don't know enough about the
24 configuration of the plant, so my first question is, is
25 the main steam and feed water piping area open to the

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1 turbine building or is it sealed from the turbine
2 building?

3 In other words is it just an open, you know,
4 pipe chase or pipe tunnel that if I'm standing in the
5 turbine building I can look into it or is it actually
6 sealed?

7 MR. ITO: It's not, no.

8 CHAIRMAN STETKAR: It's not which?

9 MR. BIERY: It's not because it's sealed or
10 is it not sealed?

11 MR. ITO: Sealed.

12 MR. BIERY: It is sealed.

13 CHAIRMAN STETKAR: Okay. Now the question
14 is then, if indeed this flood scenario occurs from a one
15 square foot break in the main feed water piping, that
16 break releases both mass and energy into this now what
17 I understand to be an enclosed space.

18 And I understand if all of that, what starts
19 out being some sort of two-phase mixture of steam and
20 water condenses, you can calculate an eventual level of
21 water in that area.

22 However, before that happens it seems to me
23 that that area will experience a fairly reasonable
24 pressure transient. I don't know what that pressure
25 transient is because I can't boil water with help from

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1 a stove, but the question that I had is if indeed this
2 flooding event causes a pressure transient, are those
3 doors designed to retain the pressure transient?

4 In other words, if they're not that break
5 event will blow some mass and inventory out into the rest
6 of the reactor building. So my real question here is not
7 the elevation of the door for some sub-cooled level of
8 water in the area, it's will the doors actually withstand
9 the break?

10 I have a suspicion, but I'd like
11 confirmation on that.

12 MR. BIERY: Do you want to answer now or?

13 MR. ITO: Can I clarify that? You are
14 concerned that pressure onto that door?

15 MR. BIERY: Will the doors withstand the
16 pressure loading?

17 MR. ITO: In the closed space?

18 MR. BIERY: Yes.

19 (Off the record comments)

20 MR. ITO: Yes, this also. I've got to
21 check on that and get back later.

22 CHAIRMAN STETKAR: Get back to us?

23 MR. BIERY: We'll need to follow up with you
24 on that one.

25 CHAIRMAN STETKAR: Okay. Thank you.

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1 MR. BIERY: Okay, the next section we'll
2 cover is Section 3.6, Protection Against Dynamic Effects
3 Associated with Postulated Rupture of Piping. This DCD
4 Section provides outline information on the pipe rupture
5 protection.

6 The following are defined for the US-APWR,
7 this includes design measures and bases, postulated pipe
8 rupture location, jet impingement load, as well as
9 leak-before-break evaluation methodology. There are no
10 open items for this DCD Section.

11 In accordance with SRP 3.6.1, the plant is
12 designed to provide protection against piping failure to
13 ensure that these failures would not compromise the
14 functional capability of safety-related systems nor
15 maintain the safety of the plant when a pipe break is
16 postulated, required plant conditions, design measures,
17 and bases are provided.

18 Break or crack location is postulated in
19 accordance with SRP Branch Technical Position 3-4, which
20 is a highest stress location, location, great effect on
21 essential equipment, et cetera.

22 Jet thrust reaction force and jet
23 impingement loads are defined in accordance with SRP
24 3.6.2. Design criteria for pipe whip restraint and jet
25 impingement barriers are provided.

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1 Leak-before-break evaluation procedures,
2 this subsection describes the design basis to eliminate
3 the dynamic effects of pipe rupture for high energy
4 piping systems of reactor coolant loop piping, RCL branch
5 piping, and main steam piping.

6 The LBB evaluation is performed in
7 accordance with SRP 3.6.3. LBB criteria are applied to
8 RCL piping, branch piping, with normal diameter of six
9 inches or larger as well as main steam piping inside a
10 containment.

11 MEMBER RICCARDELLA: So do I understand
12 that you've applied these before break to essentially all
13 reactor coolant loop piping instead of pipe whip
14 restraints? Instead of protection against pipe breaks?

15 MR. TAKAYAMA: We consider a percent, we
16 apply LBB --

17 MEMBER RICCARDELLA: All locations? All
18 locations in the reactor coolant system?

19 MR. TAKAYAMA: Oh, no. Greater than a
20 6-inch --

21 MEMBER RICCARDELLA: Yes. I understand.
22 All locations greater than six inches.

23 MR. TAKAYAMA: Yes. But if you got a, is
24 not satisfied even if the pipe size is 8-inch, all
25 locations 8-inch pipe is post break is postulated.

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1 MEMBER RICCARDELLA: Postulated, I
2 understand. And are all these analyses complete? All
3 the LBB analyses?

4 MR. TAKAYAMA: Every analysis completed.

5 MEMBER RICCARDELLA: Well then are there
6 some locations where LBB was not satisfied?

7 MR. TAKAYAMA: Eight inch and/or 6-inch
8 pipe diameter is not satisfied.

9 MEMBER RICCARDELLA: Yes, okay. I
10 understand. Thank you.

11 MR. BIERY: Again, there are no open items
12 for this DCD Section.

13 CHAIRMAN STETKAR: You essentially, in
14 addition to the LBB inside the containment, you also take
15 credit for no circumferential piping breaks in the main
16 feed water and steam piping area, right?

17 MR. TAKAYAMA: Main feed --

18 CHAIRMAN STETKAR: Except for the branch
19 lines, I mean --

20 MR. TAKAYAMA: But main feed water pipe we
21 doesn't apply LBB.

22 CHAIRMAN STETKAR: Okay. Not in the PCCV,
23 but out in the steam and feed water piping area, the
24 largest break that you assume out there is that one square
25 foot break.

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1 MR. TAKAYAMA: Oh. I'll recap here --

2 CHAIRMAN STETKAR: Yes. I'm talking about
3 the break exclusionary.

4 MR. TAKAYAMA: Yes. Outside of the --

5 CHAIRMAN STETKAR: Outside the PCCV,
6 between the turbine building, the area that I was talking
7 about and the flooding before.

8 MR. TAKAYAMA: Okay.

9 CHAIRMAN STETKAR: In that area you account
10 only for circumferential breaks of the steam riser piping
11 to the relief valves or the safety valves and a nominal
12 one square foot break in the --

13 MR. TAKAYAMA: Yes.

14 CHAIRMAN STETKAR: The limiting one there
15 is the feed water break, right?

16 MR. TAKAYAMA: Oh, yes. We don't operate
17 LBB, that's the --

18 CHAIRMAN STETKAR: Right, but it's not LBB
19 because you're not monitoring leakage there. This is
20 just based on piping design, right?

21 MR. TAKAYAMA: Oh, yes, sir. Normally
22 PCCV penetration breakage exclusion area. We apply PCCV
23 containment break exclusion criteria we apply those
24 portions main steam room.

25 CHAIRMAN STETKAR: Okay.

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1 MR. TAKAYAMA: And one square foot break is
2 assumed to break.

3 CHAIRMAN STETKAR: I understand that, and
4 the one square foot break --

5 MR. TAKAYAMA: Yes.

6 CHAIRMAN STETKAR: -- that break area
7 bounds the size of any penetration, any, what I call riser
8 lines or drain lines from the steam and feed water piping,
9 I at least looked for those.

10 The questions is, and I'm not a structural
11 or piping systems engineer, I don't know the basis for
12 declaring that area a break exclusion area. It's not the
13 LBB criteria because, you know, you don't have the
14 monitoring for leakage that you do on the other side of
15 the wall to satisfy those criteria, this is just simply
16 seems to be based on the design of the piping and the
17 supports and structures in that area, is that correct?

18 MR. TAKAYAMA: Correct.

19 CHAIRMAN STETKAR: Okay. I'll ask the
20 staff more about that later because, as I said, I don't
21 understand anything about piping design. If there
22 aren't any other members questions, I guess we can
23 proceed, move on.

24 MR. BIERY: We'll now move onto Section
25 3.9, we're going to break this up into subsections.

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1 We'll start with Subsection 3.9.1, Special Topics for
2 Mechanical Components.

3 This subsection provides information on
4 methods of analysis for ASME Code, Section III, Division
5 1, Classes I, II, and III components and supports to
6 include core support structures. There are no open
7 items for this subsection.

8 Design transients, components are
9 evaluated using the design transients in accordance with
10 the requirements for a Class I in ASME Code, Section III.
11 The design transients give fluid system pressure,
12 temperature, flow transients, and frequency to perform
13 the ASME Code fatigue analysis and stress analysis.

14 These do not cover the seismic loading and
15 other mechanical loadings on each component. Design
16 transient item of each service level, A, B, C, and D, and
17 test conditions addressed, 60-year design life is
18 considered when determining the number of occurrences.

19 Computer programs, a number of computer
20 programs, including commercial and in-house MHI codes,
21 are used for static dynamic and hydraulic transient
22 analysis for the component design. All computer
23 programs are verified and validated in accordance with
24 ASME NQA-1, Subpart 2.7.

25 NRC audits for computer programs was

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1 completed back in August of 2011 and was subsequently
2 closed. Again, no open items for this subsection.

3 CHAIRMAN STETKAR: Mark, this is not, I
4 have a couple of questions. As I went through the Tables
5 that list the number of transients that you analyzed, and
6 I will fully admit this is not a question that really has
7 anything to do with the safety evaluation of the
8 equipment, it's more of a margins question.

9 And it really has more implication in terms
10 of potential challenges to the operating utility of the
11 plant than it does for any of the analysis work, so take
12 it within that grain.

13 I'm not challenging the analyses, but if I
14 look at a couple of the transients, in particular let me
15 just focus on one of them, the other one has a little more
16 margin.

17 If I look at the upset conditions, reactor
18 trip from full power, there are three different
19 categories of trips that are combined in that general
20 classification. One is a reactor trip with no
21 inadvertent cool down, which I'll call sort of a routine
22 reactor trip.

23 One is a reactor trip with a cool down, but
24 without a full safety injection and that's modeled by a
25 steam generator overflow of that basically. And then

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1 there's a reactor trip with a cool down and a subsequent
2 safety injection which is modeled by I think a stuck open
3 steam relief valve or something like that.

4 And the numbers of those events over the
5 60-year design life are 60 of the, what I'll call routine
6 reactor trips, 30 of the cool down without a safety
7 injection, and ten of the cool down with a safety
8 injection.

9 And I kind of focused on the 60 normal
10 reactor trips. That's basically one reactor trip per
11 year which is for many plants a fairly large number, but
12 not very large.

13 In other words, if I look at that margin of
14 one trip per year for that particular transient compared
15 to the margins that are built into your transient
16 analyses for other things like ten to 100 events per year
17 when I would expect to see maybe one.

18 I was curious why that one in particular had
19 such a small margin? Because if I'm now a plant that's
20 operating that has not the best experience in the world,
21 and it doesn't have to get too bad to average one trip
22 per year, I might be in trouble in terms of counting up
23 transients later on and verifying that I need to redo
24 analyses for this particular type of an event.

25 MR. BIERY: So you just want to know the

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1 basis behind the number?

2 CHAIRMAN STETKAR: Yes. And, you know, to
3 give people more margin would it make much difference to
4 your transient analyses if you assume three, or four, or
5 five of those events per year, which would be sort of more
6 consistent with the margins that you have built into the
7 other transient analyses that you've done.

8 I have no idea whether that trip is one of
9 the more limiting transients. I just don't know. Pete?

10 MEMBER RICCARDELLA: Yes. A related
11 question is, is it planned to install online fatigue
12 monitoring at the plant?

13 MR. NISHIO: We are --

14 MALE PARTICIPANT: Might be a COL question.

15 (Crosstalk)

16 MR. TAKAYAMA: Did you say about fatigue
17 monitoring system?

18 MEMBER RICCARDELLA: Yes.

19 MR. TAKAYAMA: Oh. Recently in the United
20 States fatigue monitoring system is applied when
21 planned, but it's the scope of past customers, so we may
22 not have determined whether --

23 MEMBER RICCARDELLA: Okay.

24 MR. TAKAYAMA: -- in fatigue monitoring
25 system is applied or it is not, but recently we believe

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1 that customer will apply fatigue monitoring system.

2 MEMBER RICCARDELLA: This relates to Dr.
3 Stetkar's question because what we've found in going back
4 and looking at operating plants is that you have a
5 relatively small number of some of these cycles, assume
6 like 60 for the, but that the severity, when you look at
7 how the plants operate they have many more cycles, but
8 they're less severe.

9 And so rather than they just count the 60,
10 most of the U.S. plants have installed fatigue monitoring
11 systems that look at the actual severity of the
12 transient.

13 So you might have, and that's acceptable in
14 lieu of just counting your number of trips up to 60.

15 CHAIRMAN STETKAR: But as I understand your
16 answer is, the decision to implement a fatigue monitoring
17 program is basically a COL, that the certified design
18 doesn't include credit for that if you will, is that
19 correct?

20 MR. TAKAYAMA: So I don't know.

21 CHAIRMAN STETKAR: You did, your transient
22 analyses do look at, they do look at some numbers of those
23 more minor transients.

24 MEMBER RICCARDELLA: Yes.

25 CHAIRMAN STETKAR: They look at load

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1 following type transients and things like that, so their
2 analyses do indeed acknowledge that some of the less
3 severe transients will occur at substantially higher
4 frequencies.

5 MEMBER RICCARDELLA: Yes.

6 CHAIRMAN STETKAR: I mean a couple of times
7 a day kind of frequencies. And I looked at those and
8 those seem to be, you know, sort of reasonable margin at
9 least for the design type calculations.

10 But there was, this one in particular is one
11 that I said well, of all the ones that I thought about,
12 this one seemed to have a relatively small margin
13 compared to, you know, actual operating experience,
14 which I grant you today is much, much better than it used
15 to be, but plants still do have inadvertent, unexpected
16 trips.

17 MR. BIERY: So normal reactor trips, you
18 basically want to know the reasoning of the small margin?

19 CHAIRMAN STETKAR: Yes.

20 MR. BIERY: Are we prepared --

21 CHAIRMAN STETKAR: And as I said, it's not,
22 your analysis is based on that number, so I'm not
23 necessarily, I'm not questioning your analysis, I'm not
24 questioning the safety of the plant, I'm not questioning
25 the design of the plant even.

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1 It's more of a question in terms of the
2 amount of margin that's built into your analysis and the
3 implications going forward for the eventual operator of
4 that plant when they do start counting up these
5 transients.

6 Because in most of the, in fact in all of
7 the other cases, at least qualitatively, I can see there
8 was a lot of margin built in there.

9 MR. BIERY: I think Hiroki Nishio wants to
10 say something.

11 MR. NISHIO: The trip is for one unit. So
12 the 60 is, I think 60 is an extensive trip, it's very,
13 very conservative to the, and also we have the, looks at
14 all the upright one unit --

15 CHAIRMAN STETKAR: Yes, I understand that.
16 If I'm operating a reactor unit, this says on average
17 you're accounting for one unplanned reactor trip without
18 any further complications per year --

19 MR. NISHIO: Per year, yes.

20 CHAIRMAN STETKAR: -- over the 60-year life
21 of the plan. And I'm saying that that is, for many
22 currently operating plants, a larger number than they
23 currently average, but it's not very much larger, okay.

24 It's probably not a factor of two larger,
25 for example.

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1 MR. SPRENGEL: So what's the --

2 CHAIRMAN STETKAR: It's an observation,
3 Ryan.

4 MR. SPRENGEL: Okay.

5 CHAIRMAN STETKAR: I again, I'm trying to,
6 you know, I'm an individual person just reading these
7 things giving you comments and observations and this one
8 in particular was notable because the amount of margin
9 that's built into your analyses for this particular
10 transient is much smaller than, much smaller than, the
11 amount of margin built into your analyses for any of the
12 other transients that you've evaluated, just looking at
13 transient counts.

14 MR. SPRENGEL: Okay.

15 CHAIRMAN STETKAR: And you might of been
16 out of the room, I prefaced it to say that I'm not raising
17 an issue related to either of your analyses as being
18 inadequate, your analyses are perfectly adequate.

19 I'm not raising an issue to say that you've
20 obviously underestimated the number of transients based
21 on any experience.

22 I'm just making the observation that this
23 one in particular, the margin that's built into that,
24 seems to be fairly small, such that going forward I could
25 envision particular plant operators getting concerned

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1 about having to redo the analysis because their projected
2 number of reactor trips over the life of the plant will
3 start to come very close to that number, especially if
4 I think about early plant operations and projecting out.

5 So that's all. It was more of an
6 observation.

7 MR. BIERY: We're going to switch seats
8 here momentarily.

9 CHAIRMAN STETKAR: Be careful when you're
10 moving up there, if you hit those microphones our
11 recorder over there has very, very sensitive earphones
12 and any time you hit this microphone it explodes in his
13 ear.

14 So just be careful not to hit, they're
15 really, really sensitive.

16 MR. BIERY: Yes, sir. I will now move --

17 CHAIRMAN STETKAR: By the time he turns 35
18 he will not have any hearing left, I'm convinced of this.

19 MR. BIERY: We'll go ahead and move onto
20 Subsection 3.9.2, that's Dynamic Testing and Analysis of
21 Systems Components and Equipment. The dynamic analysis
22 methodology, a finite element model of the reactor
23 coolant loop is used for analysis of RCL system response.

24 Additional finite element subsystem models
25 for the steam generator and reactor pressure vessel are

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1 applied for analysis of internal structures. Dynamic
2 hydraulic loads during LOCA events are evaluated by a
3 blowdown analysis using the MULTIFLEX Code.

4 Flow induced vibration assessment for
5 reactor internals, FIV assessment program is established
6 in accordance with Reg Guide 1.20. Conclusion of
7 prediction analysis is that reactor internals have
8 sufficient margins for adverse flow effects from fluid
9 elastic instability, vortex-shedding lock-in,
10 turbulence, and reactor coolant pump pulsation induced
11 vibration.

12 Test program for the first operating plant,
13 we'll use a vibration measurement and high-cycle fatigue
14 evaluation conducted during the hot functional test.

15 There are a couple of open items for this
16 subsection. First is to provide a comparison of
17 technical data for both steam generators used in SONGS
18 and US-APWR, explain any design differences between
19 US-APWR steam generator design between US-APWR and Fort
20 Calhoun, explain how contact force of the anti-vibration
21 bars will be checked to ensure it is sufficiently high
22 to prevent in-plane tube instability, as well as explain
23 why the wear of the tube support plates is considered to
24 be caused by turbulence excitation and not by in-plane
25 tube instability.

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1 This response is under preparation by MHI.

2 MEMBER RICCARDELLA: A general question
3 related to this open item. Is it planned to do any
4 testing of the steam generator tube bundles to verify
5 adequate prediction against vibration?

6 MR. SPRENGEL: There is no testing planned
7 right now.

8 MEMBER RICCARDELLA: Is the design
9 significantly different than the replacement steam
10 generators at San Onofre?

11 MR. SPRENGEL: I hesitate to answer that
12 because that's a qualitative term --

13 MEMBER RICCARDELLA: Yes, I understand.

14 MR. SPRENGEL: -- but the response in the
15 RAI actually focuses on differences between the
16 different units --

17 MEMBER RICCARDELLA: Okay.

18 MR. SPRENGEL: -- and actually we're
19 working with the staff to expand it beyond just on solely
20 Fort Calhoun in terms of our comparisons. And I guess
21 if there's any further detail or discussion that we want
22 to have it would be a proprietary discussion.

23 MEMBER RICCARDELLA: Okay. We want to do
24 that.

25 MR. SPRENGEL: We could discuss this

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1 further, we just need to close the meeting.

2 CHAIRMAN STETKAR: Okay. I think, you
3 know, if the members do have questions that they want to
4 delve into, we have no problem closing the meeting at all.

5 So if we want to pursue this we can. I'll
6 ask Pete and Sam, you said --

7 MEMBER ARMIJO: I have a question. I don't
8 know how, you know, I only have one question. Well I hate
9 to close the meeting for one question, but I think it's
10 a good question, so it's up to you, John.

11 CHAIRMAN STETKAR: But you're pretty sure
12 it would go into details of the design that are --

13 MEMBER ARMIJO: Well it relates, let me
14 tell you what the question is and --

15 CHAIRMAN STETKAR: Yes, then we can decide.

16 MEMBER ARMIJO: -- then you can decide.
17 But basically my question is, has Mitsubishi developed
18 a test methodology, physical test methodology, that can
19 reproduce the effects observed at San Onofre?

20 CHAIRMAN STETKAR: Sounds proprietary.

21 MEMBER ARMIJO: And has, you know, and that
22 means have you actually done tests that said we can
23 reproduce in our test facility the kind of wear that
24 happened on those tubes?

25 And then the second part of that question

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1 is, if you have such a test do you intend to apply it to
2 the steam generators for this design?

3 MALE PARTICIPANT: What, a US-APWR --

4 CHAIRMAN STETKAR: Ryan already said that
5 they don't plan to do any testing, right? So why don't,
6 if there are questions, this is, we're probably treading
7 into proprietary information is that right, Ryan?

8 (Crosstalk)

9 MR. SPRENGEL: We're also treading into --

10 CHAIRMAN STETKAR: Yes.

11 MEMBER ARMIJO: Yes, sensitive stuff.

12 MR. SPRENGEL: -- proprietary discussion
13 that's not privy to MHI to disclose.

14 CHAIRMAN STETKAR: Yes. Okay. Let me ask
15 MHI and the members, we have a window of opportunity. I
16 can close the meeting, you know, now and we go till lunch
17 to discuss steam generators if indeed that would be a
18 productive use of 30 minutes of our time.

19 We could also close the meeting either
20 today, this afternoon, or tomorrow to have that type of
21 discussion, again, if it's productive. That's
22 obviously, I don't whether it would be or not.

23 MR. SPRENGEL: Right. Well,
24 unfortunately --

25 CHAIRMAN STETKAR: You basically have some

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1 understanding of what you can discuss and, again, what's
2 relevant to the US-APWR design.

3 MEMBER ARMIJO: Well, you know, I'd like
4 the question to just stay on the record --

5 CHAIRMAN STETKAR: Yes.

6 MEMBER ARMIJO: -- and at some point we get
7 it answered.

8 MR. SPRENGEL: Oh, no, I can answer that
9 question. We have no testing planned for US-APWR.

10 MEMBER ARMIJO: Yes, but the prior question
11 was, has Mitsubishi developed such a test or had someone
12 develop it for them, a client, and demonstrate that they
13 can reproduce what happened at San Onofre?

14 MR. SPRENGEL: I --

15 MEMBER ARMIJO: It's a very standard thing,
16 you know --

17 MR. SPRENGEL: We can have that as a
18 takeaway, but I think that question is actually for SONGS
19 to answer.

20 CHAIRMAN STETKAR: That sounds more --

21 MR. SPRENGEL: I don't think I can answer
22 that question.

23 MEMBER ARMIJO: Well it's a question for
24 Mitsubishi, it's not for SONGS. I'm asking, do you have,
25 it's very simple. I'll ask do you have, have you

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1 developed a test that says hey, look, we had this problem
2 with a steam generator, it wasn't detected or anticipated
3 by analytical methods, but now we know what went wrong
4 and we have developed a test to assure that we never get
5 into that problem again.

6 That's really the question and it's not a
7 SONGS issue, it's a Mitsubishi issue.

8 MEMBER RICCARDELLA: You know, and I could
9 interpret that the ASME Code requires such a test. That
10 if it's a nonstandard design and you're going to qualify
11 your design, you need to do some testing.

12 MR. SPRENGEL: I don't feel comfortable
13 continuing the discussion any further in an open session,
14 so --

15 CHAIRMAN STETKAR: Certainly not in an open
16 session. The question is can we continue it in a closed
17 session where there could be some productive discussion?

18 If we can, we'll close it. Let's, look,
19 rather than beating around the bush, let's close the
20 session and discuss what we can discuss and at least air
21 out more details of the questions and responses and then
22 we'll at least understand each other a little bit better.

23 MR. SPRENGEL: Yes. I guess I would
24 request that maybe we hold the closed portion at the, it
25 might be difficult at the beginning of tomorrow. The

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1 questions are trending away from US-APWR specifically,
2 I understand the questions and I don't fault the
3 questions, but it's a complex --

4 CHAIRMAN STETKAR: Sure.

5 MR. SPRENGEL: -- business environment
6 right now that will be hard for us to --

7 CHAIRMAN STETKAR: You know, and I
8 absolutely understand that, so, Ryan, I'll ask you, let
9 me put on the table that we should close, we should have
10 some closed discussion between now and the end of
11 tomorrow to at least air out the questions and whatever
12 we can discuss.

13 I'll let you decide on the timing of that
14 and who you may or may not want present, okay?

15 MR. SPRENGEL: Okay.

16 CHAIRMAN STETKAR: So we'll just put that
17 on the agenda --

18 MR. SPRENGEL: Sure.

19 CHAIRMAN STETKAR: -- and you can get back
20 to us and tell us when you want that closed session and
21 we'll make sure that it happens.

22 MEMBER SCHULTZ: John, I have a question
23 for Mark that should be in open session on this topic.
24 In this particular section as compared to the others that
25 we've discussed this morning, you did not talk about code

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1 qualification for the analysis that was performed or NRC
2 audits of the analysis methodology as was done in other
3 sections.

4 And I'm just wondering what the status is
5 related to the qualification of the computational codes
6 that have been used here and the NRC review.

7 MR. BIERY: Yes. I believe we covered, not
8 in this section specifically, but in a prior section.

9 MEMBER SCHULTZ: Okay. So this applies
10 across Section 3.9 then? That's this statement?

11 MR. BIERY: Yes.

12 MEMBER SCHULTZ: And into 3.9.2?

13 (Off the record comments)

14 MR. BIERY: I see agreement. It
15 equalifies across the board.

16 MEMBER SCHULTZ: Okay, thank you.

17 MR. BIERY: The second open item in
18 Subsection 3.9.2 is also steam generator related,
19 provide preliminary design of the steam generator tube
20 bundle and design of criteria for the tubes and retainer
21 bars against flow-induced excitations, including
22 various effects.

23 Again, response is under preparation. The
24 next subsection is 3.9.3, that's ASME Code, Class I, II,
25 and III components, components supports, and core

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1 support structures. And we have two open items in this
2 subsection.

3 This subsection provides regulatory
4 compliance with the following, we list here 10 CFR 50,
5 Appendix A, and 50.55(a), 10 CFR 50, Appendix S, and GDCs
6 2, 4, 14, and 15.

7 Component design, component design is
8 performed in accordance with the ASME Boiler and Pressure
9 Vessel Code, load combinations for all ASME service
10 levels, such as dynamic loads and static loads are used.

11 Design criteria and stress limits are based
12 on ASME Code Section 3. Reactor coolant loop design is
13 presented in Appendix 3-C of Technical Report
14 MUAP-09002, which is a summary of seismic and accident
15 load conditions for primary components and piping.

16 Design specs for risk significant ASME
17 Class I, II, and III PSCs, including supports, are
18 provided in accordance with ASME Section 3. Design and
19 installation of pressure relief devices, pressure relief
20 valves are designed to comply with the requirements of
21 ASME Code Section 3.

22 Pressurized or safety valves provide
23 over-pressure protection for the reactor cooling system.
24 Safety valves and power operated relief valves are
25 provided on the steam lines.

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1 Relief valves are provided on the residual
2 heat removal system as well, and these perform low
3 temperature over-pressure protection for the reactor
4 cooling system.

5 Pump and valve operability assurance, pump
6 operability, the operability of active pumps is
7 established for safety-related functions and operating
8 conditions. Active pump design criteria and stress
9 limits for pressure retaining and support functions are
10 based on ASME Code, Section III.

11 Similarly, for valve operability,
12 operability of active valves is established for
13 safety-related functions and operating conditions. And
14 design criteria and stress limits for the pressure
15 retaining support functions, again, based on ASME Code,
16 Section III.

17 Component support design, is confirmed to
18 be in accordance with the boiler and pressure vessel
19 code. Load combinations for all ASME service levels,
20 design criteria and stress limits are based on ASME
21 Section 3.

22 Support classifications divide into two
23 classifications, manufactured standard supports, to
24 include spring hangers, snubbers, and struts, as well as
25 supplementary steel supports, frame type pipe supports,

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1 base plates and anchor bolts.

2 Again, we have some open items for this
3 subsection. The first, requested MHI give details of
4 the modeling and analysis methods of supports used for
5 major components, including sketches of the support,
6 design, loads, and load combinations, applicable stress
7 of limited criteria, and fatigue evaluation criteria.

8 A response was submitted in April of 2009,
9 and this RAI is an open item pending the staff's review
10 of two Technical Reports, MUAP-08005 and MUAP-10006.

11 The next open item, requested MHI to inform
12 the staff when PSC design specs within the audit scope
13 are available for audit. MHI submitted revised design
14 completion plan for the US-APWR piping systems and
15 components in December of 2012, and its revision in
16 August of '13, both of which requested the audit to be
17 planned for December of this year.

18 MHI will submit a response to confirm
19 completion of the design specs. Next subsection is
20 3.9.4, Control Rod Drive Systems. This subsection
21 provides information of design, functional requirements
22 and operability assurance program for the control rod
23 drive mechanism portion of the control rod drive system.

24 The CRDM of the US-APWR is the magnetically
25 operated jacking type based on the L-106A type CRDM,

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1 which has been used in many operating plants in the U.S.
2 and Japan.

3 The CRDM pressure housing is designed in
4 accordance with ASME Code, Section III, Subsection NB.
5 We have some open items for this subsection. The first
6 requested MHI to show the basis of the allowable rod
7 travel housing deflection and demonstrate that the
8 estimated CRDM deflection in US-APWR does not exceed
9 allowable limits.

10 In the amended response MHI estimated
11 deflection of the CRDM pressure housing at Level D
12 conditions, it's within the allowable limits. The
13 response to these sub-questions is going to be revised
14 to reflect updated seismic information at a later point.
15 No impact on DCD is expected at this time.

16 Next open item, requested MHI to provide
17 justification for the increase in the maximum CRDM
18 deflection for the Level D conditions in the amended
19 response to RAI 107-1293.

20 In this MHI explained that the CRDM dynamic
21 response analysis results reflected the seismic
22 conditions of DCD Rev 3. This question and response will
23 be revised to reflect updated seismic information.
24 Again, we also do not expect the DCD to be impacted by
25 this.

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1 Next subsection is Subsection 3.9.5,
2 Reactor Pressure Vessel Internals. This subsection
3 provides outline information on the structure and the
4 design basis of upper and lower reactor pressure vessel
5 internals.

6 The codes and standards applicable to
7 reactor internals are ASME Code, Section III, Subsection
8 NG, as well as ASME Code Section 11.

9 The US-APWR adopts the use of a neutron
10 reflector replacing conventional baffle structures.
11 This will result in improved neutron reflectivity and
12 significant reduction in the number of threaded
13 fasteners.

14 And we give a figure here of the neutron
15 reflector assembly.

16 MEMBER RICCARDELLA: How do you reduce the
17 number of fasteners? What is it about the design that
18 reduces the number of fasteners?

19 MR. MATSUMOTO: Do you mean how many
20 fasteners number? In the case of --

21 MEMBER RICCARDELLA: We can't hear you.
22 You have to speak up.

23 CHAIRMAN STETKAR: Matsumoto-san, just
24 speak up a little bit louder so that we can hear you on
25 the recorder.

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1 MR. MATSUMOTO: In the case of core
2 barrier, fastener number is about 2000. On the other
3 hand, this involve is about 20 piece.

4 MEMBER RICCARDELLA: Just 20 fasteners in
5 the whole baffle structure?

6 MALE PARTICIPANT: Thank you.

7 MALE PARTICIPANT: As long as it hangs
8 together. No RAIs on this one.

9 MALE PARTICIPANT: Okay.

10 MR. BIERY: Again, no open items for this
11 subsection. Moving on to Subsection 3.9.6, Functional
12 Design Qualification In-Service Testing Programs for
13 Pumps, Valves, and dynamic Restraints.

14 ASME Code, Section III, Class I, II, and III
15 safety-related pumps, valves, and dynamic restraints
16 that are required to perform a safety function are
17 subjected to in-service testing to assess and verify
18 operational readiness as set forth in 10 CFR 50.55(a)(f),
19 as well as the ASME OM Code.

20 The in-service testing program implements
21 ASME OM Code 2004 edition through '06 addenda. The COL
22 applicant is responsible for administrative control of
23 the IST program as well as control of the ASME Code
24 addition and addenda which will be used in their IST
25 programs.

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1 We have an open item for this subsection.
2 The RAI is an open item to track and audit of the US-APWR
3 design and procurement specs to evaluate implementation
4 of the functional design and qualification and IST
5 programs.

6 And currently preparation of sample design
7 and procurement specs isn't progressed by MHI.

8 CHAIRMAN STETKAR: Mark, I, and I don't
9 know the best way to do this. I went through Table
10 3.9-14. I really didn't intend to go through it, but I
11 got started and one thing led to another, so I did.

12 And I had several questions about the
13 testing frequencies for a number of valves listed in that
14 Table that in general, you either go for quarterly
15 testing or sometimes it's referred to as cold shutdown,
16 sometimes it's referred to as a refueling outage,
17 sometimes it's referred to, you know, 24 months, but it's
18 basically 2-year testing or quarterly testing on the vast
19 majority of those valves.

20 And in many cases the 2-year testing
21 interval for valves was justified by statements saying
22 either of the tests would result in disruption of a
23 normally operating support system or it could result in
24 a plant transient and therefore the test should only be
25 conducted at cold shutdown or when those systems were not

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1 normally pressurized or operating.

2 And I looked at a number of those, and I
3 actually have a lot of questions here, which are probably
4 too detailed to go through, but in many cases it wasn't
5 clear to me that the justification was consistent with
6 the way that the plant will be operated.

7 For example, you know, if I look at a lot
8 of the support systems, essential service water,
9 essential chilled water, component cooling water,
10 ventilation systems, the plant is basically designed to
11 have two trains of those things running normally, two
12 trains in standby.

13 And there's a requirement for the pumps or
14 the fans, or the chillers, or whatever the large rotating
15 equipment, that that equipment be tested once per
16 quarter, that's the Table 3, I've forgotten the Table
17 number. It's the Table on the pumps and those sort of
18 things.

19 I don't know how the COL applicant is
20 actually going to run their plant. A lot of plants that
21 have those quarterly testing requirements take the
22 normally running train and put it in standby and take the
23 standby train and make it normally running.

24 In other words, they switch the plant
25 configuration once per quarter, that's good, they

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1 satisfy their testing requirements and they balance the
2 run times on pieces of equipment, so everybody's happy,
3 but that's obviously the COL applicant and how they're
4 going to run the plant.

5 But given the fact that half the plant is
6 in standby at least half the time, it's not at all clear
7 to me why I can't stroke a valve for something that's in
8 standby because stroking that valve would disrupt a
9 normally running cooling system.

10 And yet the justification is made that if
11 I operate those valves I'll disrupt a normally running
12 system, so, therefore, I can only do it during cold
13 shutdown. And there are a lot of other things like
14 testing of the safety depressurization valves and
15 depressurization valves from the pressurizer.

16 It says that I have to test the block valve
17 once per quarter, but I can't test the other ones unless
18 I'm in cold shutdown because, well I might induce a LOCA.
19 You'd only induce a LOCA if the block valve's closed.

20 Close the block valve, cycle a
21 depressurization valve, re-open the block valve. You
22 have to test the block valve. So I had a lot of questions
23 like that that I couldn't understand the justification
24 for not testing once per quarter on a lot of the systems.

25 As I said there's a lot of details, and this

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1 really, I'll telegraph it to the staff because I didn't
2 see any staff questions regarding those test
3 frequencies.

4 So I'll just raise it now, if you have some
5 general response, you know, rather than going into
6 valve-by-valve, system-by-system, I'd appreciate it,
7 from your perspective, and I will ask the staff, you know,
8 sort of a similar question when they come up about why
9 they didn't have questions about those test frequencies
10 in the Table.

11 MR. BIERY: So your concern is consistency
12 and reasoning behind the testing frequencies of those
13 valves?

14 CHAIRMAN STETKAR: Exactly. And in
15 particular wherever the testing is justified by
16 statements that says performing the testing once per
17 quarter would disrupt a, let's say, normally required
18 support system.

19 And it's typically associated with cooling
20 water or ventilation chilled water systems, those types
21 of justifications, or that performance of the test would
22 result in a plant transient and those justifications are
23 typically assigned to things like the safety
24 depressurization valves, the depressurization valves on
25 the pressurizer, and the main steam relief valves, the

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1 main steam depressurization valves over on the secondary
2 side of the plant.

3 MR. BIERY: Okay. I think we'll need to
4 look into that further. I don't know if we can answer
5 that immediately.

6 CHAIRMAN STETKAR: If you want certain, you
7 know, if you want specific examples for elaboration, I
8 can give that you offline --

9 MR. BIERY: Okay.

10 CHAIRMAN STETKAR: -- but that detail tends
11 to get way down in the noise level for discussion, you
12 know, in the full open session here.

13 MEMBER SCHULTZ: Mark, just to ask you a
14 question about this particular response that you have in
15 preparation, in progress --

16 MR. BIERY: Yes.

17 MEMBER SCHULTZ: The NRC concern seems to
18 be in the detail associated with evaluating the
19 implementation and the way you've described it you're
20 going to hit the upper level, first part of the concern,
21 I just wanted to make sure that it's going to follow
22 through to look at functional design qualification and
23 also the IST programs.

24 This is one question for this section and
25 so I'm assuming it's going to cover, your response is

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1 going to cover each of those elements in some level of
2 detail.

3 MR. BIERY: Yes. the sample design
4 specifications that we're preparing for this audit are
5 intended to address all these concerns making sure that
6 we're consistent for a licensing basis in these specs,
7 and including all these points in the evaluation.

8 MEMBER SCHULTZ: Good. Thank you.

9 CHAIRMAN STETKAR: I think since you have
10 several slides that address the seismic qualification,
11 I think what I'll do is we'll break for lunch now rather
12 than trying to rush through those.

13 We have something else happening at noon,
14 so we basically have to break now. So what I'll do is
15 we'll recess for lunch and reconvene at 1:00 p.m.,
16 according to the schedule, and finish up this part of the
17 presentation.

18 (Whereupon, the foregoing matter went off
19 the record at 11:55 a.m. and went back on the record at
20 1:01 p.m.)

21 CHAIRMAN STETKAR: We are back in session
22 and we'll continue with MHI's presentation on Section
23 3.10, I guess, although it looks like you may have some
24 answers.

25 MR. BIERY: Yes, sir.

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1 CHAIRMAN STETKAR: So I'll keep my mouth
2 shut and let you speak.

3 MR. BIERY: Yes, sir. Good afternoon,
4 gentlemen. My name again is Mark Biery. Before we
5 proceed to Section 3.10 we're going to circle back and
6 answer some of the questions from 3.5 and I'll go ahead
7 and I'll turn it over.

8 MR. MINAMI: Yes. My name is Minami,
9 again, and I understand your question is how I calculated
10 the probability of that past due to low-cycle fatigue.

11 And the calculation procedure is explained
12 in the Section 3.3 in the MUAP --

13 MALE PARTICIPANT: Yes.

14 MR. MINAMI: -- in 07028. And on this
15 slide there is an equation which is usually called Paris
16 equation and usually used for the low-cycle analysis
17 fatigue.

18 CHAIRMAN STETKAR: Could you just make sure
19 that you speak up so that we catch on the record. You
20 can move the microphone a little bit closer. It's just
21 really important that we pick up your words. Thank you.

22 MR. MINAMI: And then this equation "A"
23 denotes crack size and the "N" is the number of where the
24 start and stop cycle and indicates stress intensity.
25 And the "C0" and the "N" is a constant particular to the

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1 material, right?

2 MALE PARTICIPANT: Yes.

3 MR. MINAMI: And from this equation we can
4 derive the following next equation and that's equal to
5 blah, blah, blah. And based on this equation --

6 MEMBER RICCARDELLA: But in the second
7 equation you need to establish a critical, a crit --

8 MR. MINAMI: Right.

9 MEMBER RICCARDELLA: -- which is a function
10 of the fracture toughness, right?

11 MR. MINAMI: K1C, function of K1C, and as
12 for the K1C we used that propriety number for estimating
13 a critical and based on the, we used Belgrade method,
14 which is authorized by --

15 MEMBER RICCARDELLA: Of the what method?

16 MR. MINAMI: Belgrade. And we obtained
17 K1C using the minimum material property, which is
18 specified in purchase specification.

19 MEMBER RICCARDELLA: Okay. So you didn't
20 assume --

21 CHAIRMAN STETKAR: You two, pull the mike
22 closer to you so you come across, I'm sorry.

23 MEMBER RICCARDELLA: I understand, keep
24 going.

25 MR. MINAMI: So we estimated K1C based on

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1 our purchase specification of the low pressure turbine
2 rotor material. And based on the K1C we estimated a
3 critical, a critical, right? So if we obtain a critical
4 we can estimate the number of the start and stop to reach
5 a critical from the initial size of the crack, right?

6 MEMBER RICCARDELLA: Yes.

7 MR. MINAMI: And for obtaining the
8 probability of the rotor failure due to low-cycle fatigue
9 we used in some variation for C0 and based on our own
10 experience.

11 MEMBER RICCARDELLA: Okay.

12 MR. MINAMI: And the variation is shown in
13 the Table 3.3, this one.

14 MEMBER RICCARDELLA: Yes.

15 MR. MINAMI: Right?

16 MEMBER RICCARDELLA: I saw that.

17 MR. MINAMI: Right. And using this mean
18 value understand that deviation. We estimated the
19 number. So if we use this variation the number of the
20 start and the stop to reach the critical speed depend on
21 the combination of C0 and the N, right?

22 MEMBER RICCARDELLA: Yes.

23 MR. MINAMI: And if we assume some profile
24 of that C0 and zero we can get to the probability of
25 occurrence.

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1 MEMBER RICCARDELLA: Well you can get a
2 distribution on N sub F on the number of cycles, right?

3 MR. MINAMI: Right.

4 MEMBER RICCARDELLA: But then how does that
5 relate to the probability of a rupture?

6 MR. MINAMI: If we estimate one combination
7 of C0 and the N we will obtain one COG, COG means variation
8 between crack size and the number. And if we add in
9 another combination of the C0 and the N we'll have another
10 variation.

11 MEMBER RICCARDELLA: Yes.

12 MR. MINAMI: So, I mean, we have the
13 probability of occurrence depending on the number.

14 MEMBER RICCARDELLA: I see. So you have
15 all these curves and then you expect 60 cycles or some
16 number of cycles --

17 MR. MINAMI: Right.

18 MEMBER RICCARDELLA: -- and you put that in
19 there, I see.

20 MR. MINAMI: Right.

21 MEMBER RICCARDELLA: Okay.

22 MR. MINAMI: Look at the way we obtain the
23 probability of most failures.

24 MEMBER RICCARDELLA: I understand, that's
25 reasonable. I would only say that in my experience

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1 there's also a probability of distribution on the
2 fracture toughness --

3 MR. MINAMI: Right.

4 MEMBER RICCARDELLA: -- and also on the
5 initial crack size because you have some uncertainty in
6 the inspections that --

7 MR. MINAMI: Right. And for the initial
8 crack size we used some numbers, but it is equal to the
9 maximum undetectable size and we assumed some additional
10 margin to compensate some uncertainty.

11 MEMBER RICCARDELLA: Okay. All right.
12 Yes, so --

13 MR. MINAMI: So --

14 MEMBER RICCARDELLA: Okay. So you treat
15 the uncertainty in C and the N and then as far as the
16 uncertainty on initial crack size and on K1C you just
17 assume conservative bounding values.

18 MR. MINAMI: Right.

19 MEMBER RICCARDELLA: I understand.

20 MR. MINAMI: Right.

21 MEMBER RICCARDELLA: Thank you.

22 CHAIRMAN STETKAR: Thank you. That was a
23 very good explanation.

24 MR. MINAMI: Thank you.

25 CHAIRMAN STETKAR: That helps a lot. It's

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1 another reason why we kind of schedule these meetings for
2 two days because our experience has been that a lot of
3 times we can get some of the questions answered pretty
4 much in real time.

5 So that's useful, thank you. And I guess,
6 Mark, you can now continue.

7 MR. BIERY: Yes, sir.

8 CHAIRMAN STETKAR: Do whatever you want to.

9 MR. BIERY: Go ahead and switch it back,
10 please. Switch to the other computer, please.

11 CHAIRMAN STETKAR: By the way we'll need
12 this slide for part of our record --

13 MR. BIERY: Yes.

14 CHAIRMAN STETKAR: -- because it's part of
15 the record of the meeting, so make sure we have that.

16 MR. BIERY: We'll proceed as soon as we get
17 our switched computer back.

18 CHAIRMAN STETKAR: Yes, that's fine.

19 (Pause)

20 CHAIRMAN STETKAR: Excellent.

21 (Crosstalk)

22 MR. BIERY: Okay. We'll go ahead and
23 proceed onto Section 3.10 and that is Seismic and Dynamic
24 Qualification of Mechanical and Electrical Equipment.

25 Qualification standards used in this

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1 section include IEEE Standard 344-2004 as modified by Reg
2 Guide 1.100 for safety-related mechanical and electrical
3 equipment and supports.

4 Also used ASME Code, Section III for
5 structural integrity of safety-related pressure
6 boundary components. And then finally, ASME QME-1-2007
7 for qualification of active mechanical equipment.

8 Performance requirements for Seismic Cat I
9 instrumentation electrical equipment are provided in
10 corresponding equipment qualification summary data
11 sheets, or EQSDSs.

12 Seismic Cat I active mechanical components
13 are defined in corresponding equipment specs along with
14 system functional requirements, performance criteria to
15 perform their designated safety-related functions under
16 the postulated SSC in combination of other concurrent
17 loadings, deformation of supports and structures is
18 considered acceptable, provide their's and other
19 equipment safety-related functional performance are not
20 compromised.

21 Testing is in accordance with Reg Guide
22 1.100, Rev 3. The EQ Program is provided in DCD Section
23 3.11. Analyses are done in accordance with Reg Guide
24 1.100, Rev 3. Analysis without testing is acceptable
25 only if structural integrity alone can ensure the design

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1 intended design function.

2 Combination of testing analysis, again, in
3 accordance with Reg Guide 1.100, if it's utilized when
4 the equipment cannot be practically qualified by
5 analysis or testing alone.

6 Test or analysis to assure structural
7 capability, including anchorage, electrical equipment
8 instrumentation supports are tested with the equipment
9 installed or an equivalent dummy. For mechanical
10 equipment supports, including pumps, valves, valve
11 operators, and fans, it's in accordance with ASME Code,
12 Section III.

13 For instrumentation line supports using the
14 criteria from ASME Code, Section III, Subsection NF, for
15 equipment Class I and II supports. Equipment
16 qualification file will include qualification method
17 used for equipment, tested analyses results, lists of
18 systems equipment, equipment support structures,
19 EQSDSs, seismic input requirements, experience-based
20 qualification will not be used for any equipment.

21 We do have some open items for this DCD
22 Section. The first, requested MHI to provide a list of
23 components in the gas turbine generator system to be
24 seismically qualified with the method of seismic
25 qualifications specified for each component in estimated

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1 qualification schedules.

2 The staff had an opportunity to witness the
3 testing. And then also, in DCD Tier 2, Section 3.10, the
4 seismic qualification criteria and procedures including
5 referenced report number, formulated electrical and
6 mechanical components of the gas turbine generator.

7 And then MHI submitted a revised response
8 in June of '13, and this RAI remains an open item pending
9 submittal and the staff review of MUAP-10023 revisions,
10 Revision 6, submitted in September '13, and we have
11 another revision scheduled for December of '13.

12 MEMBER RICCARDELLA: So to go back to an
13 earlier discussion, you asked well this turbine
14 generator, the gas turbine generator is not seismic
15 class, but yet you are going to qualify it. Is that --

16 CHAIRMAN STETKAR: There's two sets of gas
17 turbine generators.

18 MEMBER RICCARDELLA: Ah.

19 CHAIRMAN STETKAR: These are the emergency
20 gas turbine generators.

21 MEMBER RICCARDELLA: Okay.

22 CHAIRMAN STETKAR: The one's I was talking
23 about is a different set, they're the alternate AC gas
24 turbine generators.

25 MEMBER RICCARDELLA: Backup system or

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1 backup --

2 CHAIRMAN STETKAR: They're --

3 MEMBER RICCARDELLA: Okay.

4 CHAIRMAN STETKAR: -- non-safety-related
5 backup for a station blackout.

6 MEMBER RICCARDELLA: Okay.

7 MR. BIERY: With that we'll move onto
8 Section 3.12, piping design review, and we're going to
9 go ahead and switch seats here quickly again. This
10 section covers the design of the piping systems including
11 piping supports which comprise Seismic Cat I and
12 Non-Seismic Cat I piping systems.

13 Codes and standards are consistent with 10
14 CFR 50, Appendix A, General Design Criteria 1, 2, 4, 14,
15 and 15, as well as 10 CFR 50, Appendix S. Piping analysis
16 used the 1992 edition with '92 addenda of the ASME Code,
17 Section III, Division I, that's Subsections NB, NC, and
18 ND, in accordance with the requirements of 10 CFR
19 50.55(a).

20 Material properties comply with ASME Code,
21 Section II, 2001 edition through, including, 2003
22 addenda.

23 MEMBER RICCARDELLA: Is that the most
24 recently approved version of Section III? It seems old.

25 MR. TAKAYAMA: 1992 edition is because 10

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1 CFR 50.55(a) doesn't induce 1993 edition. So we use 1992
2 edition.

3 MEMBER RICCARDELLA: Okay.

4 MR. BIERY: Analysis methods, seismic
5 analysis for all Seismic Category I and II piping systems
6 use methods in accordance with SRP 3.7.3. These methods
7 include the response spectrum method or, where
8 applicable, the equivalent static load method, or
9 modeling supports in the piping analysis, the decoupled
10 support model, model the stiffness, or an integrated
11 support model, the actual structural model of the support
12 is used.

13 Dynamic analysis consists of a sequence of
14 nodes connected by straight pipe elements. Curved pipe
15 elements with stiffness properties representing the
16 piping, as well as other in-line components.

17 Computer programs are verified and
18 validated using NUREG/CR-1677, Volumes I and II. NRC
19 audit for the computer program and design methodology is
20 documented in DCD Section 3.12. That audit was
21 completed in August of 2011.

22 Stress analysis criteria, allowable stress
23 is a piping system for various loads and load
24 combinations are defined based on ASME Code, Section III,
25 Subsections NB, NC, and ND.

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1 Combination of modal response, SRSS 10
2 percent grouping method in high frequency modes are
3 considered in accordance with Reg Guide 1.92. Class I
4 piping is evaluated for the effects of fatigue caused by
5 thermal transients and other cyclic events, including
6 earthquakes and thermal stratification occurring in the
7 surge line.

8 Thermal stratification and oscillation in
9 the closed branch piping connected to the RCS would be
10 prevented in accordance with US-APWR design approach
11 described in DCD Subsection 3.12.5.9, and that, again,
12 is DCD Revision 4.

13 The environmental impact on fatigue of
14 Class I piping follows the requirements delineated in Reg
15 Guide 1.207. Seismic Category I pipe supports are
16 designed in accordance with Subsection NF of the ASME
17 Code, Section III, 2001 edition through, including, 2003
18 addenda.

19 The load combinations for the piping
20 support design are defined based on Level A, B, C, and
21 D service conditions. And we have some open items for
22 this DCD Section.

23 The first, requests MHI to clarify the
24 analysis model and input for reactor coolant loop piping
25 dynamic analysis. A response was submitted with the

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1 requested clarification in September of '12. The
2 seismic and accident design analysis method for RCL
3 system components is presented in MUAP-09002, and the
4 next revision will be submitted this month.

5 There are DCD changes, standard response,
6 which have been incorporated into DCD Rev 4 and that is
7 still pending staff review and, therefore, this RAI
8 remains an open item pending staff review.

9 The final section for today will be Section
10 3.13, threaded fasteners. The design requirements are
11 the same as that for existing operating plants.
12 Material selection is based on ASME Boiler and Pressure
13 Vessel Code, selection criteria are in accordance with
14 NCA-1220 and NB/NC/ND-2128.

15 Fracture toughness is in accordance with
16 NB/NC/ND-2300 and 10 CFR 50, Appendix G. Lubricants
17 include Fel-Pro, Neolube #126, and Nuclear Grade
18 Neverseez. MoS2 and copper-based anti-seize compounds
19 will not be used.

20 And then reactor vessel closure stud bold
21 requirements, again, similar as to the existing plants.
22 In-service inspection requirement, that procedure is
23 based on ASME Code, Section XI, and then there are no open
24 items for this DCD Section.

25 And then that concludes our presentation

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1 for today.

2 CHAIRMAN STETKAR: Okay. We're well ahead
3 of schedule, sometimes that happens. Do any of the
4 members have any questions for MHI on any of the
5 subsections of Chapter 3?

6 Nothing else? If not, then --

7 MEMBER RICCARDELLA: Just one general
8 question, and I noticed, and this might be part of what's
9 going to be reviewed in 3.7, 3.8, but I noticed in the
10 load definition document that your seismic peak ground
11 acceleration was 0.3g. Is that OBE or SSE, 0.3, service
12 Level B or service Level D?

13 MR. TAKAYAMA: SSE.

14 MEMBER RICCARDELLA: SSE, okay. 0.3g is
15 SSE. Thank you.

16 CHAIRMAN STETKAR: You selected OBE as --

17 MR. TAKAYAMA: One-third.

18 CHAIRMAN STETKAR: -- yes, one-third of
19 that or something like that.

20 MR. TAKAYAMA: Well, okay.

21 MEMBER RICCARDELLA: One-third?

22 MR. TAKAYAMA: Little less than one-third
23 ACC -- OBEs.

24 CHAIRMAN STETKAR: Okay. Any other
25 questions? If not, thank you for covering an awful lot

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1 of material very well. I really appreciate it. We
2 obviously had a few questions that we'll need to follow
3 up on.

4 The staff is up next and I don't know whether
5 you have people here yet because we're about an hour and
6 a half ahead of our published schedules and people tend
7 to organize their day around the meeting agenda.

8 So, Dennis, what's your situation?

9 MR. GALVIN: I told people to be here as
10 early as 2:00 p.m., but some people may be waiting in
11 their offices, we could --

12 CHAIRMAN STETKAR: I tell you what, why
13 don't we, so we're just not sitting around on the record,
14 why don't we take a break and see when you can muster folks
15 here and then I'll ask people -- let's take a break until
16 1:45 p.m. and hopefully you can get a few folks to start
17 your presentation by then.

18 Does that seem feasible?

19 MR. GALVIN: I think that's feasible.

20 CHAIRMAN STETKAR: Okay.

21 MR. GALVIN: Okay.

22 CHAIRMAN STETKAR: Good. Let's do that.
23 Let's recess until 1:45 p.m.

24 (Whereupon, the foregoing matter went off
25 the record at 1:26 p.m. and went back on the record at

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1 1:46 p.m.)

2 CHAIRMAN STETKAR: We are back in session
3 and we'll hear from the staff on their review of DCD
4 Chapter 3. Dennis, it's yours.

5 MR. GALVIN: Hello, my name is Dennis
6 Galvin. I'm the Chapter 3 Project Manager. As you'll
7 see, because we -- here's the staff. We have two slides
8 with the staff, who contributed to the review. As you
9 can see, we have 24 open items. About seven different,
10 over seven different technical areas.

11 So what we're going to do, is I'll go ahead
12 and introduce the open items, give a brief description.
13 If you want to go ahead and if you have any questions,
14 we'll have the technical staff, go ahead and answer the
15 questions. Just so they don't have people pairing,
16 they'll probably go to the mikes to answer the questions.

17 So first open item is, this covers three
18 different Sections, 3.2.1, 3.2.2, and 3.9.3. We need,
19 the staff does an audit of the design specifications and
20 also as part of the review of, ASME Class 1, 2, and 3
21 components. MHI as they told you, has been preparing
22 this design specifications.

23 We also are going to combine that with a
24 performance specification audit. Those were scheduled
25 to be completed, available in January 2014. At this

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1 point, with the slowdown, this is not currently
2 scheduled. We learned that in the last week.

3 The next two we've already covered, are
4 flooding, RAI 841-6055. This RAI tracks the need for the
5 staff to complete a flooding analysis audit concerning
6 the modeling assumptions and pipe break selections.
7 Staff has completed an audit, and MHI has submitted a
8 follow up response. And we're still reviewing the
9 response.

10 Also again the staff identified, next one,
11 question 30, the staff is awaiting the submittal of
12 changes to the building layout, flood barriers, and
13 water-tight doors resulting from seismic design changes.
14 Those changes have been submitted and the staff is in the
15 process of reviewing those.

16 CHAIRMAN STETKAR: Dennis, while you're
17 talking about flooding, I have a question. I'm trying
18 to find my notes here. There, in MHI's discussion of
19 flooding from internal sources, they invoke the notion
20 that cracking in certain moderate energy piping need not
21 be assumed. In particular, I'll give you a quote out of
22 Section 3.4.1.3 of the DCD. It says, "most of the water
23 containing moderate energy piping in the radiological
24 controlled area of the reactor building, is excluded from
25 flooding source because that piping is to be designed so

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1 that crack is not required to be postulated in the line,
2 in accordance with the criteria described in Subsection
3 3.6.2.1.2.2. This is attained by maintaining stress on
4 the pipes below the threshold by means of route and
5 support design."

6 And it's my understanding that they
7 basically used that assumption to exclude a large numbers
8 of potential flooding sources. I asked the applicant
9 this morning about how they consider potential flooding,
10 for example from the emergency service water, or the
11 essential service water piping connections to the
12 component cooling water heat exchanges? It's clear that
13 they don't.

14 I asked them how they consider potential
15 flooding from the connections from the emergency storage
16 tanks to the emergency feed water pump suction? It's
17 clear that they don't. If they did, they would have
18 flood depths higher than they do.

19 So my question is, given the fact that
20 piping can crack and more importantly, my observation
21 earlier this morning, that operating experience has
22 shown that floods often result not from spontaneous
23 cracking of pipe, but from maintenance and operational
24 activities that drain the water from a point A to a point
25 B. How's the staff, the staff has apparently accepted

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1 this notion of none fallible piping as a basis for the
2 flooding analysis, I was curious about how that works
3 out?

4 MR. GALVIN: We have Angelo Stubbs from the
5 staff here that --

6 MR. STUBBS: Okay. They came, this is
7 something that they came in and they made some changes
8 to what they were looking at with the moderate energy line
9 cracks, from the original application. Where they were
10 going to do a redesign and I'm not, to say is, there are
11 certain sections and in some cases they may be complete
12 systems where they actually looked at that. So that they
13 would do the design, so that they wouldn't see certain
14 stress levels.

15 I want to, and based on that, there are
16 certain areas where they re-evaluated the results of
17 flooding due to moderate energy line cracks. The
18 acceptance on that, I mean, I going to let Renee talk to
19 that from the ME's stand point. But there was a criteria
20 at 3.6.2 that decided that if they need that criteria,
21 they would not necessarily have to assume a leak in those
22 sections of the pipe. Renee can talk about it.

23 MR. GALVIN: This is Renee Li.

24 MS. LI: Yes, I'm Renee Li from Mechanical
25 Engineering Branch. I think this also from this morning

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1 discussion, we also have some question related to break
2 exclusion. So because of related, I will try to address
3 both issues. So first, the staff guideline that, for
4 postulating either breaks, in high energy line, or cracks
5 in moderate energy line is provided in SRP 3.6.2. And
6 in associated Branch Technical Position 3-4.

7 And SRP 3.6.2 and Branch Technical Position
8 3-4 in part, it provides guideline of where to postulate
9 breaks and cracks in high energy line, as well as moderate
10 energy line. And approach in those guideline is a
11 mechanistic, we assume the mechanistic value which
12 means, the failure not induced by any other event or
13 source, like seismic.

14 So it's a deterministic criteria and in
15 final, the ASME quote stress and fatigue design criteria.
16 So the Branch Technical Position 3-4 provide guideline
17 of a stress threshold. If the piping design maintain the
18 stress and the fatigue usage factor, without those
19 threshold, then one does not have to postulate breaks in
20 high energy line and cracks in moderate energy lines.

21 But I want to stress that, those breaks and
22 cracks that covered within the scope of 3.6.2, like I say,
23 is a mechanistic value. It does not include failure due
24 to seismic or other, you know, like rusting, corrosion,
25 erosion. It does not consider those.

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1 Now as far as the question you just asked
2 about moderate energy line, within the scope of 3.6.2 and
3 the Branch Technical Position 3-4, it then depend the
4 stress and fatigue within that threshold for the moderate
5 energy line, then they don't have to postulate leakage,
6 crack or assume a crack not would result in flooding.

7 But okay, flooding can be induced by other,
8 for example if you have a non-seismic category piping,
9 even it's another high energy line, since it's not
10 designed to seismic event, therefore one has to consider
11 flooding that pipe breaks, of those moderate energy lines
12 during the seismic event. So I want to differentiate the
13 importance of this too. And since 3.6.2 going to come
14 up, as far as the breaks exclusion --

15 CHAIRMAN STETKAR: Let me, let's, if I can
16 let's address that because it is a bit different in my
17 mind than the concern I've raised. I hear what you're
18 saying, and if I'm a piping designer, I understand what
19 you're saying about pipes not cracking by themselves.

20 My concern is broader than that. I'm not,
21 my concern is looking at a location in the plant where
22 I can have two of my safety divisions of equipment,
23 disabled, potentially, by a flood.

24 Because they are in a, as best as I can tell,
25 shared space. Those are A and B, of the emergency feed

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1 water, with A and B of component cooling water. Both of
2 those being safety-related systems.

3 And the C and D divisions being in another
4 shared space. So if I can flood the shared space
5 occupied by trains A and B, I take out one half of my
6 plants safety-related equipment.

7 Now my technical specifications allow me to
8 have one train out of service, indefinitely. So the
9 question is if I have a flood that takes out half of my
10 safety-related divisions with one of the other trains out
11 of service, can I indeed achieve safe shutdown? That's
12 a question in my mind.

13 Then I start to think about how I can get
14 floods? Well if you say that none of the potential water
15 sources have sufficient capacity to fill that room to a
16 depth so that my equipment can be submerged, or affected,
17 that's one type of analysis. I'm willing to accept that
18 analysis.

19 I just don't have the inventory, no matter
20 what I do to try to get the inventory to that location.
21 I submit that there are a couple of sources for those
22 locations, namely the emergency feed water storage
23 tanks, storage pits. And the essential service water
24 systems that can probably fill those rooms pretty deeply.

25 I haven't done the calculation myself,

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1 because I don't have all the dimensions. But it's clear
2 that they have not been considered as flooding sources.
3 And my question is why collectively are we not evaluating
4 those potential flooding sources?

5 I understand that we're not evaluating them
6 from a piping design criteria, because we design and
7 construct piping very well. I'm more concerned about
8 everything that can happen at a power plant, and our
9 experience that indeed we have flooded locations from
10 inadvertent operations or maintenance activities.

11 And having confidence that this plant
12 design is not vulnerable or unduly vulnerable to those
13 types of events. And I don't know where that's covered.
14 Because this is the only place that I can see where a
15 flooding analysis is performed, other than the PRA.

16 MR. STUBBS: Okay, I think I understand --

17 CHAIRMAN STETKAR: Which is not really done
18 a probabilistic flooding analysis, but that's a
19 different issue.

20 MR. STUBBS: I think I understand what
21 you're saying --

22 CHAIRMAN STETKAR: Okay.

23 MR. STUBBS: -- where you're coming from,
24 but I guess we look at our guidance. It sort of goes
25 beyond what we require to be postulated. And I guess

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1 that's what we're focused on.

2 CHAIRMAN STETKAR: Yes, and I hear what
3 you're saying. The introduction basically set that
4 stage.

5 MR. STUBBS: But, in number of, you know,
6 having conducted an audit, they do take into
7 consideration, I know for a number of systems, we didn't
8 look at every one we did, where there are backup water
9 sources and things are switched. And in many cases they
10 did take into consideration that if, one water source is
11 depleted, or you can switch to another water source.

12 And they, I think it's in some cases they
13 assumed a certain amount of time before operator action,
14 being 45 minutes or whatever, before operator action
15 would be used to cut off the secondary source.

16 But I can't go for every system, and go
17 through as part of the audit. We did look at situations
18 where just because you had, where something may be either
19 automatically or manually transferred to a different
20 source, water source, which could continue the flooding.

21 CHAIRMAN STETKAR: Let me --

22 MR. STUBBS: I don't know if, with the EFW
23 pits, I think they're like 200,000 gallons of water
24 available in those pits, and the lines were that, the
25 whole idea is to have the design so that you don't, this

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1 is when you're most, really --

2 CHAIRMAN STETKAR: Quite honestly, you
3 know, as I kind of walked through those analyses and I
4 looked for locations in the plant where you might be
5 vulnerable to failing more than one division of equipment
6 from flooding.

7 And in most parts of the plant, the flooding
8 barriers, the water tight doors, and the flooding
9 barriers are designed such that even if I filled a
10 compartment full of water, you would at most disable a
11 single division.

12 There are only a few locations that I could
13 identify where there might be a vulnerability to flooding
14 two divisions of equipment. The basement of the
15 non-radiological controlled area in the reactor building
16 is one. Then there's an upper elevation where you have
17 some shared spaces for ventilation equipment.

18 MR. STUBBS: Right.

19 CHAIRMAN STETKAR: Were about the only two
20 locations that I could equivocally come up with --

21 MR. STUBBS: Yes, I think those are the only
22 two.

23 CHAIRMAN STETKAR: And the upper divisions
24 may not, it, I didn't raise that because the upper
25 divisions I couldn't necessarily figure out where the

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1 water was going to, a large volume of water was going to
2 come from. But down in the basement, because of the two
3 water sources and the fact that it is the basement --

4 MR. STUBBS: There's no divisions in that
5 place though.

6 CHAIRMAN STETKAR: I was, I am really
7 curious about that. It may be an issue in terms of the
8 guidance and that may be it. But I'll still raise it as
9 a question at least in my mind about what is the
10 vulnerability of flooding in those areas. Can we indeed
11 disable two trains of equipment from a possible flooding
12 source in those areas?

13 Irregardless of trying to postulate, is it
14 going to be a pipe breaker, or is it going to be a crack,
15 or is it going to be leaking flange or is it, you know,
16 regardless of how I can get the water in there.

17 MR. STUBBS: I, in that case, well the only
18 thing without the guidance, yes, but no, we were going
19 to isolate it.

20 (Crosstalk)

21 MR. STUBBS: What margin do we have to, when
22 something, you know, it's a --

23 CHAIRMAN STETKAR: Okay.

24 MR. STUBBS: -- that's all I'm saying I
25 guess is to really look at. Do we have, you know, what

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1 sort of margin do we have? Six inches of margin. But
2 there would still need to be some intervention from
3 someone to stop the flooding at some point, otherwise
4 we're going, like I said, and that would disable
5 equipment. When you have, you know, that much water
6 available, it's --

7 CHAIRMAN STETKAR: Yes.

8 MR. STUBBS: I, sorry I can't give you a
9 much better answer.

10 CHAIRMAN STETKAR: No, no that's fine. At
11 least as I said, you at least pointed us to the available
12 guidance in the Standard Review Plan and Branch Technical
13 Position that basically governs your scope of review for
14 this.

15 Okay. I don't think, I can't ask, I mean
16 I've kind of raised the concern in my mind. I don't think
17 there's much else that we can discuss on it. I did want
18 to cut you off.

19 I still do want to discuss the break
20 exclusion area out in the steam and feed water pipe area.
21 The reason I wanted to treat that as separate, is that
22 those areas just by the nature of the equipment that are
23 located in those piping areas, they're less susceptible
24 to these operation and maintenance type flooding
25 activities.

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1 I mean, yes, we got the main steam isolation
2 valves out there and things like that, but you don't have
3 the pumps and the heat exchangers and the valve
4 connections in those areas that we do in the basement of
5 the reactor building.

6 So unless there are other questions
7 regarding the moderate energy pipe flooding in the
8 reactor building, then we can start discussing the break
9 exclusion area.

10 MS. LI: You want me to --

11 CHAIRMAN STETKAR: Yes, I mean as long as
12 you're, as long as we have your, have you here.

13 MS. LI: Branch, as I say, Branch Technical
14 Position 3-4 provides staff guideline of location of the
15 postulate pipe failure, and it kind of follow the ASME
16 design criteria. That one is the stress, one is fatigue
17 usage factor. The built in safety margin that bring down
18 the threshold.

19 So if the applicant can follow those
20 guidelines and determining where are the breaks. But
21 the speculation blank out a region that, some where
22 people call it breaks exclusion zone.

23 That's the, in a general design would be
24 between the inner isolation valve, or outer isolation
25 valve, the component penetration.

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1 CHAIRMAN STETKAR: That's where I've
2 normally seen it, but those distances are typically also
3 very short.

4 MS. LI: Yes.

5 CHAIRMAN STETKAR: And you get additional
6 confidence because of the support at the penetration,
7 plus the supports, the typical supports for the isolation
8 valve.

9 MS. LI: Yes.

10 CHAIRMAN STETKAR: I don't know anything
11 about stress analysis, that's why Pete's here, but I can
12 at least see that. The difference in this plan is that
13 the, in the main feed water and steam piping area, that
14 break exclusion area extends for, as best as I could tell
15 looking at the drawing, about 70 feet, which is a long
16 distance.

17 And I was curious whether the staff, have
18 you seen any other applicants who have done a similar type
19 of analysis?

20 MS. LI: No. Some operation trend, I saw
21 it, but same as you, when I first review it, and raised
22 my eyebrow.

23 CHAIRMAN STETKAR: Yes.

24 MS. LI: And we asked RAI, you know, explain
25 why you are apply the break exclusion region to, I think

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1 the area you of concern is the main steam going --

2 CHAIRMAN STETKAR: Yes, it's between the,
3 it's the --

4 (Crosstalk)

5 CHAIRMAN STETKAR: -- the penetration
6 after the turbine building, almost to the turbine
7 building, the wall.

8 MS. LI: Yes.

9 CHAIRMAN STETKAR: That's right.

10 MS. LI: Okay. Now so I kind of expect.
11 So in Branch Technical Position, the normal area that we
12 call break exclusion zone, it has eight additional design
13 guidelines.

14 So you know, the applicant has to
15 demonstrate that they are, meet the intent of those eight
16 additional guidelines, which improve low stress, low
17 fatigue usage factor and minimum the lengths of that
18 piping, and avoid welding and also perform 100 percent
19 volumetric inspection. So you know, and so on, so the
20 applicant has to demonstrate that they meet those
21 guidelines.

22 CHAIRMAN STETKAR: Yes.

23 MS. LI: But so, I have seen a lot of thing
24 is that, you know, theoretically talking about the breaks
25 exclusion is really from the component isolation, in fact

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1 to the outer isolation valve, however one has to think
2 of, okay, so also the outer isolation valve, so if it
3 continues and if there's a break to the valve, then the
4 consequence of that break to the operator of this plant.

5 So in a general design there will be either
6 an anchor or a five-way restraint that near the outer
7 isolation valve, which is really to protect the outer --

8 CHAIRMAN STETKAR: But in this case that
9 five-way restraint is at the turbine --

10 MS. LI: It's near the wall.

11 CHAIRMAN STETKAR: -- at the turbine
12 building wall.

13 MS. LI: Right. Yes.

14 CHAIRMAN STETKAR: As is the out buildings
15 between the isolation valve of course, so --

16 MS. LI: I agree.

17 CHAIRMAN STETKAR: So we still have, pick
18 a number, 65 feet of piping.

19 MS. LI: Right, but the, say one thing is
20 as staff, we cannot detect how the new tenant, how
21 applicant going to design their plant, so I ask RAI and
22 follow up RAI, what I make sure is they indeed meet those
23 eight additional design guideline.

24 CHAIRMAN STETKAR: Okay.

25 MS. LI: And make a statement to the best

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1 practical, minimize the lengths of that piping. And
2 also the agreement is that they don't patch that break
3 for main steam and feed water line by any branch lines
4 that come from those designs, break has to be postulated.

5 CHAIRMAN STETKAR: Yes. And they did
6 that.

7 MS. LI: Okay. And I think there is
8 another thing. I get their agreement is -- oh, right,
9 there is a sister Branch Technical Position 3-3 which is
10 the one I think this morning you also mentioned. That
11 one starts with that.

12 CHAIRMAN STETKAR: Right.

13 MS. LI: So just originally BTP does not
14 have that. So we asked the applicant to make that
15 component, postulate that one square foot. Not make --

16 CHAIRMAN STETKAR: It's a longitudinal,
17 yes.

18 MS. LI: -- approach, I mean the break, and
19 so they were evaluate the longitudinal effects,
20 including the pressurization that you talk about this
21 morning.

22 CHAIRMAN STETKAR: Yes.

23 MS. LI: So with all those commitment and
24 efficiencies they're reaching, the staff determine that
25 their future of design is acceptable from the break

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1 exclusion aspect.

2 CHAIRMAN STETKAR: Okay. Thank you,
3 that's --

4 MS. LI: Like I say, I close my eyes.

5 CHAIRMAN STETKAR: No that's, and I
6 understand what you did. I don't, not remember, I didn't
7 look up all of the criteria, but thank you.

8 MEMBER RICCARDELLA: Excuse me did you say
9 one of the criteria was no welding? One of the eight
10 criteria?

11 MS. LI: To minimize the welding.

12 MEMBER RICCARDELLA: Oh, to minimize the
13 welding. I was going to say, at 65 feet and no welding?

14 CHAIRMAN STETKAR: Sixty feet, yes in the
15 in the steam and feed water pipe it's going to be tough.

16 MS. LI: Because we require 100 percent
17 volumetric examination of the weld, so you know, they
18 have to minimize that otherwise it would be difficult.

19 MEMBER RICCARDELLA: And is that also part
20 of the in-service inspection program, 100 percent?

21 MS. LI: Yes. But is augment from the
22 normal in-service inspection.

23 CHAIRMAN STETKAR: Thank you, that was,
24 that helped a lot, helped me a lot anyway. Thank you.
25 I do as I said, I kind of view that area in my mind

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1 differently than I do the reactor building just because
2 of the types of equipment.

3 There really isn't the same type of people
4 interaction to that, so it does relate a little bit more
5 on the design and inspection of the materials themselves
6 in that area in particular. So thank you.

7 MR. GALVIN: Okay, next on the 3.4.2, this
8 is the flooding on a structural design. The staff
9 requested MHI to clarify the use of coefficient of
10 friction of 0.7 at the soil-concrete interface. It's,
11 this coefficient approach is also involved at the site
12 of the construction analysis and it's being reviewed as
13 part of that review.

14 The next point is in, this is actually
15 related to Section 3.5.1.3 the turbine missile. So when
16 you, when we get done with this, you can ask your
17 statements or questions, after the staff's coming up.

18 MHI had acceptable ITAAC for turbine
19 generator arrangement and turbine missile probability in
20 DCD Revision 2. When they went and sort of updated their
21 ITAAC, the staff had issues with their ITAAC. MHI has
22 now proposed to modify their ITAAC and they've added Tier
23 2 information, and related to their reports.

24 And so what addition wording and a
25 discussion of the turbine generator and determine

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1 missile probability in response to RAI. And so the staff
2 has found the proposed ITAAC and the Tier 2 information
3 is an alternative approach to having the information in
4 Tier 1. This is going to be a confirmatory item for
5 Revision 5.

6 CHAIRMAN STETKAR: I think on the turbine
7 missiles, I'll ask the staff. As I said this morning I
8 read, because I'm not a materials person, I read in the
9 MUAP whatever it is, 07028 which is more materials
10 oriented, but I paid more attention to the over-speed
11 analysis in MUAP-07029.

12 And as I mentioned this morning, I
13 understand what the scope of that analysis covered and
14 I had a couple of questions about the development of the
15 failure rate that was used for some of the valves in there
16 based on the zero failure evidence. But that's not the
17 most important part of my concern.

18 The important part of my concern was the
19 fact that the analyses seemed to omit everything from the
20 turbine speed sensors up to and including the solenoid
21 valves that drain the hydraulic fluid, such that the stop
22 valves and control valves will close.

23 And I didn't, as I went through the SER, I
24 didn't see any evidence that the staff looked at those
25 types of issues. So I'm really curious whether, did you

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1 look at the whole design of the system, all the way from
2 the speed sensors through the digital signal processing
3 logic, if I can put it that way, out to, including the
4 hydraulic dump valves and then the valves themselves that
5 are addressed in that technical report?

6 MR. GALVIN: We have John Honcharik, from
7 DE to kind of start the discussion.

8 MR. HONCHARIK: Hi, I'm John Honcharik and
9 I'll try to address some of those questions. The, that
10 report, the 029, which is the turbine valve failure
11 frequency. Basically that report is to evaluate and to
12 determine inspection, and do our testing frequency for
13 the valves, okay.

14 And that's based on the experience that they
15 had in the valves and the design. And we did look at
16 that. Also they do have some of the instrumentation
17 there, you know, they do have the valves, but they also
18 have the stop valve control system involved and so on --

19 CHAIRMAN STETKAR: That's right, but it's
20 my understanding that's literally the, if I bought a stop
21 valve, you know, it comes with a valve assembly and things
22 that you hook up to it. And these are the controls that,
23 for example on a control valve, the port, the hydraulic
24 fluid, you know, for that valve, position it. It can't
25 be the controls, my point is it can't be the controls I'm

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1 concerned with, because those controls do not affect the
2 valve individually. They affect the whole system.

3 MR. HONCHARIK: Okay, so you're talking
4 like the speed sensor on the turbine borders --

5 CHAIRMAN STETKAR: I'm talking about
6 literally the speed sensors on the turbine, the digital
7 signal processing from those speed sensor signals to
8 create a signal to trip the turbine, the output signals
9 from that logic that tell, there's a set, I can't remember
10 because I didn't pull up the hydraulic drawing, and it's
11 a little bit complicated as most of them are.

12 But there are sets of solenoid valves that
13 drain the hydraulic fluid from all of the turbine stop
14 valves and control valves. And the solenoid valves in
15 there, they're single failure proof, such that a single
16 failure will not prevent a turbine trip, nor will a single
17 spurious operation cause a turbine trip.

18 So it's like a, I can't remember whether
19 it's one out of two, taken twice, type of hydraulic
20 arrangement, but there are several. There are at least
21 eight when I looked at the design, there are at least
22 eight combinations of failures of two of those hydraulic
23 fluid drain valves that will prevent the turbine from
24 tripping.

25 And they cannot be associated with the

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1 single turbine stop valve and control valve. They
2 cannot logically be associated with whatever is in the
3 stop valve or control valve signal processing or
4 operation equipment because that literally can affect
5 only a single valve in the model. A single stop valve,
6 or a single control valve.

7 MR. HONCHARIK: Okay.

8 CHAIRMAN STETKAR: So I understand, and I'm
9 concerned about a testing frequency for the integrated
10 system so that we have assurance that you don't get an
11 over-speed failure.

12 MR. HONCHARIK: Right. And maybe I should
13 give a little background to the testing and inspection
14 for it. In the SRP for the Section 10.2.3, there is
15 criteria there that basically they have to meet. It
16 says, well actually this is SRP 3.5.1.3, and basically
17 they have to meet the ten to minus four, ten to minus five,
18 but there is also instance where if they do not have a
19 turbine missile analysis, okay, they must do the
20 following. Okay.

21 And it basically prescribes what testing
22 and inspection is required. And that basically is
23 inspecting the turbine rotor every other outage,
24 inspecting every valve every other outage. At least
25 once a week do all valve testing, and at least once a

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1 month, do the, each component of the governing system.
2 Basically the speed sensors and all that, which you're
3 discussing now.

4 So basically this analysis, you know,
5 there's the one, 028, which is for the turbine rotor.
6 They do that analysis in order to say that, okay, instead
7 of doing it every three years, they can provide, provided
8 that they meet the ten to minus four, ten to minus five,
9 based on their orientation, that they can do this
10 different inspection info.

11 CHAIRMAN STETKAR: According to them, it's
12 now 20 years, right, which for them is now 20 years, if
13 I remember correctly, right?

14 MR. HONCHARIK: Well the analysis says it's
15 good up to 20, but they're going to do it every ten years.

16 CHAIRMAN STETKAR: Okay.

17 MR. HONCHARIK: Now, they also did it for
18 029, for the valve testing frequency.

19 CHAIRMAN STETKAR: Right.

20 MR. HONCHARIK: Okay, and this is only for
21 the testing of the valves. Okay, and so they used all
22 their information for the valves, and to demonstrate that
23 they can do it quarterly instead of weekly, okay. But
24 they're still going to do the monthly testing for the
25 governing system. So basically that's the rate that is

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1 set into the equation.

2 CHAIRMAN STETKAR: Okay, that's an
3 important piece of information but I'll still ask you why
4 do I have confidence that monthly testing of that system
5 gives me less than ten to the minus five, over-speed
6 failure? Because in my experience, I've looked at a lot
7 of these systems and very, it's very unusual to find that
8 two of them are at all similar.

9 MR. HONCHARIK: Right, okay. Yes, I'm not
10 an electronics engineer for the system --

11 CHAIRMAN STETKAR: No, no, I'm not talking
12 so much about the electronics, I'm talking about the Rube
13 Goldberg fluid systems, the hydraulic stuff.

14 MR. HONCHARIK: Right, yes. We're also,
15 you know, in the DCD under I think it's 10.2 they do talk
16 about the hydraulic systems and everything. What they
17 do to improve it, they use stainless and they have
18 chemicals that they add to the lube oil and such that
19 prevent these previous experiences they had and so on,
20 you know, for that.

21 CHAIRMAN STETKAR: I understand that. I
22 come back to the fact that if the failure rate for
23 solenoid operated hydraulic dump valves is high enough,
24 a monthly testing frequency will not give me assurance
25 that the turbine trip failure rate is less than ten to

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1 the minus five, for the over-speed trip failure rate. It
2 will not.

3 I don't know what the failure of those
4 valves are, because they've not been evaluated. If it's
5 high enough, you might require a weekly testing frequency
6 because of the specific design of their system.

7 This is not a generic one size fits all, it's
8 their system. It is their design, with their electronic
9 signals, and their particular configuration of M out of
10 N logic, of little solenoid operated valves that need to
11 work.

12 And I guess if you're saying that they're
13 going to test that system once a month, I'm asking how
14 do I have assurance that the once per month testing, of
15 that checked part of the system, will indeed provide
16 assurance that the overall integrated frequency of
17 over-speed failures is still less than one times 10 to
18 the minus five per year? I haven't seen an analysis that
19 gives me that confidence.

20 MR. HONCHARIK: Okay.

21 CHAIRMAN STETKAR: Because it's not
22 include in the 07029.

23 MR. HONCHARIK: No, and that would not.
24 That's basically the valve test frequency. But there
25 might be some reliability program that they have for

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1 their over-speed system, but I'd have to defer that to
2 the systems speaking for that, electronics okay?

3 CHAIRMAN STETKAR: Well you said they have
4 committed to a monthly testing of --

5 MR. HONCHARIK: Yes, that's part of their
6 inspection program --

7 CHAIRMAN STETKAR: -- this other program.

8 MR. HONCHARIK: -- in the DCD.

9 MR. GALVIN: In Chapter 10 you said, right?

10 MR. HONCHARIK: Yes, in Chapter 10, 10.2.
11 I think it's on the table.

12 CHAIRMAN STETKAR: Okay, I'll go look at
13 that. But still even if it's a month, my whole point is
14 that, that month, the effectiveness of even that monthly
15 testing depends on the particular configuration of the
16 valves that they have.

17 How many series in parallel flow paths,
18 basically, and the reliability of those valves. And
19 because people do the reliability calculation using a,
20 what I call a stand-by failure rate model, which means
21 that the reliability of the valve is directly
22 proportional to the test interval.

23 It's not clear to me, that with this
24 particular design, a monthly test interval would give you
25 that assurance. It might, it's just I haven't seen an

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1 evaluation to confirm that. You said Section 10.2 has,
2 where's that --

3 MR. HONCHARIK: Yes.

4 CHAIRMAN STETKAR: Okay thanks.

5 (Pause)

6 CHAIRMAN STETKAR: Anything else on
7 turbine trip? I just get frustrated by this because,
8 it's, I've yet to see any applicant or any design come
9 in with a true end-to-end analysis, from the sensors all
10 the way out to stop valves and control valves. So this
11 is not unique to this application by the way. Thank you.

12 MR. GALVIN: Section 3.5.3, design of
13 missile barrier. The staff proposed to MHI to provide
14 an analysis assessing the local effects of an automobile
15 missile on all seismic Category I structures not covered
16 by Reg guide 1.76.

17 The staff is reviewing the applicant's
18 response. If you had any additional questions on
19 Sections 3.5 or 3.6 probably is now the time.

20 CHAIRMAN STETKAR: I don't. Any of the
21 other members?

22 MR. GALVIN: Okay, we'll go ahead to 3.9
23 now. The next two questions are associated with, as
24 you've heard this morning, getting additional
25 information related to the design of the steam generators

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1 in response to the failure mechanism, San Onofre is the
2 first one.

3 The staff did have some interactions with
4 the applicant, but we haven't received their official
5 response. And again this is again additional
6 information on designs of the US-APWR steam generator,
7 and we're awaiting their response.

8 It talks about the topics we asked about.
9 You know, the, design of the steam generator tube bundle
10 and the design criteria for the steam generator tubes,
11 retainer bars against flow-induced excitations,
12 including random turbulence, fluid elastic instability
13 and vortex shedding. We're still interacting on that.

14 Section 3.9.3, staff reviewed the seismic
15 analysis of those major components. Supports was
16 impacted by MHI's seismic analysis changes. The status
17 is staff found the analysis methods in MHI's latest
18 technical reports 10006 and MUAP-09002 acceptable.

19 Pending the incorporation of the
20 MUAP-09002, Revision 3, this issue is a confirmatory
21 item. So the staff looked at the analysis and the latest
22 revision, and found it acceptable. There's a another
23 revision coming in December, or it's scheduled for
24 December, but that doesn't address this area.

25 3.9.4.1, those three questions, again it's,

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1 there was limited margin between the calculated control
2 rod drive mechanism deflection and the design limit prior
3 to seismic analysis changes.

4 The staff is awaiting the updated maximum
5 control drive mechanism deflection based on the updated
6 seismic analysis. We haven't received this yet. I
7 think we received partial, but we haven't received all
8 the responses yet.

9 3.9.6, this has involved the, MHI has chosen
10 to address implementation of the functional design,
11 qualification, and in-service testing programs in
12 accordance with the requirements of 10 CFR 52.79,
13 therefore make available for audit the sample of
14 applicable design or procurement specifications. And
15 this says the open item will be closed upon conducting
16 the audit, which is not currently scheduled.

17 ASME allow of the design cert can be support
18 to determine specification audit, in this design center
19 it's the design certification Op. And he's going to
20 support the audit, and we're, haven't, we don't have a
21 schedule for that at this point.

22 Section 3.10, staff requested MHI to
23 provide a list of components of the gas turbine generator
24 system to be qualified and a description of the methods,
25 criteria, and procedures. This information is included

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1 in technical report MUAP-10023, which was impacted by MHI
2 seismic analysis changes.

3 The staff is reviewing a revised RAI
4 response, revision to MUAP-10023. We've had some
5 discussions and we're awaiting for the final revision.
6 We may have additional interaction before that's
7 cemented.

8 Number 3.11, MHI's commercial-grade
9 dedication process does not provide an alternative means
10 of environmental qualification since it does not address
11 all environmental qualification requirements specified
12 in 10 CFR 49 for electrical equipment and the guidelines
13 of ASME QME-1-2007, Appendix QR-B for non-metallic
14 components of mechanical equipment.

15 The staff is reviewing the applicant's
16 response. The commercial-grade dedication process and
17 environmental qualification, are really are two
18 different things, that this, they're sort mixing them
19 too, and we're trying to sort that out.

20 These next three are associated with the
21 radiation protection aspects of, radiation dose aspects
22 of environmental qualification. Staff has concerns
23 associated with the calculational methods and results
24 for total integrated dose to equipment inside
25 containment following loss of coolant accident.

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1 Actually the applicant has given us some
2 information, but because of other priorities, we haven't
3 reviewed it yet. The next one, the staff has concerns
4 associated with the calculational methods and results
5 for the beta ray source term for equipment inside
6 containment following a loss of coolant accident.

7 And the staff has concerns associated with
8 the inconsistencies in the operability times of
9 post-accident equipment inside containment. And so
10 this is associated with identifying what equipment is
11 PAM. We have received a response on that, but that's
12 still under review, post-accident monitoring.

13 MEMBER SCHULTZ: So Dennis, we didn't
14 discuss those in the applicant's presentation. Is it
15 Chapter 12, open items, are related to post-accident?

16 MR. GALVIN: Actually I don't, this slide
17 probably could be maybe wrote a little better.
18 Post-accident monitoring is actually Chapter 7, there's,
19 you know, what's the doses where the, there was some
20 question about how long the equipment needed to be
21 available.

22 And of course you have to decide what
23 equipment you need before you can decide what is needed
24 to be available, and they haven't got that far.
25 We found some, I guess, Ron, you want to explain

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1 further?

2 MR. LAVERA: Good afternoon, is this on?

3 MR. GALVIN: Yes, yes it is.

4 MR. LAVERA: I'm Ron Lavera, I'm the
5 Chapter 12 Radiation Protection reviewer, and I also do
6 the radiation protect, radiation portion of the Chapter
7 3.11 review. When doing the review for the equipment,
8 what I'm looking at is the equipment that's identified
9 in Table 3D-2, in Section 3.11.

10 But when I do that, I also go and look in
11 the other sections of the DCD, in particular, Chapter 7,
12 to make sure that there is a correlation between the
13 instrumentation that's described in Chapter 7 versus
14 3D-2.

15 So if there is, the equipment that's
16 described in Chapter 7's, got to match the equipment
17 that's described in Chapter 3.11's, got to match the
18 equipment that's described in Chapter 15. And also has
19 to match what's in Chapter 16. So if there isn't this
20 one-to-one correlation, then you get this, I have a
21 question regarding what's going on. So that's why it's
22 tied to the Chapter 7 REI.

23 In return, what you also have, is if you have
24 a piece of equipment that's identified that you may need
25 to go access, following the accident, then that involved

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1 a mission dose, which is now described in Chapter 12.4.
2 So I'm looking at this thing as a whole integrated thing.
3 So it's all got to line up, and where it doesn't,
4 questions have been issued.

5 MEMBER SCHULTZ: All right. Thank you for
6 the explanation. That's clear, thank you.

7 CHAIRMAN STETKAR: And as part of that,
8 just to make sure I understand it, in terms of this
9 Section 3.11, the concern is questions about the assessed
10 operability times for that scope of equipment. Is that
11 right?

12 MR. LAVERA: I'm not sure I'm understanding
13 your question.

14 MR. GALVIN: Well some of those, at one
15 point there was a question of, they had an operability
16 time of one duration, and then an operability of another
17 duration in a different section, right?

18 MR. LAVERA: Yes, understand that I'm not
19 going in to analyzing whether the operable duration that
20 they are coming up with, is satisfactory, but where they
21 come up with and operable duration in one place, it needs
22 to match the other.

23 CHAIRMAN STETKAR: You want to make sure
24 that it's consistent.

25 MR. LAVERA: That's the limit of my review.

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1 CHAIRMAN STETKAR: Okay.

2 MR. GALVIN: The next one is 3.11.42, the
3 staff requested MHI to provide an equipment
4 qualification data package template. Applicant has
5 provided an equipment qualification package template.
6 Staff has provided some feedback, and we're awaiting
7 additional information from MHI.

8 The next one, MHI has not demonstrated how
9 the US-APWR satisfies the environmental qualification
10 requirement for electrical equipment, 10 CFR 50.49 with
11 regard to the treatment of non-safety-related electrical
12 equipment located in a harsh environment, whose failure
13 under postulated environmental conditions prevent
14 satisfactory accomplishment of safety functions, and by
15 deleting "important to safety" words throughout
16 environmental qualification documents.

17 Now regarding number 1, Peter might want to
18 assist me here. I think we have looked at, they have gone
19 through and done analysis and determined that they don't
20 have any non-safety equipment that could impact the
21 operability of the function of a safety equipment. Is
22 that correct, Peter?

23 MR. KANG: The applicant, only one of them
24 respond, I have their response, what they submitted to
25 us was that they said that they have evaluated most of

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1 the non-safety, 10 CFR 50.49 and my own qualification,
2 the requirement is, involves the two sections, in other
3 words the safety-related, and the non-safety- related
4 which is valuable for the fact of safety- related
5 equipment.

6 And we were asked the question about whether
7 non-safety-related exempt, do you have any, have you ever
8 looked at it, or do you have any non-safety-related
9 equipment which value can affect the safety, operational
10 safety of the equipment.

11 Basically, MHI in their response indicated
12 they have evaluated, they have not found any. And in
13 fact they even put it in that statement in the DCD.
14 That's the first question. And the second is the
15 deleting "important to safety" words. If you will, we
16 consider this is a sort of pretty important words.

17 You, in words, because that is a sort of
18 general implies all the equipment basically. It's in
19 the, for to begin with, it is a regulatory word. And they
20 just cannot select this word and delete it everywhere.

21 And as I said some basic reason why they done
22 that, but staff doesn't agree with that. So we are sort
23 of had a few conference calls, and to revert back to
24 leaving important safety words in.

25 MR. GALVIN: We consider this a standard

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1 discussion at the time.

2 MR. KANG: Yes, this is a normal --

3 MR. GALVIN: We've had some interactions
4 and, you know, we're still interacting with the MHI on
5 the specific language to address, so that it's clear that
6 10 CFR 50.49 requirements are within scope and not, you
7 know, they want to use some alternative words, and we're
8 still working on that.

9 CHAIRMAN STETKAR: The, I'll let you finish
10 the last couple of bullets on here.

11 MR. GALVIN: Okay.

12 CHAIRMAN STETKAR: Because I had a couple
13 of other more general questions, but we'll get through
14 the specifics first.

15 MR. GALVIN: Question 3.11.55, the ITAAC do
16 not include demonstration of environmental
17 qualification of non-metallic parts of mechanical
18 equipment. They have a note on the table that sort of
19 excludes things, and the note's not very -- The note's
20 problematic and we're working out, on the Tier 1 table,
21 so we're working on it. Whether the note's needed or it
22 needs to be refined. And we're still interacting with
23 the applicant on that.

24 And then 3.12, design loads for piping were
25 updated because of changes to MHI's seismic analysis

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1 methods. In addition, the seismic analysis methods of
2 steam generator supports were unclear.

3 Based on a review of MUAP-09002, Revision
4 3, the staff has found the piping analysis modeling
5 acceptable and the treatment of the steam generator
6 non-linear supports conservative.

7 Now MHI has informed that they plan on
8 revising the response, so I guess we're going to have to
9 take a look at that. That's more recent than what we've
10 got here. And that's it.

11 CHAIRMAN STETKAR: Okay, I had a couple
12 general questions. One of them does relate to this
13 notion of, important to safety, versus safety-related.
14 And it, I read the SER, there's discussion not only on
15 the environmental qualification, but it also throughout
16 the SER, it sort of touches on this issue.

17 And it's not clear to me yet, from the
18 staff's perspective. So what I'd like to ask is, we do
19 have in the DCD, there is that Table 17, whatever it is,
20 .4-1, that lists non-safety-related equipment that is
21 quote, unquote, "risk significant", or it's considered
22 to be important enough to be included in the Design
23 Reliability Assurance Program.

24 From the staff's perspective, does that
25 table then define the scope of equipment that is quote,

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1 unquote, "important to safety", or are other criteria
2 invoked? And if there are other criteria, I'd like to
3 better understand what they are.

4 (Crosstalk)

5 CHAIRMAN STETKAR: It can't, as you said,
6 it can't be sort of on a case by case basis, section by
7 section of the SRP, and negotiated consensus of what is
8 the equipment that satisfies those words. Because you
9 can very quickly lead to inconsistencies that way.

10 That something is treated one way in one
11 part of the review, and a different way in a different
12 part of the review. And yet, it is the same piece of
13 equipment that provides some safety function.

14 MR. KANG: In the order he put in
15 qualifications. In other words that 10 CFR 50.49 rule
16 is pretty distinct, in word of safety. Word is very
17 written there. In other words it is nothing to be
18 related with the risk, nothing with the risk, tied with
19 the risk.

20 CHAIRMAN STETKAR: Right.

21 MR. KANG: So that's why we were in a way,
22 we like to compliance with the regulations. We'll like
23 to see use that words. That's why we are insisting this
24 is a regulatory words, but the way MHI's approaching is,
25 approach is, they use the segment of a words, the guidance

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1 word from 3, SRP, 3.11, which is an SRPs are written for
2 staff, for the staff.

3 Not for the applicants, applicants get,
4 should be able, should tell us how they meet 50.49. But
5 on the other hand, they use that guidance word from 3 SRP
6 3.11, and here you are. We are considering --

7 MR. GALVIN: Peter I think you're --

8 (Crosstalk)

9 MR. GALVIN: -- question.

10 CHAIRMAN STETKAR: Let me just step back
11 from this, because my, I'm not as familiar as you are with
12 all of the rules, nor the Branch Technical Positions, nor
13 the regulatory guidance. I'm just sort of naively think
14 of the world as I have one set of equipment in the plant
15 that's given the term, safety- related. And I have
16 another set of equipment in the plant now, that is not
17 safety-related, but is determined, deemed to be,
18 important to safety. And then I have a third category
19 of equipment that is not safety-related, and not
20 important to safety.

21 And my question is for that middle category
22 of equipment, that is not safety-related, doesn't fall
23 in the first box, but it does fall into the second box,
24 it is quote, unquote, "important to safety". How does
25 the staff and the applicant consistently identify that

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1 set of equipment?

2 Such that if I'm looking at EQ, or I'm
3 looking at flooding, or I'm looking at any of the other
4 parts of the review that we look at, I understand clearly
5 between the staff and the applicant how a particular
6 piece of equipment is categorized. What box it appears
7 in? And that's my basic question.

8 MR. GALVIN: All right, I think that
9 Theresa --

10 CHAIRMAN STETKAR: And so that there's a
11 clear understanding from both sides how that particular
12 piece of equipment will be treated.

13 MR. GALVIN: Theresa Clark did the
14 Mechanical Engineering Branch Chief, I think has some
15 comments.

16 MS. CLARK: Hi, I'm Theresa Clark as Dennis
17 said, also formally from PRA, so I kind of feel that side
18 of it as well. I do very much sympathize with the
19 frustration that you're expressing. I understand the
20 concern, and I think we could probably also have some
21 fruitful off-line conversations about this --

22 CHAIRMAN STETKAR: Sure.

23 MS. CLARK: -- even separate from the APWR
24 discussion. There, while I understand your desire for
25 a universal definition, it has been dealt with on a very

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1 case by case basis, in different sections.

2 You know, the one that Peter referred to,
3 I was furiously opening up on my phone, because it's very
4 interesting actually. In 50.49 the equipment that's
5 important to safety from a 50.49 perspective, is
6 explicitly defined in the rule as which things are
7 important to safety from that perspective.

8 CHAIRMAN STETKAR: Okay.

9 MS. CLARK: And so that's actually very
10 interesting to look at. In other venues, such as GDC 1,
11 which has to do with quality assurance, commensurate with
12 the importance to safety of equipment. That has been
13 less well defined and there has been controversy over,
14 you know, probably 30 years about how that's been defined
15 with commission interaction as well. And we didn't end
16 up with a universal definition that could be easily
17 applied.

18 However when you look at different review
19 areas such as, you know, you look at the seismic
20 classification which we spoke about this morning, the
21 quality here at classification, Reliability Assurance
22 Program, while they're not necessarily unified, we do try
23 to make the criteria for classification within those
24 areas as clear as possible, so that you can find all of
25 them.

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1 Unfortunately, I think at this point,
2 that's probably the best kind of overall explanation I
3 can give you, because we can't, we don't have that
4 universal definition and it is something that staff is
5 considering. But we found ways to get what we need to
6 do to make the safety findings under the GDC.

7 MR. HICKS: Excuse me, this, Tom Hicks from
8 MNES, do I just --

9 CHAIRMAN STETKAR: Absolutely.

10 MR. HICKS: I think we agree exactly, what
11 she just said. And that is that, that term is defined
12 differently in different places. And that is the reason
13 why we did not put the term in 3.11 of the DCD, was because
14 we felt people would misunderstand what it meant.

15 So what we did, was we took the scope that's
16 defined in the SRP, A through F, it says here's the
17 equipment that's included in this program. And it's
18 very clear what that equipment is. And that scope is
19 also listed in Reg Guide 1.206. Okay.

20 So that's what we did, and it's very clear
21 what equipment scope is in there. And we felt like if
22 we put the words back in, important to safety, it's going
23 to do exactly what she just said, it's going to confuse
24 people because it means different things in different
25 parts of the regulations. And so that's why we don't

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1 want to put that word in there, those words.

2 CHAIRMAN STETKAR: We'll let the staff and
3 the applicant discuss that within the specific context
4 of the EQ scope. This issue has come up, in some sense,
5 you're right. This is more of a generic issue. We've
6 raised it pretty much in every design certification that
7 we've been involved in. And this one is no different in
8 that sense.

9 What I'm trying to, what is specific to this
10 design center, which is a little bit of what I was trying
11 to get a sense of, is this design center does have a table,
12 that's that 17.4-1 that identifies a list, it's a very
13 large list of structured systems and components that are
14 deemed to be important to safety.

15 Well they use the term, risk significant,
16 and they're significant enough to risk, that additional
17 reliability assurance and additional quality controls
18 are warranted.

19 And what I'm trying to understand from the
20 staff's perspective, I think I'm, is whether or not for
21 your purposes in the review, does that list define the
22 non-safety-related equipment that is quote, unquote
23 "important to safety"?

24 What I'm hearing is, no, not necessarily.
25 So that's from this perspective. That at least clarifies

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1 my continuing confusion.

2 MS. CLARK: And again I sympathize with
3 that --

4 CHAIRMAN STETKAR: What I'm, on a generic
5 sense, you've discussed it internally and I think would
6 probably want to pursue ACRS in a different venue, you
7 know, this whole notion. You've had some discussions in
8 the past.

9 MS. CLARK: And I think you've been in on
10 those discussions. I think, you know, there is not an
11 official position that I'm aware of that says, that table
12 equals important to safety.

13 CHAIRMAN STETKAR: Okay. But I do see
14 discussion in other parts of the SER, I can quote
15 references to that table as part of the staff's
16 questioning about why isn't this particular set of
17 equipment identified in a particular quality group, or
18 a particular seismic group, and things like that.

19 MS. CLARK: We do --

20 CHAIRMAN STETKAR: So the staff does seem
21 to refer to that table, you know, in some areas of the
22 review.

23 MS. CLARK: We do use information like that
24 table to provide insights to our staff, to say these are
25 more important areas that you might want to look at. But

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1 in terms of an official definition of, important to
2 safety, we haven't gotten there.

3 CHAIRMAN STETKAR: Okay. Thank you.
4 That, helps, thanks. Let me just make a note here.

5 (Pause)

6 CHAIRMAN STETKAR: The other question that
7 I had, kind of a general question, and again if you were
8 here this morning you heard me ask the applicant about
9 the in-service testing frequencies for motor operated
10 valves.

11 And their justification for using a what is
12 effectively a two year testing interval versus a
13 quarterly testing interval for a fairly moderate, let's
14 call it, subset of all of the valves in the plant.

15 And I was curious how the staff reviews
16 those testing intervals and what sort of thought process
17 do you use? Because I, when I initially read the words
18 in the table that says, well if we test this valve it will
19 disrupt a normally operating required support system. I
20 said, oh, that sounds quite reasonable until I thought
21 about the fact that it isn't always operating.

22 And indeed the way people, to satisfy the
23 pump testing requirements, and other normal operational
24 requirements, it's not clear to me why they could not
25 invoke a quarterly testing interval for a large number

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1 of valves.

2 MR. SCARBROUGH: This is Tom Scarbrough,
3 I'm in Mechanical Branch. In this particular case for
4 US-APWR, we had Pacific Northwest Laboratories who has
5 IST permit review experience, go through the entire table
6 in all their systems.

7 And if you look at the SER you'll see a lot
8 of places where it was in the RAI saying why weren't all
9 these valves tested quarterly? Why are they pushed
10 back?

11 And so they went through a whole process and
12 where they found a concern they raised it, and we
13 interacted with them, and they wrote a number of changes
14 that you saw on the tables over the years, to move things
15 from cold check out, or a peeling out to quarterly as they
16 negotiated, you know, could they do this a quarterly
17 test?

18 Now the ones that I understand that you were
19 asking about, were the safety depressurization valves.
20 And there was a block valve that --

21 CHAIRMAN STETKAR: Were you here this
22 morning, Tom?

23 MR. SCARBROUGH: Yes.

24 CHAIRMAN STETKAR: Okay. Yes, I mean
25 there was a couple. There's sort of two categories, one

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1 is that type of valve. The other is valves in normally
2 operating support systems, service water, component
3 cooling water, and that forth, and they're different
4 rationales for both of those. So let's address the SDVs.

5 MR. SCARBROUGH: Yes, now this one has to
6 do with similar to what was decided with AP1000, where
7 they had two AVBs, automatic depressurization valves in
8 series, and they're both closed. The rationale here is
9 that the applicant did not want to be in a situation where
10 a mispositioning event would create a LOCA.

11 And when, it went through, this is the
12 review process we had. So even though they have a valve,
13 but they closed the other valve, but opened it, they did
14 not want to get in a situation where an inadvertent
15 operation would throw them into a LOCA.

16 CHAIRMAN STETKAR: Okay.

17 MR. SCARBROUGH: And historically, we've
18 been receptive to that argument. So that's was the basis
19 for why these safety depressurization valves, whereas
20 the block valves which is normally open anyway, so we can,
21 it can go up and down quarterly since it's already open.

22 But the safety depressurization valves
23 themselves that are normally closed, they put in their
24 table that they would only do it now because they do not
25 want to have an inadvertent event cause them to have a

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1 LOCA. And that was the same position we had with AP1000
2 and we consider that to be reasonable.

3 CHAIRMAN STETKAR: Okay. Let me just make
4 a note and I understand that rationale.

5 (Pause)

6 CHAIRMAN STETKAR: I'm a slow writer, I
7 used to be able to write more quickly and legibly. I
8 can't do that anymore, because I have a computer, but I
9 type really slowly, so, yes. And I understand that
10 rationale, I kind of get it.

11 What about the other normally operating
12 systems, the ones where they say, well if we, let me give
13 you a specific example if I can find it here quickly. I
14 have a lot of notes here, it takes me a while to find it.

15 Okay. A good example, one example you may
16 want to look into, this one I couldn't find, I couldn't
17 figure out for the life of me. And this is not the
18 specific concern that I eluded to earlier. Is that the
19 safety injection pump suction isolation valves, the SIS
20 MOV-001 ABCD, according to the table, are stroke tested
21 during cold shut down.

22 That's a stand-by system. The valves are
23 normally open. The containment spray RHR pump suction
24 isolation valve CSS MOV-001 ABCD, are stroke tested once
25 a quarter. I can't for the life of me figure out why the

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1 SI pump suction valves can't be tested once a quarter.

2 MR. SCARBROUGH: Okay.

3 CHAIRMAN STETKAR: There is no rationale
4 for why not quarterly test them. They're simply blank
5 over there. It may be an oversight.

6 MR. SCARBROUGH: Okay, we will check that.

7 CHAIRMAN STETKAR: But not to the point
8 because this is more germane to the systems that I found
9 kind of consistent rationale. If I look at component
10 cooling water, return and supply isolation valves, and
11 if you want to write down the valve numbers they are NCS
12 MOV-007 ABCD, those are the return valves. They're the
13 return from each header to the pumps. And the
14 corresponding supply isolation valves NCS MOV-020 ABCD.

15 The frequency of stroking those valves is
16 once per refueling outage, or essentially once every two
17 years. And there's a Note 7, that applies for the
18 valves. And this Note 7, is used quite frequently
19 throughout that table.

20 And it says, exercising these valves would
21 stop seal injection return water, or cooling water of the
22 reactor coolant pumps. Such stop of the water may result
23 in damage to the reactor coolant pump or reactor trip.
24 These valves are exercised during cold shut downs and
25 these components do not require water flow.

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1 I will grant you that for the two trains that
2 are normally running. The two trains that are in
3 stand-by could cycle those valves or leave them closed
4 and it doesn't affect cooling.

5 MR. SCARBROUGH: Yes.

6 CHAIRMAN STETKAR: During normal operation
7 only two trains are running, two are in stand-by.

8 MR. SCARBROUGH: Right, that's good.
9 We'll check into it.

10 CHAIRMAN STETKAR: And that applies, that
11 similar type, there's a Note 7 that says that, it's
12 related to interruption of cooling, for the record --

13 MR. SCARBROUGH: Again we --

14 CHAIRMAN STETKAR: -- cooling cups.
15 I'll give you your turn. And there's a Note 6, that
16 applies to other systems, but it's the same basic notion.
17 It says, exercising these valves would stop necessary
18 line for operation of such as utilities et cetera,
19 therefore exercise testing will be performed at cold shut
20 down.

21 That note tends to apply to things like
22 essential chilled water, essential service water,
23 cross-tie valves, among non-essential and essential
24 chilled water systems and so forth.

25 There too, during normal operation only two

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1 trains are operating, two are in stand-by and I couldn't
2 for the life of me figure out why you can't cycle the
3 valves for the stand-by trains.

4 MEMBER RAY: Well are they heat exchangers
5 though? Presume they only had a single line, in other
6 words two, they have two separate heat exchangers for the
7 reactor pump seals?

8 CHAIRMAN STETKAR: No, this is the supply
9 to, the component cooling water system on this plant is
10 interesting. Let me just say that. How they get water
11 to reactor --

12 (Crosstalk)

13 CHAIRMAN STETKAR: -- this is, these, the
14 two valves that I'm talking about are the valves, think
15 of them as the, it's easiest to think of them as the
16 suction and the discharge valve of the component cooling
17 water pump.

18 MEMBER RAY: No, I just was just trying to
19 say --

20 CHAIRMAN STETKAR: It's not quite that
21 simple, but it's --

22 MEMBER RAY: -- at some point they're
23 separate, but at some point if you're talking about at
24 the valves at the seals, that's not true. That's not
25 true.

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1 CHAIRMAN STETKAR: Pumps A and B, hate to
2 do this but, pumps A and B supply header A-1, which then
3 supplies reactor coolant pumps A and B.

4 MEMBER RAY: And you're not talking the
5 valves.

6 CHAIRMAN STETKAR: I'm not talking about
7 the valves --

8 MEMBER RAY: --off the header?

9 CHAIRMAN STETKAR: -- off the header.
10 Those, that's clear. If I close that valve and they say
11 you can't touch that valve during normal operations, and
12 absolutely you can't touch that valve. But cycling, if
13 pump A is running, cycling the valves for pump B has
14 absolutely no affect whatsoever on component cooling
15 water flow to anything.

16 MEMBER RAY: Okay, I got it, never mind.

17 MR. SCARBROUGH: Well these again, we'll
18 followup.

19 CHAIRMAN STETKAR: And I don't know how the
20 staff approaches that, because in some sense it's, the
21 problem is that in some sense it depends on how the
22 eventual plant operator will operate those systems.

23 But in another sense if I'm now inheriting
24 this certified design, as a plant operator, and I only
25 need to test those months, those valves once every two

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1 years. That is the starting frequency that I use for my
2 now, what will eventually become, a risk informed service
3 testing program which will extend at, beyond those two
4 years. And that's the concern that I have.

5 MR. SCARBROUGH: Right. Well actually the
6 way we, this review is setup for this operational
7 program, the design certification applicant is providing
8 a description of the program.

9 CHAIRMAN STETKAR: Yes.

10 MR. SCARBROUGH: And then the COL applicant
11 can incorporate by that right reference in the program.

12 CHAIRMAN STETKAR: Right.

13 MR. SCARBROUGH: But when they get to the
14 point where they're completing their ITAAC, and we're
15 actually performing operational program inspections, we
16 will be looking at the program itself, including each of
17 these justifications for cold shut down. And so at that
18 point, is when they have to actually justify all of these
19 extensions.

20 CHAIRMAN STETKAR: Right.

21 MR. SCARBROUGH: Because of right now, this
22 is a description of the program based on their best
23 knowledge. But when we get to the phase when they're
24 building the plant and we're doing the operating program
25 inspection, the staff has to accept full review.

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1 Reviewing each of the justifications for acceptance.

2 So there is no finality at this point with
3 the design certification. It really only comes at the
4 COL licensing stage. Actually it's even during the,
5 sort of the ITAAC process when we're conducting our
6 operational program inspections. And that's when there
7 will be finality.

8 You know, so as they build the plant, we'll
9 be looking at each one of these justifications and
10 saying, okay now that you built the plant, you can
11 actually test this quarterly, the way you have the plant
12 setup.

13 And then they would, you know, we would not
14 accept the justification, because we have to accept their
15 justification, or they have to go back to quarterly
16 testing. So this is the best knowledge right now of what
17 they think they can do. But it won't be final until we
18 actually do the operational program inspection.

19 CHAIRMAN STETKAR: And there again, I'm a
20 slow writer, that's, that's a good explanation. I also
21 see that rationale. Of course, then it's incumbent,
22 very incumbent on those inspectors to think about these
23 types of issues.

24 MR. SCARBROUGH: That's right, and they do.

25 CHAIRMAN STETKAR: In some sense, you could

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1 do the design certification a couple different ways.
2 You put quarterly testing in there, and then they justify
3 why you can't do it per quarter, or put do your testing
4 in there, and rely on the inspectors to tell you that you
5 need to do it quarterly.

6 MR. SCARBROUGH: And how we have it setup
7 for Vogtle, getting ready for Vogtle this summer, was
8 that the regional inspectors will be supported by NRO and
9 the IST program reviewers. And they can assure that the
10 justifications are acceptable.

11 CHAIRMAN STETKAR: Okay. That helps.
12 That helps a lot.

13 MR. SCARBROUGH: Okay.

14 CHAIRMAN STETKAR: That helps a lot.
15 Thank you. Do any of the other members have any
16 questions for this staff on Chapter 3? If not, thank
17 you.

18 MR. GALVIN: Thank you.

19 CHAIRMAN STETKAR: Now we face a little bit
20 of a time management question. Ryan, we are at 4
21 o'clock, is? Okay. Let me ask Luminant, I haven't seen
22 Luminant's, I have to be careful, because I'm still on
23 the record here. I haven't seen Luminant's
24 presentation, what, we have a closed session scheduled
25 at 4 o'clock. It's 3:15 p.m. now, we need to take a break

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1 here sometime.

2 What I'd like to do in the interest of time
3 management is, if we can have Luminant start their
4 presentation and run through about a half hour of it, then
5 break for the closed session. And finish up Luminant's
6 presentation, it's probably the best use of our time,
7 unless that creates too many headaches for you.

8 MR. WOODLAN: No that sounds good.

9 CHAIRMAN STETKAR: You good with that?
10 Okay, let's do this then so that we can rearrange seating
11 and such. We'll take a 15 minute break, reconvene at
12 3:30 p.m. and have Luminant start their presentation on
13 Chapter 3, and see how far we get through it before our
14 4 o'clock closed session. So we'll recess until 3:30
15 p.m.

16 (Whereupon, the foregoing matter went off
17 the record at 3:14 p.m. and went back on the record at
18 3:31 p.m.)

19 CHAIRMAN STETKAR: We're back in session.
20 This is still an open session. We're going to hear from
21 Luminant on their Chapter 3, again except for Chapters,
22 or Section 3.7, 3.8. For opening, I'll ask Stephen
23 Monarque from the staff, do you have any opening remarks?

24 MR. MONARQUE: Thank you. Good afternoon.
25 My name is Stephen Monarque. I am the lead Project

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1 Manager for the review of the Comanche Peak COLA. I want
2 to thank the committee members for the opportunity to
3 present COLA Chapters 3 and 9 today and tomorrow.

4 Chapter 3 discussion will not include
5 Sections 3.4, 3.7, 3.8 due to our ongoing review of
6 hydrology and seismic analysis. And with that, I'll
7 turn it over to Luminant.

8 CHAIRMAN STETKAR: Thank you.

9 MR. WOODLAN: Good afternoon. My name is
10 Don Woodlan. I'm the Licensing Manager for the COLA,
11 COLAs for Comanche Peak, Units 3 and 4. Pleasure to be
12 here again, and be briefing the ACRS Subcommittee.

13 Before we start, let me briefly make as I
14 mentioned on the US-APWR, their slow down obviously has
15 an impact on us. We follow their work activity, and we
16 are closely linked to their work.

17 Luminant has assessed our options on the
18 review, and as we stated in our letter, which we have
19 filed, that we have decided that it's not worth the
20 resources at this point in time, I've informed them that,
21 also the NRC staff, to continue the review of the Comanche
22 Peak COLAs until we better understand and the reviews of
23 the US-APWR are further along. Therefore as of March
24 31st of next year, we are going to fully suspend the
25 ongoing reviews of our application.

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1 Some of them were actually suspended
2 earlier. We're working with the staff to identify those
3 activities that we want to get completed, including a
4 couple ACRS briefings if we can possibly get them done,
5 to leave the product in the best condition we can, and
6 it clear at division, so that when we do restart, there's
7 a very obvious point to restart all the activities.

8 CHAIRMAN STETKAR: You say that's March
9 31st, is the --

10 MR. WOODLAN: That's the end date, yes.

11 CHAIRMAN STETKAR: That's the end date, so
12 we'll need to over the next 4 months, carefully
13 coordinate our schedules with your schedules, so that we
14 make sure that whatever activities need to completed, at
15 least from our perspective --

16 MR. WOODLAN: Yes.

17 CHAIRMAN STETKAR: -- we have those in our
18 subcommittee schedule. And if necessary, our full
19 committee. As you know, our full committee does not meet
20 in January, so we'd be looking at February, March as our
21 only full committee meetings.

22 MR. WOODLAN: And because we're getting
23 this subcommittee meetings in, these two, that you'll
24 probably really want to try and get those in.

25 CHAIRMAN STETKAR: Yes.

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1 MR. WOODLAN: If we can.

2 CHAIRMAN STETKAR: Yes, yes. So we'll
3 need to do that.

4 MR. WOODLAN: All right, with that let me
5 move onto the presentations. We are doing Chapter 3
6 first. And the agenda is as shown here. We'll do an
7 introduction, just a few good words about the license
8 conditions in this chapter. And the we'll get into this
9 site-specific aspects, which includes three SER open
10 items. It's not as brief as some of them, where we were,
11 IBRed all the way through.

12 We'll do some site-specific stuff here, but
13 in general. Overall we're going to be IBRing. And
14 that's covered here in the introduction. We're sticking
15 to the same approach we have for our earlier chapters.
16 The FSAR primarily uses the IBR methodology.

17 We have taken no departures in this chapter
18 from the US-APWR DCD. All COL items that are in the DCD,
19 have been addressed in the FSAR. We do have the three
20 open items, which we're going to cover with the
21 individual sections where they apply. We have five
22 license conditions, and we have no contentions pending
23 before the ASLB.

24 The next three slides cover the license
25 condition of the, and I'm not going to go into them in

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1 detail. You can read them if you want to, I know
2 they're not a significant item as far as ACRS goes.

3 But several of these items do relate to
4 things we talked about earlier, with the US-APWR. For
5 example 3.1 on the pipe hazards analysis. And that is
6 an analysis that will be done, in this case, prior to
7 actually installing the pipes in any given area of the
8 plant. We will complete the pipe hazards analysis for
9 that.

10 Let me go to the next slide, in-service
11 testing, now which we were just talking about with the
12 US-APWR. And I do agree with the discussions that were
13 held there. We will create our in-service test program.

14 It will be reviewed by the NRC via
15 inspection activities. And we do have that first bullet
16 there, 3.3 is where we provide a schedule to the NRC of
17 our development of the IST and implementation. So that
18 they can come out and do their inspections.

19 And this is where there is a, by the way,
20 we agree and have proposed wording for all five, or all
21 of these license conditions. There is a slight
22 difference between our wording and the NRC's wording as
23 they presented in the safety evaluation. And that we
24 recognize there may be a period of time after we get our
25 COL, before we start construction.

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1 The current SE wording requires that we
2 start providing this schedule to the NRC within 12 months
3 of the COL. Our variation is, it's within 12 months of
4 the COL, or upon starting construction, whichever comes
5 later. Recognizing there may be a dead period there.
6 It's kind of crazy to be filing reports every year for
7 no work. We have worked that out with the NRC.

8 And this last one, is the last set of license
9 condition, there is one license condition mentioned in
10 the SE, relative to turbine inspection program. It's
11 not a chapter 3 license condition, but it is related as
12 we discussed this morning with the US-APWR.

13 With that, we'll start moving into the
14 site-specific aspects of Chapter 3. And I'll turn it
15 over to Mr. John Conly.

16 MR. CONLY: Thank you, Don. My name is
17 John Conly. I'm the COLA Project Manager for Luminant.
18 All Chapter 3 appendices, except 3 Delta and 3 Kilo are
19 incorporated by reference without supplement or
20 departure. Those two appendices 3 Delta and 3 Kilo will
21 be discussed along with their related sections later in
22 this presentation.

23 Section 3.1, conformance with GDC. In
24 accordance with GDC 45, the essential service water
25 system piping is arranged to permit access for

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1 inspection. Manholes, hand holes or inspection ports
2 are provided for periodic inspection of system
3 components. The integrity of underground piping is
4 demonstrated by pressure and functional tests.

5 Section 3.2, classification. The
6 site-specific, safety-related systems and components
7 that are designed to with stand the effects of
8 earthquakes without loss of capability to perform their
9 safety function, are identified in Table 3.2-201 as the
10 essential service water system.

11 The ultimate heat sink, except the basin
12 makeup piping and valves, and the ultimate heat sink
13 essential service water pump house ventilation system.
14 The DCD methods of equipment classification and seismic
15 categorization are applied to Table 3.2-201, including,
16 important to safety, and, risk significant, as discussed
17 during the DCD presentation this morning.

18 Section 3.3, wind loadings. The
19 site-specific, basic severe wind speed of 96 miles per
20 hour, is enveloped by the standard plant severe wind
21 speed of 155 miles per hour. There are no site-specific
22 seismic Category 2 buildings or structures.

23 There are no site features that promote wind channeling
24 or buffeting that warrants special design consideration.

25 Site specific seismic Category 1

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1 structures, that is the ultimate heat sink related
2 structures, the essential service water pipe tunnel, and
3 the power source fuel storage vaults are designed for the
4 same tornado loadings and combined tornado effects using
5 the same methods for qualification as the standard plant,
6 SSCs.

7 Further, the design basis hurricane wind
8 speed for site-specific seismic Category 1 structures is
9 145 mph as you will see in FSAR Revision 4 very soon.
10 This is bounded by the DCD 160 mile per hour design basis
11 hurricane wind speed.

12 CHAIRMAN STETKAR: John, just to, I know we
13 haven't seen it yet, but was that 145 mile per hour wind
14 speed evaluated according to the guidance in, and I've
15 forgotten the Reg guide number, it's like 1.1.21 or 22,
16 something like that.

17 MR. CONLY: Yes.

18 CHAIRMAN STETKAR: It is, okay.

19 MR. CONLY: Failure of non-safety-related
20 buildings and structures on site will not jeopardize
21 safety-related structures, systems or components. And
22 will not generate missiles that are not bounded by FSAR
23 Subsection 3.5.1.4.

24 Site specific or field routed
25 safety-related structures, systems and components are

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1 evaluated for the need for structural reinforcement and
2 or missile barriers. Are there any additional
3 questions? I will ask Todd Evans to continue with 3.4.

4 MR. EVANS: All right. Todd Evans with
5 Luminant, and I'm going to cover Section 3.4 which
6 pertains to flooding design. There are no site-specific
7 flood protection measures for Comanche Peak 3 and 4 since
8 the plant grade is above the design basis flood levels.

9 All seismic Category 1 structures that are
10 below grade are protected against flooding, including
11 effects of groundwater. And all site-specific
12 safety-related structures which includes the ultimate
13 heat sink related structures, the essential service
14 water pipe tunnel, and the power source fuel storage
15 vaults have been evaluated for internal flooding.

16 These structures have independent
17 compartments for each safety train, such that internal
18 flooding of any one compartment, will not prevent other
19 trains from performing the required safety functions.

20 CHAIRMAN STETKAR: Do you have, and we may
21 see it tomorrow, when I made a -- interesting -- I asked
22 this morning, MHI, who has the responsibility for
23 evaluation of flooding in essential service water pipe
24 tunnel, the ESWPT, and the essential service water pipe
25 chases, the ESWPC? And they said they belong to you.

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1 MR. EVANS: And that's correct.

2 CHAIRMAN STETKAR: Okay. So, that third
3 large bullet there, also includes the pipe chases, right?

4 MR. EVANS: That's correct.

5 CHAIRMAN STETKAR: And my problem is I
6 don't know the exact configuration of the pipe tunnels
7 and the pipe chasers because I haven't seen --

8 MR. EVANS: We are going to look at that a
9 little bit more tomorrow in Chapter 9. We've got some
10 diagrams.

11 CHAIRMAN STETKAR: Good.

12 MR. EVANS: They're not real detailed but
13 --

14 CHAIRMAN STETKAR: Let me telegraph
15 something for tomorrow.

16 MR. EVANS: Okay.

17 CHAIRMAN STETKAR: Because it's something
18 that I came across, in something that I can't quickly find
19 here. Section 9.2.5.4 of the SER now, not your CLFSAR,
20 there's something that quotes a response to an RAI, and
21 let me give you that number, so you might want to look
22 it up.

23 It's RAI 6403?14.03.07-38 Part 3. If
24 you're looking for letters, the letter is dated September
25 24th, 2012 and November 12th, 2012. Question was

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1 regarding freezing in the ESW pipe tunnels and pipe
2 chases.

3 And at least quoted in the SER, it says,
4 ambient temperature in the ESWPT and ESWPC will not fall
5 below freezing but will remain at or above ground
6 temperature. The tunnel is not a closed area, so air can
7 pass through it.

8 The tunnel openings are connected to heated
9 areas in the reactor building, power source building and
10 UHSRS, and only warm air passes into the tunnel area.
11 Therefore water in the tunnel piping will not freeze.

12 That statement gave me the impression that
13 if I was standing in the essential water service pump
14 building let's say, I would see a pump going out and there
15 would be an open space, or a pipe going out. There would
16 be an open space around that pipe, and I can crawl through
17 that open space and I will come to an open space going
18 into the reactor building, and I will come to an open
19 space going into the power source building.

20 In other words that those pipe tunnels, and
21 pipe chases are not sealed compartments, because this
22 says warm air can flow throughout that area and that's
23 one of the reasons why the pipes won't freeze. And I was
24 curious, if that's correct, then I'm not sure how the
25 flooding analyses look at floods and potential

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1 propagation of floods among those different locations.

2 Floods that either originate in the pipe
3 tunnels or pipe chases themselves, or floods that
4 originate in one location, and water flows through the
5 pipe tunnels and pipe chases to another location. So
6 if everything is closed and isolated, I understand.

7 But if indeed it's open the way, at least
8 I got the impression from that question about nonfreezing
9 of the pipes, that lead to a question about design for
10 the flooding anyway.

11 MR. EVANS: Yes, I think I can understand
12 your question, the --

13 CHAIRMAN STETKAR: We know we want to
14 address it tomorrow --

15 MR. EVANS: We can do that or --

16 CHAIRMAN STETKAR: -- so if you have the
17 drawings, let's do it tomorrow if you've got the drawing.

18 MR. EVANS: Okay.

19 CHAIRMAN STETKAR: But I just wanted to
20 alert you, because it is a related type issue. So if you
21 have drawings better, than show the configurations and
22 whether the penetrations are sealed or open, we can
23 address it tomorrow.

24 MR. EVANS: Yes, we can.

25 CHAIRMAN STETKAR: I won't forget.

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1 MR. EVANS: We can be sure of that.

2 CHAIRMAN STETKAR: I have it written down,
3 so I can't forget. But I did want to alert you to it
4 because it was something I wasn't quite sure about, so.

5 MR. EVANS: We'll pull out, there are a
6 couple drawings that are actually in Chapter 3, and
7 actually the next slide kind of gets into that. There
8 is an Appendix 3K, and there's a couple of figures, well
9 this figure 3K-201, a couple of sheets there that show
10 the, I don't have them, those figures in the slide, but
11 they're in the --

12 CHAIRMAN STETKAR: Yes, I mean I looked at
13 those and for some reason I wasn't, I still couldn't quite
14 get the configuration in my mind.

15 MR. EVANS: They don't completely tell the
16 story of, which you're talking about there, yes.

17 CHAIRMAN STETKAR: Okay.

18 MR. EVANS: So we've kind of already
19 covered this slide, I think, so move onto Section 3.5.

20 MR. CONLY: Okay, 3.5, missile protection.
21 Internally generated missiles from the pump house, vent
22 fans, pumps, and cooling tower fans are not considered
23 credible due to casings, housings, shrouds, and steel and
24 concrete structures.

25 Comanche Peak Units 1 and 2 are outside the

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1 low trajectory turbine missile strike zone, of Units 3
2 and 4, and vice-versa. Unit 3 and Unit 4 turbine
3 generators are in an unfavorable orientation, as defined
4 by SRP Section 3.5.1 with respect to safety-related
5 structures systems and components of the adjacent
6 US-APWR unit.

7 However, the inspection intervals keep P1
8 less than E to the minus five per year. Therefore, P4,
9 the acceptable risk of turbine missiles, is maintained
10 less than E to the minus seven per year.

11 CHAIRMAN STETKAR: Can I stop you before
12 you go to the next slide, because I had two questions
13 related to this slide. The first is, I have yet to
14 understand what the words, not credible, means. So I'm
15 not I don't understand that. I do understand, big
16 concrete walls, I understand that sort of stuff in terms
17 of confining missiles once they're ejected.

18 One of the questions that I did have, and
19 this, I don't want to address the notion of not credible
20 versus once in ten million years, because by saying not
21 credible you're saying it's by definition, much, much
22 less than once in ten million years.

23 The ESW pump rooms have the pumps in them
24 obviously. They have fans in them, which have shrouds
25 and all that kind of stuff. One of the questions that

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1 I had, is are the cables for the UHS transfer pump, run
2 through the ESW pump room? Here's the concern.

3 If I get a missile bouncing around the
4 inside of the ESW pump room, can that missile damage the
5 cables for the transfer pump for that division? Because
6 I don't care whether the missile damages the ESW pump
7 because that's clearly only one division. However, the
8 transfer pump functionality for that division could be
9 important.

10 MR. EVANS: I think what you're probably
11 getting at is that the, can a given pump house, the ESW
12 pump is one train, and the transfer pump is a different
13 train.

14 CHAIRMAN STETKAR: And I'm not so much
15 concerned, it the concern is, that suppose I do have a
16 missile generated in that room, from some source. If
17 that missile disables the ESW pump, that's fine. That
18 takes that division, let's call it division A, train A
19 out of ESW.

20 If I have another division drained for
21 maintenance, which I can, I'm now left with two ESW pumps
22 and the transfer pump from what, let's call it the
23 division A basin, to make up for my 30 day supply for the
24 two remaining divisions that I have operable.

25 So for example in particular, let's

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1 generate the missile in train A, let's say that train B
2 basin is drained for maintenance, which it could be
3 during power operations. That leaves me train C and D
4 operating and operable.

5 But I now have less than 30 day's worth of
6 inventory available in trains C and D, because if that
7 missile in train A disables my transfer pump, or basin
8 A, I'm now left with less than 30 days water inventory,
9 follow me?

10 MR. EVANS: Yes.

11 CHAIRMAN STETKAR: In that example, so the
12 question is, are the cables for that transfer pump run
13 through or vulnerable to damage from a missile in the
14 ESW pump room itself or are they run outside of that room?

15 MR. EVANS: No, they are separate. The
16 cables from one train do not go in the compartment for
17 the other train.

18 CHAIRMAN STETKAR: Okay, they do not, okay,
19 because there was some discussion, again in Chapter 9
20 that wasn't quite sure, it almost sounded like the cable,
21 the cables were in the room, but separate.

22 You know, when I looked at fire analysis,
23 it sounded like they were separated by distance, but
24 still in that room. But if they're not run through that
25 room, that alleviates my concern.

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1 MR. EVANS: There have been some design
2 changes over the evolution of the, and you referred to
3 the RAIs and all that so I'm sure you're familiar with
4 those. But in, so in earlier revisions, I think we might
5 have had that situation.

6 The fact where the pumps may even have been
7 in the same room, but the current design has a wall
8 between the ESW pump and the transfer pump. And they're
9 separate.

10 CHAIRMAN STETKAR: I saw the wall, but
11 again, I'm concerned about that the cables would also
12 only come up into that --

13 MR. EVANS: There's only cables from the
14 ESW pump in that room, and they're only cables for the
15 transfer pump, and associated equipment, in the train I
16 should say.

17 CHAIRMAN STETKAR: Thank you, that answers
18 that question. Let me just write notes. And the other
19 question I had related to this slide, is that you heard
20 the discussion about confirming that the frequency of
21 turbine missiles is less than ten to the minus five for
22 a year. And all of that questions.

23 Because you have unfavorably oriented
24 turbines, regarding inter-unit configuration between
25 Units 3 and 4, the conclusion is that last sub-bullet,

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1 that the risk is acceptable because P4, which is the
2 product of P1 and P2 and P3, is less than ten to the minus
3 seven per year.

4 And my question is, how do we have assurance
5 that the product of P2 and P3, P2 being the conditional
6 probability that the missile strike, strikes a critical
7 component, and P3 being the conditional probability that
8 given a missile strike, damage occurs. How do we have
9 assurance that, that probability is less than ten to the
10 minus two?

11 Have you done an evaluation that looks at
12 target areas for both low trajectory and high trajectory
13 missiles to give yourself assurance that indeed that's
14 the case?

15 MR. CONLY: Let me yield to MNES, Ryan.

16 (Pause)

17 MR. MINAMI: This is Minami speaking and I
18 understand that, that the combination of P2 and P3 is
19 described in the SRP at 3.5.1.3. And for favorably the
20 strike can damage, should be one times ten to the minus
21 three. And for unfavorably one times ten to the minus
22 two, right? And if my understanding is correct, we did
23 not need to verify the product of P2 and P3.

24 CHAIRMAN STETKAR: Thank you, I'll ask the
25 staff and why they know that's less than 10 to the minus

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1 two.

2 MR. CONLY: And by controlling P1, through
3 increased inspection frequency, we drive that to where
4 P2 and P3 can remain as stated in SRP 3.5.1 and yet P4
5 can be maintained less than E to the minus seven.

6 CHAIRMAN STETKAR: The implication of
7 course is that even if I had all of my safety-related
8 equipment immediately adjacent to every missile that
9 flies out of that turbine, by some inference, the
10 frequency of damage is less than one in a hundred. And
11 to me that doesn't necessarily fall as a direct
12 conclusion. So you're basic, what I hear you saying is
13 you're basically relying on the numbers in the SRP,
14 without doing any specific analysis.

15 MR. CONLY: That's my understanding, yes.

16 CHAIRMAN STETKAR: So, I'll defer that
17 question to the staff, so that I understand why they have
18 confidence then, that the product is less than ten to the
19 minus two. Okay. Let's see if, I really have a closed
20 session scheduled at 4 O'clock. Let's see if we, no we
21 can't.

22 Yes. So in the interest of not stopping you
23 in mid-sentence on slide 13, let's temporarily recess
24 from this presentation, pick it up on slide 13, when we
25 reconvene and Ryan, are you folks ready?

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1 MR. SPRENGEL: Yes.

2 CHAIRMAN STETKAR: Okay, what we will do
3 now is, we will close the meeting, so that we can discuss
4 the questions regarding the steam generators. Girija,
5 could you do me a favor and go find Sam, because he did
6 want to sit in on this session. Harold does not, but Sam
7 did. I alerted him to the fact that this would occur
8 before, but I don't want him to feel to left out.

9 In the meantime, I'd asked both the staff
10 and MHI to confirm that there is no one in the room who
11 should not be here. So we're okay. And we are then in
12 closed session. And I'll wait until Sam comes.

13 Make sure that we have the bridge line
14 closed, if, it's open.

15 (Off microphone discussion)

16 CHAIRMAN STETKAR: The phone is fine, it's
17 we have separate lines to the bridge line, I think. Not
18 today?

19 (Off microphone discussion)

20 MEMBER ARMIJO: Some protection.

21 CHAIRMAN STETKAR: Do you have the bridge
22 line open so that we can hear folks speaking or not?
23 Okay.

24 MR. SPRENGEL: Then we should go.

25 CHAIRMAN STETKAR: No. But you do want

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1 them to hear?

2 MR. SPRENGEL: Yes. Okay.

3 CHAIRMAN STETKAR: That's the best we can
4 do then. With that, we are in closed session and let's
5 address at least the questions that were raised this
6 morning.

7 MR. SPRENGEL: I guess I'd like to give a
8 little bit of an overview first, and then we can see how
9 far to go from there. But basically because of ongoing
10 litigation, we will have no further discussion on SONGS
11 or any discussions related to SONGS specifically or
12 testing for SONGS or anything.

13 Now we do have a RAI response that is in
14 process and under discussion with the staff. We've
15 given the response, and had some discussion, and given
16 a followup response. And we're continuing discussion
17 with the staff on that.

18 And actually there is more than one RAI
19 response, but the most recent one right now is looking
20 at making a, basically a design commitment for the
21 in-plane fluid elastic instability ratio below .75. And
22 then discussion with the staff most recently is focused
23 on not only making that commitment, but giving the design
24 information of how that evaluation is going to be done.

25 And that's our most recent step with the

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1 staff, of giving some information on how that future
2 design would happen. And it is future work. All these
3 evaluations are reliant on the detailed design
4 information that we don't have right now.

5 So we're making commitments on evaluations
6 in the future, and we're giving a methodology. And just
7 so you know, it's RAI number 1031-7031. So again, still
8 draft, we're working on it right now.

9 But the second part of that goes into the
10 methodology, and it is to basically apply the ASME
11 methodology for out-of-plane vibration, or in-plane as
12 well. And it goes through some details of adjustments
13 and some of the coefficients and values that would be
14 adjusted for the evaluation in the future of our getting
15 -- so that's all in the second part of that RAI response
16 going through the future methodology.

17 The first part gets into a question that
18 came up earlier in terms of comparisons. And the staff
19 had asked and we've expanded the comparisons, that right
20 now include SONGS and also Fort Calhoun, and also
21 Arkansas Nuclear 1, Unit 2.

22 And that was really for a middle ground in
23 terms of size. So we've got SONGS is huge, Fort Calhoun
24 was smaller, we were kind of in the middle but on the
25 smaller side, now we Arkansas Nuclear 1 kind of filling

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1 that gap in between. And we rule out different variables
2 as, there's an RAI word, design features is what we call
3 it.

4 So it gives a perspective of where the
5 different plants fit, and we go through a discussion, not
6 so much in this RAI, but in a previous RAI response, RAI
7 930, where we looked at kind of some of the root causes,
8 and those are documented of course in the SONGS
9 information, and those are publically available.

10 But particularly focusing on steam quality,
11 and we looked at comparisons for SONGS versus US-APWR,
12 and it goes through, you know, how much let's see, we have
13 a lower steam quality, and the kind of the run down of
14 effects as a result of that.

15 So this RAI is newer and the staff has asked
16 us to kind of expand our comparison beyond just SONGS,
17 and that's when we've added the other plants. So it
18 gives some comparisons for sizes and just different
19 features of the different plants.

20 So that's in this response, and that's what
21 we're still working on, on finalizing. But ultimately
22 it comes down to a commitment for the future evaluation
23 for evaluating the in-plane FEI ratio. And maintaining
24 it, now below, of course above one is the real problem,
25 so we're adding a margin even below that and setting the

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1 value at .75.

2 MEMBER ARMIJO: Okay. I had just a couple
3 questions. The factor of .75, is that a
4 well-established analytical basis to assure that you do
5 not get this in-plane versus the out-of-plane?

6 MR. SPRENGEL: That was --

7 MEMBER ARMIJO: My understanding that past
8 practice was that if you had met the out-of-plane
9 requirements, you were sure to meet the in-plane
10 requirement.

11 MR. SPRENGEL: That was in previous
12 understandings, I would agree.

13 MEMBER ARMIJO: Yes, but kind of a folk lore
14 antidotal, or whatever it was, but in fact it turned out
15 not to be the case, and so maybe it's a good question to
16 Pete, who's more familiar with the code. Of whether this
17 .75 is kind of a well-established conservative thing, or
18 whether you established this by virtue of testing?
19 Because I know you, there was some testing done.

20 MR. SPRENGEL: Let me, okay so the .75 is
21 actually a conservatism, and it's adding margin, so
22 you're right in terms of previously looking at
23 out-of-plane vibration, and you said, okay we're okay
24 with that, we were wrong.

25 MEMBER ARMIJO: But we were wrong.

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1 MR. SPRENGEL: Now we've accepted no,
2 that's not good enough, let's also look at the in-plane
3 vibration and the value we've had. So that's the new key
4 part. And the .75 is not actually the real number, it's
5 a ratio of 1.0, that's the problem. So we're adding this
6 margin below that and saying, we're not going to deal with
7 .99 and then you know, one up there. We're going to come
8 down and keep our ratio below .75 as an additional margin.

9 MEMBER RICCARDELLA: What's the standard
10 practice for the out-of-plane, as used?

11 MR. SPRENGEL: I think it's also .75, so
12 that the key part --

13 MEMBER RICCARDELLA: That's standard
14 practice all along?

15 MR. SPRENGEL: Right. The key part is not
16 the .75, it's the evaluation being done at all.

17 MEMBER RICCARDELLA: Yes.

18 MR. SPRENGEL: And I will say that we've
19 given a methodology, we've given approach right now, our
20 intention is to stay engaged with the industry and I think
21 things will continue to evolve. And we'll continue to
22 adjust as any different evaluations are made available.

23 But we wanted to get something to the staff
24 right now and make these in a way, commitments, that we're
25 going to do this evaluation. We're going to do it. This

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1 is all we have as an industry right now, it's the best
2 we have. And as we go forward, we'll stay engaged and
3 contribute as we can to improve any methodology.

4 Because I think one thing we're left with
5 right now is the methodology is arguably over
6 conservative. Because we just have to go with what we
7 have. And so we're okay, we're documenting that, we're
8 giving that to the staff, working out some details back
9 and forth, but ultimately this is going to be an item that
10 continues to develop over time.

11 And we'll stay engaged. I mean of course
12 we have our stuff to deal with now, and we'll do that.
13 But this will be an item just for the industry as a whole
14 to continue to learn and develop knowledge on.

15 MEMBER ARMIJO: Yes, I keep coming back to
16 the question, is you know, is the conservatism in the
17 methodology that you're including a .75, but first of all
18 start with the analysis, and then you apply a
19 conservative factor, is that supported by testing, test
20 data? Or is that just calculation?

21 MR. SPRENGEL: I cannot speak to the ASME
22 methodology that being created. I think that's the root
23 of the question and --

24 MEMBER ARMIJO: But it's not, so let me get
25 one last try. It's not supported by Mitsubishi test

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1 data? It comes from, if there was test data that was used
2 to let's say, validate the ASME methodology?

3 MR. SPRENGEL: No, we're not --

4 MEMBER ARMIJO: That's up to, you have not
5 done --

6 MR. SPRENGEL: US-APWR is not doing any
7 testing to validate the ASME code methodology.

8 MEMBER RICCARDELLA: You know the ASME code
9 has some, is based on some testing, but it's on very
10 simple tube bundles straight tubes, and things like that,
11 and it specifically says in the appendix that if you're
12 going to use more complex, or different designs, you
13 should do testing.

14 That's stated at, I forget the appendix
15 number, I haven't, it's been a while since I looked at
16 it. But I would guess that, you know, if your design,
17 you know, we've been designing and building steam
18 generators for a long time without having these problems,
19 and so as long as the design isn't too much of a departure
20 from existing designs, that would count as testing, to
21 some degree.

22 MEMBER ARMIJO: Sure. Operating
23 experience would count as testing, some experience.

24 MEMBER RICCARDELLA: I think you said you
25 were going to make these comparisons, but these steam

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1 generators are much smaller than SONGS, is that because
2 it's four instead of two?

3 MR. SPRENGEL: Yes. The number of steam
4 generators available in the different plants is a key
5 part of it. Yes. Just reading off our table here, we
6 have SONGS, I mean the key, internal power, yes. This
7 is like a thermal output first steam generator, which is
8 one of the key factors.

9 On SONGS that's 1729 US-APWR 1116. So I
10 mean SONGS, just the reality of it is, you know, fewer
11 steam generators, they're huge and they pump a lot of
12 energy into them. And that's some of the detail that we
13 go through between these two different RAI responses,
14 highlighting that they are different. They are
15 definitely different.

16 MEMBER ARMIJO: Okay. Thanks, that
17 answers my question.

18 CHAIRMAN STETKAR: Yes, it sounds like, you
19 know, in terms of our involvement, we'll just, whatever
20 the schedule plays out to be, we'll just follow it as the
21 RAI responses play out, and staff completes their
22 evaluation of those responses. Both of you satisfied?

23 MEMBER ARMIJO: Yes, you know, I've asked
24 the question and he's answered the question. You know,
25 ultimately the staff will have to, I may ask it again.

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1 CHAIRMAN STETKAR: Yes, sure. No, that's,
2 but it's does in terms of --

3 MEMBER RICCARDELLA: Staff has asked the
4 question --

5 (Crosstalk)

6 CHAIRMAN STETKAR: Yes, they have asked the
7 question, so it's on the table. It needs to get resolved
8 in terms of the staff. And we get a shot at it, you know.

9 MEMBER ARMIJO: In the future.

10 CHAIRMAN STETKAR: In the future when it is
11 indeed eventually resolved, so. Anything else?

12 CHAIRMAN STETKAR: No.

13 CHAIRMAN STETKAR: Okay. Thank you,
14 thanks Ron, that was really helpful. Then what we'll do
15 is we'll reopen the session and ask Luminant to come back
16 up and finish their presentations.

17 What I'd like to do today, if it's feasible,
18 is actually finish this Luminant's presentation on
19 Chapter 3, and the Staff's review on Chapter 3, so that
20 tomorrow we can pick up Chapter 9 on Luminant in the
21 morning. That's easier on everybody I think.

22 MR. SHUKLA: Yes, we already have slides
23 for staff.

24 CHAIRMAN STETKAR: Yes. So thank you.
25 And we are back in open session.

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1 MR. CONLY: 3.5 missile protection
2 continued. The probability of an aircraft crashing into
3 the plant was estimated in accordance with SRP 3.5.1.6,
4 because the plant is within five miles of the nearest edge
5 of military training route, Victor, Romeo, -158.

6 The number of aircraft operations on
7 VR-158 is less than the number of operations per year that
8 would increase the crash probability beyond E to the
9 minus seven. Therefore neither an air crash nor an air
10 transportation accident is required to be considered as
11 part of the design basis in accordance with the SRP.

12 CHAIRMAN STETKAR: Okay, I did some back of
13 the envelop calculations and I won't bore you with those.
14 My basic question is that in the FSAR, as far as military
15 aircraft crash frequencies that are used in the analysis.

16 The assertion was made that the commercial
17 aircraft crash frequency of four E to the minus ten, crash
18 per flight mile, provides a conservative approach for
19 determining the probability of in-route crashes on
20 military airways. That's a quote from the FSAR.

21 I, for other activities, compiled a
22 reasonable amount of aircraft crash data, and indeed a
23 frequency of four E to the minus ten per flight mile, for
24 what are typically characterized as in-transit flights
25 of commercial aircraft operating under the rules of 14

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1 CFR 121, which basically means the kind of aircraft that
2 we normally fly around on, the commercial passenger
3 aircraft that are subject to rather stringent rules.

4 That four E to the minus ten frequency, is
5 reasonably comparable to actual experience. If you go
6 into FAA and NTSB data bases over quite a long period of
7 time.

8 It is crash frequencies for small aircraft,
9 for aircraft that we generally consider to be commuter
10 aircraft or normally just call it commuter aircraft, are
11 considerably higher than that. Also and this is data you
12 can't find from FAA, because they don't compile the data,
13 crash frequencies for military aircraft tend to be quite
14 a bit higher than that.

15 Particular this data available for,
16 unfortunately the data that's available for military
17 usually are not recorded in terms of crash frequency per
18 flight mile. That's a problem. At least not in the U.S.
19 In other countries they are, but I can't share that
20 information.

21 MEMBER RICCARDELLA: The four E to the
22 minus ten is for flight miles?

23 CHAIRMAN STETKAR: Four E to the minus ten
24 is per flight mile in-transit. So we're talking about
25 cruising aircraft crashes. We're not talking about

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1 climb, or decent, or year airport operations, those crash
2 frequencies are a lot higher.

3 But this is for just, you know, your basic
4 cruise operation, climb over the desert, looking up,
5 down, observing the scenery, falling out of the sky from
6 35,000 feet or whatever.

7 Military aircraft crash frequencies tend to
8 be higher than that. At least from the data I've seen.
9 So my fundamental question is, what's the justification
10 for your assertion that the military aircraft crash
11 frequencies are either comparable to or bounded by this
12 four E to the minus ten crash frequency per year, per
13 flight mile value? It's derived from commercial
14 experience.

15 That's sort of the basic question. I have
16 other questions about methodology and things like that,
17 number of flights in air corridors, and I'm going to ask
18 the staff about the number of flights. But I understand
19 the methods that you've used. And I understand at least
20 the data that are tabulated for the number of flights in
21 that particular military corridor.

22 But I guess for you, because that number is
23 quoted in the FSAR, I'd like to understand why it's either
24 accurate or conservative for military aircraft crash
25 frequencies? Considering the range of military

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1 aircraft and that you typically find military aircraft,
2 depending on, in the data bases I've seen for the U.S.,
3 they're typically not very specific. They tend to sub
4 divide them into quote, unquote, "large military
5 aircraft", which are things like bombers and cargo
6 aircraft, and they're, you know, tankers. And small
7 military aircraft that are fighters, and attack aircraft
8 and training aircraft.

9 And the crash frequencies in particular for
10 the small aircraft are about an order of magnitude higher
11 than the larger aircraft. So I don't know what kind of
12 aircraft used this particular air corridor, because I
13 don't know, you know, I don't know what people do there.

14 It's not a, I pulled it up, it's certainly
15 not a training area, which is good news for you. But it's
16 a point to point corridor, and I don't know what kind of
17 aircraft are using it, so I guess I'd like a little bit
18 of feedback on the justification for that frequency.

19 MR. CONLY: We understand your question.
20 The analysis was done in accordance with SRP 3.5.1.6, and
21 we will have to get back with you on the details of that
22 analysis.

23 CHAIRMAN STETKAR: Okay. Thank you.

24 MR. CONLY: Are there any other questions
25 on 3.5 missile protection? Then let me ask Todd to take

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1 3.6.

2 MR. EVANS: All right. Section 3.6
3 addresses protection against effects of postulated
4 rupture of piping. There are no site-specific high
5 energy piping within the essential service water pipe
6 tunnels or ultimate heat sink related structures.

7 The essential service water pipe protection
8 system contains site-specific moderate energy piping.
9 Pipe break hazard analysis for site-specific moderate
10 energy piping will be performed per the guidelines given
11 in the DCD.

12 And will identify any postulated crack
13 locations, require protective measures, and
14 environmental and flooded impacts to ensure that
15 safety-related functions are not affected. This pipe
16 break hazard analysis is subject to license condition 3-1
17 which Don, showed us earlier.

18 And we will have procedures that will
19 address plant operating and maintenance requirements to
20 prevent water hammer. And that's all for Section 3.6.
21 Any questions?

22 CHAIRMAN STETKAR: No, because you only own
23 the pipe chases and the pipe tunnels. So, okay. Go on.

24 MR. EVANS: Okay. Move on to Section 3.9
25 on mechanical systems and components. The only

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1 site-specific active equipment is the ultimate heat sink
2 transfer system pumps and valves. The IST Program
3 incorporates the DCD described program as expanded upon
4 in the FSAR using ASME Section 11, ASME OM Code, Tech
5 Specs, and good engineering practice.

6 And it is also the subject, and is also in
7 conformance with NUREG-1482 guidelines for in-service
8 testing. And also note that the IST program is the
9 subject of license condition 3-3, which we covered
10 earlier as well.

11 We do have one SER open item on Section 3.9,
12 it's 3.9.6-21. It addresses the providing of additional
13 details of the requirements for functional design
14 qualification and IST programs as is typically given in
15 specifications.

16 This is a subject that was mentioned and
17 covered in the DCD presentation, so it's the same story
18 here. That typical specifications are being prepared
19 and will be available soon for staff review. Those are
20 the same work, body of work that was discussed in the DCD
21 presentation.

22 MR. WOODLAN: Okay, next we're moving to
23 3.10, and this is Don Woodlan. I'll cover 3.10, seismic
24 and dynamic qualification of mechanical and electrical
25 equipment. 3.10 and 3.11 kind of go together to cover

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1 the equipment qualification and I'll cover both of those,
2 starting with the seismic first.

3 We do use pretty standard OBE as one third
4 of the SSE for Comanche Peak. The EQ that's the
5 environmental qualification program, is described in
6 MUAP-08015. Now MUAP covers more than just
7 environmental qualification, it in fact covers just
8 about the entire equipment qualification, including how
9 we handle mechanical equipment.

10 The site-specific implementation requires
11 the turnover of all the EQ program products to Luminant,
12 and that's part of giving the operational program for the
13 maintenance and environmental qualification.

14 Now to 3.11, the actual environmental
15 qualification program. It will be established and
16 implemented prior to fuel load. This is the operational
17 side of the EQ program. Equipment test results are
18 maintained as auditable project records and those will
19 be turned over and maintained by Luminant as part of the
20 program.

21 Site-specific equipment, the site
22 equipment of concern are those that are subject to loss
23 of ventilation and still required to remain functional.
24 And those are addressed and identified in the FSAR.

25 In looking at Appendix 3D, is where we

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1 identify the equipment, it in seismic Category 1, and
2 these will require, be required to be qualified and
3 addressed as part of the equipment qualification
4 program.

5 We do have a, let me make sure, yes, two SER
6 open items related in this area. The first one has to
7 do with the environmental qualifications,
8 specifications for mechanical equipment. And this
9 issue's tied to the same issue we touched on several
10 times, design and procurement specifications.

11 And one of the aspects that will be looked
12 at is, do they adequately address the environmental
13 qualification requirements?

14 The second open item is to provide a full
15 description of the operational environmental
16 qualification program. That is included in MUAP-08015.
17 It has been provided to the staff and it is under review
18 by them. And that takes us to 3.12. Any questions on
19 3.10 or 3.11? 3.12, piping design review. Todd.

20 MR. EVANS: All right. Regarding the
21 piping design review for Section 3.12. Site-specific
22 response spectra is used for analysis of yard piping
23 that's not included in the standard plant design in the
24 DCD. ASME 3, Class 2 or 3 piping is not exposed to wind,
25 or tornado loading for the site-specific piping.

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1 Exposed non-ASME piping is evaluated for effects.

2 For site-specific ground motion response
3 spectra, there are no exceedances of high frequency
4 certified seismic design response spectra. Therefore,
5 screening of piping for high frequency sensitivity is not
6 required.

7 Section 3.13 covers threaded fasteners,
8 basically what's included in the FSAR is our commitments
9 for the programs associated with this. Threaded
10 fastener Pre-Service Inspection Program will be
11 implemented after start of construction.

12 And the In-service Inspection Program will
13 be implemented as part of Operational Program. And that
14 concludes our Chapter 3 presentation for the COLA.

15 CHAIRMAN STETKAR: Do members have any more
16 questions for Luminant? Good. Thank you. Wasn't too
17 painful.

18 (Off microphone discussion)

19 CHAIRMAN STETKAR: You notice Don is
20 getting really good about understanding which sections
21 he ought present.

22 MR. EVANS: He is good isn't he?

23 CHAIRMAN STETKAR: Isn't he good.

24 MR. EVANS: He knows which ones to choose
25 and I see he disappeared.

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1 CHAIRMAN STETKAR: So we'll have the staff
2 come up and give their presentation on the review,
3 Chapter 3.

4 (Off microphone discussion)

5 MR. GALVIN: Did you turn it on? Girija,
6 I think I need help.

7 MALE PARTICIPATE: And you'll need the
8 password.

9 MALE PARTICIPATE: I guess we could work
10 with the handouts.

11 (Off microphone discussion)

12 CHAIRMAN STETKAR: Dang that's a good
13 password.

14 (Laughter)

15 (Off microphone discussion)

16 MR. GALVIN: Yes, but I memorized it.
17 Whole bunch of periods.

18 CHAIRMAN STETKAR: Okay, we're ready.

19 MR. GALVIN: Again, we are briefing on the
20 US-APWR, on looking at Comanche Peak, Chapter 3, SE.
21 We've identified the reviewers. We have a little
22 thinner staff and I think we have the ones, at least the
23 questions you've identified so far, they're still here.
24 So if you have any questions.

25 CHAIRMAN STETKAR: All right.

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1 MR. GALVIN: We have three open items as was
2 discussed before. The first two involve conducting an
3 audit of the design and procurement specifications for
4 the in-service testing. Well, address implementation
5 of the functional design, qualification, and in-service
6 testing programs and also for environmental
7 qualification of the mechanical equipment.

8 And the other open item is the staff cannot
9 complete its evaluation of Luminant's description of its
10 environmental qualification operational program,
11 because the review of the US-APWR Equipment
12 Environmental Qualification Program is incomplete.

13 We still have a fair number of open items
14 or issues as you heard this morning, so we're, it's just
15 not practical to complete the review until we make more
16 progress for the DCD. That's all we have. Those are all
17 the open items, so if you have some questions?

18 CHAIRMAN STETKAR: Dennis, do you have your
19 aircraft crash reviewer here?

20 MR. GALVIN: Right here.

21 CHAIRMAN STETKAR: Excellent.

22 MR. GALVIN: Raul is here. Time to run
23 away.

24 CHAIRMAN STETKAR: Two questions that I
25 had. One is, and I don't know whether this is a typo

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1 or not. In Section 3.5.1.6 of the COL FSAR Revision 3,
2 there is a statement that says, in order to maintain PFA,
3 which is the aircraft crash frequency, less than the
4 order of ten to the minus seven for both Units 3 and 4,
5 the above equation is rearranged to solve for N, which
6 is the number of flights, the flight operations per year,
7 using values CA and W, is determined below.

8 And the conclusion is that as long as the
9 number of flights in that air traffic control, air
10 traffic corridor VR-158 is less than 19,300 flights per
11 year, given that aircraft crash frequency that we
12 discussed earlier, four E to the minus ten, crash per
13 year, per flight mile, everything is okay.

14 And indeed I confirmed, given the
15 configurations, and distances, and areas, and things
16 that, that 19,300 value is consistent with the
17 information in the FSAR.

18 In Section 3.5.1.6.4 of the safety
19 evaluation report, is a statement that says, based on the
20 guidance provided in SRP Section 3.5.1.6, the applicant
21 estimated the number of flight operations is required to
22 be less than 35,300 per year to meet the acceptable
23 total probability of an aircraft accident of less than
24 ten to the minus seven per year.

25 So now I'm curious, why in one place it says

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1 19,300 and in the SER it says 35,300?

2 MR. AHMED: In the version of FSAR, 19,300
3 was calculated. But later on, they have changed the way
4 they calculated the area, to be 0.0909 and also they have
5 many other, in the earlier calculation with respect to
6 the actual distance that had to be used.

7 Therefore we corrected their calculation
8 and submitted the revised calculation to the staff.
9 Therefore based upon that calculation if, we confirmed,
10 the value would be 35,300.

11 CHAIRMAN STETKAR: Okay now --

12 MR. AHMED: Yes.

13 CHAIRMAN STETKAR: Okay go on.

14 MR. AHMED: Yes. And then to go from the
15 -- whether it needs, I mean, they have calibrated and
16 confirmed that they're meeting 35,300 in order to meet
17 the probability criteria of one ten to the four minus
18 seven. And the staff inquired the real --

19 CHAIRMAN STETKAR: Let me stop you there,
20 because I have another question about that, but let me
21 stop you at that point, because now I'm even more confused
22 than I was before.

23 It's a pretty simple calculation, I used the
24 information in the FSAR of .0909, a square mile per unit.
25 I took, multiplied that by two, and I rounded it to .18.

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1 I used the width of the aircraft traffic control corridor
2 and the distance from the edge of the aircraft control
3 corridor, as per the guidance in the SRP.

4 And I used a crash frequency of four times
5 ten to minus ten per flight mile year. And indeed I came
6 up with a value that was in round numbers 19,300, not
7 35,300. So I'm not sure all of the numbers that you
8 quoted are the numbers that I used to come up with 19,300.

9 MR. AHMED: The area, original, the area
10 was 0.07. Okay, that did not, we didn't change it. I
11 did not degrade the criteria. But the other number is
12 twice the width of the area, plus the distance.

13 CHAIRMAN STETKAR: That's right. That
14 comes out to be 14 miles.

15 MR. AHMED: No, it will be, the width of the
16 area is ten miles, times 20, two is 20, plus 7.6. 7.6
17 miles is the actual area from the, I think that is the
18 distance.

19 CHAIRMAN STETKAR: 7.8, but I'll give you
20 7.6.

21 MR. AHMED: So if you take the width of the
22 area is ten, and multiply by two, that would be 20 plus
23 7.6. 27.6 if you use that number, you'll get 35,300.

24 (Pause)

25 (Crosstalk)

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1 MR. WOODLAN: Yes, this is Don Woodlan
2 again. There has been some changes. And these will
3 appear in Revision 4, next week I hope. The, you're
4 correct, John, the number that we've come up with now and
5 it includes some minor adjustments, but basically it
6 was we incorrectly addressed the area by a factor of two.

7 Really the version that you saw and the
8 current number that's going to appear in Revision 4 is
9 17,600 operations per year, which I think is aligned with
10 what you came you up with, John.

11 CHAIRMAN STETKAR: That's, yes, I mean
12 that's a lot closer, that's right, 17,600 and that's for,
13 but that's half of the 35,300.

14 MR. WOODLAN: Correct.

15 MR. GALVIN: I think they told us 35,000,
16 that's what made it in the SC, and I think it was a big,
17 so maybe we must have --

18 (Crosstalk)

19 CHAIRMAN STETKAR: It may be this thing
20 about hitting a single unit, versus hitting a both units.

21 MR. WOODLAN: I think that's exactly what's
22 happened --

23 CHAIRMAN STETKAR: By a factor of two going
24 on here, but okay, I understand that, okay. Got it. Let
25 me just write a note here.

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1 (Pause)

2 CHAIRMAN STETKAR: Just make sure that we
3 get that straight because again I was using the total
4 footprint, regardless of how you adjust the numbers, I
5 was using the total footprint of the site versus the
6 footprint of a single unit. And that's of course a
7 factor of two in there.

8 Now, all right. Well, let me ask you the
9 question because I cut you off, because I did have a
10 question about your data. In the SER it says the staff
11 obtained, latest five years, 2004 through 2008 of flight
12 operations data within ten miles of the site from the
13 federal aviation administration.

14 Using this data, the NRC staff determined
15 that the maximum annual number of total military flight
16 operations within ten miles of the site is 11,192 for the
17 year 2006.

18 And my question is, in the FSAR, at least
19 the version of the FSAR that I have, in Section 2.2.7.2
20 of the FSAR, it lists a number of flights per year of 300
21 to 400 for that particular military airway. And the
22 other military airway is IR-139 and that lists 10 flights
23 per year.

24 My question to the staff is, this 11,192
25 flights per year, which are characterized as military

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1 operations from the FAA, is that the total number of
2 flights, commercial plus military?

3 MR. AHMED: No.

4 CHAIRMAN STETKAR: Only military?

5 MR. AHMED: Okay, the FAA flight I get
6 includes all flights from runway to destination, within
7 five miles. So they give, where is the origin, where is
8 the destination, date, and the flight, and designation
9 of the aircraft.

10 CHAIRMAN STETKAR: Yes.

11 MR. AHMED: So there are prior designations
12 they have.

13 CHAIRMAN STETKAR: That's what I have.

14 MR. AHMED: So did you get the, so first
15 of all when the data comes, if it is not a designated
16 military, I use all the aircraft flights. Using the ten
17 miles to see very conservative estimation of the
18 probability.

19 But in this case I have generated a program,
20 I can thin out based upon the designation whether it is
21 a military, so I screen only military.

22 CHAIRMAN STETKAR: So this is, this count
23 of 11,192 --

24 MR. AHMED: All the aircrafts designated
25 military by that letter, yes.

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1 CHAIRMAN STETKAR: Okay.

2 MR. AHMED: Passing too within ten miles of
3 the site.

4 CHAIRMAN STETKAR: Well that actual, then
5 I'm really interested in the basis for that four E to the
6 minus two, ten, four E to the minus ten crash frequency
7 for military aircraft for in-flight operations because
8 if indeed there is something on the order of 11,000
9 flights per year in that --

10 MEMBER SCHULTZ: 2006.

11 CHAIRMAN STETKAR: In 2006, but in that
12 corridor, military flights.

13 MR. AHMED: I compiled the information by
14 year, five years, and then --

15 CHAIRMAN STETKAR: And that was the highest
16 of the five years?

17 MR. AHMED: That would be the highest of the
18 five years.

19 CHAIRMAN STETKAR: Yes. And that's fine.
20 But it's important for me, I don't care about the specific
21 number or the year, it's on the order of something between
22 ten thousandish versus a few hundredish. And that's a
23 big difference.

24 MR. AHMED: Maybe a few hundred probably is
25 pertaining to that, you know, one particular military

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1 area. I do not know. I mean, it's a very difficult to
2 designate that way.

3 CHAIRMAN STETKAR: Okay.

4 MR. AHMED: And to answer one more question
5 about the probability, I looked at the data base compiled
6 by Sandia National Laboratory for the various DOE sites.
7 And again it is probably is by different aircrafts also.
8 I looked that, to see a value how much it is, the
9 probability is changed. So it is more or less comparable
10 of that, as far you stated it could be an order of
11 magnitude difference.

12 CHAIRMAN STETKAR: Yes. It's, did you
13 look by the way at, there's a DOE standard. It's DOE
14 standard, DOE STD.

15 MR. AHMED: Yes, that is --

16 CHAIRMAN STETKAR: 30142006, okay.
17 That's the number that was used and it was compiled by
18 Sandia, it was used for Yucca Mountain.

19 MR. AHMED: But, that was read, is also
20 available.

21 CHAIRMAN STETKAR: Yes. I didn't have
22 access to lab data, but I'm sure you guys do. And there
23 they do differentiate between aircraft operations, take
24 off and landings versus in flight, they give ranges,
25 minimum average, maximum, for the two different, at least

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1 in the summary information for the two different
2 classifications.

3 And I've done some playing with that data,
4 in terms of looking at different ways of estimating crash
5 exposure areas, and backing out a crash rate per flight
6 mile if you will. And they tend to be quite a bit higher
7 than the commercial aircraft crash rates.

8 The large aircraft is more comparable.
9 They're fairly close within a factor of three or four or
10 five. But the small aircraft is a lot higher. They're
11 like an order of magnitude higher.

12 So the concern is that if the air traffic
13 density of 11,000 or so flights per year has a high number
14 of small military aircraft, that it's not clear that the
15 frequency, the crash frequency is on the order of ten to
16 the minus seven.

17 MR. AHMED: But probably we have to keep in
18 mind if it is a smaller aircraft, even though it is
19 probably is higher, the impact hazard is much less.

20 CHAIRMAN STETKAR: But they didn't do that
21 analysis, did they? They simply argued that the
22 frequency of an aircraft of any size or any energy within
23 the site, is less than ten to the minus seven.

24 A more detailed analysis might justify the
25 fact that the risk is acceptably small, but they didn't

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1 do the detailed analysis. And right now I'm kind of
2 questioning, you know, whether or not the assertion that
3 the crash frequency, regardless of potential damage,
4 indeed is less than ten to the minus seven.

5 And as I said, if the, if your flight density
6 data are at all in the right ball park, on the order of
7 10,000 or so flights per year, then it becomes even more
8 important to understand whether or not the frequency that
9 they're using for the in-flight crash frequency is indeed
10 reasonable. Because you're starting to get really close
11 actually. Really close.

12 MEMBER SCHULTZ: And there's a difference
13 to be explained.

14 CHAIRMAN STETKAR: Yes, so.

15 MR. AHMED: And we thought we were
16 answering one letter to ACRS long time, three years ago
17 with the respect to viewing the details.

18 CHAIRMAN STETKAR: Yes, I knew, yes, that's
19 why I didn't talk much about the methodology. We've
20 discussed that before, so I was, stick to this
21 methodology and at least discuss the numbers.

22 Thanks that helps a lot by the way. Any
23 other members have any questions, further questions for
24 the staff? If not, let me do a couple of administrative
25 things here.

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1 First of all, let me ask if there are any
2 members of the public in the room who would like to make
3 a statement or comment? And I don't know, I know we have
4 a bridge line, I don't know if there are any members of
5 the public on the bridge line?

6 MEMBER RICCARDELLA: No.

7 CHAIRMAN STETKAR: There are not.

8 MEMBER RICCARDELLA: Just whatever you put
9 on the tape.

10 CHAIRMAN STETKAR: Okay. So I don't need
11 to open the bridge line to see if there are any public
12 comments. I'd like to thank the staff for your
13 presentation on Chapter 3. And as we usually do at the
14 end of the subcommittee meetings, I'd like to go around
15 the table, and see if any of the members have any closing
16 comments or areas that they'd like to bring up in summary,
17 because this is our shot at Chapter 3. Tomorrow we'll
18 talk about Chapter 9. Pete?

19 MEMBER RICCARDELLA: No.

20 CHAIRMAN STETKAR: Harold?

21 MEMBER RAY: I did listen, and no I don't.

22 CHAIRMAN STETKAR: Thank you much, Steve?

23 MEMBER SCHULTZ: Nothing further.

24 CHAIRMAN STETKAR: Charlie?

25 MEMBER BROWN: Nothing further.

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1 CHAIRMAN STETKAR: You notice I leave the
2 best for last. Sam?

3 MEMBER ARMIJO: Nothing more.

4 CHAIRMAN STETKAR: Thank you, and I don't
5 have anything more, so miraculously we're finished and
6 we'll talk about Chapter 9 of the COL tomorrow. And we
7 are adjourned.

8 (Whereupon, the meeting in the
9 above-entitled matter was concluded at 4:53 p.m.)

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

US-APWR SUBCOMMITTEE

+ + + + +

THURSDAY

NOVEMBER 21, 2013

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear
Regulatory Commission, Two White Flint North, Room T2B1,
11545 Rockville Pike, at 8:30 a.m., John W. Stetkar,
Chairman, presiding.

COMMITTEE MEMBERS:

JOHN W. STETKAR, Subcommittee Chairman

CHARLES H. BROWN, JR. Member

HAROLD B. RAY, Member

PETER C. RICCARDELLA, Member

STEPHEN P. SCHULTZ, Member

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1 DESIGNATED FEDERAL OFFICIAL:

2 GIRIJA S. SHUKLA

3

4 ALSO PRESENT:

5 EDWIN M. HACKETT, Executive Director, ACRS

6 SARDAR AHMED, NRO

7 MARK BIERY, MNES

8 PERRY BUCKBERG, NRO

9 THERESA CLARK, NRO

10 JOHN CONLY, Luminant

11 ANTONIO DIAS, NRO

12 JENNIFER DIXON-HERRITY, NRO

13 TODD EVANS, Luminant

14 DENNIS GALVIN, NRO

15 RAUL HERNANDEZ, NRO

16 THOMAS HICKS, MNES

17 JOHN HONCHARIK, NRO

18 MASASHI ITO, MNES

19 PAUL KALLAN, NRO

20 PETER KANG, NRR

21 RON LAVERA, NRO

22 RENEE LI, NRO

23 ATSUSHI MATSUMOTO, MHI

24 YOSHIHIRO MINAMI, MHI

25 STEPHEN MONARQUE, NRO

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1 MASATOSHI NAGAI, MNES
2 HIROKI NISHIO, MHI
3 YUKIHIRO NISHIZAWA, MHI
4 RYAN NOLAN, NRO
5 HIKARU OGASAWARA, MHI
6 RICHARD SAMPLES, MNES
7 THOMAS SCARBROUGH, NRO
8 MOHAMED SHAMS, NRO
9 RYAN SPRENGEL, MNES
10 ANGELO STUBBS, NRO
11 YOSHIHIRO TAKAYAMA, NRO
12 LARRY WHEELER, NRO
13 DONALD WOODLAN, Luminant

14 *Present via telephone
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P-R-O-C-E-E-D-I-N-G-S

(8:31 a.m.)

CHAIRMAN STETKAR: Okay, this is the second day of the meeting of the United States Advanced Pressurized Water Reactor Subcommittee. I'm John Stetkar, Chairman of the Subcommittee.

ACRS Members in attendance are Harold Ray, Steve Schultz and Charlie Brown. Mr. Girija Shukla is the designated Federal Official.

Today we're going to continue the discussions from yesterday and hear about Chapter 9 of the Comanche Luminant combined license application. I understand that we're going to have both opened and closed sessions today.

The way we'll organize it, I think Luminant will present the open session material first. We'll close the meeting and hear the closed session presentations and then reopen it for the staff's presentation.

I also understand that MHI has some responses to a few of our questions anyway, from yesterday, and that the staff had some additional information that they'd like to provide to support some of the discussions from yesterday. We will pick up those items after we finish the discussions about Chapter 9.

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1 Again, I remind everyone to please turn of
2 your cell phones so that we make sure that we hear you
3 on the transcript. If you have something to say please
4 come up to the microphone and announce your name and speak
5 clearly and sufficiently so that we understand you and
6 whatever those words say.

7 With that I will turn it over to Stephen
8 Monarque to say, if you have anything to say as an
9 introduction and he's shaking his head.

10 MR. MONARQUE: I just wanted to say, thank
11 you for having us today. And with that we can turn over
12 the mic.

13 CHAIRMAN STETKAR: Welcome, it's good to be
14 had. I'll turn it over now to Luminant, Don Woodlan.

15 MR. WOODLAN: Thank you and good morning
16 everyone. We are covering Chapter 9 this morning,
17 auxiliary systems. Next slide, John.

18 CHAIRMAN STETKAR: And just for the record
19 we've been joined by Pete Riccardella. Just to make sure
20 that you're, acknowledge that you're here.

21 MR. WOODLAN: First slide here is the
22 agenda. Again, it looks a lot like the agenda we
23 normally use.

24 We'll start out with an introduction,
25 address the ACRS open items, the ACRS license condition

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1 and then the site specific aspects of our Chapter 9. And
2 as you mentioned, there will be a closed portion there.

3 And we'll do that at the end unless we need
4 to reference drawings during the discussion and then we
5 can decide if we want --

6 CHAIRMAN STETKAR: Yes, we'll see.

7 MR. WOODLAN: -- go through it.

8 CHAIRMAN STETKAR: And as I said it, if some
9 of our questions drift into areas where you think it's
10 better to support the answers with that information,
11 we'll just postpone it. We'll try to keep it all open
12 and then transfer into close --

13 MR. WOODLAN: I think that will --

14 CHAIRMAN STETKAR: -- if that works.
15 Okay.

16 MR. WOODLAN: All right, next slide, John.
17 Here's the introduction. Again, very similar to the one
18 we normally use.

19 We are continuing to use the IBR
20 methodology. There are no departures from the US-APWR,
21 DCD.

22 All COLA items from the DCD have been
23 addressed in the FSAR. We do have one SER open item which
24 we'll address. We do have a license condition which we
25 will also address. And there are no contentions pending

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1 before the ASLB.

2 Now for the site specific presentation I'm
3 going to turn it over to Todd Evans.

4 MR. EVANS: All right, my name is Todd Evans
5 with Luminant and I'm glad to be here today to discuss
6 Chapter 9 of the COLA for Comanche Peak 3 and 4. This
7 slide discusses the safety evaluation open item. We
8 have one open item for Chapter 9.

9 The open item deals with standard design
10 heat load calculations being adjusted which may impact
11 some parameters in the COLA. Changes are expected as we
12 go forward.

13 The heat loads for the ultimate heat sink
14 for the service water are the load and coolant water heat
15 exchangers and the essential chillers. So there will
16 likely be some minor adjustments.

17 We do not expect those to impact the
18 conclusions for the ultimate heat sink design but we want
19 to make sure we get the capacities and the tables and
20 everything correct ultimately in the COLA. So that's
21 the reason for the open item.

22 Final parameters will be reflected at
23 future updates to the DCD and then those will be reflected
24 in the COLA.

25 CHAIRMAN STETKAR: Todd, are you going to,

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1 I'm trying to page forward here and I'm not sure that I'm
2 seeing it, I had a question about the heat load
3 calculation. Is it the appropriate time to ask that
4 question or do you have another slide --

5 MR. EVANS: I don't have any specific
6 slides that cover the heat load calculation, so I'd say
7 go ahead.

8 CHAIRMAN STETKAR: Okay, let me take a shot
9 at it. If I read the FSAR there's analysis that was done,
10 this is in Section 9.2.5.2.3 if you want the reference,
11 the pointer for the FSAR section.

12 But there's an analysis that was done that
13 used what is cited as the worse 30 day period wet bulb
14 temperature based on data that were collected from, 30
15 years of data, 1977 through 2006. And I believe that
16 that calculation was performed to evaluate the minimum
17 heat removal from the UHS.

18 Because that's typically what's done with
19 that type of calculation. Now I was curious, a lot of
20 times I see calculations that also are designed to
21 quantify the maximum evaporative heat losses so that
22 essentially the maximum mass loss from the basin.

23 And those are typically done with a, it's
24 not a minimum wet bulb temperature because that doesn't
25 necessarily give you the maximum evaporated heat loss,

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1 but it's a much different temperature profile where you
2 maximize the difference between the dry bulb temperature
3 and the wet bulb temperature rather than trying to
4 minimizing the difference.

5 And I didn't see that type of calculation.
6 I was wondering whether the, I'm not, I don't design
7 cooling towers so I don't know how these actually work,
8 but I only know from experience that I have seen two
9 different sets of calculations performed in the past.

10 One to essentially minimize heat removal
11 and the other to essentially maximize evaporative heat
12 losses and the temperature. They're both based on a
13 temperature profile that's derived from actually weather
14 data, but in one case you try to minimize the difference
15 between the wet bulb and dry bulb temperatures, the other
16 case you try to maximize the difference over that period.

17 So I was curious whether the calculations
18 that you've done, and I ask the staff too because I'm sure
19 they have people who understand this much better than I
20 do, whether we have assurance that you've calculated the
21 maximum evaporative heat losses which actually then feed
22 into the volumes of the basins and things like that?

23 MR. EVANS: I think we'll have to check on
24 that unless maybe we can back with you. To my knowledge
25 I've only seen the one calculation so I'm, but maybe I

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1 haven't seen all the calculations.

2 CHAIRMAN STETKAR: Okay. We'll ask the
3 staff, make sure that you've got your --

4 MR. WOODLAN: Well I know we did the
5 calculation because we had to confirm that we had
6 sufficient water for 30 days of cooling.

7 CHAIRMAN STETKAR: Right.

8 MR. WOODLAN: So I know we did that
9 calculation.

10 CHAIRMAN STETKAR: Well this calculation,
11 the section that I cited is all part of the discussion
12 of that analysis.

13 MR. WOODLAN: Yes.

14 CHAIRMAN STETKAR: And yet as best as I can
15 tell, the words that I read, I haven't see the details
16 of the calculation, the words that I read seem to support
17 the fact that you have adequate heat removal to satisfy
18 30 days under the most limited heat removal conditions.
19 Most limiting atmospheric heat removal conditions.

20 MR. WOODLAN: Yes.

21 CHAIRMAN STETKAR: And it wasn't clear to
22 me that that same calculation would support the maximum
23 evaporative losses. Although both of those issues are
24 discussed in the same section of the FSAR.

25 As I said, I don't design these things and

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1 I have trouble boiling water on a hot plate, but I have
2 for other cites seen two different calculations. And I
3 thought I understand why, so.

4 MR. WOODLAN: We'll have to take away.

5 CHAIRMAN STETKAR: Okay, yes. And again,
6 I'll ask the staff, perhaps you might have some of your
7 quotes --

8 MR. MONARQUE: Yes, we'll be able to answer
9 it.

10 CHAIRMAN STETKAR: Good, thanks.

11 MR. WOODLAN: What section was that by the
12 way?

13 CHAIRMAN STETKAR: It's Section 9.2.5.2.3
14 on this slide.

15 MR. WOODLAN: Got it, thank you.

16 CHAIRMAN STETKAR: In the FSAR.

17 MR. WOODLAN: Okay, we get it.

18 CHAIRMAN STETKAR: The only reason I
19 brought it up in the context of this, I read the SER and
20 a lot of their questions tended to, I think, point to do
21 you have sufficient capacity under the minimum heat
22 removal conditions --

23 MR. WOODLAN: Right.

24 CHAIRMAN STETKAR: -- rather than this, the
25 mass for the maximum evaporative heat losses. Okay,

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1 thanks.

2 MR. EVANS: All right, for Chapter 9 we have
3 one license condition discussed in the safety evaluation
4 and that we've committed to. Basically it deals with the
5 implementation of the fire protection program.

6 There are several different milestones for
7 implementing different aspects of the fire protection
8 program during the course of the project.

9 The first milestone is that storage
10 buildings for byproduct and special nuclear materials.
11 The program will be implemented before initial receipt
12 of those materials.

13 And the second milestone deals with
14 implementing the fire protection program in areas
15 containing new fuel before receipt of the new fuel. And
16 then finally the ultimate implementation of the full fire
17 protection program features will be before initial fuel
18 load.

19 Moving onto Section 9.1.5, the heavy load
20 handling program. The aspect of this program or this
21 section in the COLA, since we're mostly incorporated by
22 references referring to the establishing of program
23 prior to first fuel load, aspects of the heavy load
24 handling program are detailed in Section 9.1.5 and the
25 program will be established prior to first fuel load.

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1 Section 9.2 and 9.5, these sections will be
2 discussed in the closed session as we talked earlier, so
3 let's put a place holder here to show that we are going
4 to cover those sections.

5 So moving on then to 9.4, which covers
6 ventilation systems. The capacities of the HVAC,
7 heating ventilation air condition equipment, reflects
8 site specific conditions.

9 The ultimate heat sink central service
10 water pump house ventilation system maintains proper
11 environmental conditions. So the COLA takes the site
12 specific aspects for environmental temperatures and uses
13 those to come up various capacities for HVAC equipment.

14 CHAIRMAN STETKAR: Todd, as usual, I have
15 an off the wall question but it just struck me as curious.
16 And the staff had a related question but a little bit
17 different.

18 And this is, the terminology is somewhat
19 obscure so I want to make sure we all understand what I'm
20 talking about. There are HVAC equipment rooms that
21 contain ventilation equipment, as best as I can tell, and
22 that ventilation equipment supplies the main control
23 room and the Class 1E electrical rooms.

24 So I'm not talking about the main control
25 room itself or the Class 1E electrical rooms, I'm talking

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1 about the rooms that has the HVAC equipment that supplies
2 those locations.

3 And they have four trains of those rooms and
4 because the COL Applicant had to supply the heating
5 capacities, the heater capacities, they're induct
6 heaters, the staff noted it and I started to followup and
7 think about it, that according to the information in FSAR
8 Table 9.4-201, that information indicates that there
9 will be induct heaters in the ventilation supply to this
10 ventilation equipment room.

11 So now I'm talking about the ventilation or
12 the ventilation equipment room. But heaters are only
13 needed for Trains B and C. That heating is not required
14 for Trains A and D.

15 And I was curious because I couldn't think
16 about what differences there would be among the four
17 trains. If I look at the HVAC system layout in the P&IDs
18 in the FSAR and the DCD, it all seems symmetric among the
19 four trains.

20 And yet it's clearly said, in a response to
21 one of their, they didn't ask why not have it in Trains
22 A and D, they were questioning whether the heating
23 capacity was sufficient in Trains B and C. And you
24 responded in a letter that said, Applicant agreed to
25 amend Table 9.4-201 to indicate that for the line item

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1 of MCR class 1E, electrical HVAC equipment room, induct
2 heater capacity that no heating by induct heaters is
3 required for Trains A and D.

4 What, do you have any information about the
5 asymmetries, why they're not required?

6 MR. EVANS: Not specifically, and maybe we
7 can take that away and look at that, but my understanding
8 is based on the location of them relative, there was not
9 the need for the heaters.

10 CHAIRMAN STETKAR: Okay.

11 MR. EVANS: And the heaters in Train A and
12 D are fairly small. They're only --

13 CHAIRMAN STETKAR: Yes, it's not a big
14 issue it's just I'm always intrigued --

15 MR. EVANS: Yes.

16 CHAIRMAN STETKAR: -- in a plant that's
17 otherwise, you know, very, very symmetric among the four
18 trains, if I see sources of non-symmetry, I'm also
19 intrigued about why.

20 MR. EVANS: If I remember correctly A and
21 D, Trains A and D are on the outside so to speak --

22 CHAIRMAN STETKAR: It probably is.

23 MR. EVANS: -- and B and C are in the middle.
24 So there could be something to do with how things
25 communicate, but.

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1 CHAIRMAN STETKAR: It's not a major point
2 it's just something that, as I was reading through things
3 was curious.

4 MR. EVANS: And what I was saying was, Train
5 A and D, the capacity of those is 2.2 kilowatts which is,
6 you know, very small heater. So it doesn't take a lot
7 for the Train A and D whereas, so.

8 CHAIRMAN STETKAR: Okay.

9 MR. EVANS: But we can take that away.

10 CHAIRMAN STETKAR: Okay, yes it's a
11 curiosity more than anything else. So don't make a big
12 deal about it, please.

13 MR. EVANS: Okay. No, I noticed the same
14 thing when we were going through this.

15 CHAIRMAN STETKAR: Well it was just notable
16 also that the response to the staff's REI says that no
17 heating is required for those rooms, you know, rather
18 than saying, oh, yes, well it should be equal. Anyway,
19 I'm sorry, continue.

20 MR. EVANS: Okay, next we'll cover Section
21 9.5.1, fire protection system. Basically again this
22 deals with the program aspects of the fire protection
23 system.

24 The fire protection program ensures that
25 fire will not affect safe shutdown capabilities. We use

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1 a defense and depth approach that includes fire
2 detection, extinguishing systems and equipment,
3 administrative controls and procedures and training
4 personnel.

5 Our hazard analysis is performed and we will
6 have a combustible control program as part of that as
7 well.

8 CHAIRMAN STETKAR: Okay. I had a few
9 questions about the fire protection program. Let me
10 find my notes here.

11 Bear with me, I'm now completely
12 disorganized. Let me ask you about the fire brigade
13 first.

14 And it had some discussion about this I know
15 before when we were talking about Chapter 13, so I in some
16 sense, some of this information I'd like to confirm that
17 the thought process is still the same and then I wanted
18 to ask a little bit more focus questions specifically
19 about the fire brigade.

20 According to the FSAR, the fire brigade is
21 a five person fire brigade.

22 MR. EVANS: Correct.

23 CHAIRMAN STETKAR: And it's my
24 understanding that you plan share that fire brigade
25 between the two units, 3 and 4. Is that still the plan?

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1 You basically have one site fire brigade
2 that can handle fires at both units or is that evolving?

3 MR. EVANS: That I don't know.

4 CHAIRMAN STETKAR: Okay. Well some of
5 that discussion back in, you probably remember --

6 MR. EVANS: Yes.

7 CHAIRMAN STETKAR: -- it was September of
8 2012 so I'm sure that it's right at the fore front of your
9 memory. And at that time you said you hadn't really made
10 final plans for the fire brigade but that at that time
11 you were still planning to share the fire brigade between
12 the two units.

13 So I wanted to followup, for my
14 understanding, because some of my questions about
15 staffing the fire brigade might be different depending
16 on how, whether you have it organized with two fire
17 brigades, one per unit versus a single fire brigade at
18 the site level.

19 And let me get the more specific questions
20 while you think about the first one. In the, and again
21 I'll point you to the section of the FSAR just so that
22 you have it for reference. It's FSAR Section
23 9.5.1.6.1.6. I love these things.

24 MR. EVANS: Yes.

25 CHAIRMAN STETKAR: The discussion talks

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1 about the fire brigade but it also notes that during a
2 fire event it says, an incident commander designated by
3 plant management and trained in emergency services
4 incident management systems, assumes the overall
5 responsibility in the event of a fire emergency and
6 provides advice and guidance to the shift manager. The
7 incident commander is responsible for incident command
8 activities and for making, following specific
9 recommendations to the shift manager based on an
10 assessment of the magnitude of the fire emergency from
11 reports received from the prior team leader.

12 And some of those responsibilities include
13 decisions regarding safe shutdown of the plant that's
14 required, implementation of the emergency plan. And
15 there's some other administrative duties.

16 Now I'm starting to get a little bit
17 confused about the number of people and the
18 responsibilities of the individuals on shift. In
19 particular the shift manager, as I understand it, has the
20 overall responsibility for operations of the plant and
21 decisions regarding emergency planning, communications.

22 In other words that person is the lead
23 responsible person for managing the plant. And those
24 are fairly specific duties.

25 Each unit, as I understand it, will have a

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1 shift manager and a unit supervisor. I think that --

2 MR. EVANS: Correct.

3 CHAIRMAN STETKAR: -- that we had some of
4 that discussion during Chapter 13. So now if I think
5 about a single unit, I have a shift manager and a unit
6 supervisor, both of who are SROs.

7 And then you have a shift technical
8 advisory, that according to our previous discussions,
9 you plan to share between the two units.

10 So during a fire, now I have a shift manager
11 who has a lot of responsibilities for overall operation
12 of the unit and external communications and
13 implementation of the emergency plant, I have the unit
14 supervisor, whose a SRO who should be dedicated to minute
15 by minute supervision of people manipulating equipment
16 and following abnormal emergency operating procedures,
17 fire response procedures and so forth, and now I have an
18 incident commander who is making decisions about, should
19 we shutdown the unit and making recommendations from,
20 receiving information from the fire brigade or what's
21 called the fire team, making recommendations to the shift
22 manager regarding emergency responses.

23 Who fulfills all of these duties during a
24 real event? I mean who do you satisfy the staffing for
25 the shift manager, the incident commander, the unit

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1 supervisor and the shift technical advisory those four
2 responsibilities with the planned shift manning that you
3 have and the responsibilities of the fire brigade that
4 you've outlined?

5 We'll go through the fire brigade, the
6 people who are actually out in the plant doing the
7 firefighting next.

8 MR. EVANS: Well the --

9 CHAIRMAN STETKAR: I didn't quite, you know
10 if there's an organization chart that points me to who
11 does exactly what or I couldn't find one?

12 MR. EVANS: Yes, let me see if I could
13 understand the, the shift manager, the unit supervisor,
14 those are individual people.

15 CHAIRMAN STETKAR: Right.

16 MR. EVANS: The incident commander that's
17 referred to here would be a different person from those.
18 And as you correctly indicated, the incident commander
19 does not have the decision making, he doesn't make the
20 decisions as far as --

21 CHAIRMAN STETKAR: Right. As I understand
22 it, the function is to collect information coming in from
23 the field, process that information and make
24 recommendations --

25 MR. EVANS: Make recommendations to the

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1 shift manager --

2 CHAIRMAN STETKAR: -- to the shift manager,
3 yes.

4 MR. EVANS: -- who would make the ultimate
5 decisions.

6 CHAIRMAN STETKAR: Yes.

7 MR. EVANS: And yes, those positions would
8 be, the incident commander would come from some of the
9 on shift, other on shift personnel.

10 CHAIRMAN STETKAR: Well that's exactly my
11 question. Which other on shift person?

12 MR. EVANS: Oh.

13 CHAIRMAN STETKAR: Because I'm starting to
14 run short of numbers of bodies to do things like fight
15 the fire, make decisions, do communication, you know,
16 stand at the boards and actually manipulate control,
17 supervise the manipulation of those controls and provide
18 things like the shift technical advisor stand back
19 oversight function from a plant safety perspective.

20 MR. EVANS: Well there are other on shift
21 personnel. I don't have a list of --

22 CHAIRMAN STETKAR: Okay.

23 MR. EVANS: -- who those are or how many
24 there are. But like the plant equipment operators are
25 --

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1 CHAIRMAN STETKAR: So this incident
2 commander slot, that's what I didn't understand, it could
3 be staffed by a non-licensed individual?

4 Because equipment operators don't have a
5 license. And what concerned me a bit is one of the duties
6 of this incident commander, at least as it's laid out in
7 the FSAR, is to make recommendations regarding safe
8 shutdown of the plant and implementation of the emergency
9 plan.

10 MR. EVANS: Right.

11 CHAIRMAN STETKAR: Which is something that
12 equipment operators usually don't understand a lot
13 about.

14 MR. EVANS: But with the required training,
15 I know I'm familiar with being involved in emergency
16 planning, drills, I'm a member of emergency planning team
17 for Units 1 and 2. I don't have an SOR license but as
18 part of the duties in the TSC, we do make recommendations,
19 we do the guideline for following the emergency plan
20 guidelines, we're trained in them what the guideline are.

21 CHAIRMAN STETKAR: Okay.

22 MR. EVANS: We make recommendations to the
23 emergency coordinators who are SRO type qualified. We
24 don't make the decisions --

25 CHAIRMAN STETKAR: Yes, no, sure.

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1 MR. EVANS: -- but we have enough training
2 that we, you know, are able to make recommendations.

3 CHAIRMAN STETKAR: Okay, let me just make
4 a couple of notes here. Okay. Let me ask, this is kind
5 of a related question but it's a little bit different
6 because now I'm dropping down into the staffing of the
7 fire brigade but the same kind of issue regarding fire
8 brigade staffing versus other staffing to support
9 operations of the unit.

10 And again, the reference for the FSAR is
11 Section 9.5.1.6.3. It relates to qualifications of the
12 fire protection personnel.

13 And that section says, the brigade leader
14 and at least two brigade members have sufficient training
15 in or knowledge of plant systems to understand the
16 effects of fire and fire suppressants on safety shutdown
17 capability. A brigade leader is competent as evidence
18 by possession of an operator's license or equivalent
19 knowledge of plant systems to assess the potential safety
20 consequences of a fire and advise MCR personnel.

21 And maybe I'm reading too much into this
22 paragraph but it seems to tell me that three of the five
23 fire brigade members are, basically come from the
24 operations organization. Because they're
25 qualifications are knowledge of plant systems,

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1 understand the effects of the fire on safe shutdown
2 capability and things like that.

3 And I guess I'll just read the questions
4 that I had just so that we kind of get them out on the
5 table. And one of them was, is a license reactor
6 operator or a senior reactor operator always assigned to
7 be the fire brigade leader?

8 I mean that's just a basic question.
9 They're implications that it might be but of that's the
10 case, I'm not sure about staffing in the main control
11 room.

12 If you don't have a license reactor operator
13 or an SRO as the fire brigade leader, how does the fire
14 brigade, how do you ensure that the fire brigade leader
15 has the qualifications as stated here that says, is
16 competent as evidence by possession of an operator's
17 license?

18 So that's clear that it is a licensed
19 operator or equivalent knowledge of plant systems. That
20 means an unlicensed person who has equivalent knowledge
21 to a licensed operator.

22 MR. EVANS: But with knowledge of plant
23 systems.

24 CHAIRMAN STETKAR: The plant systems to
25 assess the potential safety consequences of a fire and

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1 advise main control room personnel. So it's not just,
2 yes indeed this pump puts water from that tank to that
3 injection line it's, gee, if I burn up this pump, what
4 implications does that have on overall plant safety
5 response. Which is a higher level than, for example, the
6 knowledge that typical equipment operators would have.

7 And then the final question I had is, is if
8 indeed three members of the five member fire brigade are
9 basically gleaned from the operations staff, the on shift
10 operation staff, how does that effect the availability
11 of licensed operators in the control room, whether it's
12 an RO or an SRO, and the number of equipment operators
13 that are left not responsibly for fire brigade duties to
14 actually manipulate equipment in the plant?

15 And as I said, some of these questions, the
16 responses to some of those questions hinge a little bit
17 on the fact of whether or not you're going to have a shared
18 fire brigade between the two units or whether you have
19 two units specific fire brigades. I can see a shared
20 fire brigade that has benefits and detorments.

21 The shared fire brigade you can start
22 pulling people from the other unit --

23 MR. EVANS: Right.

24 CHAIRMAN STETKAR: -- to fulfill some of
25 these functions. Unit specific fire brigades tend to

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1 start getting pretty thin on being able to staff the fire
2 brigade responsibilities, at least as the way they're
3 outlined here, and maintain sufficient staffing to
4 fulfill everything else that needs to be done at the same
5 time.

6 Now you probably don't have, unless you
7 really thought a lot of this stuff in detail you may not
8 have answers right now, but I'm just trying to raise the
9 question in terms of looking forward in terms of overall
10 staffing and sort of the plans to define and man and
11 identify responsibilities for a fire event.

12 MR. WOODLAN: I think you had it right when
13 you were discussing the fact that we're still working on
14 this.

15 CHAIRMAN STETKAR: Okay.

16 MR. WOODLAN: It is a level of detail lower
17 than what's in the FSAR.

18 CHAIRMAN STETKAR: It is.

19 MR. WOODLAN: You may remember that with
20 Tim Clouser was here --

21 CHAIRMAN STETKAR: Yes.

22 MR. WOODLAN: -- who discussed this last
23 time, former operations manager and very deeply involved
24 with this, and he quoted the, he identified what they do
25 in Unit 1 and 2 --

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1 CHAIRMAN STETKAR: Yes.

2 MR. WOODLAN: -- and it's actually part of
3 the watch bill.

4 CHAIRMAN STETKAR: Yes.

5 MR. WOODLAN: And before every watch
6 staffing they go over it and designate it on there are
7 who are the fire brigade members and they assure that
8 those are sufficiently separated, all the other
9 activities can be performed. As I recall, his answer on
10 3 and 4 was he suspected it was going to be the same.

11 The biggest difference is 1 and 2 have a lot
12 of common equipment therefore it really needed to be a
13 single fire brigade.

14 CHAIRMAN STETKAR: Yes.

15 MR. WOODLAN: 3 and 4 doesn't need to be a
16 single fire brigade.

17 CHAIRMAN STETKAR: Right.

18 MR. WOODLAN: It will be an administrative
19 decision which hasn't been made yet.

20 CHAIRMAN STETKAR: I know we had the
21 discussion during Chapter 13 at sort of that level.

22 MR. WOODLAN: Yes.

23 CHAIRMAN STETKAR: Now in Chapter 9 they're
24 kind of drilling down into more specifics about
25 qualifications of individual responsibilities, this

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1 incident commander responsibility that the fire brigade
2 members themselves, in terms of their interface and
3 knowledge of equipment operations and the types of
4 recommendations that the fire brigade leader would be
5 expected to make.

6 So that's now starting to drop down into
7 that additional level of detail where providing some
8 assurance that indeed all of the functions will be
9 fulfilled, if it is a shared fire brigade between the two
10 units, if it's a unit specific fire brigade for that
11 particular unit in an event of a fire, it can be pretty
12 important.

13 You know, we've had real events where lack
14 of kind of cleared guidance in terms of responsibilities
15 has led to confusion, if nothing else. And yes, I
16 understand this notion of assembling people at the
17 beginning of this shift and saying, A, B, C, D, E, you're
18 the fire brigade today and, A, you're the fire brigade
19 leader which is all fine if I can select people from
20 operations and maintenance.

21 And then I think it was even mentioned,
22 security staff might in some cases be assigned to the fire
23 brigade --

24 MEMBER SCHULTZ: And training staff might
25 be as well.

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1 CHAIRMAN STETKAR: -- and training staff if
2 the training staff was there.

3 MR. WOODLAN: And it is a little more
4 complex than that.

5 CHAIRMAN STETKAR: Yes.

6 MR. WOODLAN: I mean you probably realize
7 is there are specific training programs for various roles
8 in the fire brigade.

9 CHAIRMAN STETKAR: Yes.

10 MR. WOODLAN: We do maintain a
11 qualification list. And one of the jobs of the shift
12 coordinator, it's probably the shift manager, is to
13 confirm that any individual assigned a task does in fact
14 have active valid qualifications.

15 The training programs and the frequency of
16 retraining are all based on assuring that that happens.

17 CHAIRMAN STETKAR: Okay.

18 MR. EVANS: I think I agree. It is very
19 important that all the functions are identified and
20 they're planned out and to make sure that you have the
21 staffing required with the proper qualifications to
22 cover those functions.

23 And absolutely as we developed the details
24 of the program we will ensure that that happens and --

25 CHAIRMAN STETKAR: And of course the

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1 concern, you know as I read these things, as you sort of
2 focus on each section of the FSAR and isolation, it's
3 easier to write words that says, yes, we're going to have
4 somebody on the fire brigade that will do A and B and C
5 because it's important to do that.

6 MR. EVANS: Right. The cumulative, your
7 concerned about the --

8 CHAIRMAN STETKAR: The cumulative will
9 effect --

10 (Simultaneous speaking)

11 CHAIRMAN STETKAR: -- when you start
12 looking at the number of bodies you actually have on
13 shift.

14 MR. EVANS: And the cumulative effect will
15 --

16 CHAIRMAN STETKAR: And that's where people
17 get in trouble.

18 MR. EVANS: Yes.

19 CHAIRMAN STETKAR: You know, quite
20 honestly that's where we've seen issues in the past where
21 people that had dual responsibilities and had to make a
22 decision about, you know, do I go support the fire brigade
23 or do I go operate a piece of electrical equipment because
24 I'm the guy whose supposed to do both.

25 MR. EVANS: Yes, understand.

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1 CHAIRMAN STETKAR: Okay. That's all I had
2 on the fire brigade. That's enough.

3 I did have one, since we are talking about
4 the, everything with the fire protection, right, this is
5 the only slide on fire protection?

6 MR. EVANS: That's correct.

7 CHAIRMAN STETKAR: In the, of course I've
8 lost my notes here, in the fire hazards analysis, and I'll
9 give you the alphabet soup again, it's Appendix 9A,
10 Section 9A.3.113 which is just the general fire hazards
11 analysis. In particular the fire area that I'm looking
12 at is FA7-301. It's the transformer yard.

13 MR. EVANS: Yes.

14 CHAIRMAN STETKAR: And I understand how it
15 was divided up. There's essentially a separate fire
16 area for each of the transformers out there, which makes
17 sense, and I understand the separation, I understand
18 their protection.

19 There was a statement though there that
20 says, since none of the four safety trains of equipment
21 provided to assure plant shutdown would be effected, no
22 adverse impact of safe shutdown would result from a fire
23 in the transformer yard. Reserve Auxiliary
24 Transformers 3 and 4 are the offsite power supplies to
25 all of the safety buses.

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1 MR. EVANS: One of the offsite power
2 supplies, correct.

3 CHAIRMAN STETKAR: One of the offsite power
4 supplies.

5 MR. EVANS: Yes.

6 CHAIRMAN STETKAR: And I was curious, I
7 don't know the nuances of the word when it says, no
8 adverse impact on safe shutdown would result. Certainly
9 if I burn up one of those transformers I'm going to have
10 demands on things.

11 But if by you mean I'm not going to disable
12 safe shutdown ability, I totally agree with that. You
13 do have other power supplies around.

14 MR. EVANS: Right, obviously the loss of
15 reserve auxiliary transformers, for whatever reason,
16 whether it's due to a fire or due to some other reason,
17 would cause a transfer for the safety buses to the
18 alternate power source. Yes.

19 CHAIRMAN STETKAR: Is that the typical, the
20 concern that I have is people doing fire analysis just
21 making words that says, well this is not a safety related
22 piece of equipment so I don't care about it. When in the
23 real world the plant kind of really cares if you burn up
24 one of those transformers.

25 MR. EVANS: Absolutely.

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1 CHAIRMAN STETKAR: I mean plant equipment
2 plus not to mention the plant people, but --

3 MR. EVANS: Yes.

4 CHAIRMAN STETKAR: I'm just kind of hung up
5 on this sense of the glib statement that it wouldn't have
6 any adverse effect. And if by that the implication is
7 it would not prevent safety shutdown, I fully agree with
8 that.

9 MR. EVANS: Yes, I think that is the
10 implication.

11 CHAIRMAN STETKAR: Okay. Thanks. Again,
12 sometimes I hang up on words because I've seen people who
13 are experts in fire protection programs and experts in
14 fire analysis who don't understand at all how a plant
15 works.

16 MR. EVANS: Right.

17 CHAIRMAN STETKAR: And they sometimes make
18 very simplistic statements about the fact because
19 they're given a list of "safety related equipment" and
20 as long as that list doesn't exactly match some of the
21 pieces of equipment that they're looking at, they check
22 off a box that says, it's not important at all.

23 Okay, thanks. I've got. Again, I just
24 wanted to kind of raise that because it was the only place
25 in the whole fire hazards analysis where I actually

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1 stumbled across something that was a bit vague.

2 MR. EVANS: Okay.

3 CHAIRMAN STETKAR: Thanks. You can flip
4 your slide now.

5 MR. EVANS: Okay.

6 CHAIRMAN STETKAR: You've been waiting
7 long enough, interpret five seconds of silence as flip
8 the slide.

9 MR. EVANS: Moving right along. Let's
10 move to communications, Section 9.5.2.

11 There are various intra-plant and offsite
12 communication systems provided for both normal and
13 emergency conditions. External communication links
14 include things such as standard telephones, microwave
15 telephones, fiberoptic links for fiber optic data,
16 radios, direct telephone links, i.e., ring down type
17 lines to state local NRC, satellite telephones and of
18 course personal cell phone.

19 Plant communications are backed up by eight
20 hour battery capacity. And I think that covers the
21 communication system aspects.

22 Fuel or storage tanks are discussed in
23 Section 9.5.4. These are site specific aspects.

24 The underground vaults containing the fuel
25 oil tanks for the gas turbine generators are provided.

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5 the vault will not go below the fuel oil cloud point.

6 Vault temperatures can go down to 32 degrees
7 but the fuel oil in the tanks will not go below the fuel
8 cloud point. And that finishes the open part of our
9 presentation for Chapter 9.

10 CHAIRMAN STETKAR: Let me ask you one
11 question that is kind of an it at the interface. And I
12 don't know whether it's better to talk about it now or
13 later.

14 As I understand it, the essential service
15 water system is designed, there are cross connects
16 between essential service water and the fire protection
17 system for the reactor building and the essential service
18 water pump house. Such that during a safety shutdown
19 earthquake at least, I mean that's kind of an nominal
20 event but it could be other conditions, you can manually
21 align essential service water to supply at least a couple
22 of host stations in each location.

23 There's some 75 gpm design and 18,000
24 gallons of capacity.

25 MR. EVANS: Right.

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1 CHAIRMAN STETKAR: I'm not so concerned
2 about the firefighting of water lines or things like
3 that. What I was interested in, and this is another one
4 of these off the wall questions, because those supplies
5 are aligned manually through local manual valves, are
6 those local valves located in the areas where you need
7 to fight the fire?

8 Because here's the thought. I have a fire,
9 I can't use my normal fire protection system. Before I
10 can start fighting the fire I need to send somebody into
11 the place where the fire is burning to open the manual
12 valve so that I then get water to my fire hose so I then
13 can start putting out the fire.

14 I don't want to be the first guy going in
15 there to operate that valve. I'd rather have the valve
16 outside of where the fire is burning or hoses working in
17 an area where if I need to go manipulate equipment there.

18 So I was curious whether you'd thought about
19 it that much? The only reason I ask is on all the
20 drawings, some of the drawings seem to say that they're
21 inside the fire areas, most of the drawings shown them
22 at the border between two locations.

23 And I'm sure you don't have that detail yet,
24 maybe you do. But it's something to think about.

25 MR. EVANS: Yes, we can check into that.

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1 The valve that is the, coming off of the service water
2 line where the tap is that feeds into the fire protection
3 system is in the, to my knowledge, is in the ultimate heat
4 sink area. So --

5 CHAIRMAN STETKAR: Well there's two of
6 them. There's one --

7 MR. EVANS: But there could be other
8 valves, yes.

9 CHAIRMAN STETKAR: -- there's one that
10 goes, I mean there's actually two branch lines. There's
11 one that feeds, and I don't know what fire hose risers
12 there are, but there's one that feeds part of the reactor
13 building and there's another one that feeds the essential
14 service water pump rooms.

15 MR. EVANS: That's what it was.

16 CHAIRMAN STETKAR: And certainly the one
17 that feeds the essential service water pump rooms is
18 someplace in the ultimate heat sink building.

19 MR. EVANS: That's the one I was referring
20 to, yes.

21 CHAIRMAN STETKAR: Okay. But the other
22 one for the reactor building only shows up, it typically
23 shows up at a border between the reactor building and
24 other locations.

25 MR. EVANS: It's a P&ID --

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1 CHAIRMAN STETKAR: It's even worse, it's
2 got an artist conception.

3 MR. EVANS: Yes.

4 CHAIRMAN STETKAR: And again, it's a subtle
5 nuance but if you're developing a fire protection plant,
6 this is more supposed to than ESW obviously. I don't
7 care whether the alternate supply is coming from ESW or
8 whether it's coming from a pumper truck.

9 MR. WOODLAN: I can't answer exactly where
10 those --

11 CHAIRMAN STETKAR: Oh.

12 MR. WOODLAN: -- are but I can tell you we
13 had that discussion.

14 CHAIRMAN STETKAR: Oh, really?

15 MR. WOODLAN: I asked the same question and
16 they showed, and as I recall and I may have this wrong,
17 but I believe one of the valves, for example, was located
18 in a stairwell away from the fire area that we're talking
19 --

20 CHAIRMAN STETKAR: That's exactly the kind
21 of --

22 MR. WOODLAN: So we did look at it although
23 I can't tell you exactly where they are.

24 CHAIRMAN STETKAR: That's all I wanted to
25 hear is you already thought about it.

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1 MR. WOODLAN: Okay.

2 CHAIRMAN STETKAR: Thank you. Thanks.

3 MR. EVANS: Well that completes the open
4 portion. If no further questions we can move to the --

5 CHAIRMAN STETKAR: Do any of the members
6 have any questions for Luminant as far as the material
7 that we've covered in the open session?

8 MEMBER RAY: No.

9 CHAIRMAN STETKAR: If not we will now close
10 the meeting so that we can discuss the closed information
11 regarding the ultimate heat sink and essential service
12 water system.

13 (Whereupon, the foregoing matter went off
14 the record at 9:20 a.m. and went back on the record at
15 9:49 a.m.)

16 CHAIRMAN STETKAR: I believe that Luminant
17 is now done with your presentation completely, so I'd
18 like to, thank you very much, you covered a lot of
19 material. And again, just to make sure that we have
20 everything covered, do any of the members have any other
21 questions for Luminant?

22 MEMBER SCHULTZ: No, sir.

23 CHAIRMAN STETKAR: If not, thank you, I
24 appreciate it and what we'll do is we will take a break
25 so that we don't have to interrupt the staff.

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1 MR. SHUKLA: The staff is the only one that
2 is late.

3 CHAIRMAN STETKAR: We will take a break so
4 that we don't have to interrupt the staff and we will
5 reconvene at, I'll be generous, ten minutes after 10:00.

6 (Whereupon, the foregoing matter went off
7 the record at 9:50 a.m. and went back on the record at
8 10:11 a.m.)

9 CHAIRMAN STETKAR: We are back in session.
10 Just for the record this is an open session and we will
11 hear from the staff on their review of COL Chapter 9.

12 MR. KALLAN: Okay.

13 CHAIRMAN STETKAR: Paul?

14 MR. KALLAN: Thank you very much. My name
15 is Paul Kallan. I'm the Senior Project Manager and also
16 the Chapter P.M. for Chapter 9. Steve Monarque is the
17 lead for this project and Larry Wheeler is the technical
18 staff member.

19 We had one open item on the SER, it's
20 basically the DCD made a change in the calculations and
21 Commanche Peak has to reflect this because it's more of
22 a documentation and Larry's going to explain more.

23 CHAIRMAN STETKAR: Okay.

24 MR. WHEELER: Good morning. Like Paul had
25 mentioned earlier, or just now, and the Applicant had

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1 mentioned earlier, this is more of a documentation issue.

2 This is to catch up the Applicant's FSAR to
3 the DCD. DCD Rev 4 indicated there are some small
4 changes for the heat load, safe shutdown with the LOOP
5 peak heat load remains the same.

6 The LOCA peak load did have a small 2 percent
7 change. The LOCA 30-day heat load for development of
8 heat sink slightly affected the 30-day cooling capacity.

9 These changes are going to be shown in, or
10 picked up by the Applicant in their FSAR Section
11 9.2.5.2.3. With that said, the next two lines show the
12 small changes going from 8.4 million to 8.3 for the safe
13 shutdown in the LOOP.

14 And then for the LOCA it goes from 8.2 to
15 8.4 million for the LOCA. So the concerns the staff has
16 are none. The 8.4 remains the same even though --

17 MALE PARTICIPANT: Right.

18 MR. WHEELER: -- how you got there came from
19 a different heat load.

20 MEMBER SCHULTZ: What accounts for the
21 decrease in heat load related to the shutdown with LOOP
22 evaluation? I mean it sounded like in the description
23 that nothing had changed except the answer.

24 MR. WHEELER: I don't have that
25 information, that would come from the MHI, the D.C. What

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1 I can say, that I did an audit of the calculations,
2 Comanche Peak, and when I got into the details of this
3 calculation it was, the staff, with MHI and Comanche Peak
4 staff was there, had said there were some changes that
5 were coming down the road.

6 That the calculations I had saw at that time
7 were in fact going to change slightly and now this is the
8 information that they are going to bring forward for us
9 to look at.

10 MEMBER SCHULTZ: Okay. I understand.
11 Thank you.

12 CHAIRMAN STETKAR: Larry --

13 MR. WHEELER: If you flip to the next slide
14 we're essentially done with my presentation, but I'm open
15 to questions.

16 CHAIRMAN STETKAR: No you're not.

17 (Laughter)

18 CHAIRMAN STETKAR: I did have, were you in
19 earlier when I asked the Applicant about the calculation
20 for the minimum heat removal, the meteorological
21 conditions for minimum heat removal versus maximum
22 evaporate loss?

23 Am I misunderstanding something or --

24 MR. WHEELER: Well the --

25 CHAIRMAN STETKAR: -- do you have any help?

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1 MR. WHEELER: You're going in the right
2 path. I did look at the calculations at the audit, I
3 can't remember how long ago that was, but there was a set
4 of calculations that looked at return temperature,
5 because that's what we're concerned about is --

6 CHAIRMAN STETKAR: Yes.

7 MR. WHEELER: -- and is hot water going to
8 the cooling tower and cold water going back to the plant,
9 that's a different set of calculations than the
10 evaporative cooling calculations.

11 CHAIRMAN STETKAR: Right. Because for the
12 calculation with the return temperature you want to --

13 MR. WHEELER: Maximum wet bulb.

14 CHAIRMAN STETKAR: Yes, maximum wet bulb.

15 MR. WHEELER: Yes.

16 CHAIRMAN STETKAR: The other one you want
17 maximum, isn't absolute minimum what I, you have the --

18 MR. WHEELER: But you're also looking --

19 CHAIRMAN STETKAR: -- maximum difference
20 between the wet and dry bulbs.

21 MR. WHEELER: -- at a duration of 30 days.

22 CHAIRMAN STETKAR: Yes.

23 MR. WHEELER: Now a duration of 30 days
24 you're now looking at an accident --

25 CHAIRMAN STETKAR: Yes.

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1 MR. WHEELER: -- because you're looking at
2 the maximum heat load.

3 CHAIRMAN STETKAR: Yes.

4 MR. WHEELER: So what I had done and I know
5 I might be getting into some proprietary information, if
6 I get too deep into the calculation --

7 CHAIRMAN STETKAR: And if you do we can
8 close the meeting.

9 MALE PARTICIPANT: Right.

10 CHAIRMAN STETKAR: No problem at all. So
11 it's up to --

12 MR. WHEELER: Let me go down this path, I
13 think I'm going to be okay, is I looked at the
14 calculation, I made a lot of good notes, I brought those
15 notes back and I essentially made my own Excel
16 spreadsheet.

17 And that Excel spreadsheet pretty much
18 resulted in the same outcome that MHI and Comanche Peak
19 came up with, and the concern was, is how much water do
20 I need for 30 days for the design basis accident.

21 So I made all these columns as you can see,
22 there's lots of columns, lots of calculations, I let
23 Excel spreadsheet do all that math, and I came up with
24 exactly the same results that I saw at the calculation
25 at Comanche Peak.

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1 What I'm trying to say is, the input into
2 that calculation fixed the return temperature at 95
3 degrees, and in order to fix a return temperature of 95
4 degrees the cooling tower efficiency has to be taken into
5 account for wet bulb.

6 So you have to assume, because now you're
7 talking a 30-day duration, accident conditions, you have
8 to fix something, 95 degrees, and then you work through
9 your calculation.

10 CHAIRMAN STETKAR: But if I took a
11 temperature profile, if I took, I mean, what I know is
12 the accident heat load --

13 MR. WHEELER: That's correct.

14 CHAIRMAN STETKAR: -- that's something
15 that's fixed --

16 MR. WHEELER: And it's always changing.
17 It takes after a couple hours and then it tails right off.

18 CHAIRMAN STETKAR: It's, you know, it's a
19 changing load, but I nominally know that.

20 MR. WHEELER: Right.

21 CHAIRMAN STETKAR: And if I fix my cooling
22 tower design --

23 MR. WHEELER: Yes.

24 CHAIRMAN STETKAR: -- and then change my
25 meteorological, my wet bulb temperature, meteorological

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1 parameters --

2 MR. WHEELER: Okay.

3 CHAIRMAN STETKAR: -- and allow the return
4 temperature, the basin return temperature to vary, such
5 that the meteorological parameters that I set get me the
6 maximum evaporative heat loss --

7 MR. WHEELER: Okay.

8 CHAIRMAN STETKAR: -- would I come up with
9 a different basin inventory requirement? Follow me?

10 MR. WHEELER: Time to go to one of the
11 backup slides and let me tell you what slide that is,
12 Slide 7.

13 CHAIRMAN STETKAR: See I told you it's
14 longer than one slide.

15 MR. WHEELER: That's four.

16 CHAIRMAN STETKAR: You didn't believe me.

17 (Laughter)

18 MR. WHEELER: Backup slides, there we go.
19 So this is the information related to how much volume I
20 need on site for 30 days. So you start with the Reg
21 Guide, prior 30-day cooling.

22 They looked at the meteorological
23 conditions for the worst case, 30 years of data --

24 CHAIRMAN STETKAR: Now define for me
25 carefully what "worst case" means. Does that mean the

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1 minimum difference between the wet bulb and dry bulb over
2 a 30-day period?

3 MR. WHEELER: No, this is just looking at
4 non-coincident wet bulb.

5 CHAIRMAN STETKAR: Okay. But --

6 MR. WHEELER: If they took that data --

7 CHAIRMAN STETKAR: But the highest
8 non-coincident wet bulb.

9 MR. WHEELER: Right.

10 CHAIRMAN STETKAR: Okay.

11 MR. WHEELER: And they came up with an
12 average wet bulb for 30 days.

13 CHAIRMAN STETKAR: Yes.

14 MR. WHEELER: Okay. Now what they did on
15 top of that, so you're starting with 78 --

16 CHAIRMAN STETKAR: Right.

17 MR. WHEELER: -- so obviously you want some
18 margin --

19 CHAIRMAN STETKAR: Right.

20 MR. WHEELER: -- so you build in some
21 margin, the margin looks at a recirculation --

22 CHAIRMAN STETKAR: Right.

23 MR. WHEELER: -- two degrees, it's
24 reasonable, and then they turn around and add an
25 additional three degrees --

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1 CHAIRMAN STETKAR: Right.

2 MR. WHEELER: -- so now you're at 83.

3 CHAIRMAN STETKAR: Right.

4 MR. WHEELER: So they calculations they all
5 looked at had a starting point of worst case of web bulb
6 of 83 degrees.

7 CHAIRMAN STETKAR: Right.

8 MR. WHEELER: So you work through all those
9 calculations to verify that you had a return temperature
10 of 95.

11 CHAIRMAN STETKAR: Right, given --

12 MR. WHEELER: Ninety-five is now the input
13 into the evaporative cooling, because now you're looking
14 at worst conditions, DBA or LOCA, over 30 days the worst
15 meteorological conditions per the Reg Guide.

16 So you're starting at 83, going to get a
17 return temperature of 95 and then now you fix that 95
18 degrees for 30 days, that's being a very conservative
19 analysis, 30 days of 95 degrees and looking at the heat
20 load peaks and then the degraded heat load over 30 days,
21 so you come up with this huge volume as a worst case.

22 CHAIRMAN STETKAR: I guess what I'm asking,
23 maybe I'm still not understanding the calculation and if
24 I get too dense just tell me and we'll move on.

25 Suppose that they had selected, they looked

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1 at the 30-day period and selected an average wet bulb
2 temperature of, pick a number, 65 degrees.

3 MR. WHEELER: Okay.

4 CHAIRMAN STETKAR: Given the LOCA heat load

5 --

6 MR. WHEELER: Okay.

7 CHAIRMAN STETKAR: Don't fix the 95
8 degrees, just take the LOCA heat load, would that have
9 affected the total amount of evaporative heat loss such
10 that the basin capacity requirements would be more than
11 under this calculation? Follow me?

12 MR. WHEELER: The deficiency of a cooling
13 tower is --

14 CHAIRMAN STETKAR: Related to the
15 temperature, yes.

16 MR. WHEELER: -- is related to the wet bulb
17 which you're going to get --

18 CHAIRMAN STETKAR: One.

19 MR. WHEELER: -- a delta between wet bulb
20 and return temperature of somewhere around, we'll just
21 use the number eight to ten.

22 CHAIRMAN STETKAR: Right.

23 MR. WHEELER: So if you're wet bulb is at
24 65, and we'll just round it up to 75, now ESW is at 75.
25 I did not look at doing any calculations at 75 degrees

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1 starting point.

2 CHAIRMAN STETKAR: What I don't
3 understand, because I don't do these kind of equations
4 is whether the --

5 MR. WHEELER: But I can certainly go
6 through what I did here and input different values --

7 CHAIRMAN STETKAR: I mean I see --

8 MR. WHEELER: -- and see what the results,
9 but --

10 CHAIRMAN STETKAR: I have seen people do
11 those two different, they'll do this one which
12 essentially defines the volume and the cooling tower
13 efficiency to maintain temperatures less than or equal
14 to 95 degrees in the basin.

15 MR. WHEELER: Sure.

16 CHAIRMAN STETKAR: And I've seen people do
17 a separate analysis that, like I said, fixes the heat
18 input and looks at a temperature profile where you
19 essentially maximize the difference between the wet bulb
20 and dry bulb temperature to see if that makes any
21 difference in the required basin inventory, in other --

22 MR. WHEELER: Right.

23 CHAIRMAN STETKAR: -- maximize the
24 evaporative heat loss, but let the return temperature,
25 you know, vary to whatever it would be.

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1 MR. WHEELER: Now what I can say is when we
2 walked in and did the calculation reviews for Comanche
3 Peak, you know, they give us the calculations of concern.

4 They might have done other calculations to
5 rule out what you were just saying and then just present
6 to the NRC, this is the most bounding condition.

7 CHAIRMAN STETKAR: Yes. I just wanted to
8 make sure -- yes.

9 MR. WHEELER: So we would have to pull that
10 thread and go back to Comanche Peak because I, are there
11 other supporting calculations that now indicate what you
12 gave us is now bounding.

13 CHAIRMAN STETKAR: Yes. And that's what
14 I, I asked that, you know, in the earlier session and they
15 said --

16 MR. WHEELER: And I think then I could, at
17 the same time I can go back and crank through, you know,
18 a whole bunch of numbers at different temperatures.

19 CHAIRMAN STETKAR: But I mean cranking
20 through numbers, and it still has to be realistic for
21 their site --

22 MR. WHEELER: Sure.

23 CHAIRMAN STETKAR: -- I mean they selected
24 this set of temperatures with their penalties based on
25 their review of 30 years of meteorological data for that

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1 site.

2 So it isn't, you know, that 78 degree
3 temperature that they started isn't a hypothetical
4 temperature --

5 MR. WHEELER: Correct.

6 CHAIRMAN STETKAR: -- like my, you know, I
7 picked 65, I really don't know, you know, what the
8 appropriate temperature distribution would be for that
9 type of calculation.

10 MR. WHEELER: But once again for this site
11 we do have four, 33 2 percent basin sitting there, and
12 the fact that the water level gets low you got, you got
13 too many of gallons sitting and the next --

14 CHAIRMAN STETKAR: No, I, you know, I
15 understand, too, also.

16 (Simultaneous speaking)

17 CHAIRMAN STETKAR: I also do.

18 MR. WHEELER: There's margin built into
19 this site that should not get them into trouble.

20 CHAIRMAN STETKAR: Yes.

21 MEMBER SCHULTZ: But beyond that given what
22 they're working to achieve in terms of the 30-day
23 response, the depiction of the site in high temperature
24 --

25 MR. WHEELER: Correct.

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1 MEMBER SCHULTZ: -- 78 plus five degrees to
2 the delta of 95, that would appear to be the bounding
3 calculation.

4 MR. WHEELER: Yes, as what I see and how it
5 appears to be done.

6 CHAIRMAN STETKAR: It may very well be
7 through this site. I mean it's not Palo Verde, for
8 example, so there is, you know, in terms of evaporative
9 losses.

10 MR. WHEELER: So what you're saying, you
11 want the staff to further look at this, I mean like --

12 CHAIRMAN STETKAR: Well I asked, I mean --

13 MR. WHEELER: -- Comanche and MHI to --

14 MEMBER SCHULTZ: We put it out on the table.
15 I mean I'd like some assurance that somebody at least
16 thought about --

17 MR. WHEELER: Sure.

18 MEMBER SCHULTZ: -- that the calculation
19 that's presented in the FSAR as, the way it's presented
20 is these are the worst possible conditions for everything
21 and indeed the design satisfies the worst possible
22 conditions.

23 MR. WHEELER: Yes.

24 MEMBER SCHULTZ: And I guess we're asking
25 for assurance that indeed, not only the medium cooling

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1 requirements if I can cast them that way --

2 MR. WHEELER: Sure.

3 MEMBER SCHULTZ: -- but the maximum
4 evaporative heat loss --

5 MR. WHEELER: Sure.

6 MEMBER SCHULTZ: -- essentially maximum,
7 the best possible cooling conditions based on actual, you
8 know, site data, were also considered. Whether that
9 would make a substantial, any difference in the decisions
10 about either inventory or timing of the need to transfer
11 water from basin to basin or things like that.

12 MR. WHEELER: Okay. I understand.

13 MEMBER SCHULTZ: Okay. Thanks.

14 CHAIRMAN STETKAR: You did that very well
15 without getting into proprietary stuff.

16 MR. WHEELER: Thank you.

17 CHAIRMAN STETKAR: The other question that
18 I had, and this more of a not-so-technical question, is
19 that the FSAR, I know they're doing, you know, they refer
20 to Reg Guide 1.189 and NFPA-804 as their basic references
21 for guidance and criteria.

22 Do you know whether they've, and I'm not
23 sure whether I know this or not, are they complying,
24 complying is the wrong word, are they using Reg Guide
25 1.189, Rev 2 or are you reviewing them to Reg Guide 1.189,

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1 Rev 2 because, you know, there's substantial changes to
2 Rev 2.

3 MR. WHEELER: Right. Yes, I understand
4 your question and let me see if there's someone in the
5 audience that's a fire protection engineer.

6 CHAIRMAN STETKAR: And the other part of
7 the question is, NFPA-805 seems to apply for Part 52
8 licensees, and I'm not familiar with 804.

9 MR. WHEELER: Okay.

10 CHAIRMAN STETKAR: There's no reference to
11 NFPA-805 whatsoever in the FSAR. NFPA-805, you know,
12 obviously, can be used for deterministic, it doesn't have
13 to be used, the rule in NFPA-805 gives you the option to
14 have a risk-informed fire protection program, but it also
15 contains guidance and requirements for a deterministic.

16 So I was curious whether or not the fire
17 protection program design, let me get the full question
18 out, is being reviewed in the context of Reg Guide 1.189,
19 Rev 2, and NFPA-805?

20 MR. WHEELER: I think I'm going to get some
21 help on this one.

22 CHAIRMAN STETKAR: And now we see --

23 MR. DIAS: Let me say something. This is
24 Antonio Dias. The person, the expert of the technical
25 staff responsible for our protection is not here today.

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1 We're going to get back to you on this later, hopefully
2 in two weeks.

3 MR. WHEELER: Okay.

4 CHAIRMAN STETKAR: Great. Thank you.

5 MR. DIAS: Thank you.

6 CHAIRMAN STETKAR: I don't have anything
7 more for the staff. Do any of the other members have
8 anything more for the staff?

9 (Multiple no's)

10 CHAIRMAN STETKAR: If not, what I'd like to
11 do before we transition to MHI's responses to some open
12 items from yesterday and additional information from the
13 staff, is I'll ask first if we have any public comments
14 from anyone in the room regarding the Chapter 9 review.

15 MR. MONARQUE: Hey, John?

16 CHAIRMAN STETKAR: Yes.

17 MR. MONARQUE: Let me, you had asked a
18 question about which revision of Reg Guide 1.189 --

19 CHAIRMAN STETKAR: Yes.

20 MR. MONARQUE: -- maybe Luminant can answer
21 that question to you, if you're interested? They would
22 know --

23 CHAIRMAN STETKAR: Luminant can.

24 MR. EVANS: This is Todd Evans with
25 Luminant. Yes, both the DCD and the COLA are to Reg Guide

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1 1.189, Rev 1.

2 CHAIRMAN STETKAR: Rev 1. Okay, now, then
3 my question to the staff will be, going forward, since
4 1.189, Rev 2 has been out since 2009, I think, and
5 NFPA-805, I've forgotten the dates on the rule that
6 endorses 805 is, going forward, what do we do, or what
7 do you? I don't do anything.

8 MR. MONARQUE: And we understand your
9 question. We'll get back to you on that.

10 MR. WHEELER: Okay.

11 CHAIRMAN STETKAR: But it is, just for the
12 record, it is 1.189, Rev 1?

13 MR. WHEELER: Yes.

14 CHAIRMAN STETKAR: Okay. I thought that I
15 remembered that, but I didn't, yes, now I found the
16 citation. It is 1.189, 1. Okay, thank you.

17 MR. MONARQUE: And I think we listed the SE.

18 MR. WHEELER: Yes, we did.

19 CHAIRMAN STETKAR: Yes, and in fact I just
20 found it. I have so much notes that sometimes I get lost.
21 It is cited in Table 9.5.1-1R. They make a comparison,
22 point-by-point comparison, it's a long Table,
23 point-by-point comparison, it does specifically cite Rev
24 1 of Reg Guide 1.189.

25 So going forward since Rev 2 has been out

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1 now for, it was issued in October 2009, so we're now four
2 years into that.

3 MR. WHEELER: Okay.

4 CHAIRMAN STETKAR: Going forward, and
5 there are differences as you well know in terms of things
6 like treatment of multiple spurious operations and some
7 other subtleties.

8 MR. WOODLAN: John, this is Don Woodlan.
9 Did you want confirmation on 805?

10 CHAIRMAN STETKAR: Well 805 is not
11 mentioned anywhere.

12 MR. WOODLAN: Right. We did not choose
13 that option.

14 CHAIRMAN STETKAR: Yes.

15 MR. WOODLAN: We are not using 805.

16 CHAIRMAN STETKAR: Well, okay, but it's my
17 understanding, I've kind of been through this, 805 is
18 not, everybody thinks of NFPA-805 as risk informed fire
19 protection because that's the context that everybody
20 speaks of it.

21 NFPA-805 outlines a fire protection program
22 and it gives you an option of doing a risk informed
23 process, but that's an option.

24 MR. WOODLAN: Yes.

25 CHAIRMAN STETKAR: NFPA-805, you can

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1 develop a deterministic, if I want to call it that, fire
2 protection program following the guidance in NFPA-805
3 without ever saying those nasty words PRA.

4 MR. SHUKLA: It allows to cherry pick
5 those.

6 CHAIRMAN STETKAR: It allows you to cherry
7 pick, you can mix and match deterministic and
8 probabilistic. I'm not familiar with 804, so I don't
9 know how 804 and 805 work together or whether there are
10 any discrepancies between those two in terms of the
11 requirements that they contain.

12 You know, the 10 CRF 50.48 does not mention
13 NFPA-804. It's not mentioned. It only mentions
14 NFPA-805 as being the endorsed standard. So I'm curious
15 how we're, you know, transitioning in time here in terms
16 of the requirements and whether reliance on older
17 requirements could be missing some things that we ought
18 not to miss.

19 MR. WHEELER: Okay.

20 CHAIRMAN STETKAR: As I said, that's all I
21 had. I'm not sure whether I was interrupted or not, but
22 again, just for the record, I'll ask are there any public
23 comments regarding the review of Chapter 9?

24 Hearing nothing in the room, we don't have
25 the public on the bridge line, so what I'll do is, again,

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1 thanks a lot for the staff. One slide only took 25
2 minutes so that was pretty good and thanks again. I
3 appreciate it.

4 With that, let's, I'll put MHI off. The
5 staff wanted to present some information that would help,
6 I believe, elaborate on some of the discussion that we
7 had yesterday, so let's ask them to come up first and do
8 that.

9 MR. GALVIN: And, John, we decided we're
10 not going to do that at this point.

11 CHAIRMAN STETKAR: Okay. Thank you.
12 That was quick. In which case, Ryan, do you have some
13 information that you'd like to present to -- or they have
14 the answers to some of the issues we raised yesterday?

15 MR. SPRENGEL: Are we open or closed?

16 CHAIRMAN STETKAR: We are open. We're
17 still, unless MHI, do you need to close it for anything
18 for this?

19 MR. SPRENGEL: No, open is fine. We'll
20 need to connect.

21 CHAIRMAN STETKAR: Yes, okay, so --

22 MR. SPRENGEL: We'll have to talk to them.

23 CHAIRMAN STETKAR: -- we'll get that set up
24 somehow.

25 (Pause)

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1 MEMBER BROWN: Do you need Theron to do his
2 connection?

3 CHAIRMAN STETKAR: I certainly do because
4 I have no idea what this is about.

5 MEMBER BROWN: No, I was just -- he was
6 looking for cables. I don't --

7 MEMBER BROWN: Looks like he wanted to find
8 cables, so that's all.

9 MALE PARTICIPANT: Just grab one.

10 CHAIRMAN STETKAR: I'm lucky I can turn a
11 light on without electrocuting myself much less hook up
12 cables.

13 (Pause)

14 CHAIRMAN STETKAR: Theron, help.

15 MEMBER BROWN: I think I lost my electrical
16 safety lesson for the one time that I learned when I was
17 eight years old, in other words, don't stick a
18 screwdriver with a wire in one part of the socket, stick
19 the screwdriver in the other one and watch part of the
20 screwdriver disappear.

21 I thought that was really cute at eight
22 years old, fortunately it was an insulated handle. I
23 carried that with me, it got lost in when electricity is
24 dangerous.

25 CHAIRMAN STETKAR: It's, you know, Darwin

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1 tends to take care of some of these things. It's like
2 --

3 MEMBER BROWN: I built a radio, a 5-tube
4 radio, and it said strip, you know, take all the
5 insulation off --

6 CHAIRMAN STETKAR: We're on the record by
7 the way.

8 MEMBER BROWN: Oh, okay. Thought we were
9 waiting here.

10 CHAIRMAN STETKAR: We are, but we wait on
11 the record.

12 MEMBER BROWN: Oh, that's okay. I don't
13 mind being embarrassed. Tell him not to record my story.

14 CHAIRMAN STETKAR: Too late.

15 (Pause)

16 CHAIRMAN STETKAR: I'm starting to believe
17 that we need a few little buttons. Sam and I have talked
18 occasionally, the little light to tell us when the bridge
19 line is open.

20 I think we need a little switch to put the
21 Muzak on in the background during these pauses.

22 MALE PARTICIPANT: Is Theron coming or
23 what?

24 MR. SHUKLA: He's coming.

25 MALE PARTICIPANT: He's coming, okay.

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1 MALE PARTICIPANT: There we go.

2 MR. SPRENGEL: Okay. To not spend anymore
3 time waiting on that, we do have a list of --

4 CHAIRMAN STETKAR: We should be up. Are
5 you?

6 MR. SHUKLA: Yes, we are up.

7 MR. SPRENGEL: Yes. He'll just need to
8 open up those specific areas, but we have about 12 items
9 that we've --

10 CHAIRMAN STETKAR: Oh.

11 MR. SPRENGEL: -- identified from
12 yesterday to follow up on to differing levels of detail.
13 I think they are all pretty clear. And now today we'll
14 try to go through a couple of the items and if we're able
15 to resolve them that's great.

16 If not, I think it'll give us an opportunity
17 to kind of refine the question --

18 CHAIRMAN STETKAR: Yes, that's great.

19 MR. SPRENGEL: -- and get to the real heart
20 of the question.

21 CHAIRMAN STETKAR: That's great.

22 MR. SPRENGEL: And I think some of them
23 yesterday were leading to real issues that we really
24 didn't get to. So we'll go through a few items now and
25 oddly, but fortunately, we have ample time to go through

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1 those.

2 So I'll turn it over to Nagai-san to
3 introduce the first topic.

4 MR. NAGAI: Thank you, Ryan. Good morning
5 everyone. This is Masatoshi Nagai with MNES. There
6 were about, you have open questions from yesterday's
7 discussion and we'd like to cover as many items as
8 possible today.

9 I'd like to start with Section 3.2 and move
10 forward in the section order. So the first question was,
11 the feed water system is considered to be a
12 risk-significant system in Table 17.4-1, but in Table
13 3.2-2 it is not classified accordingly and you were
14 asking why that was.

15 And Nishio-san is going to provide an answer
16 for that.

17 MR. NISHIO: I am Hiroki Nishio of MHI.
18 Yes, I confirmed that Table 17.4-1 and then either one
19 -- that's, it is considered -- and according to our
20 classification 4-C, it becomes a different Class IV or
21 V, it is a discontinued class.

22 So now coming to DCD we described equipment
23 of Class VIII, so it is not consistent so we've directed
24 to change that, change that feed water classification,
25 you know, it should be in a Class IV to be consistent with

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1 the Table 17.4-1.

2 CHAIRMAN STETKAR: So just to make sure I
3 understand, you're saying that you proposed them to
4 change the classification from VIII to V for the feed
5 water system.

6 MR. NISHIO: From VIII to IV.

7 CHAIRMAN STETKAR: IV, okay. I forgot.
8 I've lost my list of classifications, but anyway, raise
9 it's classification from VIII. Thanks for that
10 clarification.

11 What I'd caution you to think about is that
12 if, and I believe it's true, if the feed water system is
13 included in Table 17.4-1, for the purpose of delivering
14 water to the steam generators --

15 MR. NISHIO: Right.

16 CHAIRMAN STETKAR: -- then not only the
17 feed water system equipment itself, but also the
18 condensate system, the turbine building cooling water
19 system, and the non, whatever it's called, the
20 non-essential service water system or the normal service
21 water system, would also be required plus the power
22 supplies because you need electricity, cooling water,
23 and the source of suction water for the feed water pump.

24 So that, the reason I raised it is that
25 there's a potentially very large increase in the scope

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1 of equipment that you may be raising the classification
2 on if you include the feed water system --

3 MR. NISHIO: Yes.

4 CHAIRMAN STETKAR: -- because it's just not
5 the, it's not only the feed water pumps and feed water
6 control valves and such, it has to then logically also
7 include condensate and all of those support systems,
8 which is quite a bit of equipment.

9 So I appreciate this as a, let me call it
10 a preliminary feedback, but the implications could be
11 fairly significant.

12 MR. NISHIO: Yes. Let me direct to the
13 stuff to the PRA people.

14 CHAIRMAN STETKAR: Yes.

15 MR. NISHIO: And what function is required
16 for this significant component.

17 CHAIRMAN STETKAR: Yes, be careful. I
18 mean if it were only feed water isolation, for example,
19 it would be different, because then it would only be the
20 feed water isolation valves and perhaps the feed water
21 control valves.

22 But from the brief description in Table
23 17.4-1, it was my understanding that feed water was
24 included in that Table for the function to supply water
25 to the steam generators, which means a lot more equipment

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1 would be included in those higher classifications.

2 So I would just caution you to keep that in
3 mind.

4 MR. NISHIO: Okay.

5 CHAIRMAN STETKAR: And make it very clearly
6 understand when you talk to the PRA people or the Expert
7 Elicitation Team, which also had some input into the
8 population of equipment in that Table 17.4-1, that you
9 clearly understand the functions there.

10 MR. NISHIO: Okay.

11 MR. NAGAI: Okay. So our next one, while
12 we were discussing seismic classification in Section 3.2
13 there was a question about whether MHI has considered
14 pending updates to ground motion data and Ogasawara-san
15 has a response to that question.

16 MR. OGASAWARA: Yes. This is Hikaru
17 Ogasawara speaking from MHI, Civil Engineer. The
18 updates to the ground motion data in CEUS Seismic Source
19 is COLA issue, this is not DCD issue.

20 And MHI does not consider this update to the
21 ground motion data in CEUS Seismic Source in DCD. And,
22 also, this issue is covered by DCD Section 3.7.1.

23 MR. NAGAI: If there isn't any --

24 CHAIRMAN STETKAR: Does --

25 MR. NAGAI: Yes, understand?

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1 CHAIRMAN STETKAR: Understand, yes. So
2 essentially we'll cover that once we get to the COL cite
3 specific seismic hazard evaluation in three point,
4 whatever it is, seven I guess. Thanks.

5 MR. NAGAI: Okay, so next one, Section 3.3,
6 there was a question why there is such a large difference
7 in probability between the severe wind speed and
8 hurricane speed, but there's just only a 5-mile per hour
9 difference in the wind speed.

10 And I would like to ask Ogasawara-san to,
11 again, to present the response.

12 MR. OGASAWARA: Yes. This is Hikaru
13 Ogasawara speaking. First of all, the reason of
14 selecting ten to the minus two is based on Standard Review
15 Plan 3.3.1 and to select ten to the minus seven is based
16 on the Regulatory Guide 1.221.

17 And the reason considering for hurricane
18 speed, that probability is ten to the minus seven per year
19 is defined to cover the United States site as defined in
20 this presentation, a 160-mile per hour line is located
21 around here. That covers our potential customer site.

22 CHAIRMAN STETKAR: Yes.

23 MR. OGASAWARA: On the other hand, the
24 region of severe wind speed, that probability is ten to
25 the minus two per year is taken conservatively wider than

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1 the region of hurricane.

2 In this presentation 155-mile per hour is
3 around this area.

4 CHAIRMAN STETKAR: Yes.

5 MR. OGASAWARA: So the reasons of there is
6 a large difference in the probability between ten to the
7 minus two and ten to the minus seven even though the wind
8 speed difference is just five miles per hour.

9 So the difference is, the covering area is
10 different.

11 CHAIRMAN STETKAR: If I look at the wind
12 speed contours on the right from Reg Guide 1.76, I see
13 contours that progress inland from the coast. If I look
14 at the contours from Reg Guide 1.221, I see contours that
15 progress inland from the coast.

16 I honestly don't understand the argument.
17 I do understand the argument if you would admit that Reg
18 Guide 1.76 is based on things that are simply made up and
19 are not based on real data, which is more of a staff
20 problem than your problem.

21 But I will not accept the notion that
22 155-mile per hour wind has a recurrence frequency of once
23 in a hundred years, and 160-mile per hour wind has a
24 recurrence frequency of once in ten million years. That
25 just does not make any sense.

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1 Mother Nature doesn't work that way.
2 Something on one of these two depictions is wrong.
3 Mother Nature does not work that way. So we'll just
4 leave that one open.

5 You've referred us to the Standard Review
6 Plan and Reg Guide Sections that you've used, so indeed
7 your complying with the available guidance. This is
8 more an issue for the staff. The staff's guidance is not
9 consistent.

10 I'll put that on there. It's now on the
11 public record, it is not consistent. We've raised this
12 issue for the last two or three years and it's just an
13 example of where the staff is using inconsistent guidance
14 based on inconsistent concepts of meteorological
15 parameters.

16 And the problem is, in this particular
17 issue, and again I'll put this on the record, you are
18 making design decisions based on these two values.
19 There are statements in the Design Certification
20 Document that says your turbine building siding is
21 designed to remain intact for a severe wind of 155 miles
22 per hour. That is a specific design decision.

23 As the implications on costs, structures,
24 and everything, there are also statements that say for
25 protection against hurricane differential pressures,

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1 the siding is designed to blow off at 160 miles per hour
2 because the design must be organized such that you don't
3 have two large differential pressures.

4 Those are very distinct constraints on
5 design based on these interpretations of a 5-mile per
6 hour difference with a factor of 100,000 difference in
7 the recurrence interval.

8 And that's the reason, I know that your
9 buildings are designed for 200 and whatever it is miles
10 per hour tornado loads, you know, which is higher than,
11 different type of loading dynamics, but higher than the
12 hurricane.

13 I know you design for 166-mile per hour
14 hurricane. The question is, having several different
15 design criteria based on numbers that just don't make any
16 sense.

17 So it's, I'll put it back to the staff, is
18 I'll ask you to justify why you believe 155-mile per hour
19 wind speed for what we'll call a severe wind from
20 Reference X has a frequency of one event in a hundred
21 years where a wind speed of 166-miles per hour from
22 Reference Y has a frequency of ten to the minus seven.

23 I'd the like the staff now to justify that,
24 so you can get back to us.

25 MEMBER SCHULTZ: And we appreciate what you

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1 presented today.

2 CHAIRMAN STETKAR: Yes, we do.

3 MEMBER SCHULTZ: Because it demonstrates
4 pictorially what is the issue here and what needs to be
5 resolved.

6 MEMBER RAY: Did you want to say something
7 more?

8 MR. SPRENGEL: No. I think we're done at
9 this time.

10 MR. GALVIN: I think that the Reg Guides may
11 have been on the wrong figures, but I guess it still
12 doesn't change your point. The hurricane is Reg Guide
13 1.221 --

14 CHAIRMAN STETKAR: Yes, that's correct.

15 MR. GALVIN: -- the straight line winds are
16 Reg Guide 1.76 --

17 CHAIRMAN STETKAR: Right.

18 MR. GALVIN: -- looks like they had those
19 reversed.

20 CHAIRMAN STETKAR: On the slide, yes.
21 That's fine.

22 MR. GALVIN: But your point is well taken.

23 CHAIRMAN STETKAR: Okay. Thanks. It's
24 only something, and I honestly don't know what difference
25 it makes in the structural design effort or in the review

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1 effort for that matter, except for the fact I did come
2 across that one place that says, you know, for a 5-mile
3 per hour difference, at least on the turbine building
4 siding, there are very distinct design criteria that seem
5 to be imposed in their design.

6 And that starts to get a bit troubling. So,
7 anyway, I think we've raised the concern, and I do, I
8 appreciate the feedback because we now do have on the
9 record that the guidance that you used and the basis that
10 you used for selecting those two different wind speeds.

11 So we'll toss it back to the staff to get
12 back to us at some time. This by way, it is obviously
13 a generic issue, it is not particularly a US-APWR issue
14 because we do understand where you selected your values
15 from for US-APWR design.

16 However, it may have implications on
17 US-APWR design if, indeed, the design criteria for
18 certain structures are substantially different based on
19 those two different wind speeds.

20 And, again, I mentioned the turbine
21 building because I at least saw something there. So,
22 thank you.

23 MR. NAGAI: Okay. So, next one, Section
24 3.5, there was a question about technical justification
25 for determining probabilities of internally generated

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1 missiles and there's a DCD statement that the probability
2 of internal missile generation is maintained with ten to
3 the minus seven and the Chairman was asking the basis for
4 that.

5 And, also, you pointed out inconsistency
6 between that probability and the one used in Chapter 19,
7 and Ogasawara-san has an answer for that question.

8 MR. OGASAWARA: Yes. This is Hikaru
9 Ogasawara again. It is described in DCD 3.5.1.1.1.1 --

10 (Laughter)

11 (Simultaneous speaking)

12 CHAIRMAN STETKAR: 3.5.1 --

13 MR. OGASAWARA: 1.1.1.1, four times one.

14 CHAIRMAN STETKAR: Four ones, 3.5.1.1.1.1,
15 okay.

16 MR. OGASAWARA: The probability of
17 occurrence due to the potential missile from piping is
18 less than ten to the minus seven after that. If piping
19 is evaluated in Section 3.6 were to rupture, the piping
20 is held by its support.

21 However, the probability of occurrence, P1,
22 remains less than ten to the minus seven since the section
23 remains attached to the remainder of the piping system.

24 This sentence means that the piping break
25 is considered according to Section 3.6 and possibility

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1 of damage by missile caused by piping break is to be
2 ignored, that is to say possibly less than ten to the
3 minus seven.

4 CHAIRMAN STETKAR: I guess, you know, this
5 is another situation where, I understand that argument
6 by the way, that regardless of what the piping failure
7 frequency is, the frequency of missile, the conditional
8 probability of missiles being generated from a pipe
9 break, you know, would be lower than that frequency
10 because of the supports and the anchors and things like
11 that.

12 The basic concern that I'm raising is not
13 so much about each individual piece of the evaluations
14 that are presented in DCD Chapter 3, it's the fact that
15 statements are made that probabilities are less than ten
16 to the minus seven, which is a very small number, without
17 any evidence of actual supporting analyses to justify
18 those small numbers.

19 And the question is, if you're going to draw
20 a conclusion that is based on a small number you should
21 be able to show the evaluation that was done to justify
22 that small number.

23 So, for example, in a pipe break, if the pipe
24 break frequency was ten to the minus three per year, why
25 are you confident that the conditional probability of a

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1 missile is a factor of one in 10,000? Follow me?

2 MR. OGASAWARA: Okay.

3 CHAIRMAN STETKAR: Yes, and that requires
4 some analysis. It doesn't require what we just think it
5 would be a lot smaller, because a lot smaller could be
6 one in 1000, which is pretty small, but it's still then
7 a factor of ten times higher than ten to the minus seven.

8 So that's what I'm basically challenging,
9 is that if you're drawing these conclusions based on
10 numerical arguments, like a frequency of ten to the minus
11 seven per year, I'm asking whether you have the analyses
12 to provide confidence that those very small numbers are
13 justified.

14 And it's for a variety, I mean, I brought
15 up the examples of the LOCA frequencies because they're
16 the easiest things to point to, but it also applies for
17 several of the other types of missiles that you address
18 from rotating equipment and load drops and things like
19 that.

20 MR. TAKAYAMA: Is it okay?

21 CHAIRMAN STETKAR: Sure. Well, I mean,
22 that's, I'm trying to raise the concern here a little bit
23 because I hear what you're saying on pipe supports
24 qualitatively, but I still don't hear the fact that
25 you've looked at those piping sections and can justify

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1 that the conditional probability of a missile being
2 ejected is less than ten to the minus three, or ten to
3 the minus four, or whatever it would take if you look at
4 the pipe break frequency.

5 In a similar manner to, you know, you did
6 do the turbine missile analysis, that essentially looks
7 at all of those conditional probabilities so there is
8 some basis for saying yes, I have confidence that the
9 frequency of a turbine missile ejection is less than
10 whatever it is, ten to the minus five per year.

11 MR. TAKAYAMA: My name is Yoshihiro
12 Takayama. We perform pipe break protection design in
13 accordance with Standard Plan 3.6.1, 3.6.2, and other
14 practical place position 3.3 and 3.4.

15 So our design is -- in comparison with
16 Standard Review Plan acceptance criteria, so practical
17 risk, concept of a pipe break is relatively small.

18 We use deterministic design for pipe break.
19 Then we, because that physical damage by pipe break
20 missile is relatively small, which is we think ten to the
21 minus seven.

22 CHAIRMAN STETKAR: See, the last statement
23 there that I heard is you say "we think ten to the minus
24 seven," and I'm asking for what's the justification for
25 why you think it's less than ten to the minus seven

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1 because ten to the minus seven is a very, very small
2 number.

3 MR. TAKAYAMA: But we --

4 CHAIRMAN STETKAR: If you think it might be
5 less than ten to the minus six, which is also a very, very
6 small number, that's still a factor of ten times higher
7 than ten to the minus seven.

8 So I'm asking you why you think it's less
9 than ten to the minus seven and not just less than ten
10 to the minus six? Follow me? I mean it's, what I'm
11 really raising, and perhaps I'll ask the staff about this
12 because the staff has accepted what you've developed.

13 They didn't have any, I didn't see any open
14 items or lingering questions about essentially that
15 screening process that you went through for all of those
16 different potential missile hazards.

17 I'll ask the staff then how the staff has
18 confidence that indeed those ten to the minus seven
19 numbers that are cited in the DCD are reasonably
20 acceptable.

21 MR. GALVIN: We didn't bring the staff
22 today. We'll have to get back to you.

23 CHAIRMAN STETKAR: Yes. No, that's -- so
24 we'll just leave that open, but I'll leave you off the
25 hook for now because I do, again, I appreciate you've come

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1 back and told us at the references that you used in terms
2 of the Standard Review Plan, the basis that you used in
3 terms of the piping, in terms of supports and hangers and
4 things like that, to give you confidence that the
5 conditional probability of missiles would be small.

6 What I'm questioning is the justification
7 for smaller than that very small number. So I'll ask the
8 staff then because they've accepted those values to see
9 if they can come back to us at sometime in the future and
10 provide us a little bit better confidence about why they
11 feel those numbers are reasonable.

12 MEMBER SCHULTZ: Again, I will just comment
13 that I appreciate that you framed the issue well, because
14 this is what we were describing and discussing yesterday.

15 In the past, before anyone felt obligated
16 to assign a number to the conclusion of the discussion,
17 negligibly small, would have been an appropriate
18 conclusion related to this.

19 But if it's felt, if we feel a need to then
20 assign a number and we choose to assign a number of ten
21 to the minus seven to everything that we believe is
22 negligibly small, we document that number, and the
23 concern would be that sometime someone would use that
24 number and it really doesn't necessarily represent
25 reality.

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1 It represents negligibly small, but it can
2 be --

3 CHAIRMAN STETKAR: It's a good --

4 MEMBER SCHULTZ: -- a concern if it's in
5 fact then used later on as a real value in an analysis.
6 It's happened before in other industries. We don't want
7 it to happen here.

8 CHAIRMAN STETKAR: That's a bit of the
9 problem. Once, as Steve said, once you've put that
10 number, especially in the Design Certification Document
11 --

12 MR. TAKAYAMA: It will --

13 CHAIRMAN STETKAR: -- you've essentially
14 raised the bar, you've leant credibility to that value
15 and if you don't have the supporting analyses to justify
16 that it could be dangerous in many different ways.

17 MR. TAKAYAMA: I understand.

18 CHAIRMAN STETKAR: Not dangerous to
19 safety, but dangerous in terms of misinterpretation of
20 what that number might mean or the intent of the
21 conclusion, the engineering conclusion.

22 So I'll ask the staff to come back to us
23 sometime in the future. We'll leave that as an item that
24 we'd like the staff to get back to us, okay.

25 MR. GALVIN: We'll track with the

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1 transcript.

2 CHAIRMAN STETKAR: Yes, thanks, Dennis.
3 Thank you.

4 MR. NAGAI: So next question. While we
5 were discussing Section 3.5 the Chairman pointed out that
6 the analysis performed for MUAP-07029, it appeared that
7 the failure of hydraulic system and over-speed
8 protection system, in other words the entire system, was
9 not considered in the analysis.

10 And Minami-san of MHI would like to provide
11 additional information regarding that question.

12 MR. MINAMI: This is Minami speaking. And
13 before starting our discussion I would like to give a
14 brief explanation on our control and protection system
15 and for better understanding your comment yesterday.

16 And our system, this picture shows our
17 control system and contains main stop valve, main control
18 valve, RSV and IV. And high pressure. High pressure
19 oil is supplied. High pressure oil is supplied to each
20 of the valves through the high-pressure pump, two
21 high-pressure pumps.

22 And the high-pressure pump is supplied to
23 the servo valve, except for the RSV. Because RSV is
24 operated in on/off most so no servos. And the
25 high-pressure is supplied to the servo valves and the

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1 regulated pressure oil is supplied to the piston, which
2 is connected to the valve directly.

3 And each valve is equipped with dump valve.
4 And the dump valve is connected to emergency trip
5 headers. We have two emergency trip headers. One is
6 for MSR, MTSD and RSV and the other is for MPCV and IV.

7 And if the pressure in the emergency trip
8 header is reduced the dump valve is opened and the
9 high-pressure oil in the piston is drained to the drain
10 line. And the valve closed.

11 And high-pressure emergency trip header is
12 connected to -- one emergency trip header is connected
13 to OPC, over-speed protection control. And the other
14 header is connected to EOST, which is being consist of
15 four solenoid valve establishing one out of two, twice
16 project, right?

17 CHAIRMAN STETKAR: Yes.

18 MR. MINAMI: And this, at the bottom, on the
19 right side, you will see a spill pickup, right? We have
20 independent spill pick-up sets. One is for control.
21 One set is for control and the one set is for protection
22 system. Independent system.

23 And we have three pick-ups for each sets.
24 And two out of three signal is sent to the solenoid valve
25 through turbine protection system and the safety logic

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1 system.

2 And the OPC has two solenoid valves. And
3 if one solenoid valve opened the -- The two solenoid
4 valves.

5 CHAIRMAN STETKAR: Yes, 52A and 52B. Are
6 the valve numbers, you can't see them on here.

7 MR. MINAMI: Okay. And at least one SV
8 must be open for tripping. Not tripping. Not tripping.

9 CHAIRMAN STETKAR: You need both of them to
10 open for tripping.

11 MR. MINAMI: Right.

12 CHAIRMAN STETKAR: Yes.

13 MR. MINAMI: And USV has four solenoid
14 valve and one have to trip twice for --

15 CHAIRMAN STETKAR: Right. Those valves
16 numbers are, I hope, 51C, D, E and F. So far my equations
17 are correct. Go on.

18 MR. MINAMI: In addition to EOST we have
19 MOST, mechanical over-speed trip devices, which is
20 mainly operated by mechanical parts and are completely
21 independent from the EOST. Speed sensor is also
22 independent from --

23 CHAIRMAN STETKAR: Yes.

24 MR. MINAMI: And so this is the outline of
25 our hydraulic control and protection system. And, if my

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1 understanding is correct your comment you give us
2 yesterday is, in the MUAP in our technical report we are
3 addressing the left side, mainly left side, which
4 includes a main valve. We are addressing only left side.

5 And we should address, what we should focus
6 on, the right side equipment or component. We need to
7 address right side component.

8 CHAIRMAN STETKAR: That is exactly
9 correct. That's my concern. Well I don't want to say
10 focus, I want to say the entire frequency of over-speed
11 failure should include everything that's on this
12 drawing. And that it's not, as you explained the system,
13 as is my understanding of the system, it's also not as
14 simple as a line for the left and the right because of
15 the way that the over-speed trip controls operate the
16 solenoid valves.

17 So for example, as you mentioned one pair
18 of solenoid valves, the 52 number solenoid valves, affect
19 one set of main valves. And the 51 set, the
20 one-out-of-two taken twice, affect a different set of
21 main valves.

22 So you cannot just evaluate the solenoid
23 valves in isolation because different combinations of
24 failures of the solenoid valves on the right side will
25 effect different combinations of the main valves on the

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1 left side.

2 So the only way to really evaluate the
3 entire failure frequency is to look at everything that's
4 on the slide in front of us together. And that was
5 basically my comment.

6 And you're exactly right, the main concern
7 that I have is that the current analysis in MUAP-07029
8 addresses only what you've numbered 1, 2, 3, 4 on the left
9 side of what we're seeing on this drawing.

10 Now how important is the equipment on the
11 right side when you put everything together? That I
12 don't have a clear answer for.

13 MR. MINAMI: Okay. Next slide please.
14 And I'd like to move to the issue we need to discuss today.
15 And last night I checked our back data for the technical
16 report of 07029 and I confirmed the data, the data is
17 taken from all the Japanese PWR units, more than 20 units.

18 And the data is the data as of 2007, because
19 this report is write in 2007. And I confirmed that such
20 events as below counted as valve or system failure. Such
21 incidence includes servo valve malfunction due to
22 degraded oil. Servo valve or solenoid valve malfunction
23 due to inadequate maintenance or single failure of the
24 components such as LVDT.

25 So in this part I want to say that even

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1 single component failure occurred, I counted it's one.
2 One event.

3 CHAIRMAN STETKAR: Are these, the failures
4 that you're discussing, failures related to the valves
5 on the left of the drawing? The turbine control valves,
6 stop valves and intermediate valves and reheat stock
7 valves. Did you look for failures of the solenoid valves
8 or the equipment on the right-hand side of your drawing?

9 MR. MINAMI: Yes.

10 CHAIRMAN STETKAR: You did?

11 MR. MINAMI: Yes.

12 CHAIRMAN STETKAR: And you found none? Or
13 you found one of those?

14 MR. MINAMI: One or two --

15 CHAIRMAN STETKAR: One or two?

16 MR. MINAMI: Yes. For example, I found
17 some solenoid valve malfunction due to, I think, due to
18 inadequate maintenance. But --

19 CHAIRMAN STETKAR: But what you're saying
20 is that your database does include the equipment on the
21 right-hand side of that drawing, the solenoid valves?

22 MR. MINAMI: Right. And as we discussed
23 yesterday, single malfunction do not lead to the turbine
24 fail. But I assumed single malfunction is equivalent to
25 the turbine trip.

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1 CHAIRMAN STETKAR: Could, yes.

2 MR. MINAMI: So and the third sentence is
3 no actual unexpected turbine over-speed by instant
4 observed during investigation period. Strictly
5 speaking I found one turbine over-speed event. But it
6 was due to misoperation by the operator. So I didn't
7 include such events.

8 So if I exclude such data I didn't find any
9 unexpected turbine over-speed actually. So my
10 conclusion is, like that, all the instance including any
11 single failure of the component within the entire system
12 are counted as MTCV or protection system failure for
13 conservative purpose.

14 So I agree that my event categorization is
15 misunderstanding or confusing. But what I did is I think
16 nothing can be --

17 CHAIRMAN STETKAR: Well I see at a high
18 level what you have done. And again I'll come back to
19 saying that when you look at -- First of all the failures
20 of any of these pieces of equipment are very small.

21 If I take the failure rate model that was
22 used in MUAP-07029, in the MUAP, for the valves on the
23 left, the main valves. If I translate that annual
24 failure rate into a per-demand, in other words, how
25 likely is it that the valve fails to close, those failure

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1 rates are on the order of about, the low end, the ones
2 for which there were no failures observed, are about $2.6E$
3 to the minus 4.

4 In other words, about three failures in
5 10,000 demands. For the high end, where there were some
6 valve failures observed, they're about $7E$ to the minus
7 4. About seven failures in 10,000 demands, less than one
8 in 1,000.

9 So they're still very, very reliable
10 valves. Your data that you've compiled or looked at for
11 the solenoid valves in the hydraulic system confirmed
12 that they're also very reliable valves. My concern is
13 that the integrated model, the combined model of
14 everything on the slide before, combines a large -- Well
15 I have to be careful.

16 A number of combinations of two failures and
17 three failures together, not single failures, but two and
18 three failures together. But a large number of those
19 combinations that add up. In other words, you know, ten
20 to the minus six combinations gives you one E to the
21 minus 5.

22 And what I'm interested in understanding is
23 how do the combinations of, in some cases it's two
24 failures some cases it's three failures, for the
25 equipment on the right side of the slide when it's

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1 combined with the equipment on the left side of the slide,
2 how do those missing combination affect the conclusion
3 that the test interval will still give us less than 1E
4 to the minus 5 per year?

5 And I think it might, but I don't base my
6 conclusions on what I think. I base my conclusions on
7 what I can look at and see what the analysis has done.
8 So this is encouraging information to say that we have
9 not had any hardware related over-speed incidents. And
10 that you have not identified any failure data that would
11 lead us to believe that the solenoid valves in the
12 hydraulic system had very high failure rates, which is
13 good.

14 You know, if you found many of those
15 failures that would be a potential real problem. So it's
16 encouraging that the failure rates of those valves are
17 low. And given the data that you have for the main valves
18 there's some evidence, from what you looked at in your
19 data, that the solenoid valve failure rates may be
20 comparable to those main valves.

21 In other words, two to five to seven, E to
22 the minus 4 per demand, that they're not ten to the minus
23 2 and they're not ten to the minus 7. But that still
24 doesn't give us the confidence that the integrated model
25 would still support the 1E to the minus 5.

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1 It gives me additional confidence. But it
2 doesn't give us that confidence that the full model would
3 support that.

4 MR. MINAMI: And I think we need to consider
5 the fact that we have, our system has the capability to
6 test solenoid valve online. And I'm not sure our
7 customer is really doing such kind of --

8 CHAIRMAN STETKAR: That is, by the way,
9 that's always a question, because the way the models are
10 developed -- And I know we're going into a lot of detail
11 here, but we will finish by noon. The way the models are
12 developed that that testing interval and whether it's
13 really used by your customers to support the number of
14 failures is very, very important.

15 Because the failure probability and the way
16 the models are developed depends directly on those test
17 intervals. If your customers are only testing the
18 solenoid valves once per year that failure data accounts
19 for that once per year testing. If they're actually
20 testing them once per month the failure data accounts for
21 the once per month testing.

22 So it's important to understand what that
23 customer base is telling us in terms of the failure data
24 and the types of testing that the customers are doing to
25 confirm those failure rates. That's in some sense a

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1 related but different issue in terms of the completeness
2 of this evaluation.

3 MR. MINAMI: But if we consider such factor
4 as we can be tested, you know to carry online, I think
5 our result, our conclusion in this technical report is
6 not reasonable I think. So --

7 CHAIRMAN STETKAR: Well we're getting into
8 a lot of detail. We can discuss this a little bit more
9 perhaps after the meeting. Because we probably have
10 some other items to discuss this morning and we do need
11 to end by noontime.

12 It's good, I really appreciate the work that
13 you did to look for that data. And I will tell you from
14 my perspective it's encouraging because you didn't
15 identify anything that would lead me to have a definite
16 concern. It's still I'm not completely satisfied with
17 the completeness of the evaluation to justify that small
18 number. Okay?

19 And as I said, if you want to we can discuss
20 a little bit after the meeting and I can show you a little
21 bit some more of my concerns. And, again, I'm not
22 concerned in an absolute sense of whether or not the
23 system is safe. No single failure will cause failure of
24 the system. The data that you presented do not give me
25 concerns about the reliability of the individual valves.

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1 It's just having confidence that that 1E to
2 the minus 5 number is supported by a complete evaluation.
3 And it's especially important not only for the design
4 certification it's important for the COL applicant
5 because they're relying on that value for confidence that
6 their unfavorable design configuration at Comanche Peak
7 is still acceptable. So that 1E to the minus 5 is even
8 more important for them.

9 Thank you, by the way.

10 MR. NAGAI: Okay. Next question was also
11 related to this technical report. How MHI determined
12 the failure rate of stop and control valves since zero
13 events exist to evaluate against. So Minami-san.

14 MR. MINAMI: Yes. On this picture it shows
15 how we estimated the failure rate in case of no events.
16 And the black solid mark on the left side is the starting
17 point of evaluation. And the left side black solid mark
18 is the timing of investigation. And between these two
19 black marks when we didn't, no incident, we assume,
20 incident, just after incident, just after investigation.

21 And including this assumed event we
22 calculated the failure rate. I think this way gives us
23 some conservative number.

24 CHAIRMAN STETKAR: Yes, okay. Thanks,
25 that actually does answer my question that I had. I

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1 thought this is what you did, but it wasn't completely
2 clear because in the report you talk about mean values
3 of zero and 95 percent confidence values of some number.
4 And then you use the 95 percent confidence value, but
5 really the value that you're using was calculated this
6 way.

7 MR. MINAMI: Yes.

8 CHAIRMAN STETKAR: For those cases where
9 you had zero failures?

10 MR. MINAMI: Yes.

11 CHAIRMAN STETKAR: Okay. Thank you. Let
12 me make a note on that. That one is done.

13 MEMBER BROWN: This still the same topic?
14 Figured as much.

15 CHAIRMAN STETKAR: You have a question?

16 MEMBER BROWN: Not on -- Well you triggered
17 my thoughts yesterday and so I did some review yesterday,
18 because we did Chapter 10 how long ago? A while ago, on
19 the over-speed trip system. And I had gone through it
20 then and didn't have a big problem.

21 But I've learned subsequently about another
22 point. Now you all have a mechanical over-speed trip and
23 I used to operate machines that had mechanical over-speed
24 trips and that's all they had. There was no other, I'm
25 going back 35/40 years.

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1 And we didn't allow electronic trips at that
2 time, just because of the reliability of them. This is
3 for naval vessels, war ships. And so we periodically
4 tested those, but it wasn't frequent. It might be at an
5 overhaul or a maintenance period, a major maintenance
6 period, stuff like that. So we're talking multiple
7 years in between testing those.

8 And I can't remember in my experience with
9 the naval nuclear program ever seeing -- The mechanical
10 over-speed trips always worked. They may not be quite
11 as fine tuned, you can say well they're going to trip at
12 105 percent or 110 percent, might be 112, might be 108.
13 But not as crisp as the electronic systems are.

14 So when I looked at the systems I see a very
15 clear independence between your electronic over-speed
16 trip and your mechanical over-speed trip. And this is
17 an information question from the standpoint, how often
18 -- I went back and looked it up. I couldn't find it real
19 quickly because I just lost track of how to do it. How
20 often do you all test the mechanical over-speed trip in
21 your all's, is it covered under the ITAAC in your DCD?

22 MR. MINAMI: No, I don't think so.

23 MEMBER BROWN: Is it every refueling
24 outage? Or is it every ten years or anything like that?
25 I mean does anybody have a feel for that?

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1 MR. MINAMI: We usually recommend two kind
2 of test. Two kind of test. And the first test is
3 actually over-speed, actually over-speed --

4 MEMBER BROWN: Yes, you raise the speed of
5 the turbine up to a certain point and get the centrifugal
6 switch to operate and that triggers the whole rest of the
7 mechanical chain.

8 MR. MINAMI: Right. And this kind of test
9 is carried out just before the shut down for refueling.

10 MEMBER BROWN: Okay. So every refueling?

11 MR. MINAMI: Right.

12 MEMBER BROWN: So about every two to three
13 years?

14 MR. MINAMI: Two years or three years,
15 right.

16 MEMBER BROWN: Okay.

17 MR. MINAMI: And in addition to the first
18 test we usually recommend to do the oil pressure test.
19 Just supply the high-pressure oil to the eccentric
20 weight. And the high-pressure will high-pressure,
21 overcome the springboard and that eccentric weight --

22 MEMBER BROWN: All right. You've said
23 enough. I understand that.

24 CHAIRMAN STETKAR: How frequently do you do
25 the oil test?

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1 MEMBER BROWN: Well he said, if I got it,
2 he does it before they do the over-speed test.

3 CHAIRMAN STETKAR: Right before. I missed
4 that part.

5 MEMBER BROWN: I thought that's what you
6 said, is that correct?

7 MR. MINAMI: No, that test is once a month.

8 CHAIRMAN STETKAR: Once per month for the
9 oil test.

10 MR. MINAMI: Right.

11 MEMBER BROWN: Okay. That would tear my
12 hair out, but you couldn't do --

13 CHAIRMAN STETKAR: We used to do it once per
14 month and we only tripped about once every four times,
15 so.

16 MEMBER BROWN: That's a problem.

17 CHAIRMAN STETKAR: It was.

18 MEMBER BROWN: Okay. But I haven't
19 finished quite yet, so you're not off the hook yet. Now,
20 what if you run that test on the mechanical over-speed
21 trip and it fails? Do you have to fix it before you go
22 back into operation? Are you allowed to restart and
23 operate through another operating period of two to three
24 years with and inoperative mechanical over-speed trip
25 function?

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1 MR. MINAMI: I'm sorry, I can't answer. I
2 don't have answer your question at this moment. So I
3 have to take my time before --

4 MEMBER BROWN: Okay. I'm asking because
5 if the answer is yes then that raises some questions,
6 which I did not look at, on the EOST. Your diagram, if
7 you read all the words in the DCD, it talks about, you
8 know, it's got independent sensors from the TPS for the
9 control system side.

10 If you look in your diagram you've got
11 separate sensors for it. And it goes through separate
12 electronics, separate processing units. At least
13 that's the appearance, even though it's housed in the
14 same cabinet as the EOST is.

15 But then if you say it's okay to operate with
16 the mechanical system to of service that raises questions
17 about the EOST and how those sensors are fed into the
18 processing part.

19 As an example, in other words, you want now
20 -- It's two out of three, I think, if I remember, it might
21 be two out of four. It's --

22 CHAIRMAN STETKAR: Two out of three.

23 MEMBER BROWN: Two out of three, right?
24 For tripping. And you then want those three little
25 channels to be independent of each other. In other

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1 words, independent power supplies, a sensor feeding each
2 of the channels. That would make everything, you could
3 put a wall between them, and everything would be totally
4 independent. And that's independent of your control
5 system.

6 If the sensors feed, all three, feed each
7 of the three channels of processing and you only have say
8 two power supplies feeding all three, you know,
9 optioneered so you have continuity of power, all three
10 of the processings, you've now destroyed your
11 independence of those three channels.

12 And on a software-based system it's even
13 worse than on an analog-based system in terms of having
14 something fool the system and then potentially result in
15 inoperation, other than in between your checks, which you
16 may find something for some period of time. None of
17 which is described in your DCD in any detail as to how
18 that independence would be maintained.

19 So that's the purpose of my question. It
20 was raised, I've got a similar issue, or a similar
21 situation, that I'm evaluating for another project,
22 trying to get some definition. And then doing some
23 comparison on another one.

24 So that's why I bring the point up. But you
25 don't have an answer of whether you're allowed to go back

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1 into operation with the mechanical over-speed trip out
2 of service, for two years say?

3 MR. MINAMI: But from design viewpoint, we
4 also recommend to do the online test of EOST.

5 MEMBER BROWN: Oh no, I understand all
6 that. But that's not, the online testing is different.
7 That's the testing for a specific failure, a sensor
8 fails, a processor fails, a power supply fails. With
9 software-based systems you can have noise come in, I've
10 seen it happen that's why I'm asking, and it literally
11 corrupts the data and it disable the over-speed trip. In
12 other words it just never sees that. You can over-speed
13 and it just doesn't know it's going to over-speed.

14 MR. MINAMI: What I want to say is that
15 during the EOST online test the EOST doesn't work.

16 MEMBER BROWN: No, I understand that.

17 MR. MINAMI: Okay. But if MOST is working,
18 if system separation occurred MOST would --

19 MEMBER BROWN: I'm not worried, as long as
20 the MOST is not operational I don't have a problem. My
21 only concern is you come out, you've tested the
22 over-speed function coming out of the refueling -- Going
23 into the refuel --

24 CHAIRMAN STETKAR: Charlie, we do need to
25 finish the meeting. Let me go back. If you had an

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1 integrated model for everything that was shown on the
2 first slide you could address these questions. Because
3 the integrated model would look at the probability of
4 failure of the mechanical over-speed trip.

5 It would look at the probability that it's
6 unavailable due to maintenance. It would look at the
7 probability of failure of the speed sensors. It would
8 look at the actual logic for the speed sensors. It would
9 look at common cause failures. You don't have that model
10 so you can't actually answer the types of questions or
11 determine how they might affect the reliability.

12 And Charlie's raising concerns from kind of
13 a deterministic sense without the notion of how important
14 they might be. And you can't answer questions about
15 important they might be because you don't have the
16 analytical model developed to sort of explore those
17 questions.

18 You know, how important is it if the
19 mechanical over-speed trip is out of service for a whole
20 year due to, you know, inoperable. And if the sensors
21 indeed do have some type of common corruption. If you
22 have a model you can --

23 MEMBER BROWN: And corruption is the key
24 word. I don't care what made them bad. You can't answer
25 -- It's what they do to the processing system if it's a

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1 software-based system. That's the issue. You can lock
2 up the software-based decision maker and not have a trip.
3 And that's different, I understand it's a different type
4 of failure, that's all, that people have not thought of.

5 CHAIRMAN STETKAR: My whole point is that
6 an integrated model could help to answer several of these
7 questions. And you don't have that.

8 MEMBER BROWN: No, the simple answer is if
9 you always repair it before you go back into operation.
10 You know it's working when you go in, you don't test it
11 again until the end.

12 So if it's not going to work in between
13 you're not going to figure that out unless it fails in
14 a manner to trip the turbine, which is a failure mode.
15 Then you will know it. Then you may want to go back up
16 while you're replacing a valve or solenoids or what have
17 you and then the next question comes into play.

18 So that's the point. We can get on. There
19 wasn't enough definition in what we have in terms of the
20 design. I've got that in one other project and now that
21 has raised other questions because I didn't understand
22 the discussion relative to the electronic functions.

23 I turn it back to you. I'm sorry, John. I
24 wanted to get that --

25 CHAIRMAN STETKAR: No, it's okay. No,

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1 they're good questions. They are good questions. They
2 can be evaluated if you look at the whole system in total.

3 MR. MINAMI: I know.

4 CHAIRMAN STETKAR: I'll keep coming back to
5 that, that you can answer many of these questions if you
6 have that whole model. Or you could at least explore,
7 you could do sensitivity studies, for example, to explore
8 some of the implications of the types of issues that
9 Charlie is raising.

10 MR. MINAMI: Okay.

11 MR. NAGAI: Okay, next moving on to Section
12 3.4, there were four open items. The first one was
13 related to a break in charging pump piping on the west
14 side of the building. The question was, "What is the
15 justification for the flooding level being limited since
16 at switch over should occur for the charging pump to draw
17 suction from RWSP?"

18 CHAIRMAN STETKAR: Right.

19 MR. NAGAI: And Nishio-san from MHI would
20 like to provide an answer to that question.

21 MR. NISHIO: This is Hiroki Nishio again.
22 And MHI has already submitted this RAI response related
23 to this issues. RAI Number is 841-6055.

24 CHAIRMAN STETKAR: 841-6055?

25 MR. NISHIO: Yes.

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1 CHAIRMAN STETKAR: Okay.

2 MR. NISHIO: Yes. And then -- that when
3 charging line failure and then letdown isolation valve
4 will close. Ater that, delivery of the VCT going down
5 and no alarm will be activated. And then after that the
6 water source of the suction line will be switched to the
7 VCT to the RSWP, or the multi-line.

8 So the charging pump will continue to run
9 but that based on the VCT alarm, operator can stop the
10 charging pump. According to the flooding operation, we
11 counted that a maximum of 15,000 cubic feet is taken into
12 account, or taken into accounted into the flooding
13 analysis. The other hand, the maximum flow rate of the
14 charging pump -- it means flow over the charging pump,
15 is about 100 GPM. Oh let's see 440 GPM of flow, 100
16 cubic.

17 So then we have enough time to reprogram --
18 or whatnot. We have time, a little of time to stop the
19 charging pump.

20 CHAIRMAN STETKAR: Okay. Thank you for
21 pointing us to the RAI, we'll look. We'll get a copy of
22 that RAI and the response. I understand what you're
23 doing. You're basically taking credit for the operator
24 responding to the alarm and tripping the pump.

25 MR. NISHIO: Yes.

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1 CHAIRMAN STETKAR: So we'll take a look at
2 that. Thank you.

3 MR. NAGAI: Okay. Next one was this time
4 east side of the reactor building a non-radiological
5 controlled area, the Chairman was asking what happens to
6 the result of the evaluation if the door from the area
7 to process building somehow disturbs the flow from those
8 two buildings. And Nishio-san, again, has an answer to
9 that question.

10 MR. NISHIO: Yes. Let's see. In the, you
11 know, the flooding analysis we consider that one area,
12 both sides of the reactor building and process building
13 too.

14 CHAIRMAN STETKAR: Yes.

15 MR. NISHIO: And because both buildings
16 were separated by the fire work door, watertight door.
17 But we have assumed that some, maybe it is not register,
18 it doesn't register to the worker so we are -- We consider
19 the worker in the reactor building going to the process
20 building and moreover we have the drain line, a drain line
21 from the process building to the reactor building. So
22 that mean the bypass line, there becoming the bypass
23 line. So the level of the reactor building and the
24 process building will be ultimately the same.

25 CHAIRMAN STETKAR: Okay. Yes. And I know

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1 that's what you did. The drain lines do communicate
2 directly? I mean even if the door was absolutely
3 watertight you would still have propagation through the
4 drain lines?

5 MR. NISHIO: Yes, the --

6 CHAIRMAN STETKAR: Or do the drain lines in
7 those areas have check valves in them?

8 MR. NISHIO: Sometimes. Sometimes in
9 located in the RB. And I know sometimes in the process
10 building. Just during process building go to the
11 reactor building.

12 CHAIRMAN STETKAR: So you go from power
13 resource to the reactor building but not the other way?

14 MR. NISHIO: No, there is no check valve.

15 CHAIRMAN STETKAR: Okay.

16 MR. NISHIO: So there is a pipe restraint.

17 CHAIRMAN STETKAR: Okay. I'd have to -- I
18 think in the interest of time, that's starting to get a
19 little more complicated than I can understand. I'm
20 actually more concerned in the reactor building and the
21 power source building of floods from the service water
22 than I am from that door. I think I understand what you
23 did and why you did it. But I need to think about it a
24 little bit more.

25 MR. NAGAI: Okay. We have two more. One

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1 is also associated with Section 2.4. The Chairman
2 pointed out two potential additional water sources, such
3 as ESW, CCW heat exchangers. And Nishio-san has answer
4 to that question.

5 MR. NISHIO: If the -- either repeat
6 occurrence due to the human error or -- this, flood water
7 is collected through the drain line system and to the
8 non-radioactive reactor building sump located in the
9 lowest level in the NRCA, non-radioactive control area.

10 And so the RB sump, reactor building sump,
11 has a high water level and the operator can know that a
12 leak, there's a leak in the reactor building. I mean,
13 that's in this side. And so reactor can take action to
14 some containment measure so when there is -- so but this
15 is not, this kind of event is just operating issue. So
16 in the flooding analysis we put in there some bounding
17 value to the analysis and we evaluated. So is it --

18 CHAIRMAN STETKAR: Do you actually have a
19 flooding analysis that looks, I mean that specifically
20 addresses the situation that you were describing? In
21 other words that addresses the capacity of the drain
22 line, the timing of the alarms and the timing of the
23 operator action to isolate the flood hazard for all of
24 the potential flood hazards in each area?

25 I mean, I hear what you're saying about what

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1 could be done. I'm asking you whether you've actually
2 evaluated those types of scenarios for different
3 flooding sources.

4 MR. NISHIO: I can't respond right now. So
5 okay. Okay.

6 CHAIRMAN STETKAR: I'd appreciate, if you
7 have that, I'd appreciate seeing it because I'd like to
8 understand a little bit better what you did. Thank you.

9 MR. NAGAI: The last one for the main steam
10 feed water piping area of the reactor building at 76 feet
11 and 5 inches. Question was if a break occurs in that area
12 can the doors to that room withstand a likely pressure
13 transient caused by the break.

14 MR. NISHIO: First in this FW view are
15 closed compartment but with the blow off panel, the
16 rupture panel, is installed.

17 CHAIRMAN STETKAR: Oh, okay.

18 MR. NISHIO: And then so if that room
19 pressure goes high the blowout panel rupture and the
20 pressure will go to outside.

21 CHAIRMAN STETKAR: I missed the blowout,
22 for some reason I either didn't remember or I missed the
23 blowout panels. So thanks. That answers that one.
24 Thank you.

25 MR. GALVIN: John, we do have Mohamed

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1 Shams, the construction engineering branch chief who
2 could address, at least speak to your concerns on severe
3 wind versus extreme wind. I don't know if you want to
4 do that now or after you close.

5 MR. SHAMS: I could take one minute to
6 explain that.

7 CHAIRMAN STETKAR: Sure, let me make sure,
8 have you covered everything?

9 MR. NAGAI: Yes.

10 CHAIRMAN STETKAR: Okay. Great. Thank
11 you, very much. I really, by the way, I appreciate --
12 One of the reasons why we schedule this for two days
13 because it does give you the opportunity to get back to
14 us. And I really appreciate the effort getting back to
15 us. And you've clarified several of the issues. You've
16 answered a few of them, so I do appreciate that.

17 MR. NAGAI: Thank you, Chairman.

18 CHAIRMAN STETKAR: The members have any
19 more questions for MHI? I know, Charlie, you raised a
20 couple of questions.

21 MEMBER BROWN: That was the last thing.
22 Somehow I've got to think about that. Try to get some
23 more info on it.

24 CHAIRMAN STETKAR: So yes, looks -

25 MEMBER BROWN: -- be helpful on that,

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1 eventually.

2 MR. SHAMS: So my understanding is that the
3 Committee asked about the --

4 CHAIRMAN STETKAR: Just make sure we have
5 your name for the record.

6 MR. SHAMS: Sure. My name is Mohamed
7 Shams, S-H-A-M-S.

8 CHAIRMAN STETKAR: Thanks.

9 MR. SHAMS: And I'm the branch chief for the
10 Structure Engineering Branch.

11 CHAIRMAN STETKAR: Thanks, Mohamed.

12 MR. SHAMS: So my understanding of the
13 question is the Committee looked at the values reported
14 for the severe wind, the speeds reported for the severe
15 wind versus the hurricane. And one being 155 miles per
16 hour for the severe wind versus the hurricane being 160.
17 And the probabilities of exceedance for the two was not
18 proportional to the modest increase in speed.

19 The answer to that is because they are not
20 coincident, those two valleys don't happen at the same
21 location. 155 mile per hour severe wind corresponds to
22 more like 290 mile per hour hurricane that has the 10 to
23 minus 7 probability of being exceeded.

24 On the other hand 160 mile per hour
25 hurricane at 10 to the minus 7 corresponds more like to

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1 a 90 mile per hour severe wind. So what that means
2 ultimately is that MHI selected a severe wind value that
3 essentially envelopes the entire continent of the United
4 States. But the hurricane wind leaves portions that are
5 not enveloped.

6 That's addressed later on in a COLA
7 application whether or not that site will be
8 appropriately covered by the parameters. And we would
9 take exceptions at that time.

10 MEMBER RAY: The difference is what causes
11 the wind. Whether it's a straight-line or a hurricane.

12 MR. SHAMS: Right, yes.

13 CHAIRMAN STETKAR: Let me phrase it
14 differently. What is the 10 to the minus 7 straight-line
15 wind speed? You said something like 200 and some odd
16 miles an hour?

17 MR. SHAMS: 209.

18 CHAIRMAN STETKAR: 209, okay. I'll have
19 to think about this, because it's still --

20 MR. SHAMS: So it's for the site versus for
21 the --

22 CHAIRMAN STETKAR: Well I understand the
23 site because I actually looked at the site data. I know
24 where they came up with the 94 miles per hour. I know
25 where they came up with their hurricane for the site.

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1 What still is confusing to me is that we're
2 characterizing a 155 mile per hour wind as a once in 100
3 year. If I operate the site for 100 years I would expect
4 to see it once. We're characterizing a 160 mile per hour
5 wind as occurring once in 10 million years, that if I
6 operate the site for one million years I'd only have a
7 ten percent chance of seeing a five mile per hour higher
8 wind speed. And that to me still doesn't make sense.

9 MR. SHAMS: Yes, maybe I'll try to explain
10 better. As a COLA we select a site, these numbers
11 wouldn't be those numbers. You know, if a COLA is to say
12 select a site that would have the 160 mile per hour 10
13 to the minus 7, they would have a 90 severe wind that would
14 not be exceeded more than one time in 100 years.

15 CHAIRMAN STETKAR: Right, got that. But
16 the bigger concern is not so much the numbers roulette
17 that we're playing here. The bigger concern is what
18 implications do those two values have on making design
19 decisions for the plant? What differences in the design
20 arise because of something that's assigned 155 mile per
21 hour wind speed at a nominal occurrence interval of once
22 in 100 years.

23 And what different design decisions are
24 made relating to that 160 mile per hour wind speed, or
25 lack of design decisions. I don't need to make a design

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1 decision for 161 miles per hour because by definition it
2 is less than 10 to the minus 7 per year.

3 MR. SHAMS: Sure.

4 CHAIRMAN STETKAR: And yet I expect a 155
5 mile per year to occur once every 100 years. So am I
6 either not including something in the design that I ought
7 to, because I'm just below that magic 10 to the minus 7
8 number at 160.1 miles per hour?

9 Whereas, I'm designing for 155 mile per hour
10 wind in once in 100 years. So am I losing something, or
11 am I including something in the design that I ought not
12 to because I'm designing to this 155 mile per hour wind
13 when I don't really expect it to occur?

14 MR. SHAMS: Yes. I mean to best answer
15 that --

16 CHAIRMAN STETKAR: And both of those
17 questions have implications.

18 MR. SHAMS: To best answer that is two
19 values are going to be treated differently in load
20 combinations. One, that being the severe wind, it gets
21 treated in load combinations that have lower, if you
22 would, factors of safety on them. The one with the
23 higher probability would have a load factor of like 1.7
24 so we would double that.

25 To answer your question, am I losing

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1 something by considering just the 160 as opposed to, you
2 know, 290? Yes. As it is you wouldn't be able to --

3 CHAIRMAN STETKAR: But the way to think of
4 it is the 160 versus 290. Not the 160 versus 155.

5 MR. SHAMS: Yes.

6 CHAIRMAN STETKAR: Okay. That helps a
7 little bit. That does help.

8 MR. SHAMS: And, you know, by virtue of that
9 is the design as it is wouldn't be suited directly to like
10 a South Florida site. You know, we --

11 CHAIRMAN STETKAR: Oh sure. Yes, that's
12 clear. Yes, okay. Thanks. I'll have to think a little
13 bit more about that. But that does help, thank you.

14 Anything else from the staff?

15 MR. GALVIN: That's all we have right now.

16 CHAIRMAN STETKAR: Okay. Anything else
17 from any of the members? If not adjourned. Thank you
18 very much for everyone, staff and MHI Lumina. Thanks for
19 all the feedback on the questions. I think we got a lot
20 of things clarified. Anything else from anyone in the
21 room? If not we are adjourned. Thank you.

22 (Whereupon, the meeting in the
23 above-entitled matter was concluded at 12:06 p.m.)

24

25

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Presentation to ACRS Subcommittee

Chapter 3: Design of Structures, Systems, Components and Equipment (Except 3.7/3.8)

November 20, 2013

Mitsubishi Heavy Industries, Ltd.

Presenters



Thomas Hicks – Lead Presenter (Sections 3.1, 3.2, and 3.11)

Mark Biery – Lead Presenter (Sections 3.3, 3.4, 3.5, 3.6, 3.9, 3.10, 3.12, and 3.13)

Hiroki Nishio – Technical Expert

Richard Samples – Technical Expert

Yukihiro Nishizawa – Technical Expert

Hikaru Ogasawara – Technical Expert

Yoshihiro Takayama – Technical Expert

Yoshihiro Minami – Technical Expert

Msashi Ito – Technical Expert

Atsushi Matsumoto – Technical Expert

Masatoshi Nagai – Licensing

Contents of DCD Chapter 3 (1/3)



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Contents of DCD Chapter 3 (3/3)



Section No.	Description
3.10	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment
3.11	Environmental Qualification of Mechanical and Electrical Equipment
3.12	Piping Design Review
3.13	Threaded Fasteners (ASME Code Class 1, 2, and 3)



Section 3.1: Conformance with NRC General Design Criteria

3.1 Conformance with NRC General Design Criteria



Subsection No.	Description
3.1.1	Overall Requirements
3.1.2	Protection by Multiple Fission Product Barriers
3.1.3	Protection and Reactivity Control Systems
3.1.4	Fluid Systems
3.1.5	Reactor Containment
3.1.6	Fuel and Reactivity Control
3.1.7	Combined License Information

3.1 Conformance with NRC General Design Criteria



- **US-APWR conforms with applicable criteria in 10 CFR 50, Appendix A, the General Design Criteria (GDC).**
- **Section 3.1 describes how the US-APWR design meets the applicable GDC and refers to specific DCD sections for further technical information.**

3.1 Conformance with NRC General Design Criteria



➤ Major RAIs (Open Items)

- ✓ There are no Open Items in Section 3.1.



Section 3.2: Classification of Structures, Systems, and Components

3.2 Classification of Structures, Systems, and Components



Subsection No.	Description
3.2.1	Seismic Classification
3.2.2	System Quality Group Classification
3.2.3	Combined License Information

- **The US-APWR SSCs are classified according to nuclear safety classification, seismic category, quality groups, quality assurance classification, and codes and standards.**
 - ✓ Seismic classification is addressed in Subsection 3.2.1.
 - ✓ Equipment classification is addressed in Subsection 3.2.2.
- **There is one Open Item in Section 3.2.**

3.2.1 Seismic Classification



➤ Seismic Category I

- ✓ Based on RG 1.29 “Seismic Design Classification”.
- ✓ Designed to withstand the effects of the SSE and remain functional.
- ✓ Required for all safety-related SSCs.

➤ Seismic Category II

- ✓ SSCs not required to remain functional following an SSE but whose failure could degrade performance of safety-related SSCs to an unacceptable safety level.
- ✓ Designed and constructed to maintain their structural integrity under seismic loading from the SSE.

3.2.1 Seismic Classification



- **Certain non-safety-related SSCs have special seismic design requirements, for example:**
 - ✓ Safety-related instrument lines used to actuate or monitor safety-related systems (RG 1.151)
 - ✓ Fire protection systems (RG 1.189)
 - ✓ Radioactive Waste Management Systems (RWMS) (RG 1.143)
 - ✓ Diverse Automatic Actuation System

- **Remaining SSCs assigned to Seismic Category NS.**

3.2.2 System Quality Group Classification



➤ Quality Groups based on RG 1.26, NRC Quality Groups

- ✓ Quality Group A - ASME Code, Section III, Class 1, safety-related components that are part of the reactor coolant pressure boundary (RCPB)
- ✓ Quality Group B - Pressure-retaining portions and supports not in Quality Group A for safety-related containment isolation, ECCS and residual heat removal functions
- ✓ Quality Group C - Pressure-retaining portions and supports for other safety-related functions not included in Quality Groups A or B
- ✓ Quality Group D - Non-safety-related water- and steam-containing components of systems that are not part of the RCPB or included in Quality Groups A, B or C, or RWMS, but are part of systems or portions of systems that contain or may contain radioactive material

3.2.2 System Quality Group Classification



➤ Equipment Classes (1 through 10)

- ✓ Classes 1 through 3 - Safety-related systems and components
 - Correspond to RG 1.26 quality groups A, B, and C
 - Include other non-ASME class, safety-related components
- ✓ Class 4 – Non-safety-related systems and components
 - Selected equipment addressed by NRC, Quality Group D
- ✓ Class 5 – Non-safety-related components
 - Listed as “risk significant” in DCD Table 17.4-1
 - Designed to meet special seismic requirements such as seismic category II
 - Perform functions that address ATWS or station blackout
 - Are not within the purview of Equipment Classes 4, 6, 7, and 8

3.2.2 System Quality Group Classification



➤ Equipment Classes (1 through 10)

- ✓ Class 6 – Non-safety-related components of the RWMS and a part of steam generator blowdown system
 - Meet RG 1.143
- ✓ Class 7 – Non-safety-related components of the fire protection system
 - Meet RG 1.189
- ✓ Class 8 – Non-safety-related components containing radioactive materials, and classified as Quality Group D that are not included in Equipment Classes 1-7
 - The applicable codes and standards are the same as Equipment Class 4
- ✓ Classes 9 and 10 – Non-safety-related components and structures that do not fall into any one of Quality Groups A through D, or Equipment Classes 1 through 8

3.2.2 System Quality Group Classification



➤ DCD Table 3.2-2 Lists Mechanical and Fluid SSCs, and Their Classification

- ✓ Seismic Category
- ✓ Equipment Class
- ✓ Quality Assurance Classification
 - 10 CFR 50 Appendix B ("Q") – safety-related SSCs, Equipment Classes 1 through 3
 - Augmented quality requirements ("A") – selected non-safety-related SSCs, Equipment Classes 4 through 7
 - Part III of the Quality Assurance Program (QAP) Description
- ✓ Applicable Design Codes and Standards

3.2 Classification of Structures, Systems, and Components



➤ Major RAIs (Open Items)

RAI No.	Question	RAI Topic / NRC Concern	RAI Response / DCD Impact
1015-7054	03.09.03-31	RAI asked applicant to include in any future edition of "Revised Design Completion Plan for US-APWR Piping Systems and Components," the classifications from the response to RAI 580-4584, Question 3.2.2-16 regarding making design basis documents supporting quality group classification available for audit.	<ul style="list-style-type: none"> ➤ RAI response is currently under preparation. ➤ Submitted "Updated Design Completion Plan for US-APWR Piping Systems and Components" on August 30, 2013 that addressed the staff's request.



Section 3.11:
Environmental Qualification of
Mechanical and Electrical
Equipment

3.11 Environmental Qualification of Mechanical and Electrical Equipment



Section No.	Description
3.11	Environmental Qualification of Mechanical and Electrical Equipment
3.11.1	Equipment Location and Environmental Conditions
3.11.2	Qualification Tests and Analyses
3.11.3	Qualification Test Results
3.11.4	Loss of Ventilation
3.11.5	Estimated Chemical and Radiation Environment
3.11.6	Qualification of Mechanical Equipment
3.11.7	Combined License Information
3.11.8	References
Appendix 3D	Equipment Qualification of Electrical and Mechanical Equipment

3.11 Environmental Qualification of Mechanical and Electrical Equipment



➤ Purpose

- ✓ Environmental qualification (EQ) of mechanical and electrical equipment

➤ Scope of Equipment in EQ Program

- ✓ Consistent with SRP 3.11 scope guidance
- ✓ Consistent with RG 1.206 (C.I.3.11) scope guidance

3.11 Environmental Qualification of Mechanical and Electrical Equipment



➤ EQ requirements:

- ✓ Qualified mechanical and electrical equipment
 - Designed to perform its safety function under all anticipated environmental conditions
 - Considered all anticipated environments for the required length of time

- ✓ EQ of equipment located in a harsh environment
 - Demonstrated by testing and/or a combination of testing and analysis

- ✓ QAP complies with 10CFR50 Appendix B
 - Ensures all requirements are accomplished

Appendix 3D Equipment Qualification of Electrical and Mechanical Equipment



- **DCD App.3D and US-APWR Equipment Qualification Program Technical Report (MUAP-08015) integrate:**
 - ✓ Functional Qualification of active mechanical equipment in DCD 3.9
 - ✓ Seismic Qualification in DCD 3.10
 - ✓ Environmental Qualification (EQ) in DCD 3.11
- **Table 3D-2 (US-APWR Equipment Qualification Equipment List) lists:**
 - ✓ Equipment required to be qualified under the Equipment Qualification Program
 - ✓ Active mechanical components required to be functionally qualified
 - ✓ Equipment with special seismic qualification requirements

Appendix 3D Equipment Qualification of Electrical and Mechanical Equipment



- **US-APWR Equipment Qualification Program Technical Report (MUAP-08015)**
 - ✓ Identifies the regulatory basis and industry standards
 - ✓ Provides EQ parameters
 - ✓ Describes the standard equipment qualification program, procedures and policies to be implemented during the design, procurement, construction, testing, turnover and operational phases of a project
 - ✓ Provides the requirements and guidance for development of a specific Project Equipment Qualification Program (PEQP)

3.11 Environmental Qualification of Mechanical and Electrical Equipment



➤ Major RAIs (Open Items) (1/3)

RAI No.	Question 3.11-XX	RAI Topic / NRC Concern	RAI Response / DCD Impact
589-4536	36,37,38	<ul style="list-style-type: none"> ➤ Methodology and assumptions used to calculate TID after LOCA ➤ Update of Technical Report (MUAP-08015) to include containment airborne activity concentrations used to determine gamma and beta TID ➤ Mission dose for selected equipment that requires repair 	<ul style="list-style-type: none"> ➤ Revised Response to RAI 589-4536 Question 03.11-36 (including 37) and 38 was submitted in April, 2013. ➤ US-APWR Equipment Qualification Program Technical Report (MUAP-08015) will be updated to include methodology, assumptions and containment airborne activity concentrations used to calculate TID after LOCA. ➤ The changes for mission dose have been incorporated into DCD Revision 4 ➤ Status: Under NRC review
880-6142	42	<ul style="list-style-type: none"> ➤ Equipment Qualification Data Package (EQDP) Template ➤ Information to be contained in the EQDP 	<ul style="list-style-type: none"> ➤ Revised Response to RAI 880-6142 Question 3.11-42 was submitted in February, 2013. ➤ US-APWR Equipment Qualification Program (MUAP-08015) will be revised to include the EQDP template as Attachment D of the report. ➤ Status: Under NRC review

3.11 Environmental Qualification of Mechanical and Electrical Equipment



➤ Major RAIs (Open Items) (2/3)

RAI No.	Question 3.11-XX	RAI Topic / NRC Concern	RAI Response / DCD Impact
805-5915, 880-6142	41,43	<ul style="list-style-type: none"> ➤ The EQ program was consolidated with the US-APWR Equipment Qualification Program (MUAP-08015), but they are not addressing the same requirements. ➤ Use of the term “important to safety” to define the scope of the EQ program ➤ Completeness of Table 3D-2 as a list of equipment requiring environmental qualification 	<ul style="list-style-type: none"> ➤ Response to RAI 805-5915, Q 3.11-41 has revised Section 3.11 to include EQ, seismic qualification and functional qualification into US-APWR Equipment Qualification Program (MUAP-08015). ➤ Scope of EQ has been corrected to comply with the scope of SRP Section 3.11 in the response to RAI 1034-7055, Q 3.11-63, 64 and 65, submitted on June, 2013. ➤ Table 3D-2 has been corrected to add missing equipment or delete unnecessary equipment in the revised response to RAI 805-5915, submitted on February, 2013. ➤ The changes have been incorporated into DCD Revision 4. ➤ MUAP-08015 will be updated to reflect the changes. ➤ Status: Under NRC review

3.11 Environmental Qualification of Mechanical and Electrical Equipment



➤ Major RAIs (Open Items) (3/3)

RAI No.	Question 3.11-XX	RAI Topic / NRC Concern	RAI Response / DCD Impact
901-6257	55	<ul style="list-style-type: none"> ➤ ITAAC to demonstrate EQ of electrical and active mechanical equipment. 	<ul style="list-style-type: none"> ➤ Existing ITAAC has been revised in the response to RAI 1031-7108, Q 3.11-62, submitted in August, 2013. ➤ The necessary DCD changes have been submitted to the NRC in attachments to the RAI response, and will be incorporated into DCD Rev 5. ➤ Status: Under NRC review
650-5093	39	<ul style="list-style-type: none"> ➤ Commercial-grade dedication process to meet the 10CFR50.49 requirements. 	<ul style="list-style-type: none"> ➤ To clarify how CGD will be used in EQ, MHI will modify MUAP-08015, Section 3.1.1 to EQ of commercial grade item will be performed using a combination of qualification testing to the appropriate standards supplemented with an acceptable commercial grade dedication program and documentation as detailed NRC endorsed EPRI topical reports.



Section 3.3: Wind, Tornado and Hurricane Loadings

3.3 Wind, Tornado and Hurricane Loadings



Subsection No.	Description
3.3.1	Wind Loadings
3.3.2	Tornado and Hurricane Loadings
3.3.3	Combined License Information

➤ **There are no Open Items in Section 3.3.**

3.3.1 Wind Loadings



- The design basis wind loadings are determined in accordance with American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI), “Minimum Design Loads for Buildings and Other Structures”, ASCE/SEI 7-05.
- The US-APWR severe wind speed is 155 mph (Annual probability of exceedance: 0.01)

3.3.2 Tornado and Hurricane Loadings



Design	Tornado	Hurricane
Maximum wind speed (mph)	230	160
Exceedance frequency (per year)	10^{-7}	10^{-7}
Atmosphere pressure drop (Psi)	1.2	Non
Missile	Automobile Sphere Pipe	Automobile Sphere Pipe
Regulatory Guide	RG 1.76	RG 1.221

3.3.2 Tornado and Hurricane Loadings



- **Tornado and hurricane velocity pressure loads are computed in accordance with procedures accepted by SRP 3.3.2.**
 - ✓ No tornado wind speed adjustment applies with respect to height.

- **Tornado atmospheric pressure loading is computed for maximum pressure drop.**
 - ✓ There is no atmospheric pressure effect for hurricane.

- **Load combinations are in accordance with procedures accepted by SRP 3.3.2 and are supplemented with the design criteria and procedures provided in BC-TOP-3-A.**

3.3 Wind, Tornado and Hurricane Loadings



➤ Major RAIs (Open Items)

- ✓ There are no Open Items in Section 3.3.



Section 3.5: Missile Protection

3.5 Missile Protection



- This section provides outline information on missile protection.

- The following are defined:
 - ✓ Structures, Systems, and Components(SSCs) to be protected
 - ✓ Credible missile selection
 - ✓ Design for missile protection

- There are two Open Items in this section.

3.5 Missile Protection



Subsection No.	Description
3.5.1	Missile Selection and Description
3.5.2	Structures, Systems, and Components to be Protected from Externally Generated Missiles
3.5.3	Barrier Design Procedures
3.5.4	Combined License Information

3.5.1 Missile Selection and Description (1/3)



- **Six types of missiles are considered for US-APWR missile protection design:**
 - ✓ Internally Generated Missiles (Outside Containment)
 - ✓ Internally Generated Missiles (Inside Containment)
 - ✓ Turbine Missiles
 - ✓ Missiles Generated by Tornadoes and Hurricanes
 - ✓ Site Proximity Missiles (Except Aircraft)
 - ✓ Aircraft Hazards

- **Protection (probabilistic approach, physical separation, barrier design and design feature) for internally generated missiles is provided.**

3.5.1 Missile Selection and Description (2/3)



- **COL applicant is to identify site-specific SSCs to be protected from turbine missiles, and assess T/G orientation including for other units at multi-unit sites.**

3.5.1 Missile Selection and Description (3/3)



- **The design basis spectrum of Tornado and Hurricane missiles conforms to that defined in applicable regulatory guides:**
 - ✓ RG 1.76 for Tornado missiles
 - ✓ RG 1.221 for Hurricane missiles

- **The COL applicant will verify site interface parameters with respect to aircraft crashes and air transportation accidents.**

3.5.1.3 Turbine Missiles (1/4)



- **Two categories of turbine failures are evaluated:**
 - ✓ Design over-speed failure associated with brittle fracture
 - ✓ Destructive over-speed failures associated with ductile failure

- **Two supporting technical reports have been submitted:**
 - ✓ MUAP-07028 “Probability of Missile Generation from Low Pressure Turbines”
 - ✓ MUAP-07029 “Probabilistic Evaluation of Turbine Valve Test Frequency”

3.5.1.3 Turbine Missiles (2/4)



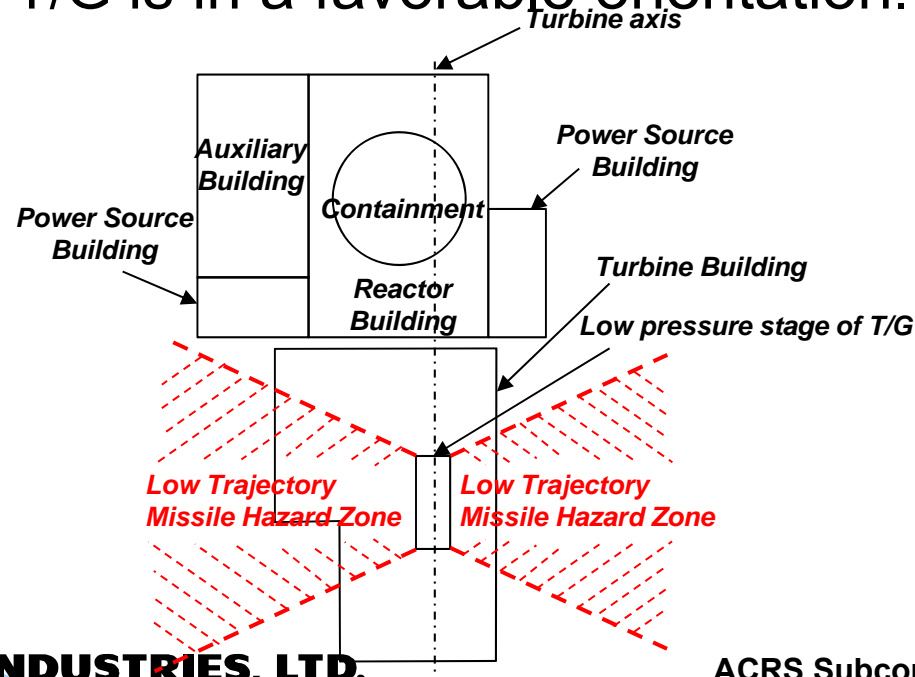
➤ Turbine missile generation probabilities:

- ✓ Brittle fracture within the range less than design over-speed
 - Less than 10^{-5} per year unless ISI intervals exceeds 20 years (MUAP-07028)
- ✓ Destructive over-speed
 - Less than 10^{-5} per year by quarterly turbine valve test frequency (MUAP-07029)

3.5.1.3 Turbine Missiles (3/4)



- **SRP 3.5.1.3 prescribes:**
 - ✓ P1 of favorably oriented turbine to be less than 10^{-4} to obtain P4 in acceptable risk rate of 10^{-7} per year.
- **US-APWR turbine is favorably oriented**
 - ✓ The R/B, PCCV, PS/B, and safety-related and non-safety related SSCs within these structures are located such that T/G is in a favorable orientation.



3.5.1.3 Turbine Missiles (4/4)



- **P1 for US-APWR turbine is maintained to be less than 10^{-5} by:**
 - ✓ Proper rotor design, material selection, PSI and ISI programs, and redundant protection and control system.
 - ✓ Details are discussed in Chapter 10, Section 10.2.2.3 and 10.2.3.

3.5.2 Structures, Systems, and Components to be Protected from Externally Generated Missiles



- **SSCs are protected from external missiles by the reinforced concrete external walls and roof of the safety related R/B and PS/B.**

3.5.3 Barrier Design Procedure



- **Components, protective shields, and missile barriers are designed to prevent damage to safety-related components by absorbing and withstanding missile impact loads.**
- **The target SSCs, shields, and barriers are evaluated for both local effects and overall structural effects due to missile impacts.**

3.5 Missile Protection



➤ Major RAIs (Open Items)

RAI No.	Question 03.05.03-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
758-5680	10	The staff requested the applicant to provide an analysis assessing the local effects of an automobile missile on all seismic Category I structures.	<ul style="list-style-type: none">➤ Submitted a response to the NRC on April 25, 2013.➤ The response is under review by the NRC staff.

3.5 Missile Protection



➤ Major RAIs (Open Items)

RAI No.	Question	RAI Topic / NRC Concern	RAI Response / DCD Impact
782-5910, Rev. 3	14.03.07-58 (Open Item 3.5.1.3-4)	<p>Plant System- Inspections, Tests, Analyses and Acceptance Criteria: NRC requests the followings regarding DCD Tier1 Section 2.7.1.1.1 (Design Description of T/G) and Table 2.7.1.1-1(T/G ITAAC)</p>	
		<p>➤ Key Design Features information regarding turbine orientation should be included in DCD Tier 1.</p>	<p>➤ MHI revised Tier 1 Section 2.7.1.1.1 to include the description of “turbine favorably oriented” with respect to the nuclear island within the standard design scope as suggested.</p>
		<p>➤ AC of ITAAC Table should state that the turbine missile <u>probability analysis exists</u> and concludes that the probability of missile <u>is less than 10⁻⁵</u> per year.</p>	<p>➤ MHI revised to include AC in ITAAC Table stating that:</p> <ul style="list-style-type: none"> the turbine missile generation reconciliation report exists and concludes that all the as-built information such as LPT material properties are bounded by the assumptions of turbine missile analysis report. turbine valve test frequency is consistent with that of valve test frequency evaluation report. <p>➤ MHI’s response to a follow-up RAI (RAI1052-7205) is under review by the NRC staff.</p>



Section 3.4: Water Level (Flood) Design

3.4 Water Level (Flood) Design



Subsection No.	Description
3.4.1	Flood Protection
3.4.2	Analysis Procedures
3.4.3	Combined License Information

- **The US-APWR is designed to accommodate the effects of external or internal flooding**
 - ✓ Protection of plant nuclear safety functions during and after the internal or external flooding events is addressed in subsection 3.4.1.
 - ✓ Design conditions for Seismic Category I structures to withstand the hydrostatic/dynamic loads from the design-basis flood and/or groundwater conditions is addressed in subsection 3.4.2.

3.4.1 Flood Protection (1/4)



➤ External flood protection

- ✓ Water sources
 - Probable maximum precipitation (PMP)
 - Ground water
 - Probable maximum flood (PMF) of streams and rivers
 - Tsunami
 - Surge, seiche flooding, and wave action
 - Potential dam failures
 - Outdoor water storage facility failures
 - Potential cooling water canals and reservoir failures
- ✓ Design-basis flooding level (DBFL) for US-APWR standard design: 1 ft below the plant grade
- ✓ Site specific external flood conditions are addressed by COL applicants.

3.4.1 Flood Protection (2/4)



➤ External flood protection

- ✓ Key design features
 - Thick reinforced concrete external walls and base mats
 - Penetration with flood protection features
 - Sloped roofs with drainage system

- ✓ Site specific design features (e.g. site grading and drainage, dikes, levees, retention basins) are addressed by COL applicants.

3.4.1 Flood Protection (3/4)



➤ Internal flood protection

✓ Water sources

- Earthquakes (failure of non-seismic components)
- Pipe breaks and cracks in accordance with Section 3.6.2
- Fire fighting operations
- Pump mechanical seal failures

3.4.1 Flood Protection (4/4)



➤ Internal flood protection

✓ Key design features

- Physical separation of safety-related SSCs by protective barriers, water-tight doors and penetration seals to preclude simultaneous loss of redundant systems
- Enhanced piping design to minimize postulated flooding water source
- Placement of safety-related SSCs above internal flood levels

➤ The NRC staff conducted an audit of design documents in April, 2013.

3.4.2 Analysis Procedures



- Discusses flooding effects to seismic category I structure design
- Section 3.8 provides the design and analysis procedures used to transform the static and dynamic effects of the DBFL and ground water levels applied to seismic category I structures.

3.4 Water Level (Flood) Design



➤ Major RAIs (Open Items)

RAI No.	Question 03.04.01-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
841-6055	29	The RAI asked to provide the basis for assumptions made for evaluating flooding due to fire fighting operations, and to discuss how high and moderate energy line breaks and cracks are accounted for in the flooding analysis.	<ul style="list-style-type: none">➤ Submitted the final response in July, 2013 after the technical audit in April, 2013, and the response is currently under evaluation.➤ Provided the basis for assumptions for fire fighting operations and high or moderate line breaks in the flood evaluation.➤ Internal flooding evaluation was updated to reflect a series of design changes.➤ Updates and changes have been incorporated in DCD Rev.4.

3.4 Water Level (Flood) Design



➤ Major RAIs (Open Items)

RAI No.	Question 03.04.01-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
841-6055	30	The RAI asked to update Figure 3K-5 to show flood barriers at the main control room vestibule.	<ul style="list-style-type: none">➤ Submitted a response in October 2012 where MHI stated that the figure would be updated in accordance with the closure plan for seismic and structural analyses.➤ The updated figure has been incorporated in DCD Rev.4.

3.4 Water Level (Flood) Design



➤ Major RAIs (Open Items)

RAI No.	Question 03.04.02-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
546-4345 489-3516	5 and 6	Requests to further clarify the use of 0.7 as the coefficient of friction at the soil-concrete interface.	<ul style="list-style-type: none">➤ MUAP-12002 Revision 1 "Sliding Evaluation and Results", which utilized new coefficient of friction 0.5, was submitted in January 2013.➤ Revised responses to Question 03.04.02-5 and 6 were submitted in March 2013.➤ These documents are currently under review by the NRC staff.



Section 3.6:
Protection Against Dynamic Effects
Associated with Postulated Rupture
of Piping

3.6 Protection Against Dynamic Effects Associated with Postulated Rupture of Piping



- **This section provides outline information on the pipe rupture protection.**

- **The following are defined for the US-APWR:**
 - ✓ Design measures and design bases
 - ✓ Postulated pipe rupture location and jet impingement load
 - ✓ Leak-Before-Break (LBB) evaluation methodology

- **This section has no open items.**

3.6 Protection Against Dynamic Effects Associated with Postulated Rupture of Piping



Subsection No.	Description
3.6.1	Plant Design for Protection against Postulated Piping Failure in Fluid Systems Inside and Outside Containment
3.6.2	Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping
3.6.3	LBB Evaluation Procedures
3.6.4	Combined License Information
Appendix-3B	Bounding Analysis Curve Development for Leak Before Break Evaluation of High-Energy Piping for US-APWR
Appendix-3E	High-Energy and Moderate Energy Piping in the Prestressed Concrete Containment Vessel and Reactor Building

3.6.1 Plant Design for Protection Against Postulated Piping Failure in Fluid Systems Inside and Outside Containment



- **In accordance with SRP 3.6.1, the plant is designed to provide protection against piping failure to ensure that such failures would not compromise the functional capability of safety-related systems.**
- **In order to maintain the safety of the plant when a pipe break is postulated, required plant conditions, design measure and design basis are provided.**

3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping



- **Break or crack location is postulated in accordance with SRP BTP 3-4.(eg ; high stress location, location that has great effect on essential equipment, etc.).**
- **Jet thrust reaction force and jet impingement load are defined in accordance with SRP 3.6.2.**
- **Design criteria for pipe whip restraint and jet impingement barriers are provided.**

3.6.3 LBB Evaluation Procedures



- This subsection describes the design basis to eliminate the dynamic effects of pipe rupture for high-energy piping systems of RCL piping, RCL branch piping, and main steam piping.
- LBB evaluation is performed in accordance with SRP 3.6.3.
- LBB criteria are applied to RCL piping, RCL branch piping with normal diameter of 6 inches or larger, and Main Steam piping in PCCV.

3.6 Protection Against Dynamic Effects Associated with Postulated Rupture of Piping



➤ Major RAIs (Open Items)

- ✓ There are no Open Items in Section 3.6.



Subsection 3.9.1: Special Topics for Mechanical Components

3.9.1 Special Topics for Mechanical Components



- This subsection provides information on methods of analysis for ASME Code Section III, Division 1, Class 1, 2, and 3 components and supports including core support structures.
- There are no Open Items in this section.

3.9.1 Special Topics for Mechanical Components



Subsection No.	Description
3.9.1.1	Design Transients
3.9.1.2	Computer Program Used in Analyses

3.9.1.1 Design Transients



- Components are evaluated using the design transients in accordance with the requirements for Class 1 in ASME Code, Section III.
- The design transients give fluid system pressure, temperature, flow transients, and frequency to perform the ASME Code fatigue analysis and stress analysis.
 - ✓ These do not cover the seismic loading and other mechanical loading on each component.
- The design transient item of each Service Level (A, B,C and D) and test condition is addressed.
- The 60 year design life is considered when determining the number of occurrences of each transient.

3.9.1.2 Computer Program Used in Analyses



- A number of computer programs which are commercial codes and house codes, are used for static, dynamic, and hydraulic transient analysis for component design.
- All computer programs are verified and validated in accordance with ASME NQA-1, Subpart 2.7.
- NRC audit for computer programs was completed in August 2011 and closed.

3.9.1 Special Topics for Mechanical Components



➤ Major RAIs (Open Items)

- ✓ There are no Open Items in Subsection 3.9.1.



Subsection 3.9.2:
Dynamic Testing and Analysis of
Systems, Components, and
Equipment

3.9.2 Dynamic Testing and Analysis of Systems, Components, and Equipment



Subsection No.	Description
3.9.2.1	Piping Vibration, Thermal Expansion, and Dynamic Effects
3.9.2.2	Seismic Analysis and Qualification of Seismic Category I Mechanical Equipment
3.9.2.3	Dynamic Response Analysis of Reactor Internals under Operational Flow Transients and Steady-State Conditions
3.9.2.4	Preoperational Flow-Induced Vibration Testing of Reactor Internals
3.9.2.5	Dynamic System Analysis of the Reactor Internals under Faulted Conditions
3.9.2.6	Correlations of Reactor Internals Vibration Tests with the Analytical Results

3.9.2 Dynamic Testing and Analysis of Systems Components and Equipment



- **Dynamic Analysis Methodology
(Subsections 3.9.2.1, 3.9.2.2 and 3.9.2.5)**
 - ✓ A Finite Element (FE) model of the Reactor Coolant Loop (RCL) is used for analysis of RCL system response.
 - ✓ Additional FE sub-system models of SG and Reactor Pressure Vessel are applied for analysis of internal structures.
 - ✓ Dynamic hydraulic loads during LOCA event are evaluated by blow-down analysis with 'MULTIFLEX' code.

3.9.2 Dynamic Testing and Analysis of Systems Components and Equipment



➤ Flow-Induced Vibration (FIV) Assessment for Reactor Internals (3.9.2.3, 3.9.2.4, 3.9.2.6 and TeR MUAP-07027)

- ✓ FIV assessment program is established in accordance with RG1.20.
- ✓ Conclusion of Prediction analysis: Reactor Internals have sufficient margins for adverse flow effects (Fluid Elastic Instability, Vortex-shedding lock-in, Turbulence / RCP pulsation-induced vibration).
- ✓ Test program for the first operating plant: Vibration measurement and high-cycle fatigue evaluation will be conducted in Hot Functional Test (HFT).

3.9.2 Dynamic Testing and Analysis of Systems, Components and Equipment



➤ Major RAIs (Open Items)

RAI No.	Question 03.09.02-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
1013 - 7011	103	<p>(a) Provide a comparison of technical data of both SGs (SONGS and US-APWR)</p> <p>(b) Explain any design differences between the SG of the US-APWR and that of Fort Calhoun.</p> <p>(c) Explain how the contact force of the AVBs will be checked to ensure it is sufficiently high to prevent in-plane tube instability.</p> <p>(d) Explain why the wear at the tube support plates is considered to be caused by turbulence excitation and not by in-plane tube instability.</p>	➤ Response is under preparation

3.9.2 Dynamic Testing and Analysis of Systems, Components and Equipment



➤ Major RAIs (Open Items)

RAI No.	Question 03.09.02-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
1013 - 7011	104	Provide the preliminary design of the SG tube bundle and the design criteria for the SG tubes and retainer bars against flow-induced excitations, including random turbulence, fluid elastic instability, and vortex shedding.	➤ Response is under preparation.



Subsection 3.9.3:
ASME Code Class 1, 2, and 3
Components, Component Supports,
and Core Support Structures

3.9.3 ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structure



Subsection No.	Description
3.9.3.1	Load Combinations, System Operating Transients, and Stress Limits
3.9.3.2	Design and Installation of Pressure-Relief Devices
3.9.3.3	Pump and Valve Operability Assurance
3.9.3.4	Component Supports
Appendix 3C	Reactor Coolant Loop Analysis Methods

➤ **There are two Open Items in this subsection**

3.9.3 ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structure



- **This subsection provides regulatory compliance with the following.**
 - ✓ 10 CFR 50, Appendix A and 10 CFR 50.55a for the design of safety-related structure and components.
 - ✓ 10 CFR 50, Appendix S for seismic category I structure and components.
 - ✓ GDC 2 for seismic design, effect of the earthquake without loss of capability to perform safety function.
 - ✓ GDC 4 for normal and accident environmental conditions.
 - ✓ GDC 14 and GDC 15 for RCPB design of safety-related components in various operating conditions in compliance with ASME Code, Section III requirements.

3.9.3.1 Load Combinations, System Operating Transients, and Stress Limits



➤ Component Design

- ✓ Component design is performed in accordance with ASME B&PV Code.
- ✓ Load combinations for all ASME Service Levels, such as dynamic loads (seismic, accident) and static loads (dead weight, thermal load) are used.
- ✓ Design criteria and stress limits are based on ASME Code, Section III.
- ✓ Reactor Coolant Loop design is presented in Appendix 3C and Technical Report MUAP-09002, "Summary of Seismic and Accident Load Conditions for Primary Components and Piping".
- ✓ Design specifications for Risk Significant ASME Class 1,2,3 PSCs including supports are provided in accordance with ASME Section III.

3.9.3.2 Design and Installation of Pressure-Relief Devices



➤ Design and Installation of Pressure-Relief Devices

- ✓ Pressure relief valves are designed in compliance with the requirements of ASME Code, Section III.
- ✓ Pressurizer safety valves provide over-pressure protection for the RCS.
- ✓ Safety valves and power operated relief valves are provided on the steam lines.
- ✓ Relief valves are provided on the RHRS. These also perform low temperature over-pressure protection for the RCS.

3.9.3.3 Pump and Valve Operability Assurance



➤ Pump Operability

- ✓ The operability of active pumps is established for safety-related functions in operating conditions.
- ✓ Active pump design criteria and stress limits for pressure-retaining and support functions are based on ASME Code, Section III.

➤ Valve Operability

- ✓ The operability of active valve is established for safety-related functions in operating conditions.
- ✓ Active valve design criteria and stress limits for pressure-retaining and support functions are based on ASME Code, Section III.

3.9.3.4 Component Supports



➤ Component Support Design

- ✓ Component support design is confirmed to be in accordance with ASME B&PV Code.
- ✓ Load combinations for all ASME Service Levels
- ✓ Design criteria and stress limits are based on ASME Section III.
- ✓ Support classification into two classifications.
 1. Manufactured standard supports
 - Spring Hanger
 - Snubber
 - Strut
 2. Supplementary steel supports
 - Frame type pipe supports
 - Base plates and anchor bolts

3.9.3 ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structure



➤ Major RAIs (Open Items)

RAI No.	Question	RAI Topic / NRC Concern	RAI Response / DCD Impact
209-1803	03.09.03-21	Requests details of the modeling and analysis methods of supports used for major components, including sketches of the support design, loads and load combinations, applicable stress limit criteria, and the fatigue evaluation criteria.	<ul style="list-style-type: none"> ➤ Submitted a response on April 30, 2009 ➤ The requested details were provided in MUAP-08005, which was superseded by MUAP-10006 and 09002 submitted on November 30, 2012 and July 31, 2013, respectively. ➤ Fatigue evaluation will be performed in accordance with ASME Code, Section III Subsection NF. ➤ This RAI is an Open Item pending the staff's review of the two reports above.

3.9.3 ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structure



➤ Major RAIs (Open Items)

RAI No.	Question	RAI Topic / NRC Concern	RAI Response / DCD Impact
1015 - 7054	03.09.03-31	Requests MHI to inform the staff when the PSC design specifications within the audit scope become available and the staff may commence its audit.	<ul style="list-style-type: none"> ➤ Submitted “Revised Design Completion Plan for US-APWR Piping Systems and Components” on December 7, 2012 and its revision on August 30, 2013, both of which requested the audit be planned for December 2013. ➤ MHI will submit a response to confirm completion of the design specifications.



Subsection 3.9.4: Control Rod Drive Systems

3.9.4 Control Rod Drive Systems



Subsection No.	Description
3.9.4.1	Descriptive Information of CRDS
3.9.4.2	Applicable CRDS Design Specifications
3.9.4.3	Design Loads, Stress Limits, and Allowable Deformations
3.9.4.4	CRDS Operability Assurance Program

3.9.4 Control Rod Drive Systems



- This subsection provides information on design, functional requirements, and operability assurance program for the control rod drive mechanism (CRDM) portion of the CRDS.
- The CRDM for the US-APWR is of the magnetically operated jacking type.
 - ✓ Based on the L-106A type CRDM which has been used in many operating plants in the United States and Japan.
- The CRDM pressure housing is designed in accordance with ASME Code, Section III, Subsection NB.

3.9.4 Control Rod Drive Systems



➤ Major RAIs (Open Items)

RAI No.	Question 03.09.4-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
107-1293	1 (Sub-questions 1293-01, 1293-06, and 1293-07)	Requests to show the basis of the allowable rod travel housing deflection and demonstrate that the estimated CRDM deflection for the US-APWR does not exceed the allowable limit.	<ul style="list-style-type: none"> ➤ In the amended response , MHI shows that estimated deflection of the CRDM pressure housing at Level D condition is within the allowable limit. ➤ The responses to these sub-questions will be revised to reflect updated seismic information. ➤ No impact on DCD is expected.
848-6093	14	Requests to provide the justification for the increase in the maximum CRDM deflection for the level D condition in the amended response to RAI No.107-1293.	<ul style="list-style-type: none"> ➤ MHI explained that the CRDM dynamic response analysis results reflected the seismic conditions of US-APWR DCD Rev.3. ➤ The response to this question will be revised reflecting updated seismic information. ➤ No impact on DCD is expected.



Subsection 3.9.5: Reactor Pressure Vessel Internals

3.9.5 Reactor Pressure Vessel Internals



Subsection No.	Description
3.9.5.1	Design Arrangements
3.9.5.2	Loading Conditions
3.9.5.3	Design Bases

3.9.5 Reactor Pressure Vessel Internals



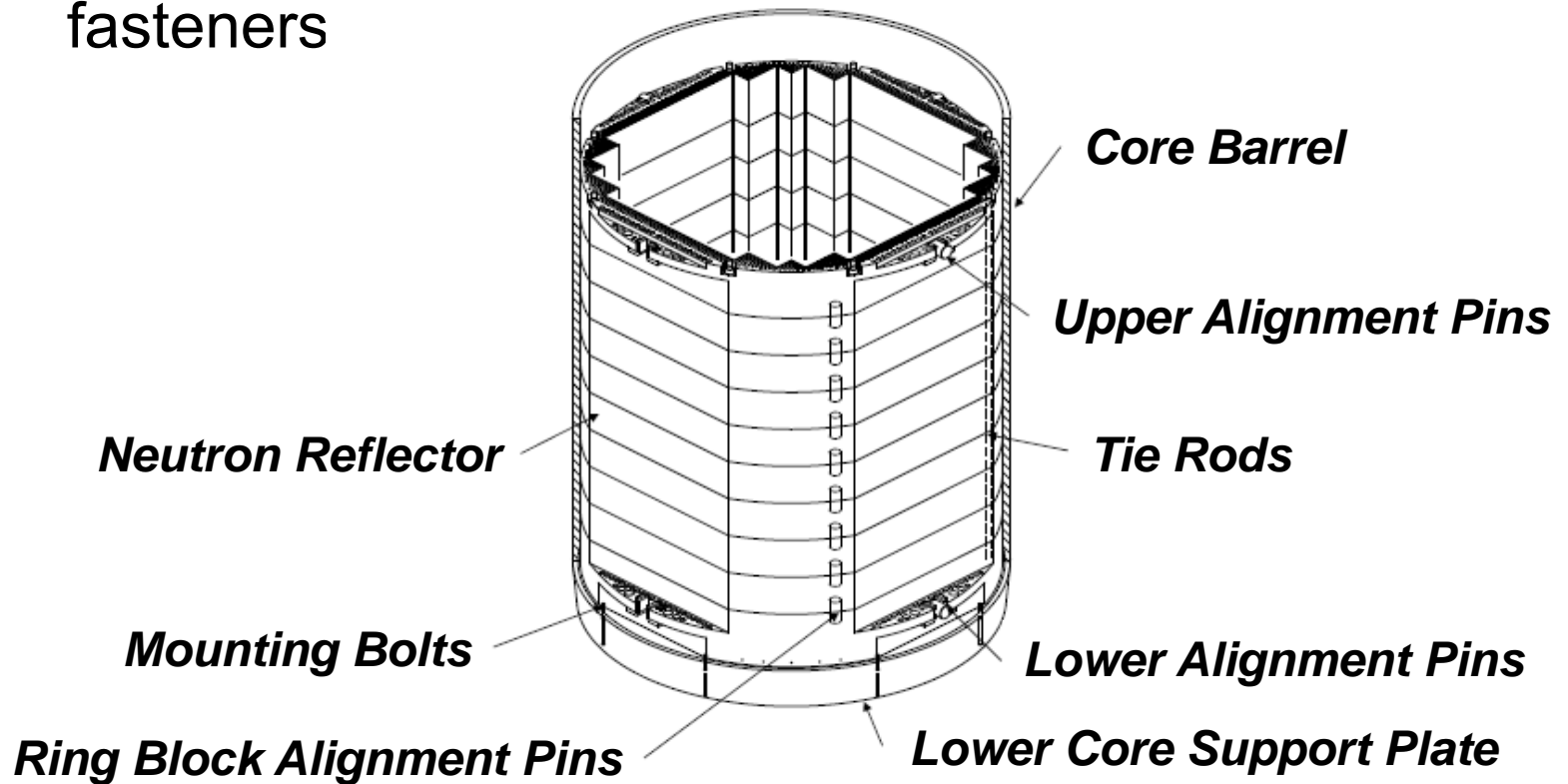
- This subsection provides outline information on the structure and the design bases of Upper and Lower Reactor Pressure Vessel Internals (RIs).

- The codes and standards applicable to Reactor Internals are:
 - ✓ ASME Code, Section III, Subsection NG
 - ✓ ASME Code, Section XI

3.9.5 Reactor Pressure Vessel Internals



- **US-APWR adopts the use of a Neutron Reflector, replacing conventional baffle structures.**
 - ✓ Improvement in neutron reflectivity
 - ✓ Significant reduction in the number of threaded fasteners



3.9.5 Reactor Pressure Vessel Internals



➤ Major RAIs (Open Items)

- ✓ There are no Open Items in Section 3.9.5



Subsection 3.9.6:
Functional Design, Qualification,
and Inservice Testing Programs for
Pumps, Valves, and Dynamic
Restrains

3.9.6 Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints



Subsection No.	Description
3.9.6.1	Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints
3.9.6.2	IST Program for Pumps
3.9.6.3	IST Program for Valves
3.9.6.4	IST Program for Dynamic Restraints
3.9.6.5	Relief Request and Authorization to ASME OM Code

3.9.6 Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints



- **ASME Code, Section III, Class 1, 2 and 3 safety-related pumps, valves and dynamic restraints that are required to perform a safety function, are subjected to IST to assess and verify operational readiness as set forth in 10 CFR 50.55a(f) and ASME OM Code.**
- **IST Program implements ASME OM Code 2004 Edition through 2006 addenda.**
- **The COL Applicant is responsible for administrative control of the IST program as well as control of the ASME OM Code edition and addenda to be used for their IST program.**

3.9.6 Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints



➤ Major RAIs (Open Items)

RAI No.	Question	RAI Topic / NRC Concern	RAI Response / DCD Impact
288-2274	03.09.06-1	This RAI is an Open Item to track an audit of the US-APWR design and procurement specifications to evaluate implementation of the functional design, qualification, and IST programs.	➤ Preparation of sample design and procurement specifications is currently in progress.



Section 3.10:
Seismic and Dynamic Qualification
of Mechanical and Electrical
Equipment

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment



Subsection No.	Description
3.10.1	Seismic Qualification Criteria
3.10.2	Methods and Procedures for Qualifying Mechanical and Electrical Equipment and Instrumentation
3.10.3	Methods and Procedures of Analysis or Testing of Supports of Mechanical and Electrical Equipment and Instrumentation
3.10.4	Test and Analyses Results and Experience Database
3.10.5	Combined License Information

3.10.1 Seismic Qualification Criteria (1/2)



➤ Qualification Standards

- ✓ IEEE Std 344-2004, as modified by RG 1.100, for safety-related mechanical and electrical equipment and their supports
- ✓ ASME Code, Section III for structural integrity of safety-related pressure boundary components
- ✓ ASME QME-1-2007 for qualification of active mechanical equipment

3.10.1 Seismic Qualification Criteria (2/2)



➤ Performance Requirements for:

- ✓ Seismic Category I instrumentation and electrical equipment
 - Provided in corresponding Equipment Qualification Summary Data Sheet (EQSDS)
- ✓ Seismic Category I active mechanical components
 - Defined in corresponding equipment specifications along with system functional requirements

➤ Performance Criteria

- ✓ To perform their designated safety-related function(s) under the postulated SSE in combination with other concurrent loadings
- ✓ Deformation of supports and structures is acceptable, provided their and/or other equipment's safety-related functional performance are not compromised

3.10.2 Methods and Procedures for Qualifying Mechanical and Electrical Equipment and Instrumentation



➤ Testing

- ✓ In accordance with RG 1.100 Rev.3 (IEEE Std 344-2004, ASME QME-1-2007).
- ✓ EQ Program provided in DCD Section 3.11.

➤ Analysis

- ✓ In accordance with RG 1.100 Rev.3 (IEEE Std 344-2004, ASME QME-1-2007).
- ✓ Analysis without testing is acceptable only if structural integrity alone can assure the design-intended design function.

➤ Combination of Testing and Analysis

- ✓ In accordance with RG 1.100 Rev.3 (IEEE Std 344-2004, ASME QME-1-2007).
- ✓ Utilized when the equipment cannot be practically qualified by analysis or testing alone

3.10.3 Methods and Procedures of Analysis or Testing of Supports of Mechanical and Electrical Equipment and Instrumentation



- **Tests or analyses to assure structural capability, including anchorage (See 3.10.2)**
 - ✓ Electrical equipment and instrumentation supports (including instrument racks, control consoles, cabinets, and panels) are tested with the equipment installed or equivalent dummy.
 - ✓ For mechanical equipment supports (including pumps, valves, valve operators and fans), in accordance with ASME Code, Section III
 - ✓ For instrumentation line supports, using the criteria from ASME Code, Section III, Subsection NF for Equipment Class 1 and 2 supports

3.10.4 Test and Analyses Results and Experience Database



- **Equipment qualification file includes:**
 - ✓ Qualification method used for equipment
 - ✓ Tests and analyses results
 - ✓ List of systems, equipment
 - ✓ Equipment support structures
 - ✓ EQSDSs, which summarize the component's qualification
 - ✓ Seismic Input Requirements

- **Experience Based Qualification**
 - ✓ Not used for any equipment

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment



➤ Major RAIs (Open Items)

RAI No.	Question	RAI Topic / NRC Concern	RAI Response / DCD Impact
486-3861	03.10-17	Requests to (1) provide a list of components in the GTG System to be seismically qualified with the method of seismic qualification specified for each component and estimated qualification schedules so that the staff will have opportunities to witness the testing; and (2) describe, in DCD Tier 2, Section 3.10, the seismic qualification criteria and procedures including referenced report number for related electrical and mechanical components of the GTG System.	<ul style="list-style-type: none"> ➤ Submitted a revised response in June 2013. ➤ This RAI is an Open Item pending the submittal and the staff review of MUAP-10023 Revisions. <ul style="list-style-type: none"> • Revision 6 of MUAP-10023 was submitted in September 2013. • Next revision is planned for December 2013.



Section 3.12: Piping Design Review

3.12 Piping Design Review



Subsection No.	Description
3.12.1	Introduction
3.12.2	Codes and Standards
3.12.3	Piping Analysis Methods
3.12.4	Piping Modeling Technique
3.12.5	Piping Stress Analysis Criteria
3.12.6	Piping Support Design Criteria

3.12.1 Introduction



- This section covers the design of the piping systems including piping supports which comprise seismic category I and non-seismic category I (seismic category II and non-seismic) piping systems.

3.12.2 Codes and Standards



- Codes and standards are consistent with 10 CFR 50, Appendix A, GDCs 1, 2, 4, 14, and 15, and 10 CFR 50, Appendix S.
- Piping analysis uses the 1992 Edition with 1992 Addenda of the ASME Code Section III, Division 1, Subsections NB, NC, and ND in accordance with the requirements of 10 CFR 50.55a.
- Material properties comply with ASME Code Section II, 2001 Edition including 2003 Addenda.

3.12.3 Piping Analysis Methods



- **Seismic analysis for all seismic category I and II piping systems use methods in accordance with SRP 3.7.3.**
- **These methods include the response spectrum method or where applicable, the equivalent static load method.**
- **For modeling supports in the piping analysis, the de-coupled support model (modeled as stiffness) or an integrated support model (the actual structural model) of the support is used.**

3.12.4 Piping Modeling Technique



- **Dynamic analysis (3D space frame) consists of:**
 - ✓ A sequence of nodes connected by straight pipe elements
 - ✓ Curved pipe elements with stiffness properties representing the piping
 - ✓ Other inline components.

- **Computer programs are verified and validated using NUREG/CR-1677, Volumes 1 and 2.**

- **NRC audit for computer program and design methodology documented in DCD 3.12 was completed in August 2011.**

3.12.5 Piping Stress Analysis Criteria (1/2)



- Allowable stresses of piping system for various Loads and Load Combinations are defined based on ASME Code Section III, NB/NC/ND.
- Combination of modal response (SRSS, 10% grouping method) and high frequency modes are considered in accordance with RG 1.92.
- Class 1 piping is evaluated for the effects of fatigue caused by thermal transients and other cyclic events including earthquakes and thermal stratification occurring in the Surge Line.

3.12.5 Piping Stress Analysis Criteria (2/2)



- Thermal stratification and oscillation in the closed branch piping connected to RCS would be prevented in accordance with US-APWR design approach described in DCD Subsection 3.12.5.9 (Rev.4)
- The environmental impact on fatigue of Class 1 piping follow the requirements delineated in RG 1.207.

3.12.6 Piping Support Design Criteria



- Seismic category I pipe supports are designed in accordance with subsection NF of the ASME Code Section III, 2001 Edition including 2003 Addenda.
- The load combinations for the piping support design are defined based on Level A, B, C, and D service conditions.

3.12 Piping Design Review



➤ Major RAIs (Open Items)

RAI No.	Question 3.12-XX	RAI Topic / NRC Concern	RAI Response / DCD Impact
804-5938	26	Requests MHI to clarify the analysis model and input for reactor coolant loop piping (RCL) dynamic analysis.	<ul style="list-style-type: none"> ➤ Submitted a response with the requested clarification in September 2012. ➤ The seismic and accident design analysis method for RCL system components is presented in MUAP-09002. The next revision of the report will be submitted in November 2013. ➤ There are DCD changes (3.7.1, 3.7.2, and 3.7.3) stated in the response that have been incorporated into DCD Rev4 and that need to be reviewed by the NRC staff. ➤ Therefore, this RAI is an Open Item pending the staff's review of MUAP-09002 and DCD Rev 4. However, the design of the RCL piping is covered by Subsection 3.9.3, and therefore, this open item is not technically concerned with Section 3.12.



Section 3.13:
Threaded Fasteners
(ASME Code Class 1, 2, and 3)

3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3)



Subsection No.	Description
3.13.1	Design Considerations
3.13.2	Inservice Inspection Requirement
3.13.3	Combined License Information

3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3)



➤ Design Requirement – Same as that for Existing Plants

✓ Material selection: ASME B&PV Code

- Selection Criteria: in accordance with NCA-1220 and NB/NC/ND-2128
- Fracture Toughness: NB/NC/ND-2300, 10 CFR 50 App-G

✓ Lubricant:

- Fel-Pro, Neolube #126 and Nuclear Grade Neverseez are mainly used
- MoS2 and Copper-based anti-seize compounds are not to be used

✓ Reactor Vessel Closure Stud Bolt requirements

➤ ISI Requirement

- ✓ ISI procedure is based on ASME Code, Section XI.

3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3)



➤ Major RAIs (Open Items)

- ✓ There are no Open Items in this section.

Acronyms (1/3)



AC	Acceptance Criteria
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
B&PV	Boiler and Pressure Vessel
BTP	Branch Technical Position
CFR	Code of Federal Regulation
CGD	Commercial Grade Dedication
CRDM	Control Rod Drive Mechanism
CRDS	Control Rod Drive System
DBFL	Design-basis Flooding
DCD	Design Control Document
ECCS	Emergency Core Cooling System
EQ	Environmental Qualification
EQDP	Equipment Qualification Data Package
EQSDS	Equipment Qualification Summary Data Sheet
GDC	General Design Criteria
HFT	Hot Functional Test
ISI	Inservice Inspection
IST	Inservice Testing
ITAAC	Inspections, Tests, Analyses, and Acceptance Criteria

Acronyms (2/3)



LBB	Leak-Before-Break
LOCA	Loss of Coolant Accident
NRC	Nuclear Regulatory Commission
PCCV	Prestressed Concrete Containment Vessel
PEQP	Project Equipment Qualification Program
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PS/B	Power Source Building
PSC	Piping Systems and Components
PSI	Preservice Inspection
QAP	Quality Assurance Program
QG	Quality Group
R/B	Reactor Building
RCL	Reactor Coolant Loop
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Coolant System
RG	Regulatory Guide
RHRS	Residual Heat Removal System
RI	Reactor Internal
RWMS	Radioactive Waste Management System

Acronyms (3/3)



SEI	Structural Engineering Institute
SG	Steam Generator
SRP	Standard Review Plan
SRSS	Square Root Sum of the Squares
SSC	Structures, Systems, and Components
SSE	Safe Shutdown Earthquake
T/G	Turbine Generator
TID	Total Integrated Dose



Backup Slides

➤ Calculation Procedure

- ✓ Crack growth rate is governed by Paris Eq.

$$(da/dN) = C_0(\Delta K)^n$$

da/dN: Crack growth rate per cycle

ΔK : Stress Intensity Range ($\propto \Delta\sigma\sqrt{\pi} \cdot a$)

C_0, n : Parameter (depends on material)

- ✓ Relation between the number of stress cycle due to startup/stop (N_f) and critical crack size (a_{cr})

$$N_f = (2/((n-2)C_0M^{n/2}\Delta\sigma^n)) \times (a_i^{-(n-2)/2} - a_{cr}^{-(n-2)/2})$$

a_i : Initial crack size

a_{cr} : critical crack size ($= (Q/\pi) \cdot (K_{IC}/\sigma)^2$)

$\Delta\sigma$: Range of stress cycles in operation

K_{IC} : Fracture toughness

M : π/Q

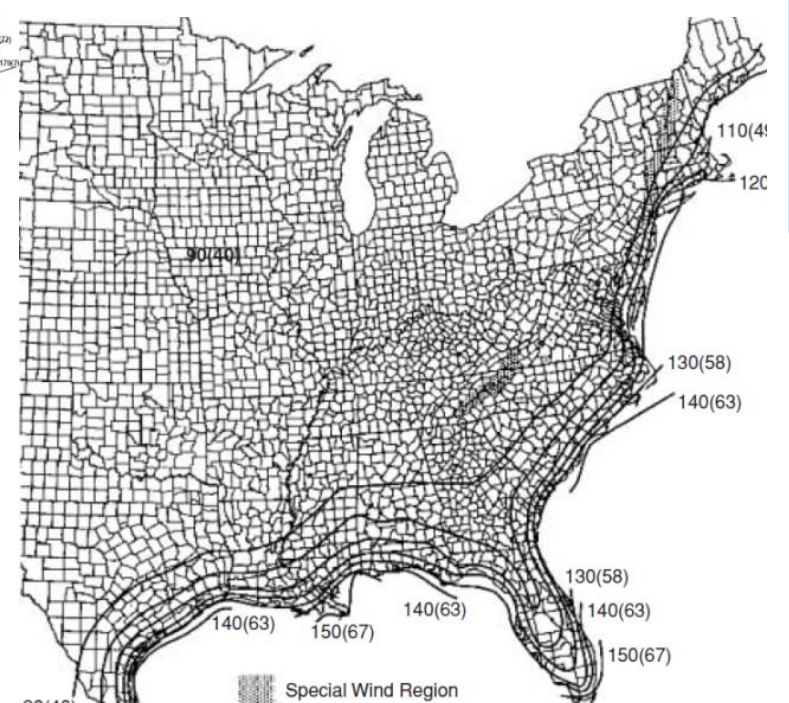
Q : Flaw shape parameter

Severe Wind v.s. Extreme Wind



RG1.221

160mph
1E-07 Annual Exceedance

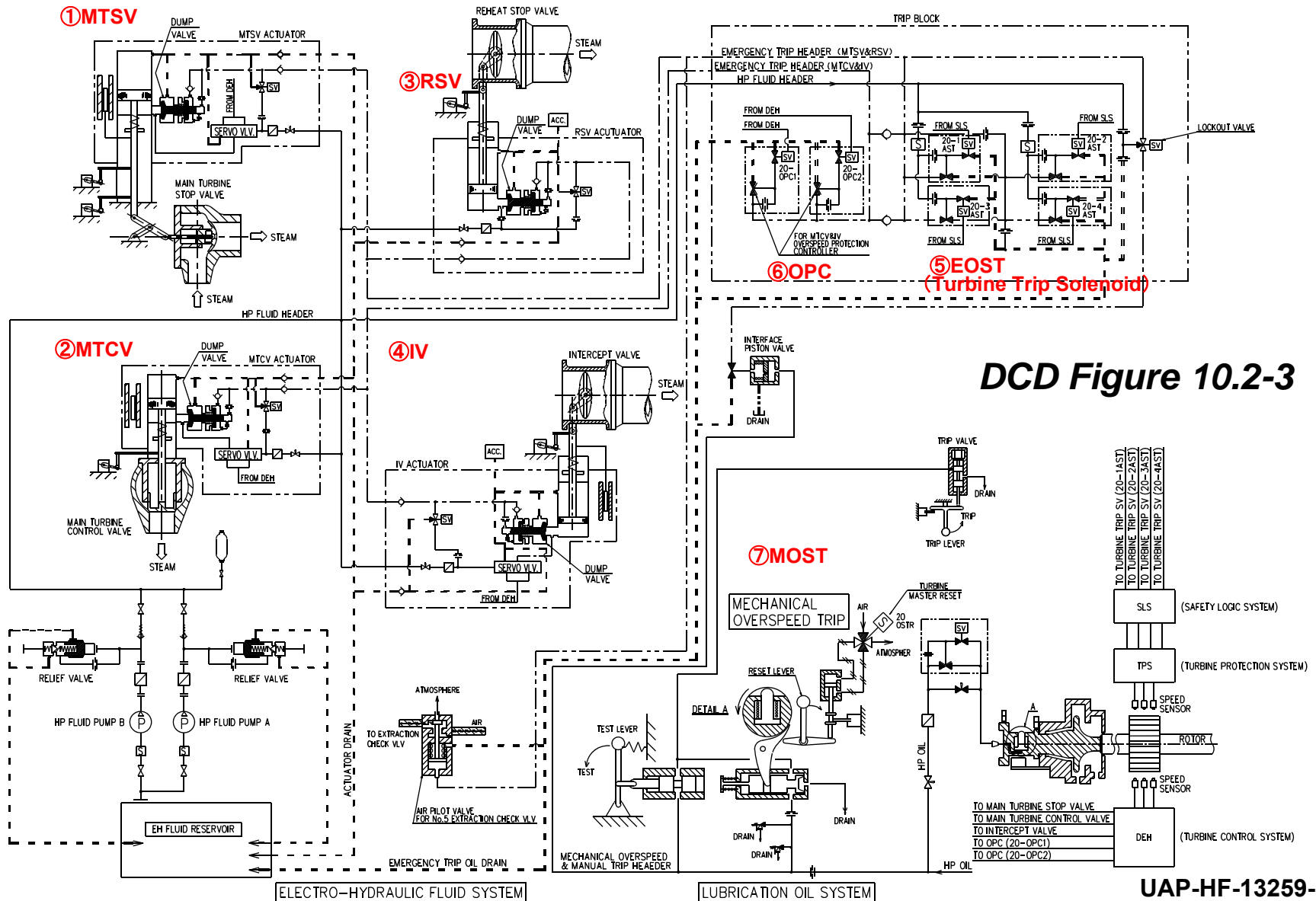


SRP3.3.1
(ASCE 07-05)

90(40)	100(45)	110(49)	120(54)	130(58)	140(63)	150(67)
Location				V mph		(m/s)
Hawaii				105		(47)

155mph
0.01 Annual Exceedance

Control and Protection System Diagram



DCD Figure 10.2-3

Data and Conservative Assumptions

(MUAP07029 Table 5.1-1)

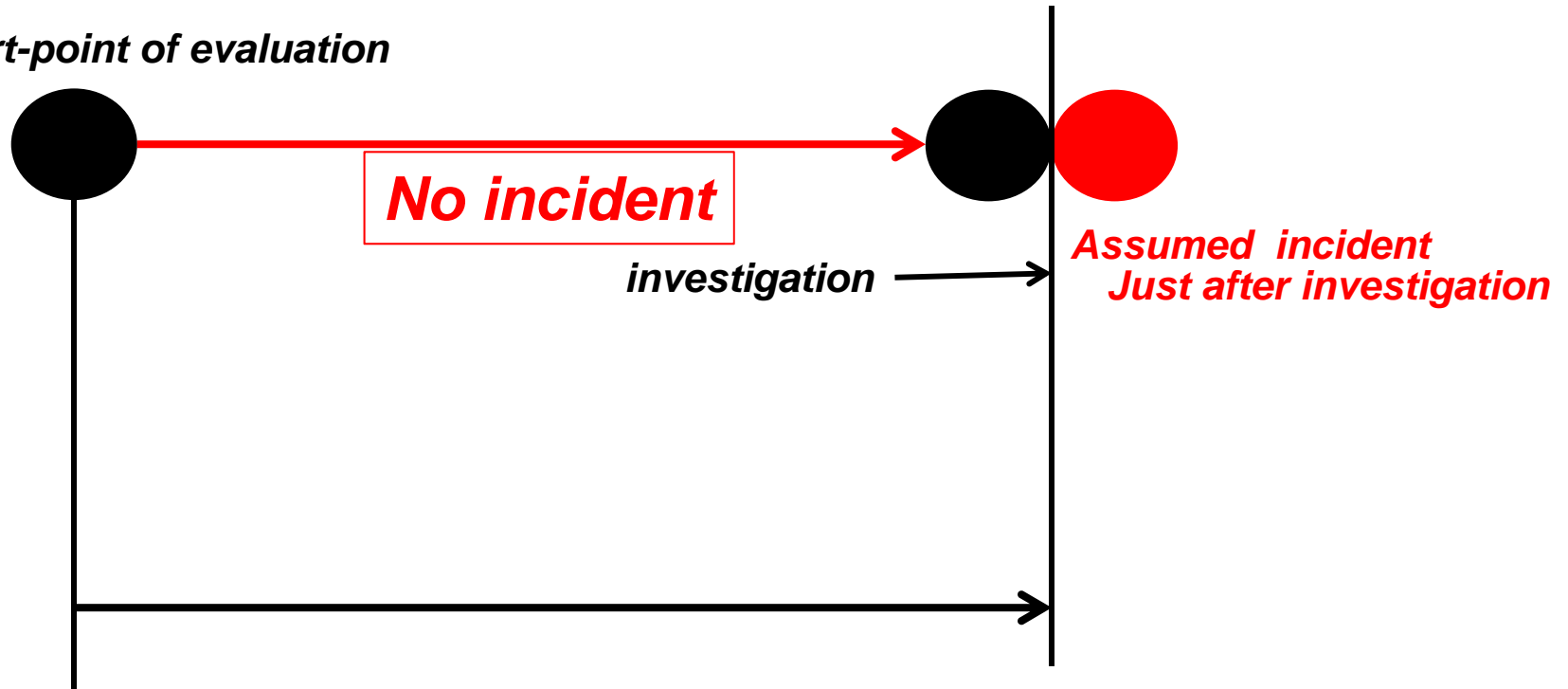


- **Data taken from All Japanese PWR units**
 - ✓ Total accumulated operating hours of the units
- **Such incidents as below are counted as valve or system failure**
 - ✓ Servo vlv. malfunction due to degraded oil
 - ✓ Servo vlv. or SV malfunction due to inadequate maintenance
 - ✓ Single failure of the component such as LVDT
- **No actual unexpected turbine overspeed by incidents observed during investigation period**
- **All the incidents including any single failure of the components within the entire system are counted as MTCV or protection system failure for conservative purpose**

Estimation of the failure rate probability



Start-point of evaluation



Using this no incident period and assumed incident just after incident, estimate upper limit of the probability



Presentation to the ACRS Subcommittee

MHI US-APWR Design Certification Application Review

Safety Evaluation Report with Open Items

Chapter 3: Design of Structures, Components, Equipment and Systems

November 20-21, 2013

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- **Mechanical Engineering Branch**
 - ♦ **Yiu Law – Section 3.2.1**
 - ♦ **Sardar Ahmed – Section 3.2.2**
 - ♦ **Renee Li – Section 3.6.2**
 - ♦ **John Wu – Section 3.9.1**
 - ♦ **Yuken Wong – Section 3.9.2**
 - ♦ **Tuan Le – Section 3.9.3**
 - ♦ **Jason Huang – Sections 3.9.4, 3.9.5**
 - ♦ **Thomas Scarbrough – Section 3.9.6**
 - ♦ **P.Y. Chen – Section 3.10**
 - ♦ **James Strnisha – Section 3.11, 3.13**
 - ♦ **Robert Hsu – Section 3.12**
- **Structural Engineering Branch 1**
 - ♦ **Jerry Chuang – Sections 3.3.1, 3.3.2, 3.4.2, 3.5.3**

Staff Review Team

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 - ♦ Angelo Stubbs – Section 3.4.1
 - ♦ Ryan Nolan – Sections 3.5.1.1, 3.5.1.2, 3.5.1.4, 3.5.2
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 - ♦ Ronald LaVera – Section 3.11
- **Electrical Engineering Branch**
 - ♦ Peter Kang – Section 3.11
- **Project Managers**
 - ♦ Lead PM: Perry Buckberg
 - ♦ Chapter PM: Dennis Galvin

Chapter 3 Review Status

SRP Section/Application Section		Number of OI
3.2	Classification of Structures, Systems, and Components	2
3.3	Wind and Tornado Loadings	0
3.4	Water Level (Flood) Design	3
3.5	Missile Protection	2
3.6	Protection Against Dynamic Effects Associated with Postulated Rupture of Piping	0
3.9	Mechanical Systems and Components	7
3.10	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment	1
3.11	Environmental Qualification of Mechanical and Electrical Equipment	8
3.12	ASME Code Class 1, 2, and 3 Piping Systems, Piping Components, and their Associated Supports	1
3.13	Threaded Fasteners (ASME Code Class 1, 2, and 3)	0
Totals		24

- The SE excludes sections 3.7 and 3.8, which are still under review.

Description of Open Items

- RAI 1015-7054, Question 03.09.03-31: This RAI tracks the need for MHI to make available for audit design specifications and other design documents for ASME Class 1, 2, and 3 Components. The open item applies to Sections 3.2.1, 3.2.2, and 3.9.3. The audit will also address topics related to Sections 3.9.4, 3.9.5, 3.9.6, and 3.11.
- Status: Open Item to be closed upon the staff completing and documenting the audit, currently planned for February 2014.

- RAI 841-6055, Question 03.04.01-29: This RAI tracks the need for the staff to complete a flooding analysis audit concerning modeling assumptions and pipe break selections.
- Status: The staff has completed the audit and is reviewing the RAI response amended following the audit.

- RAI 841-6055, Question 03.04.01-30: The staff was awaiting the submittal of changes to the building layout, flood barriers, and water-tight doors resulting from seismic design changes.
- Status: The information has been submitted and the staff is reviewing the amended RAI response.

- RAI 546-4345, Question 03.04.02-6: The staff requested MHI to clarify the use of 0.7 as the coefficient of friction at the soil-concrete interface.
- Status: The staff is reviewing MHI's basis for the coefficient of friction as part of seismic review.

Description of Open Items

- RAI 782-5910, Question 14.03.07-58: MHI included acceptable ITAAC for turbine generator arrangement and turbine missile probability in DCD Revision 2. However, MHI modified the ITAAC in DCD Revision 3 and the staff found them to be unacceptable. Applies to Section 3.5.1.3.
- Status: MHI has proposed modified ITAAC and corresponding Tier 2* information regarding the turbine generator arrangement and turbine missile probability in response to a follow-up RAI. The staff finds the proposed ITAAC and Tier 2* information acceptable and this will be a confirmatory item for DCD Revision 5.
- RAI 758-5680, Question 03.05.03-10: The staff requested MHI to provide an analysis assessing the local effects of an automobile missile on all seismic Category I structures not covered by RG 1.76.
- Status: The staff is reviewing the applicant's response.
- RAI 1013-7031, Question 03.09.02-103: The staff requested MHI to address the postulated steam generator failure mechanisms associated with the San Onofre Nuclear Generating Station with regard to the US-APWR steam generators.
- Status: The staff is awaiting the applicant's response.

Description of Open Items

- RAI 1013-7031, Question 03.09.02-104: The staff requested MHI to provide the preliminary design of the steam generator tube bundle and the design criteria for the steam generator tubes and retainer bars against flow-induced excitations, including random turbulence, fluid elastic instability (out-of-plane and in-plane), and vortex shedding.
- Status: The staff is awaiting the applicant's response.
- RAI 209-1803, Question 03.09.03-21: The staff review of the seismic analysis of major components supports was impacted by MHI's seismic analysis changes.
- Status: The staff found the analysis methods in the MHI's latest technical reports (MUAP-10006, Revision 3 and MUAP-09002, Revision 3) acceptable. Pending the incorporation of MUAP-09002, Revision 3 into the DCD, this issue is a confirmatory item.
- RAI 107-1293, Question 03.09.04-1, Subquestions 1293-01, 1293-06, and 1293-07, and RAI 848-6093, Question 03.09.04-14: There was limited margin between the calculated maximum control rod drive mechanism deflection and the design limit prior to seismic analysis changes.
- Status: The staff is awaiting the updated calculated maximum control rod drive mechanism deflection based on the updated seismic analysis.

Description of Open Items

- RAI 288-2274, Question 03.09.06-1: MHI has chosen to address implementation of the functional design, qualification, and inservice testing programs in accordance with the requirements of 10 CFR 52.79(a)(11) and therefore will make available for audit a sample of applicable design and procurement specifications.
- Status: Open Item to be closed upon the staff completing and documenting the audit, currently planned for February 2014.
- RAI 486-3861, Question 03.10-17: The staff requested MHI to provide a list of the components of the gas turbine generator system to be qualified and a description of the methods, criteria, and procedures. This information is included in technical report MUAP-10023, which was impacted by MHI seismic analysis changes.
- Status: The staff is reviewing a revised RAI response and a revision to MUAP-10023.
- RAI 650-5093, Question 03.11-39: MHI's commercial-grade dedication process does not provide an alternative means of environmental qualification since it does not address all environmental qualification requirements specified in 10 CFR 50.49 for electrical equipment and the guidelines of ASME QME-1-2007, Appendix QR-B for nonmetallic components of mechanical equipment.
- Status: The staff is reviewing the applicant's response.

Description of Open Items

- RAI 589-4536, Question 03.11-36: The staff has concerns associated with the calculational methods and results for total integrated dose to equipment inside containment following a loss of coolant accident.
- Status: The issue is dependent on the resolution of Chapter 12 open items.

- RAI 589-4536, Question 03.11-37: The staff has concerns associated with the calculational methods and results for the beta ray source term for equipment inside containment following a loss of coolant accident.
- Status: The issue is dependent on the resolution of Chapter 12 open items.

- RAI 589-4536, Question 03.11-38: The staff has concerns associated with inconsistencies in the operability times of post accident equipment inside containment.
- Status: The issue is dependent on the resolution of Chapter 12 open items.

- RAI 880-6142, Question 03.11-42: The staff requested MHI to provide a equipment qualification data package template.
- Status: The equipment qualification data package template provided by MHI is under review.

Description of Open Items

- RAI 805-5915, Question 03.11-41 and RAI 880-6142, Question 03.11-43: MHI has not demonstrated how the US-APWR satisfies the environmental qualification requirement for electrical equipment (10 CFR 50.49) (1) with regard to the treatment of nonsafety-related electrical equipment located in a harsh environment, whose failure under postulated environmental condition could prevent satisfactory accomplishment of safety functions, and (2) by deleting “Important to safety” words throughout environmental qualification documents.
- Status: The staff is reviewing the applicant’s response.
- RAI 901-6257, Question 03.11-55: The ITAAC do not include demonstration of environmental qualification of nonmetallic parts of mechanical equipment.
- Status: The staff is reviewing the applicant’s response.
- RAI 804-5938, Question 03.12-26: The design loads for piping were updated because of changes to MHI’s seismic analysis methods. In addition, the seismic analysis methods of steam generator supports were unclear.
- Status: Based on a review of MUAP-09002, Revision 3, the staff has found the piping analysis modeling acceptable and the treatment of the steam generator non-linear supports conservative. Pending the incorporation of MUAP-09002, Revision 3 into the DCD, this issue is a confirmatory item.



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Comanche Peak Nuclear Power Plant, Units 3 and 4

ACRS US-APWR Subcommittee



**FSAR Chapter 3 (less 3.7, 3.8) –
Design of Structures, Systems,
Components, and Equipment**

November 20, 2013



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Agenda

- Introduction**
- SER Open Items**
- SER License Conditions**
- Site-Specific Aspects**



Introduction

- ❑ FSAR uses IBR methodology**
- ❑ No departures taken from US-APWR DCD**
- ❑ All COL Items are addressed in FSAR**
- ❑ 3 SER Open Items**
- ❑ 5 Chapter 3 SER License Conditions**
- ❑ No contentions are pending before ASLB**



SER Open Items

RAI 244 (6222) Question 3.9.6-21

Provide detail re functional design, qualification and IST programs for pumps, valves and dynamic restraints

Proposed resolution – Typical MHI specs are projected to be available in December 2013



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SER Open Items (cont'd)

RAI 239 (6159) Question 3.11-18

Provide detail re implementation of the EQ for mechanical equipment

Proposed resolution –Typical MHI specs are projected to be available in December 2013



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SER Open Items (cont'd)

RAI 239 (6159) Question 3.11-19

Provide full description of the Operational EQ Program

Proposed resolution – the operational aspects of the EQ program are addressed in MUAP-08015, which is still under NRC review



SER License Conditions

3-1 Pipe break hazards analysis

Applicant proposed - licensee shall complete the as-designed pipe break hazards analysis before commencing installation of individual piping segments

3-2 MOV testing

Applicant proposed - licensee shall implement MOV testing program prior to initial fuel load



SER License Conditions (cont'd)

3-3 Schedule for inservice testing program

Staff imposed - within 12 months of COL, licensee shall submit schedule for inservice testing program to support planning for and conducting NRC inspection

3-4 EQ Program

Applicant proposed - licensee shall implement EQ program prior to initial fuel load



SER License Conditions (cont'd)

3-5 Schedule for EQ program

Staff imposed - within 12 months of COL, licensee shall submit schedule for EQ program to support planning for and conducting NRC inspection

5-2 Preservice testing

Applicant proposed - licensee shall implement pre-service testing program prior to initial fuel load

Turbine Inspection Program

Applicant proposed – program to be implemented prior to initial fuel load



Site-Specific Aspects

Appendices 3A, 3B, 3C, 3E, 3F, 3G, 3H, 3I, and 3J are incorporated by reference with no supplements or departures

3.1 Conformance with General Design Criteria

ESWS and CCWS piping arranged to permit access for inspection

- Manholes, hand holes, inspection ports**
- Integrity of underground piping demonstrated by pressure and functional tests**



3.2 Classification of Structures, Systems, and Components

- Site-specific S-R SSCs designed to withstand the effects of earthquakes without loss of capability to perform their safety function are**
 - **ESWS**
 - **UHS (except basin makeup piping and valves)**
 - **UHS ESWS pump house ventilation**

- DCD methods of equipment classification and seismic categorization applied to Table 3.2-201**



3.3 Wind and Tornado Loadings

- Site-specific basic wind speed (96 mph) enveloped by standard plant design (155 mph)**

- There are no site-specific SC II buildings/structures**
 - **No site features promoting channeling/buffeting**
 - **Wind design methods used for standard plant buildings are valid for site**

- Site-specific SC I structures (UHSRS, ESWPT, PSFSVs) designed for same tornado loadings and combined tornado effects using same methods for qualification as standard plant SSCs**



3.3 Wind and Tornado Loadings (cont'd)

- Failure of N-SR buildings/structures will not**
 - **Jeopardize S-R SSCs**
 - **Generate missiles not bounded by FSAR 3.5.1.4**

- Site-specific or field-routed S-R SSCs evaluated for structural reinforcement/missile barriers**



3.4 Water Level (Flood) Design

- No site-specific flood protection measures applicable since plant is built above DBFL with adequate site grading**

- All SC I structures below-grade are protected against effects of flooding, including groundwater**

- All site-specific S-R structures (UHSRS, ESWPT, PSFSVs) evaluated for internal flooding**
 - Each configured with independent compartments, divisionally separated**

 - Internal flooding of any one compartment and corresponding division will not prevent system from performing required safety functions**



3.5 Missile Protection

- Internally generated missiles from vent fans, pumps and cooling tower fans are not credible**
- Units 1 & 2 are outside low-trajectory turbine missile strike zone of Units 3 & 4 and vice-versa**
- Unit 3 & 4 T/Gs are in “unfavorable orientation” with respect to S-R SSCs of adjacent US-APWR unit**
 - Inspection intervals keep $P1 < E-5$ per year**
 - Therefore, acceptable risk for turbine missiles maintained $< E-7$ per year**



3.5 Missile Protection (cont'd)

- Neither air crash nor air transportation accident is required to be considered due to limited operations per year**
- No site-specific hazards for external events produce missiles more energetic than tornado missiles identified for standard plant design**



3.6 Protection Against Dynamic Effects Associated with Postulated Rupture of Piping

- No site-specific HE piping is within protective walls of ESWPT and UHSRS**

- Site-specific ME piping systems are ESWS and FSS**
 - **A crack in ME piping does not affect safety function of ESWS and UHS**

- Procedures address plant operating and maintenance requirements to prevent water hammer due to voided lines**



3.9 Mechanical Systems and Components

- The only site-specific active equipment is UHS transfer system pumps and valves**

- IST Program developed using ASME Section XI, ASME OM Code, Tech Specs, and good engineering practice**

- IST Program implemented in general conformance with NUREG-1482**



3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

- OBE defined as 1/3 SSE**

- EQ Program described in MUAP-08015 establishes overall framework for implementation, including seismic qualification**

- Plant-specific implementation requires turnover of all EQ Program records to Luminant**



3.11 Environmental Qualification of Mechanical and Electrical Equipment

- Operational EQ Program is established and implemented prior to unit fuel load**

- Equipment test results are maintained as auditable project records**

- Site-specific equipment subject to loss of ventilation is qualified**



3.12 Piping Design Review

- Site-specific response spectra is used for analysis of yard piping not in standard plant design**

- ASME III Class 2 or 3 piping is not exposed to wind or tornado loading**
 - **Exposed non-ASME piping is evaluated**

- There are no exceedances of high frequency CSDRS**
 - **Screening of piping for high frequency sensitivity not required**



3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3)

- Threaded fastener Pre-Service Inspection Program will be implemented after start of construction**

- Inservice Inspection Program implemented as part of Operational Programs**



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3D Environmental Qualification List

10 CFR 50 App B criteria applied to seismic category I electrical, mechanical, and I&C equipment in the UHSRS



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3K Components Protected from Internal Flooding

Internal flood barrier walls are provided between trains in the UHSRS, ESWPT, and PSFSVs



Acronyms

- ❑ **ASLB** Atomic Safety and Licensing Board
- ❑ **ASME** American Society of Mechanical Engineers
- ❑ **CCWS** component cooling water system
- ❑ **COL** Combined License
- ❑ **CSDRS** certified seismic design response spectra
- ❑ **DBFL** Design basis flood level
- ❑ **EQ** environmental qualification
- ❑ **ESWPT** essential service water pipe tunnel
- ❑ **ESWS** essential service water system
- ❑ **FSAR** Final Safety Analysis Report
- ❑ **HE** high-energy
- ❑ **IBR** incorporated by reference
- ❑ **IST** inservice testing
- ❑ **ME** moderate-energy
- ❑ **MOV** Motor-operated valve



Acronyms (cont'd)

- ❑ **N-SR** **Non-safety related**
- ❑ **OBE** **operating basis earthquake**
- ❑ **PSFSV** **power source fuel storage vault**
- ❑ **RAI** **Request for Additional Information**
- ❑ **SC I** **seismic Category I**
- ❑ **SC II** **seismic Category II**
- ❑ **S-R** **Safety-related**
- ❑ **SER** **Safety Evaluation Report**
- ❑ **SSC** **systems, structures, and components**
- ❑ **SSE** **safe-shutdown earthquake**
- ❑ **T/G** **Turbine generator**
- ❑ **UHS** **ultimate heat sink**
- ❑ **UHSRS** **ultimate heat sink-related structures**
- ❑ **US-APWR** **United States Advanced Pressurized Water Reactor**



Presentation to the ACRS Subcommittee

**Comanche Peak Nuclear Power Plant, Units 3 and 4
COL Application Review**

Safety Evaluation Report with Open Items

**Chapter 3: Design of Structures,
Components, Equipment and Systems**

November 20-21, 2013

Staff Review Team

- **Mechanical Engineering Branch**
 - ◆ **Yiu Law – Section 3.2.1**
 - ◆ **Sardar Ahmed – Section 3.2.2**
 - ◆ **Renee Li – Section 3.6.2**
 - ◆ **John Wu – Section 3.9.1**
 - ◆ **Yuken Wong – Section 3.9.2**
 - ◆ **Tuan Le – Section 3.9.3**
 - ◆ **Jason Huang – Sections 3.9.4, 3.9.5**
 - ◆ **Thomas Scarbrough – Section 3.9.6, 3.11**
 - ◆ **P.Y. Chen – Section 3.10**
 - ◆ **James Strnisha – Section 3.13**
 - ◆ **Robert Hsu – Section 3.12**
- **Structural Engineering Branch 1**
 - ◆ **Sunwoo Park – Sections 3.3.1, 3.3.2, 3.4.2, 3.5.3**

Staff Review Team

- **Balance of Plant and Fire Protection Branch**
 - ◆ Ryan Nolan – Sections 3.5.1.1, 3.5.1.2, 3.5.1.4, 3.5.2
 - ◆ Raul Hernandez – Section 3.6.1
- **Materials and Chemical Engineering Branch**
 - ◆ John Honcharik – Section 3.5.1.3
 - ◆ Eric Reichelt – Sections 3.6.3
- **Radiation Protection and Accident Consequences Branch**
 - ◆ Rao Tammara – Section 3.5.1.5, 3.5.1.6
- **Electrical Engineering Branch**
 - ◆ Peter Kang – Section 3.11
- **Project Managers**
 - ◆ Lead PM: Stephen Monarque
 - ◆ Chapter PM: Dennis Galvin
- **Note: Section 3.4.1, 3.7 ,and 3.8 are not addressed in the SE.**

Description of Open Items

- RAI 244-6222, Question 03.09.06-21: MHI has chosen to address implementation of the functional design, qualification, and inservice testing programs in accordance with the requirements of 10 CFR 52.79(a)(11) and therefore will make available for audit a sample of applicable design and procurement specifications. This open item tracks the issue for Luminant.
- Status: Open Item to be closed upon the staff completing and documenting the audit, currently planned for February 2014.
- RAI 239-6159, Question 03.11-18: MHI has chosen to address implementation of the environmental qualification of mechanical equipment in accordance with the requirements of 10 CFR 52.79(a)(11) and therefore will make available for audit a sample of applicable design and procurement specifications. This open item tracks the issue for Luminant.
- Status: Open Item to be closed upon the staff completing and documenting the audit, currently planned for February 2014.
- RAI 239-6159, Question 03.11-19: The staff cannot complete its evaluation of Luminant's description of its environmental qualification operational program because the review of MUAP-08015, "US-APWR Equipment Environmental Qualification Program," for the DCD is incomplete.
- Status: The review of this open item is on hold pending the completion of the review of MUAP-08015.



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Agenda

- ❑ **Introduction**
- ❑ **SER Open Item**
- ❑ **SER License Condition**
- ❑ **Site-Specific Aspects**



Introduction

- ❑ FSAR uses IBR methodology**
- ❑ No departures from US-APWR DCD**
- ❑ All COL Items addressed in FSAR**
- ❑ One SER Open Item**
- ❑ One SER License Condition**
- ❑ No contentions pending before ASLB**



SER Open Item

9.2.5-1 UHS Heat Load

“Governing” UHS heat load for determining basin capacity changed from safe shutdown with LOOP (2-train) to LOCA (2-train). Specific values for heat load and cooling water capacity are expected to change slightly in DCD Subsection 9.2.5.2.3, Tables 9.2.5-1, 9.2.5-2, 9.2.5-3, and Technical Specification 3.7.9

Expected to be resolved in DCD Phase 4

Changes could impact COLA



SER License Condition 9-1

Fire Protection Program Implementation Milestones

- Storage Buildings for byproduct and special nuclear materials before initial receipt**

- Areas containing new fuel before receipt**

- All Fire Protection Program features before initial fuel load**



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Site-Specific Aspects

9.1.5 Heavy Load Handling Program

- Program established prior to first fuel load**



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Site-Specific Aspects (cont'd)

9.2 & 9.5 ESWS and UHS

Will be discussed in Closed Session due to SRI



Site-Specific Aspects (cont'd)

9.4 Ventilation Systems

- Capacities of HVAC equipment reflect site specific conditions**

- UHS ESW Pump House Ventilation System maintains proper environmental conditions**



Site-Specific Aspects (cont'd)

9.5.1 Fire Protection System

- Program – ensures fire will not affect safe-shutdown capabilities**

- Defense-in-depth approach that includes fire detection, extinguishing systems and equipment, administrative controls, procedures, and trained personnel**

- Fire Hazards Analysis performed**

- Combustibles Control Program**



Site-Specific Aspects (cont'd)

9.5.2 Communications Systems

- Various intra-plant and offsite communications systems are provided for normal and emergency communications**

9.5.4 Fuel Oil Storage Tanks

- Underground vaults containing fuel oil tanks for Gas Turbine Generators are provided**



Acronyms

- ❑ **ASLB** Atomic Safety and Licensing Board
- ❑ **CCW** Component Cooling Water
- ❑ **COL** Combined License
- ❑ **COLA** Combined License Application
- ❑ **DCD** Design Control Document
- ❑ **ESW** Emergency Service Water
- ❑ **ESWS** Emergency Service Water System
- ❑ **FSAR** Final Safety Analysis Report
- ❑ **HVAC** Heating, Ventilation and Air Conditioning
- ❑ **IBR** Incorporated by Reference
- ❑ **LOCA** Loss of coolant accident
- ❑ **LOOP** Loss of offsite power
- ❑ **NPSH** Net positive suction head
- ❑ **RG** Regulatory Guide
- ❑ **SER** Safety Evaluation Report
- ❑ **UHS** Ultimate heat sink
- ❑ **US-APWR** United States Advanced Pressurized Water Reactor



Presentation to the ACRS Subcommittee

**Comanche Peak Nuclear Power Plant, Units 3 and 4
COL Application Review**

Safety Evaluation Report

CHAPTER 9: Auxiliary Systems

November 20-21, 2013

Staff's Presentation Order

- **Stephen Monarque** - Comanche Peak COLA Lead Project Manager
- **Paul Kallan** – Senior Project Manager
- **Larry Wheeler** - Technical Staff Presenter

Section 9.02.05 Ultimate Heat Sink

- ***Open Item No. 09.02.05-01***

The “governing” heat load for UHS basin cooling capacity is being changed from Safe Shutdown with LOOP (2-train) mode to LOCA (2-train) mode

- DCD Revision 4 shows a small change in heat load and cooling capacity values
 - ♦ Safe Shutdown with LOOP peak heat load remains the same at $196 \text{ E}^6 \text{ BTU/H/train}$
 - ♦ LOCA peak heat load change from $158 \text{ E}^6 \text{ BTU/H/train}$ to $161 \text{ E}^6 \text{ BTU/H/train}$ (~2% increase)
 - ♦ LOCA 30 day heat load for UHS slightly affects 30 day cooling tower capacity
- These changes are expected to impact COL FSAR 9.2.5.2.3:
 - ♦ **Total cooling water capacity (gallons) – from 8.4 E^6 to 8.3 E^6 (Safe Shutdown with LOOP)**
 - ♦ **Total cooling water capacity (gallons) – from 8.2 E^6 to 8.4 E^6 (LOCA)**
- **Concerns: NONE – total UHS basin water volume remains the same**

Acronyms

- COL – combined license
- COLA – combined license application
- DBA – design basis accident
- FSAR – Final Safety Analysis Report
- GDC – General Design Criteria
- IBR – incorporated by reference
- SER – Safety Evaluation Report
- RAI – request for additional information
- RCOL – reference combined license