

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
US-APWR Subcommittee Meeting

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Friday, May 27, 2011

Work Order No.: NRC-927

Pages 1-149

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, as reported herein, is a record of the discussions recorded at the meeting.

This transcript has not been reviewed, corrected, and edited, and it may contain inaccuracies.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

MEETING OF THE US-APWR SUBCOMMITTEE

+ + + + +

FRIDAY, MAY 27, 2011

+ + + + +

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, Chairman

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR., Member

HAROLD B. RAY, Member

JOY REMPE, Member

WILLIAM J. SHACK, Member

ACRS STAFF PRESENT:

ILKA T. BERRIOS

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

C-O-N-T-E-N-T-S

Opening Remarks and Objectives 3

John Stetkar, ACRS

Staff introduction 4

Jeff Ciocco, NRO

Discussion of US-APWR DCD Chapter 5,
Reactor Coolant and Connecting Systems 7

MHI

Discussion of Comanche Peak FSAR Chapter 5,
Reactor Coolant and Connecting Systems 91

Luminant

Staff introduction 104

Stephen Monarque, NRO

Discussion of the SER related to
Comanche Peak FSAR Chapter 5,
Reactor Coolant and Connecting Systems 106

NRC Staff

Discussion of the SER related to
US-APWR DCD Chapter 5,
Reactor Coolant and Connecting Systems 108

NRC Staff

Subcommittee Discussion 113

John Stetkar, ACRS

Adjournment 149

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

8:30 a.m.

CHAIRMAN STETKAR: The meeting will now come to order. This is a meeting of the United States Advanced Specialized Water Reactor Subcommittee. I'm John Stetkar, Chairman of the subcommittee meeting. ACRS members in attendance are Joy Rempe, Charlie, Brown, William Shack, Dennis Bley and Harold Ray. The Ilka Berrios of the ACRS staff is a designated federal official. The subcommittee will review Chapter 5, reactor coolant connecting systems of the safety evaluation report associated with the USAP design certification and the safety evaluation report associated with Comanche Peak combined license. We will hear presentations from the NRC staff, Mitsubishi Heavy Industries, Luminant Generation Company and Mitsubishi Nuclear Energy Systems. We received no written comments or request for time to make oral statements from members of the public regarding today's meeting. Subcommittee will gather information, analyze relevant issues and facts and formulate proposed positions and actions as appropriate for deliberation by the full committee. The rules for participation in today's meeting have been announced as part of the notice of this meeting

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

(202) 234-4433

1 previously published in the Federal Register. Parts
2 of this meeting may need to be closed to the public to
3 protect information proprietary to Mitsubishi Heavy
4 Industries or Mitsubishi Nuclear Energy Systems or
5 other parties.

6 I'm asking the NRC staff and the Applicant
7 to identify the need for closing this meeting before
8 we enter into such discussions and to verify that only
9 people with the required clearance and need to know
10 are present. So, its up to you. If we get into
11 issues that are proprietary to alert the subcommittee
12 and we'll decide how to handle that.

13 A transcript of the meeting is being kept
14 and will be made available stated in the Federal
15 Register notice. Therefore we request that
16 participants in this meeting use the microphones
17 located throughout the meeting room when addressing
18 the subcommittee. Participants should first identify
19 themselves and speak with sufficient clarity and
20 volume so that they may be readily heard.

21 We will now proceed with the meeting and
22 I call upon Jeff Ciocco to begin.

23 MR. CIOCCO: Yes, good morning. Thank you.
24 My name is Jeff Ciocco. I'm the lead project manager
25 for the USAPWR design certification. Thank you for

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 having us back. Mr. Stetkar, this is our fourth
2 USAPWR subcommittee meeting for a total of, I believe
3 this our seventh chapter presenting to you and once
4 again on a Friday and a good Friday I'll say. We'll
5 do the individual staff introductions as we present
6 our safety evaluation report to you after Mitsubishi
7 and Luminant does. I just point out that the safety
8 evaluation report was written to revision two of the
9 DCD. As you know revision three came in at the end of
10 March or early April this year. So that's also, so
11 that is under review and once again, thank you for
12 having us and I think we are ready to move ahead.

13 CHAIRMAN STETKAR: Great. Thank you very
14 much. And I guess I'll turn over the meeting to
15 Mitsubishi. I'm not sure who will take the lead at
16 the moment.

17 MR. WILSON: My name is Con Wilson and I
18 work with Mitsubishi. And the presentation that --
19 would you like me to speak louder.

20 CHAIRMAN STETKAR: Yes, just make sure --
21 pull the microphone a little bit closer to you there.
22 They are pretty sensitive. If you are up front, this
23 is kind of juggling act. Be very careful not to hit
24 them with your paper because it explodes in our
25 recorder's ears. But if you speak low make sure the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 microphone is up front because it will help the
2 transcript.

3 MR. WILSON: The material that's on the
4 screen before us, there's a presentation we are going
5 to go through in a few minutes. Let's go to the first
6 slide please. My name is up at the top of this list,
7 Con Wilson. My role today would be to present the
8 material. Mr. Katsura?

9 MR. KATSURA: My name is Yosuke Katsura.
10 I am nuclear NRC systems, Chapter 5 MNES.

11 MR. WILSON: And Mr. Fujimoto?

12 MR. FUJIMOTO: Good morning. My name is
13 Hideki Fujimoto. I belong to Mitsubishi Heavy
14 Industrials. I am Chapter 5.

15 MR. WILSON: And Mr. Ogino?

16 MR. OGINO: Morning. This is Takafumi
17 Ogino, MHI.

18 MR. WILSON: And Mr. Hirota?

19 MR. HIROTA: Good morning. My name is
20 Takatoshi Hirota. I am MHI. And I work for the
21 engineering.

22 MR. WILSON: So during today's meeting
23 these technical experts may provide, depending on what
24 kind of questions there are, they may participate.
25 The next slide please.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 There is a list of acronyms in the
2 handout. I won't read them to you but let me say they
3 might come in handy during our meeting. Next slide.
4 Next slide.

5 This slide summarizes Chapter 5, Section
6 Heading and in the color on the right-hand side of
7 this, the color gives you a sense what are open items.
8 The yellow items are open items in the SER and the
9 green items, there are no open items in those areas.
10 In this presentation there are, there's a slide, I
11 think for every item in this list. They are mostly
12 just for information. So, but if you are interested
13 in discussing them, please ask. As we go forward, but
14 you can see the, there are not too many open items.
15 And later in the meeting I believe the NRC
16 presentation will cover some of the same material. So
17 you can find out their view on this. Next slide.

18 USAPWR is a four loop configuration which
19 is very familiar to all of us I believe. And Section
20 5.1 of this section gives a brief overview of it.
21 There are of course four steam generators, four
22 reactor coolant pumps, a pressurizer, conventional
23 four loop. Let's go to the next slide please.

24 5.2.1 of Chapter 5 deals with compliance
25 codes and code cases and the main thing I want to draw

1 your attention to is that the 2003 agenda, the ASME
2 code, is what was, is the basis for the work that's
3 going forward and there is an open item on this
4 subject. This is an interesting one in the sense it
5 is kind of a, well it's a special situation that I
6 don't know that anyone else has seen. You see the
7 open item, title, it deals with compliance with code
8 cases, NCA-1140, Code Case N-782 and Reg Guide 1.84.
9 The ASME Section 3 NCA-1140 disallows the use of code
10 additions that are earlier than three years prior to
11 the construction permit. And the R-COLA data,
12 September 2008, implies a violation of this. The ASME
13 issued code case N-782 to allow the code addition
14 endorsed by the DCD, to sort of resolve this problem.
15 But the code case isn't in Reg Guide 1.84. So, I
16 think its just a matter of timing and in fact if the
17 SER was written at a slightly different time period
18 this wouldn't be an issue at all. But basically the
19 plan is that the Code Case N-782 will be added to the
20 DCD Table 5.2.1.2 along with a note of explanation
21 justifying its use. Next slide.

22 5.2.2 deals with overpressure protection.
23 The overpressure protection system has the following
24 features, the pressurizer safety valves on four
25 separate nozzles at the time of the pressurizer. For

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 like temperature overpressure protection provided by
2 the containment spray residual heat removal pump
3 suction relief valves that are installed in each train
4 of the RHR system. All of the RAIs are closed in his
5 section. Next slide.

6 CHAIRMAN STETKAR: What's the best way to
7 organize our questions. For example, if we have
8 questions on the overpressure protection, is it
9 appropriate to ask those now? I was looking ahead in
10 your presentation slides.

11 MR. WILSON: Let's say the order of the
12 presentation is really pretty from front to back of
13 Chapter 5.

14 CHAIRMAN STETKAR: Okay.

15 MR. WILSON: And I think it would be
16 appropriate to when the topic pops up --

17 CHAIRMAN STETKAR: For example, now, if
18 we have questions.

19 MR. WILSON: Yes. I think its appropriate
20 and let me -- its possible that later in the
21 presentation there are things that relate to it.

22 CHAIRMAN STETKAR: You can alert us to
23 that then. I just wanted to makes sure --

24 MR. WILSON: It depends on what the
25 question is.

1 CHAIRMAN STETKAR: You'll find if you've
2 not presented before this subcommittee in the past,
3 that we are not shy about disrupting your plans and
4 jumping in and asking questions. So, I just wanted to
5 make sure that I understand the kind of flow your
6 presentation so that we didn't interrupt too much.
7 With regard to the pressurizer safety valves, the
8 standard pressurizer safety valves, I looked at the
9 relief capacities, and I recognize that, I understand
10 that there is sizing for design basis events. Has
11 Mitsubishi performed any best estimate ATWS analyses?
12 I recognize that anticipated transients with SCRAM are
13 beyond the design basis event analysis. They are
14 beyond design basis events. I was curious whether you
15 performed any best estimate ATWS analyses and if so,
16 whether you could comment on the relief capacity from
17 the pressurizer safety valves to handle potential ATWS
18 events, which can be rather severe as you know
19 pressure transients. And if you haven't, that's a
20 question we'll put on the table.

21 MR. WILSON: I'm not prepared to answer
22 that question so let me, I think you asked it pretty
23 clearly though. Can we make the question --

24 CHAIRMAN STETKAR: Absolutely. The way
25 the subcommittee works is that if we can get a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 question answered in real time today that's wonderful.
2 If we can't we have a running list of questions that
3 we raise. And at the end of today's meeting, we'll
4 try to reiterate what the questions are that have,
5 let's say have somewhat greater importance and then
6 you'll be back for subsequent presentations either for
7 the final SER with no open items on this topic or
8 perhaps on other topics if you are prepared to provide
9 answers. So we have that kind of running laundry list
10 of questions that come up. If you are not prepared at
11 this meeting to answer, you certainly have
12 opportunities later.

13 MR. WILSON: One clarification on this
14 specific question.

15 CHAIRMAN STETKAR: Yes.

16 MR. WILSON: Is it written down or will
17 it be written down that has the proper context that
18 you intend or is that something that we should just
19 note at this point?

20 CHAIRMAN STETKAR: We, the staff can work
21 with Ilka. We usually try to take some brief notes.
22 But unfortunately in many cases you have to rely on
23 the transcripts to get the context of the entire
24 question. We don't formulate RAIs in the same sense
25 that the staff does.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. WILSON: Some things are pretty
2 structured, aren't they?

3 CHAIRMAN STETKAR: Yes. We are not quite
4 that structured but if you do have questions, we can
5 always get you clarifications through our staff.

6 MR. WILSON: Okay. Just maybe a chance
7 for the technical team to maybe they have a response.
8 I don't know.

9 MR. ONOZUKA: This is Masanori Onozuka.
10 For this particular subject question. We don't have
11 the stuff here. So we will come back to you and
12 usually what we do is Mitsubishi has taken those. And
13 of course after the meeting when its available, we
14 also go through the meeting minutes and make sure your
15 questions and we will provide you the responses to
16 these questions as usual.

17 CHAIRMAN STETKAR: And Mitsubishi has
18 been very good at doing that in the past. They have
19 been very, very responsive. So that process seems to
20 be working quite well.

21 MR. WILSON: Okay.

22 CHAIRMAN STETKAR: Is it the appropriate
23 time to discuss the RHR suction relief valves and the
24 low temperature overpressure protection provided by
25 those? Is this the appropriate time in your

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 presentation to discuss those or is it better to
2 discuss those when we talk about the RHR system
3 itself.

4 MR. WILSON: Let me say I would prefer to
5 get into the rhythm of the presentation and then --

6 CHAIRMAN STETKAR: Okay. That's fine.

7 MR. WILSON: Your right, it does, the
8 topic comes up again.

9 CHAIRMAN STETKAR: Okay.

10 MR. WILSON: And so, next slide please.
11 5.2.3 talks about the pressure boundary materials. My
12 perception of the industries that over the years we've
13 really gravitated some very specific materials that
14 are best in use of nuclear power plants. These, just
15 the low alloy steels, the forgings are 508 Grade 3.
16 There are some cases where plates used with the
17 equivalent material properties in 533 Type B.
18 Stainless steels are all based on experience with
19 using them in this environment. So there are special
20 attributes to minimize susceptibility to cracking and
21 such.

22 MEMBER SHACK: Well obviously this is the
23 one controversial point. Most of your material
24 selections are very sensible. They seem to be best
25 engineering practices for these materials. 316 LN is

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 obviously an excellent choice for piping and forging
2 material. The question is your 316s. I notice all
3 your cladding materials are low carbon. So, those are
4 generally used in the places where in fact you have
5 the best control over your PWR water chemistry. You
6 know, its right in the reactor wrestle. You are
7 careful to use low carbon materials but you allow
8 higher carbon materials in the piping system which
9 again you may have dead legs somewhere. You can't
10 guarantee a low controlled oxygen everywhere. You've
11 got illuminated carbon content but its an .05 carbon.
12 And I got started in nuclear materials when GE was
13 claiming that .05 carbon was good enough to stop
14 stress corrosion cracking and I think there's kind of
15 a universal agreement now that .03 carbon is just
16 fine. You could have 316, with 316 properties with
17 .03 carbon. I mean GE did it in the 70s and 80s as
18 they replaced piping. They got essentially, basically
19 a 316. You just control the carbon. You control the
20 nitrogen. Its not LN. It is really 316 but and I
21 just can't understand why we would ever build a plant
22 with anything more than .03 carbon now.

23 MR. KATSURA: In PWR water chemistry
24 dissolved oxygen content is controlled in variable
25 content. No matter what the relationship with 5 ppb

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 and limited that is ppm. So basically the oxygen
2 content is very raw. We have no, we have many 316 is
3 using the limited carbon content. So, basically
4 satisfied, we think it is satisfied.

5 MEMBER SHACK: Well then why are you so
6 careful to specify low carbon for the cladding and the
7 buttering?

8 MR. KATSURA: Cladding and buttering.

9 MEMBER SHACK: Is all low carbon. It
10 sees the same water the pipe does.

11 MR. KATSURA: It use low carbon.

12 MEMBER SHACK: Yes and that's a good
13 idea.

14 MR. KATSURA: Welding material use low
15 carbon, the low carbon.

16 MEMBER SHACK: Why the inconsistency?
17 Why do you specify low carbon material for the
18 cladding and buttering and you are willing to tolerate
19 high carbon material for the piping and the forgings?
20 They both see the same water.

21 MR. KATSURA: The, not high carbon.

22 MEMBER SHACK: Well .05 carbon.

23 MR. KATSURA: The reason we use low
24 carbon material and very oxygen is controlled concern.
25 We use 0.05 carbon. So a limited carbon content.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MEMBER SHACK: but again you still, you
2 require low carbon for the cladding and the buttering
3 which sees only the 5 ppb carbon oxygen. The piping
4 can see 100 ppb perhaps in some dead legs. It would
5 seem to be even more important. I mean I could almost
6 make an argument for 308 and for 309 cladding as long
7 as you gave me low carbon piping.

8 MR. WILSON: Mr. Shack, may, if we go to
9 the next slide, I think it will probably go deeper
10 into this subject, if its okay. This one really, I
11 mean this is a great conversation. I appreciate it
12 and I understand your point and I, this next slide
13 reflects 3 RAIs. They are closed now but they and you
14 may be already aware of these. Forgive me if I'm
15 repeating something you know. But these three
16 although closed, we thought they were worth bringing
17 to your attention for this meeting. The first one,
18 which is question number 27, is on the subject of
19 minimum preheat temperature. And this is for ferritic
20 materials. There is a, I believe the section 3
21 specifies a 250 degree F minimum preheat for
22 prevention of a hydrogen cracking condition. And
23 Mitsubishi's approach is to, I think they limit it to
24 minus, I mean 120 degrees. Mitsubishi presented
25 experience, test data, as well as manufacturing

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 experience that was sufficient to justify this
2 condition. That's the way that one was resolved. And
3 the other issue was post baking. This is a process by
4 which the hydrogen can be basically allowed to be
5 removed after welding and then allowed delay time
6 before the post weld heat treatment. This discussion
7 took place and was satisfactorily resolved. But it
8 was one of the RAIs that was significant.

9 The next one, number 29, bears directly to
10 your question about carbon content or stainless steel.
11 The limited carbon content stainless steel will be
12 used.

13 MEMBER SHACK: I agree. .05 is better
14 than .08.

15 MR. WILSON: Sure. Let me say that my
16 understanding here is that if there is any region that
17 is categorized as a stagnant region where the oxygen
18 content might be elevated. In those cases, certainly
19 this .03 carbon limit will be applied. But for in
20 general, my understanding is that this Mitsubishi
21 would use the .03 where its, there's no, even though
22 its extra margin, the analysis supports the use of .05
23 in many places because of the ORs. But in any case,
24 this question was raised and answered and regarding
25 your question about inconsistencies, I can't answer

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that question.

2 MEMBER SHACK: I'm at least glad you have
3 the low carbon butter. I'm not really serious about
4 that one. That is inconsistent. And here you know
5 our prescience in determining bad chemistry regions,
6 that's fine. But since there's no real penalty in
7 cost and strength, I just can't understand why you
8 wouldn't --

9 MEMBER BLEY: That's where I wanted to go.
10 Can you tell us the advantage you see of using the
11 .05? Why do you, what leads you to pick the .05? I
12 was figuring it must be cost but its not. If its not
13 cost, why?

14 MR. KATSURA: In the Japanese domestic
15 plant we have been using for many, many years the .05
16 carbon content material. So we don't have experience
17 any program so we will use this material.

18 MEMBER BLEY: So you don't see a problem
19 but there's no real advantage to using it is what I
20 think I hear you say?

21 CHAIRMAN STETKAR: I think the question
22 that we are facing is going forward trying to license
23 the plant that has an expected lifetime of at least 60
24 years, going forward from the point in 2011. There is
25 material with known better properties. And Bill you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 will have to correct me because as you know I know
2 nothing about materials. But if there is a material
3 with known better properties and there is no
4 disadvantage either from a cost or an engineering
5 standpoint from using that material, when why should
6 we not use that better material, regardless of your
7 historical experience with the 5 percent carbon
8 material?

9 MR. KATSURA: One reason is the cost.

10 And we have discussed with material vendors on this
11 issue as well as, as a factor of experience. They
12 have no experience in corrosion cracking. And the
13 final reason as I said, in the control oxygen area,
14 based on our experience, we use the limited carbon,
15 limited carbon materials.

16 MEMBER SHACK: Well I don't think we are
17 going to get an answer.

18 CHAIRMAN STETKAR: I think we hear your
19 position anyway. Thanks. Proceed with your
20 presentation.

21 MR. WILSON: We've noted your question
22 and I think we can provide at least maybe a response
23 that's more direct.

24 MEMBER BROWN: Just one side question. You
25 said the intent as if you have stagnant regions which

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 you identified via your analysis then you most
2 certainly used the .03 percent material as opposed to
3 the .05 percent. So that's your intent. But is that
4 captured in the DCD? Is that intent captured?

5 MR. WILSON: Excuse me.

6 MEMBER BROWN: You are just fine.

7 MR. WILSON: The answer is that the SER
8 description says exactly that.

9 MEMBER BROWN: Okay.

10 MR. WILSON: So these kind of things I'm
11 not certain about.

12 MEMBER BROWN: When it will be captured
13 in the DCD?

14 MR. WILSON: Yes.

15 MEMBER BROWN: But it is captured in
16 terms of your discussions with the staff in the OCR
17 then?

18 MR. WILSON: Exactly the statement of the
19 stagnant region, yes.

20 MEMBER BROWN: Okay.

21 MR. WILSON: Yes. The third item in this
22 material that was, we've chosen to select to discuss
23 today is this number 30. It says to avoid SCC
24 susceptibility on cold work. This mostly was in the
25 context of the reactor vessel and may have broader

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 application also. It had to do with residual stresses
2 on the surface that might be high and the idea of
3 keeping them as low as possible. That's really the
4 line of questioning and this answer says buffing the
5 J-groove weld into dissimilar weld metal is a, what it
6 describes is a manufacturing process to either induce
7 compressive surface stresses or at least to add margin
8 against surface stress corrosion cracking. I'm not
9 sure the best technical terminology.

10 MEMBER SHACK: Cold work on the surface?

11 MR. WILSON: Yes, that's the idea. So,
12 this concludes, I think, the material part. Next
13 slide.

14 5.2.4 titled in service inspection and
15 testing. This, once again there's no open item in
16 this area. However, issues in this area have to do
17 with accessibility of equipment and personnel. You
18 can see the major RAI that's closed is listed here.
19 It has to do with that subject. The resolution was
20 accessibility is provided in accordance with 10 CFR
21 50.55a(b) (2) (xv) (A) (2) and (B). I really don't have
22 any more to say on that one. Next slide.

23 CHAIRMAN STETKAR: Under materials I had
24 one, I'm trying to look through your presentation.
25 The plant has a nominal design life of 60 years. I

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 understand you are going to have three or six
2 surveillance capsules installed for the vessel
3 surveillance, material surveillance. You proposed
4 schedule that shows removal of three of those capsules
5 should be sufficient to project materials properties
6 out through, I think its 60 effective full power
7 years. I don't know and perhaps Bill does, but
8 something that came to mind. We are facing in the
9 U.S. now License Renewal Applications for extending
10 licenses from 40 to 60 years. And I believe in some
11 cases, some of the applications have found that there,
12 the number of capsules that they have are not
13 sufficient because they've already used all of the
14 samples. The question I have is do you feel that the
15 six surveillance capsules admittedly what are
16 nominally three spares, does that provide you adequate
17 margin in case a licensee decides to come in for life
18 extension past 40 years or 60 years in the future? In
19 other words based on historical operating experience,
20 would the use of the surveillance materials, do you
21 feel you have adequate margin for that possible life
22 extension type process. And Bill please, if its not
23 a valid question because it was something that came up
24 late last night.

25 MR. HIROTA: Name is Takatoshi Hirota.

1 A surveillance program schedule is requirement with
2 schedule with ASDM, 1.8.5 and STM. We plan to resolve
3 this recapture and also the capture of the ratio and
4 from 2.2.3. So capture will approximately 60 year
5 program.

6 CHAIRMAN STETKAR: I understand that.
7 But what I don't know because I'm not familiar with
8 materials or actual operating experience. There are
9 some statements in I think I don't recall whether I
10 read it in the DCD or the COL FSAR, that said plans
11 for use of the three spare capsules would be developed
12 as necessary based on the results of the nominal
13 surveillance interval. What I don't know is what is
14 actual plant operating experience. In other words do
15 you expect at the, when we get out to for example,
16 something close to 40 effective full power years, when
17 you are trying to project out to for example maybe 80
18 years or more, do you expect to have sufficient
19 material capsules left at that time, just based on
20 normal operating experience? What has been your
21 experience in terms of the need to use those extra
22 installed spares over the nominal, let's say 40 to 60
23 year life of the plant?

24 MR. WILSON: I understand your question.
25 I think this sounds like a really good question --

1 CHAIRMAN STETKAR: There are installed
2 spares there but the one I thinking, this is kind of
3 a practical consideration because indeed for some
4 plants we have faced that problem here in the United
5 States, that people are applying for life extension
6 beyond 40 years. And they have effectively used all
7 of their surveillance coupons.

8 MR. HIROTA: So now we expect 60 years of
9 plant operation so that a subcapture we have covered
10 that 60 years. But plant operation extend to 80 down
11 to one capsule will be needed.

12 CHAIRMAN STETKAR: But you understand my
13 question is that if I get out to 40 years and I've
14 already used the other three spares for whatever
15 reason. And I don't know. I actually don't know what
16 real operating experience has been. It probably does
17 more --

18 MEMBER SHACK: You can always postulate
19 there will be some need for it and there will be some
20 unexpected development with their materials. Based on
21 what you expect to happen, this is an ample -- They
22 pick materials that have been controlled as far as you
23 know, I think they've addressed our known mechanisms
24 of reactor pressure vessel. You know you always worry
25 that as you go further out, there's another mechanism

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that you haven't addressed yet, which is why we have
2 the lead capsules. But you can't guarantee no
3 surprises will occur. But I think the plant, you
4 think the margin is adequate and reasonable?

5 MEMBER SHACK: Yes.

6 CHAIRMAN STETKAR: He knows a lot. If
7 Bill is comfortable that we have adequate margin,
8 that's probably good enough. As I said it was
9 something came to mind only because we had been
10 involved with a license renewal process here.

11 MEMBER SHACK: So it wasn't well thought
12 about.

13 CHAIRMAN STETKAR: That's right. Some
14 applicants, its been necessary for some applicants for
15 license renewal to become somewhat creative about
16 where they obtain their projected materials
17 properties. Okay, continue. Sorry for the
18 interruption.

19 MR. HIROTA: Excuse me. The Japanese
20 domestic plant, we plan to extend to the 60 year
21 operations. So as same PWR, capsule, in a 40 plan
22 schedule. We have covered 60 years. So we have never
23 used spare capsule.

24 CHAIRMAN STETKAR: Okay. So your
25 operating experience in Japan has been you've never

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the spares?

2 MR. HIROTA: Yes.

3 CHAIRMAN STETKAR: Okay, thanks that
4 helps. That helps a lot. Thank you.

5 MR. WILSON: Back to the presentation.
6 This Section 5.2.5 deals with leakage detection to the
7 pressure boundary. In RCPK leakage is classified as
8 either identified or unidentified leakage. Detection
9 of the identified leakage there are several ways that
10 are monitored by containment vessel reactor coolant
11 drain tank, pressure, temperature and level
12 indications. The unidentified leakage that's
13 monitored by air particulate radioactivity monitor and
14 airborne gaseous radioactivity monitor, air cooler
15 condensate flow rate monitoring system and containment
16 sump level and flow monitoring system. I'll also add
17 that there are many valves which have downstream
18 thermocouples to measure if there is leakage of the
19 valve, those kinds of things, a part of this leakage
20 detection program. There are no open items on this
21 subject. There was a question that is listed at the
22 bottom of this page. The resolution of it was a
23 leakage management procedure. It will be developed as
24 operating an emergency operating procedure.

25 CHAIRMAN STETKAR: Con, before we get to

1 the vessel. I have a question. I went through all
2 the systems and there's a very good summary in the DCD
3 about the leakage detection provisions for interfacing
4 system, the RHR system, accumulators, the safety
5 injection lines, reactor vessel head vents and the
6 reactor vessel head seals. With the exception of the
7 head seals, the O ring seals, where forever, I think
8 there has been monitoring of leakage both between the
9 two seals and on the outboard side of the second seal.
10 Of your leakage monitoring is outboard of the second
11 isolation valve. In other words, you must have
12 leakage through both isolation valves, whether they
13 are both normally closed motor operated valves, or two
14 check valves or a combination of a check valve and
15 motor operated valve. All of the leakage detection is
16 downstream if I will, outboard let's call it, away
17 from the reactor vessel from the second isolation
18 valve. So it will only detect leakage if both of
19 those valves leak. It will not detect leakage through
20 the first valve. So its kind of an after the fact
21 leakage monitoring system as opposed to the reactor
22 vessel closure head O ring seal leakage monitoring
23 which is an interim predictive because if you get
24 leakage through the first O ring, you detect it. And
25 I guess my question is why, first of all why have you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 designed the leakage monitoring system that way for
2 the interfacing systems, RHR and the number of
3 systems? And are there any provisions to detect
4 leakage through that first isolation valve whether it
5 is in the connection to the reactor coolant system,
6 whether it's a check valve or a normally closed motor
7 operated valve or whatever the specific device is?

8 MR. WILSON: So let me repeat what I
9 think your question is. In the case the reactor
10 vessel two O rings, there is leakage detection between
11 them and downstream so you have, you know what's
12 happening in both states.

13 CHAIRMAN STETKAR: In other words you
14 have predictive capability. If you have leakage
15 through the first one, you can alert the operators to
16 the fact that it is leaking before the second one
17 starts to leak.

18 MR. WILSON: And in the case of, in other
19 systems away from reactors, there are many cases where
20 we have double, two valves, sort of a redundant
21 arrangement with detection downstream the second.

22 CHAIRMAN STETKAR: Right.

23 MR. WILSON: And you are asking why isn't
24 there a thermocouple to detect between the two?

25 CHAIRMAN STETKAR: I don't want to

1 presume the type of design.

2 MR. WILSON: I am only trying to verify
3 the question.

4 CHAIRMAN STETKAR: That is exactly right.
5 The question is --

6 MR. WILSON: The idea is that there is a
7 precedent in the reactor vessel you are thinking of
8 and now we have a case of two valves and we detect
9 downstream of the second.

10 CHAIRMAN STETKAR: That's right. Why not
11 between the two to give me an indication that the, you
12 know, an early warning that the first one is leaking?

13 MR. WILSON: I'm not sure we have anyone
14 here who can answer this.

15 MR. OGINO: This is Ogino. Our design,
16 two valves, first for example, for plastic valve -- we
17 designed equipment -- so this is the same activity as
18 with system. So, the important point is -- so our
19 design is, we think, there is no need to check.

20 CHAIRMAN STETKAR: I think, let me make
21 sure that I understand what you said. That, I think
22 that you said that the piping between those two valves
23 is designed to withstand primary system pressure. Is
24 that correct?

25 MR. OGINO: We design for, same design

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 concept. So have same activity.

2 CHAIRMAN STETKAR: So the class break if
3 you will the class break in the piping system is
4 outboard of that second isolation valve. Is that what
5 you are saying?

6 MR. OGINO: Yes.

7 CHAIRMAN STETKAR: Okay. I understand
8 that. However, if I'm an operator of a nuclear power
9 plant and I develop a leak, if I develop a leak in
10 that first valve, it would seem to me that I would
11 like to know that situation before the second valve
12 starts to leak. And in your design, at least, I don't
13 know whether I have leakage through the first valve.
14 I only know that I have leakage through the second
15 valve. Hopefully it is small leakage that would be
16 detected quickly so I don't over pressurize the lower
17 pressure piping. But the question is from an
18 operational perspective, there is apparently an active
19 decision was made about why to install the leakage
20 detection monitoring systems where they are installed
21 and I'm asking from an operational perspective. Was
22 any thought given to the detection of leakage through
23 that first valve regardless that there are probably no
24 danger of the pipe failing itself? But to inform the
25 operators of that first leakage, in the same sense as

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the reactor vessel head seal and O rings where you
2 give the operators the early warning of leakage
3 through the first seal.

4 MR. OGINO: I understand your comment but
5 I respond later.

6 CHAIRMAN STETKAR: Okay, good.

7 MR. WILSON: Next slide. Section 5.3, the
8 reactor vessel and I believe you are already familiar
9 with the design but let me just point out a couple of
10 highlights. The bottom head does not have any nozzles
11 in it. It is all forged construction. And the weld
12 seams and the irradiated area are eliminated. There
13 is one that's in the lower end of the region where the
14 core is. This figure is difficult to see. But in any
15 case their weld seams are moved away from the, they
16 are not, there is only one weld seam that is in the
17 irradiated region and its at the edge of it. Next
18 slide.

19 5.3.2 deals with the reactor vessel
20 pressure and temperature limits. These two figures
21 that you see are from the DCD Chapter 5 and basically
22 the left, the figure on the left, is P-T limit for
23 heat up and the one on the right is for cool down.
24 And the calculations are based on the 60 year
25 effective full power years. Let's go to the next

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 slide that deals with this subject also.

2 The RT PTS values in the plant life are
3 evaluated and satisfied 10 CFR 50.61 screening
4 criteria. On this slide below the table you can see
5 the screening criteria says for forging 270 degree
6 Fahrenheit and for weld materials 300 degree
7 Fahrenheit. And you can see on the table on the
8 right-hand side that the RT PTS 60 year value is well
9 below those criteria, which is a good result. The
10 main reason the numbers are this good is because of
11 the neutron reflector that's in the core and the shell
12 which is really an important, I think, enhancement for
13 the reactor vessel. Next slide.

14 In this case, there are let's see two open
15 items. The first one, let me just read it. Generic
16 P-T Limit Report with bounding P-T limit curves based
17 on bounding material properties and projected fluence,
18 following the guidelines of GL96-03. This was a RAI
19 question but the answer was not factored into the SER.
20 But it was answered, the second bullet there says MHI
21 submitted this P-T report and it just hasn't been
22 incorporated at this time. That's all. The next
23 item, the P-T limit for the reactor vessel are based
24 on evaluation of the reactor vessel beltline and
25 closure flange reasons. Explain how this relates to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the nozzles and the remainder of the RV. The response
2 is that the RV fracture mechanics evaluation addresses
3 limits for the entire RV including nozzles is in
4 process. The fracture mechanics analysis comes after
5 the stress analysis and there's a lot of, the stress
6 analysis is not yet complete of all of these parts.
7 But this is also an in process and I think consistent
8 with. The beltline region was presented first because
9 it was generally most interesting information to start
10 with. Let's go to the next slide.

11 5.4.1 deals with reactor coolant pumps and
12 under this the RCP they supply coolant flow necessary
13 to remove heat from the reactor core and transfer it
14 to the steam generators. The shaft seals that employ
15 well established seal systems that has been proven in
16 many operating plants. The flywheel design meets the
17 Reg Guide 1.14 requirements for these different kinds
18 of analyses. It has an ISI interval set at 20 years
19 and the fracture mechanics analysis shows the
20 probability of flywheel failure is negligible. Next
21 slide.

22 MEMBER SHACK: Just on that and I looked
23 at the probabilistic fracture mechanics report. All
24 the flaw information comes out of the, some sort of
25 pressure vessel work. Why is that completely

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 applicable to the flywheel?

2 MR. WILSON: Well let me, the flywheel
3 material is 533 plate, which is a very, a material
4 used in pressure valves. So in that sense its,
5 there's applicable --

6 MEMBER SHACK: But are the fabrication
7 techniques the same when your making the pressure
8 vessel plate versus the flywheel, the machining?

9 MR. WILSON: The flywheel is a flat, flat
10 plates bolted together that are basically cut circular
11 in the machine and they meet the same kind of
12 requirements as far as volumetric inspection. They
13 are very carefully manufactured to be flawless if you
14 will. Comparing to our pressure boundary 533 which is
15 the curve plate, I don't know that there's a
16 difference.

17 MR. KATSURA: For the question material
18 obligation the pressure boundary.

19 MEMBER SHACK: So that my flaw
20 distributions would be expected to be.

21 MR. WILSON: We look at the fracture
22 mechanics evaluation and how it is, if its based on a
23 pressure boundary material, if this is a flywheel and
24 its really looking for, just a question of
25 applicability, the method really applies to a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 flywheel.

2 MEMBER SHACK: Well the method certainly
3 applies. The flaw of the actual data, you know --

4 MR. WILSON: I see, so how the flaw would
5 be distributed in a flywheel versus how it would be
6 distributed --

7 MEMBER SHACK: Right, the density and the
8 size distribution. I mean, you literally use the flaw
9 distributions from the vessel for that analysis.

10 MR. KATSURA: This comment later.

11 CHAIRMAN STETKAR: I had a question also
12 on the flywheel integrity and this may be obviated by
13 the probabilistic fracture mechanics analysis that was
14 done. The nominal speed of the reactor coolant pump
15 is 1200 rpm and for an overspeed during LOCA analyses,
16 you take credit for the leak before break analysis, at
17 least in the deterministic analysis to justify that
18 the limiting overspeed would be 1500 rpm, 25 percent
19 larger. I didn't look the probabilistic fracture
20 mechanics. Do they look at ranges of overspeed
21 greater than 1500 rpm in that analysis Bill?

22 MEMBER SHACK: I don't remember that now.

23 CHAIRMAN STETKAR: I mean the question is
24 what would the, if you didn't take credit for the lake
25 before break, what would the maximum overspeed on the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 LOCA conditions be? And that's why, I wasn't sure in
2 the probabilistic fracture mechanics, the range of
3 speed, whether they looked at any chance that it was
4 greater than 1500 rpm. I did look at the
5 deterministic report. And there it is strictly
6 limited to 1500 rpm which is the same speed that they
7 are actually going to test flywheel.

8 MR. FUJIMOTO: Excuse me, we expect, we
9 estimate for overspeed. We sent 135 for normal speed.
10 That 1500 rpm. And in this case, we calculate
11 fracture criteria and that's our calculation provided.

12 CHAIRMAN STETKAR: I understand that but
13 my question was, unfortunately I'm not either a
14 materials person or an I an hydraulic engineer. So I
15 really don't understand quite how these things work in
16 practice. But if you, in the deterministic analysis,
17 its very clear that says because of the leak before
18 break assumption, the maximum overspeed of the pump is
19 limited to 1500 rpm. And my question what influence
20 on that maximum overspeed does the leak before break
21 assumption have? What is that influence? In other
22 words if you did not apply the lead before break
23 assumption, would, what would the maximum projected
24 overspeed of the pump be and how would that affect
25 then the critical crack size and its growth? If you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 don't do deterministically, how have you counted for
2 that in the probabilistic world where there is some
3 chance that it might not apply?

4 MR. WILSON: Let me say that the, on the
5 next slide there is an item that bears directly on
6 this subject.

7 CHAIRMAN STETKAR: Okay.

8 MR. WILSON: I want to speak to it and
9 then let's I think we might be able to satisfy your
10 question.

11 CHAIRMAN STETKAR: Okay.

12 MR. WILSON: There are two open items
13 related on the pump. The first one, there were two
14 RAI questions that were wrapped up in one open item,
15 open item number two. The staff requested additional
16 information about a critical flaw size associated with
17 1500 rpm design speed. Let me comment. They asked
18 this because the information provided by MHI was that
19 at much higher speeds. They basically had numbers
20 that went to basically as a function of flaw size and
21 run into the, you know, how big, the numbers were very
22 big, much bigger than 1500 rpm.

23 CHAIRMAN STETKAR: It is?

24 MR. WILSON: In their evaluation.

25 CHAIRMAN STETKAR: Okay.

1 MR. WILSON: So there is a curve and
2 this, in any case, then the subsequently compelling
3 question that you will find in the SER in this was
4 reliable detection threshold. So you've really got
5 how small can you see and how big are you at 1500.
6 And you are really looking for this distance between
7 them because the original answer is really showing the
8 upper end of the speed that we go with the small flaw.
9 So, that's the question you are asking, has an answer.
10 It has been exchanged with the NRC in conversations.

11 CHAIRMAN STETKAR: So you are saying that
12 the MHI has done analyses to look at growth at speeds
13 greater than 1500 rpm? I mean in terms of
14 probabilistic fraction mechanics analysis which you
15 use for determining the inspection intervals. There
16 must be some probabilities assigned to those speeds of
17 greater, a range of speeds from 1200 rpm nominal out
18 to whatever was looked at, around 1500.

19 MEMBER SHACK: Normal operation is 1200
20 with a standard deviation of 120. The overspeed is
21 1500 with a standard deviation of 150.

22 CHAIRMAN STETKAR: They do allow --

23 MEMBER SHACK: They do allow --

24 CHAIRMAN STETKAR: Exactly with the
25 justification.

1 MEMBER SHACK: Yes.

2 CHAIRMAN STETKAR: That's a different
3 question but there is --

4 MEMBER SHACK: There is a distribution.

5 CHAIRMAN STETKAR: Okay.

6 MR. WILSON: The point being -- I can't
7 speak to the probabilistic dimension but to determine
8 part of your question, there is information has been
9 discussed.

10 CHAIRMAN STETKAR: Okay.

11 MR. WILSON: And you see the response to
12 that.

13 CHAIRMAN STETKAR: Okay.

14 MR. WILSON: The 1500 design speed has a
15 critical flaw of greater than three inches.

16 CHAIRMAN STETKAR: Yes. I understand
17 that. I'll fall back on my deterministic question
18 back to the probabilistic fracture mechanics since
19 that --

20 MEMBER SHACK: I like that three inches
21 at 1500. That's the one that makes me feel good.

22 CHAIRMAN STETKAR: I'm not saying I'm
23 concerned about this. I'm just raising a question
24 about how far did the analysis look beyond that
25 nominal 1500 rpm overspeed limit, which is essentially

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 in the deterministic analysis a fixed limit. I
2 recognize you've submitted the probabilistic fraction
3 mechanics and the staff with the exception of that one
4 open item has accepted the probabilistic fraction
5 mechanics as a basis for the inspection interval. So
6 therefore the question then evolves into what's the
7 justification for the probability distribution that's
8 assigned around that overspeed, that 1500 rpm
9 overspeed and has that adequately captured the
10 probability of perhaps higher overspeeds. So, as far
11 as my deterministic question, I think I'm satisfied.
12 Thank you.

13 MR. WILSON: The next open item,
14 additional information was requested. And this has to
15 do with the RCP, operability without seal injection
16 water. This one, so we are off the subject of
17 flywheel, okay. We are now on the subject of, we're
18 still on pumps --

19 CHAIRMAN STETKAR: Continue, these side
20 conversations go on.

21 MR. WILSON: The question, one of the
22 questions was is there a low flow alarm in the main
23 control room when there is a loss of seal injection
24 water and the other question was how long can the RCP
25 operate without seal injection water? And the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 response is in process at the moment. However, the
2 answers are straightforward. There is a flow alarm in
3 the main control room from a flow meter in the seal
4 injection line. And subsection 5.4.1.3.3 refers only
5 to the loss of seal injection flow. The RCP can
6 operate indefinitely without the seal injection water
7 because of the redundant cooling offered by the
8 thermal barrier heat exchanger. And I would just add
9 that indefinitely the DCD text says maintain safe
10 operating temperatures and operates safely for safe
11 shutdown of the pump. So, but really the redundant
12 cooling is present. But that was the answer, is the
13 answer being constructed.

14 CHAIRMAN STETKAR: Okay. We're going to
15 have now several questions here so this will take some
16 time. Why don't you get through your next slide
17 because the next one will partially address some of
18 these questions.

19 MR. WILSON: All right. The next slide.
20 Thank you. This one is the third open item related to
21 the pump. And the title was RCP operability without
22 component cooling water. The question was since the
23 component cooling water, CCWC supplies cooling water
24 to both chemical volume control system, pump motors,
25 seal water cooler and oil cooler and the thermal

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 barrier. Explain the meaning of loss CCW. And the
2 second part is identify the DCD section dealing with
3 operator instructions for loss of CCWN seal injection.
4 This is another case that's in process. However,
5 subsection 5.4.1.3.4 is intended to address loss of
6 CCW to the motor bearing oil coolers or the thermal
7 barrier heat exchangers independent of each other. It
8 was not intended to mean loss of all CCW but the way
9 it was written, it's the title didn't distinguish.

10 CHAIRMAN STETKAR: Well let's rather than
11 trying to refine words in a subsection of the DCD,
12 let's talk about reality. In reality there are two
13 component cooling waters. They are a and c. One lube
14 supplies two of the reactor coolant pumps, all
15 component cooling water to two reactor cooling pumps.
16 Bearing oil coolers, motor oil coolers, thermal
17 barrier coolers and one of the two charging pumps that
18 suffice the oil injection flow. So, if I lose
19 component cooling water in one of those two loops, I
20 lose all component cooling for at least one of the
21 charging pumps and all component cooling water for two
22 reactor coolant pumps. That's not loss of all
23 component cooling water in a deterministic sense where
24 you've lost all four trains of your component cooling
25 water system. It is loss of component cooling water

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 flow in one of those two specific cooling water loops.
2 The question is what happens to the reactor coolant
3 pumps under those conditions? In particular what
4 happens to the seals due to thermal conditions because
5 you are now losing both seal injection flow and
6 thermal barrier cooling? What happens to the seals
7 from a mechanical standpoint because if the reactor
8 coolant pump remains running because after loss of oil
9 cooling at least, after some period of time, start to
10 develop reasonably severe vibrations which can cause
11 mechanical damage to the seals. So it's a fairly
12 complicated process and you can't answer it by simply
13 partitioning up if I lose cooling to the motor cooler,
14 I have this or if I lose cooling to the oil cooler, I
15 have this or if I lose cooling to the seal cooler, I
16 have this or if I lose seal injection I have this
17 other condition. Its an integrated analysis.

18 MR. WILSON: In the context of Chapter 5,
19 the intent was to look at the loss of CCW to these
20 individual entities as a separate item.

21 CHAIRMAN STETKAR: I understand that but
22 from an ACR's perspective I'm asking you to answer the
23 question, what happens if I lose, let's just take all
24 component cooling water in one of those loops rather
25 than trying to get more generic and say loss of all

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 four trains or anything like that. Because the way
2 this component cooling water system is designed, you
3 do indeed have these two, let's call them ancillary
4 loops that provide cooling to both the charging pumps
5 and the reactor coolant pumps, divided a charging pump
6 on each loop and two reactor coolant pumps on each
7 loop. So, from our perspective we're interested to
8 learn what would be the reactor coolant pump response
9 both in terms as I said, possible thermal failures of
10 the seals if the pump is running and the pump is
11 stationary and possible mechanical failures of the
12 seals due to vibration induced failures because of the
13 bearing oil coolant.

14 MR. WILSON: But in a context of a single
15 pump, let's just take for a moment. The plant's there
16 but the single pump, the loss of all CCW to the pump,
17 to the one pump is a way we can frame the question to
18 focus --

19 CHAIRMAN STETKAR: That's fine as long as
20 you can account for the fact that will also disable
21 seal injection flow.

22 MR. WILSON: Yes, that's okay.

23 CHAIRMAN STETKAR: Okay.

24 MR. WILSON: I'm just trying to frame the
25 question in a way --

1 CHAIRMAN STETKAR: Yes, if you, put it
2 down to a single pump. That's fine.

3 MR. WILSON: So the question really is
4 and I'm not sure we can answer it today but we can
5 definitely take it back and give you an answer.
6 However, I just want to clarify the question. It
7 really has to do with if we can isolate on a single
8 pump. What is the responsibility if all the CCW or
9 coolant water stops simultaneously?

10 CHAIRMAN STETKAR: Right.

11 MR. WILSON: Okay, that's the question.

12 CHAIRMAN STETKAR: That's the question.

13 MR. WILSON: I'm not sure we have --

14 CHAIRMAN STETKAR: And let me make sure
15 I clarify. There's kind of two parts to that
16 question. One part, let me make sure I understand how
17 the pump's protection works. Are there any automatic
18 trips of the reactor coolant pumps on -- well let me
19 just stop there. Are there any automatic trips of the
20 reactor coolant pumps? I mean other than circuit
21 breaker protection and those types of things. In
22 particular on high temperature or of bearings or high
23 temperature of seal water return flow or high
24 component cooling water temperature, those types of
25 trip. Does this design have anything? I didn't read

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 about them but I also did not read all of the
2 instrumentation control.

3 MR. WILSON: I'm not sure.

4 CHAIRMAN STETKAR: And if there are no
5 automatic trips, then I have to rely on the operators
6 to trip the pump manually within a timely manner.

7 MR. OGINO: This is Ogino. Our RCP is
8 tripped by, for example, some are, I think temperature
9 is either high or some vibration.

10 MEMBER BLEY: They are, automatic trip?

11 MR. OGINO: Automatic.

12 MEMBER BLEY: Which temperatures?

13 CHAIRMAN STETKAR: And where is that
14 documented? It is not document in Chapter 5 of the
15 DCD. Well Chapter 5 of the DCD only says that the
16 reactor coolant pump would be tripped, there's a ten
17 minute time window if you lose cooling to the motor.
18 And that the reactor coolant pump would be tripped
19 after the reactor is tripped. But its not specific
20 about whether a human being would effect that trip or
21 whether it would occur automatically.

22 MR. WILSON: Automatic versus manual.

23 CHAIRMAN STETKAR: Automatic versus
24 manual.

25 MR. OGINO: We have automatic trip. I

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 don't know all electrical problem.

2 MR. WILSON: We'll confirm later.

3 CHAIRMAN STETKAR: Okay that's good.

4 Because, the reason I am concerned about the automatic
5 trip is that if I back up to my original question
6 about what are the effects from loss of all component
7 cooling water to the pump I have seen many analyses
8 that have different answers about the timing and the
9 extent of failure depending upon whether the pump is
10 running and remains running after that loss of cooling
11 water or the pump is tripped and your down on the
12 stationary seals, the two and number three seal. The
13 timing and the extent of potential leakage through the
14 seals can be very, very different. So the existence
15 of an automatic trip or not is an important factor
16 there and my original question would be if there is no
17 automatic trip, I'm interested in the answer to the
18 question of what is the pump response to loss of all
19 component cooling water if it remains running and what
20 is the response if its tripped. If there are
21 automatic trips, I'm a little bit less concerned about
22 the response while its running because the automatic
23 trip would need to fail provided that, as Dr. Bly
24 mentioned, provided that set points for those
25 automatic trips are at adequate margin to protect

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 either the bearings or the seals or whatever they are
2 protecting. So, I know that's a long kind of
3 statement of concern and if you have questions, I
4 would like to get them clarified because this can be
5 an important issue as you are probably well aware,
6 reactor coolant pump seal load can be important
7 contributors for overall plant risk. So its
8 important for us to understand kind of the integrated,
9 to understand how the seals themselves are designed
10 but how the integrated, to understand how the seals
11 themselves are designed but how the integrated seal
12 protection and cooling.

13 MEMBER BLEY: And the DCD seems to talk
14 more about the motor than about the pump itself.

15 MR. WILSON: So there are two parts to
16 your question, just to clarify. The first has to do
17 with whether or not the RCP has automatic trip or a
18 manual trip. And I guess they are both, or maybe one
19 or both but nevertheless the idea is that you want to
20 clarify that. And one of them, if its either one of
21 those lead you to another question.

22 CHAIRMAN STETKAR: Well if there is an
23 automatic trip, kind of part A to the automatic trip
24 is what are the specific trip signals and what are the
25 set points so that we have assurance that the trip

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 would occur, that the trips of points have reasonable
2 margin to protect either bearing damage or seal damage
3 and there are those two mechanisms of potential seal
4 damage from either mechanical damage due to bearing
5 vibration or a thermal damage to the seals itself. If
6 there is a trip as I said part, the subpart under that
7 question is what are the trip signals and what are the
8 set points? If there is a trip I'm less concerned
9 about the progression of an event from losing cooling
10 water with the pump running, remaining running because
11 you would the trip to fail for that.

12 MEMBER BLEY: But if they get the answer.
13 Let me put this in a little perspective. There have
14 been two events. One in an operating plant and one in
15 an experimental situation in the last couple of years
16 that have kind of put a highlight, spotlight on
17 situations in which it can be really difficult for the
18 operators to catch this loss of component cooling
19 water because it is often associated with other things
20 going wrong. So there is a real safety point to this
21 question.

22 MR. WILSON: Thank you. We'll provide a
23 response.

24 MEMBER BLEY: And I guess repeated back,
25 don't lose the fact that we've lost seal injections.

1 MR. WILSON: Right.

2 CHAIRMAN STETKAR: That's just a warning
3 because if you come back and say well we still have
4 seal injection, we're going to send you away and ask
5 you to come back with the other answer.

6 MR. WILSON: So another way of saying is
7 that the pump has lost all cooling. Is that what you
8 wanted to just say?

9 CHAIRMAN STETKAR: That's about it.

10 MR. WILSON: Okay. Next slide. 5.4.2
11 deals with steam generators. There are no open items
12 in this area. I will comment that I think you may be
13 aware that this is one element in the plant that has
14 been, even though we might not have built many new
15 plants in the U.S. in recent years, we have built
16 replacement steam generators for a steady time period.
17 And the design of the steam generators has really
18 matured into being very well suited for the PWR
19 environment. So, all the features that have been very
20 much, I guess at this stage I would say field proven,
21 have been incorporated into the APWR steam generators.

22 MEMBER BLEY: What's the experience on
23 your steam generators, the newer designs like you are
24 talking about, how long have they been in service in
25 replacement?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. WILSON: It's an interesting
2 question. I guess the first --

3 MEMBER BLEY: We thought the original
4 ones were pretty good until they sat there for a few
5 years.

6 MR. WILSON: Interesting question. Let
7 me just comment that the replacement steam generators,
8 I'm debating to answer your question in the context of
9 U.S. or Japan. In the case of Mitsubishi, Japanese
10 replacement steam generators began in about maybe
11 around late 1980s and been preceded by many
12 replacements in the rest of the world. So they had
13 the benefit of the printed 690 material which is the
14 thermal 690 is the best material alone at this time
15 for steam generator tubing. That material had
16 experience, I think the first plant with it was 1985.
17 So you ask yourself is that long enough. We replaced
18 with 600 material after seven years of operation. So,
19 just to know, the old tube materials, 20 percent
20 plugging, that short time. But the Mitsubishi steam
21 generators with these features have operated, they
22 have a better operating record than any fleet in the
23 world, less tube plugging and tube plugging these days
24 is not for corrosion on 690. Its for things like
25 maintenance mistake where a tube was damaged during

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 sludge lancing or something. There are some ADD wear
2 in other vendors fleets but at this time there is no
3 tube wear in the Mitsubishi. So still your question
4 is have they operated long enough with these features?
5 I'd say yes.

6 MEMBER BLEY: So you are telling me that
7 in an operation of 20 years?

8 MR. WILSON: 690 itself, since 1985.

9 MEMBER BLEY: Okay.

10 MR. WILSON: That's the first one. That
11 was actually in the U.S. The first plant --

12 MR. KATSURA: At the unit 3 we have used
13 the TT 690 material tubing. After that, our steam
14 generator always used TT 690. We have no experience
15 -- many export steam generators and domestic steam
16 generators after unit 3 all using TT 690 tubing.

17 MEMBER BLEY: Okay, thank you.

18 MR. WILSON: Steam generators have many,
19 a long history of different things and the designs of
20 all the elements reflect the proven counter measures.
21 Next slide. 5.4.10 deals with the pressurizer. The
22 pressurizer for APWR is very similar in design to
23 those of other U.S. plants. The water volume is
24 sufficient to prevent uncovering of the heaters
25 following a reactor trip or turbine trip and the steam

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 volume is large enough to prevent water relief through
2 the safety valves following the feed line break event.
3 So, this gives you a sense of the heaters at the
4 bottom, spray nozzle at the top and the safe
5 depressurization valve nozzles at the top. Let's go
6 to the next slide.

7 The pressurizer relief tank, designed to
8 cool and condense steam discharge from the pressurizer
9 safety valves.

10 CHAIRMAN STETKAR: Con, on the
11 pressurizer only because I can't figure out where else
12 to ask it, before I get to PRT, this table in the DCD
13 that shows the high pressure reactor trip set point of
14 2385 psig on normal operating pressure, 2200 psig
15 and a low pressure reactor trip set point of 1,865
16 psig. Do you happen to know what the low pressure
17 safety injection set point pressure is? I looked for
18 it. It's kind of curiosity but I wanted to see what
19 the margin was between the reactor trip set point and
20 the safety injection set point. That safety injection
21 set point is not listed in Chapter 5 and I couldn't
22 quickly find it anywhere in Chapter 7.

23 MR. WILSON: Okay, let's I want you to
24 repeat that slowly.

25 CHAIRMAN STETKAR: Okay. What I'm

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 looking for is what is the low pressure safety
2 injection set point pressure?

3 MR. WILSON: If I may, there's a band,
4 there's a max and min.

5 CHAIRMAN STETKAR: Oh, no, no no. I'm
6 not looking, the nominal reactor trip set point is at
7 1,865 psig. Normally the safety injection set point
8 is at some margin below that. And I'm asking what is
9 the margin -- what are the two set points? I know
10 what the reactor trip set point is because that's
11 actually specified in Chapter 5 of the DCD. I could
12 not find the safety injection set point. That is not
13 listed in Chapter 5 nor could I find it any where in
14 Chapter 7 in the I&C, a specific number.

15 MR. WILSON: It must be in 15.

16 CHAIRMAN STETKAR: It may be, but I ran
17 out of steam.

18 MR. WILSON: Chapter 15 has this
19 information.

20 MEMBER BLEY: It almost has to if you've
21 done the analysis.

22 MR. WILSON: The problem is we don't --

23 CHAIRMAN STETKAR: That's right. I
24 didn't look in Chapter 15 because I ran out of steam
25 and I thought you might have the information

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 immediately at hand.

2 MR. WILSON: We will respond later to
3 that question okay.

4 CHAIRMAN STETKAR: Okay. That should be
5 an easy question. There's no intrigue on this. I'm
6 just looking for what that margin is.

7 MR. WILSON: The next slide. 5.4.11
8 deals with pressurizer relief tank. In the event of
9 excess pressure in the relief tank, rupture disk
10 discharge into containment. In the pressurizer relief
11 tank, rupture disk capacity is greater than the
12 combined capacity of the pressurizer safety valves.
13 This is just a summary of this tank. Next slide.

14 There are two open, three open items on
15 this that relate to this section. The first one is
16 for item one. Provide information, additional
17 information about the PRT and the rupture disk.
18 Basically the question is rupture pressure versus the
19 PRT design pressure. Then the next is ruptured disk
20 flow capacity versus the combined capacity of the
21 pressurizer safety valves. And the third has to do
22 with the external pressure design or design pressure
23 for the PRT. These are just, I'm not sure of the
24 history but these questions came up at a time after
25 the SER was, I mean it didn't get answered before

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that. We're working on a response but basically you
2 can see the information was readily available. The
3 rupture disk design pressure is 190 psi plus zero
4 minus five percent and the design pressure is 200
5 psig. So, the pressurizer safety valve maximum flow
6 which is in Chapter 5 is 432,000 pounds per hour and
7 there are four of them. And the rupture disk are
8 sized to a flow greater than this value. The PRT is
9 required to meet the ASME Section III rules for
10 external pressure. The delta P, design pressure is 15
11 psi. So, I anticipate this will go with, based on
12 these answers to those questions. The next open item
13 identify a reference and provide a description that
14 shows the PRT rupture disk did not pose a missile
15 threat. And the responses in preparation but the
16 rupture disks on the PRT form, they perform their
17 pressure relief function without producing a missile
18 of any type. So, I think this is one of the cases
19 where there is sort of a documentation confirming.
20 Next slide.

21 Provide a description, this is the third
22 and only last open item on this, on the PRT, provide
23 a description and identify a reference where
24 satisfaction of Reg Guide 1.29 Position C.3 and SRP
25 Acceptance Criterion 2.F are addressed. These deal

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 with the interface between seismic category one and
2 seismic category 1. SS2. And this is in process, the
3 APWR SSCs comply with these requirements and
4 additional documentation will be provided. So,
5 clarification is in process. Next slide.

6 CHAIRMAN STETKAR: Okay, Con.

7 MR. WILSON: Yes.

8 CHAIRMAN STETKAR: Let me interrupt you
9 here because you are going to start talking about the
10 residual heat removal system. We're fine for time.
11 I mean, we're not pressed for time at all. We
12 originally had a break scheduled at 10:15 but to avoid
13 interrupting your presentation and our questions about
14 this particular system, what I would like to do is
15 take our break now and then come back and discuss the
16 RHR system and remaining topics after the break.

17 MR. WILSON: Okay.

18 CHAIRMAN STETKAR: So what I would like
19 to do is recess until 10:15. We'll come back and pick
20 up the RHR system then.

21 (Whereupon the foregoing matter went off
22 the record at 9:59 a.m. and resumed at 10:16 a.m.)

23 CHAIRMAN STETKAR: Okay, we're back in
24 session. I guess we'll address the RHR system.

25 MR. OGINO: I'd like to respond with set

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 point. Out initial set point is 1860 psia and the
2 1760 psia.

3 CHAIRMAN STETKAR: 1760 psia?

4 MR. OGINO: Yes. This is described in
5 Chapter 15.

6 CHAIRMAN STETKAR: Okay.

7 MR. OGINO: Table 15.0-4.

8 CHAIRMAN STETKAR: Thanks. I didn't have
9 a chance to look at Chapter 15. 1760 psia. Thank you
10 very much. That is a reasonable margin.

11 MR. WILSON: The next slide deals with
12 Section 5.4.7, residual heat and removal system. The
13 design concept, there's a figure shown here. The RHRS
14 transfers reactor core decay heat and residual heat
15 from the RCS to the essential service water system
16 through the CCWS. The RHRS is used to transfer
17 refueling water between the refueling cavity and the
18 RWSP during refueling operations. The RHRS is a
19 safety related system consisting of four independent
20 loops by sharing portions with the containment spray
21 system.

22 CHAIRMAN STETKAR: Let's let you finish
23 the open item and we can go back to other questions.

24 MR. WILSON: Thank you. Next slide.

25 There is one open item on, in the SER for this

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 subject. Let me just comment that it says that
2 current treatment of gas accumulation issue with
3 respect to the USAPWR is substantial and appropriate.
4 However, important aspects of this issue, potentially
5 will remain unexamined and we will have more
6 discussion with the staff to clarify what is required
7 to deal with this.

8 CHAIRMAN STETKAR: I'm going to ask you
9 a couple of questions about that topic also, for
10 clarification. I read that in the SER and I want to
11 make sure that I understand the issues.

12 MR. WILSON: It may be that because that
13 presentation deals with some of the content that maybe
14 answered there and maybe the discussion might be. In
15 any case, whatever you choose. The next slide please.

16 CHAIRMAN STETKAR: Let's stop and go back
17 because I have several questions about the RHR system.
18 The first question, I have a couple of questions for
19 just technical facts. Is the RHR system for the
20 USAPWR initiated automatically or is it only manual?

21 MR. OGINO: This is Ogino. The RHR
22 system, this is manual.

23 CHAIRMAN STETKAR: Strictly manual?

24 MR. OGINO: Yes.

25 CHAIRMAN STETKAR: Okay. Are the RHR

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 suction valves from the point system, I've forgotten
2 the valve numbers, but the number one and number two
3 valves, I think. Are they normally de-energized
4 during plant power operation? Is power removed from
5 those valves?

6 MR. OGINO: Yes most is.

7 CHAIRMAN STETKAR: So to initiate, to
8 start RHR the operator must restore power to the
9 valves.

10 MR. OGINO: Yes.

11 CHAIRMAN STETKAR: And then manually open
12 the valves?

13 MR. OGINO: Yes.

14 CHAIRMAN STETKAR: Okay. Does power
15 restore to those valves, where is the power restored
16 to the valves, at the electrical switch gear?

17 MR. OGINO: Yes.

18 CHAIRMAN STETKAR: So you have to go to
19 the switch gear and close the motor contractor?

20 MR. OGINO: Yes.

21 CHAIRMAN STETKAR: I know that there is
22 a 400, I think it's a 400 psig interloft on those
23 suction valves that prevent the valves from opening.
24 Are there any automatic signals to close those valves?

25 MR. OGINO: No, there is automatic. The

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 codes for this we use RHR system, piping is used.

2 CHAIRMAN STETKAR: Yes, I understand. I
3 just wanted to make sure that there wasn't any, any
4 automatic signal. Let me, you are going to have to
5 bear with me a moment because I have questions
6 scattered here and I don't have my notes organized
7 very well. Are the RHR suction valves from the loop,
8 are they powered from safety buses?

9 MR. OGINO: Yes, safety buses.

10 CHAIRMAN STETKAR: Okay. So they can be
11 supplied, can they be supplied from the alternate AC
12 power supply? Okay. All right. As I said you'll
13 have to bear -- we're okay with time, so you'll have
14 to bear with me as I read through my notes here.
15 Okay. Now, I was going to ask you about LTOP earlier
16 when we were talking overpressure protection. I
17 wanted to ask you more about it in the context of the
18 RHR system because it is the RHR suction valves.
19 There are analyses that I read about that says that
20 the LTOP system provides adequate protection against
21 overpressure events during shutdown conditions. It is
22 my understanding that those analyses are based on a
23 configuration with two RHR trains connected to the
24 reactor coolant system.

25 MR. OGINO: Yes.

1 CHAIRMAN STETKAR: And two safety
2 injection trains available. And the analyses, one of
3 the potential overpressure conditions is spurious
4 actuation of safety injections.

5 MR. OGINO: Yes.

6 CHAIRMAN STETKAR: I looked at the relief
7 valve capacities are 1,320 gmp at an opening set point
8 pressure of 470 psig.

9 MR. OGINO: Yes.

10 CHAIRMAN STETKAR: If I look at the
11 safety injection pump head curves in Chapter 6, Figure
12 6.3-4, it seems that the safety injection pumps have
13 a rated flow of 1,540 gpm at a nominal discharge
14 pressure of 710 psig. That is 1,640 feet developed
15 head. That at 900 psig they have a flow of about
16 1,400 gpm. The point is that both of those flow rates
17 are higher than the relief capacity of those suction
18 relief valves. So my question is, how do the suction
19 relief valves provide overpressure protection if the
20 safety injection pumps are started spuriously when the
21 pressurizer is water solid? Because it is not clear
22 to me that the relief valves have adequate capacity to
23 relief that safety injection flow at either 470 psig
24 where they open or 900 psig, which is your nominal
25 design pressure at those low temperatures.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. OGINO: Safety injection pump is
2 based on the RCS pressure. RCS pressure is from
3 condition is 400 psig. So, safety injection pump
4 cannot design to the RCS. So it seems relief steam is
5 less than safety injection pump head curve.

6 CHAIRMAN STETKAR: I guess I didn't
7 understand your answer because if I look at the safety
8 injection pump head curve as published in Figure 6.3-4
9 of the DCD, it shows a flow, a minimum flow of 1,540
10 gpm at a developed head of 1,640 feet which is
11 equivalent to 710 psig. So that pump can produce
12 1,540 gpm at 700 pounds. At a lower pressure, it will
13 produce more flow with the pump head curve actually
14 stops at 1,540 gpm. So at 470 pounds that pump can
15 actually produce more flow. I don't know how much
16 more flow. Am I reading this curve wrong?

17 MEMBER BLEY: No, you're reading it
18 right. What happens down here, you could be getting
19 into run out.

20 CHAIRMAN STETKAR: You could be getting
21 into run out conditions.

22 MEMBER BLEY: You could be, yes.

23 CHAIRMAN STETKAR: But the point is the
24 pump can deliver that amount of flow, that 700 pounds.
25 And so therefore if the relief valve cannot relieve

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the amount of low delivered by the pump, pressure will
2 increase. And indeed pressure will try to increase
3 until the pump is dead headed. So I don't --

4 MR. OGINO: Your concern --

5 CHAIRMAN STETKAR: My concern is if the
6 reactor coolant system, the only reason we're really
7 concerned about this is if the reactor coolant system
8 is water solid. So I have no bubble in the
9 pressurizer. I have a solid system. If I start as an
10 analysis I think was done, if I have a spurious safety
11 injection and I start both safety injection pumps. In
12 fact I can back up and only use one safety injection
13 pump and RHR training, if its easier. But if I start
14 both safety injection pumps with the two suction
15 relief valves, the know, the RHR line, they are
16 available for pressure relief. It doesn't seem that
17 the suction relief valves have adequate capacity to
18 pass the flow, oil flow, from the safety injection
19 pump and it would seem that pressure would increase.
20 And indeed it would increase higher your nominal 900
21 pounds, which I believe is the design set point at
22 that temperature.

23 MR. OGINO: The relief set point is 470
24 psig.

25 CHAIRMAN STETKAR: Yes.

1 MR. OGINO: Such condition safety
2 injection pump the flow rate from the safety injection
3 pump is decreased down lower than the design capacity.

4 CHAIRMAN STETKAR: Lower than the design.
5 It must have a very, very strange pump head curve if
6 that's the case because if I look at the pump head
7 curve it would seem that as Dr. Bley mentioned, at
8 some point, if I have no discharge pressure, I'm
9 trying to just infinite volume, the pump will go into
10 run out and indeed I won't get very much flow from it.
11 But the pump head curves that are published in the DCD
12 as long as they are reasonably continuous out beyond
13 the point where they are cut off, would indicate that
14 I would develop more flow at a lower discharge head.
15 Now where the pump goes into run out, I don't know.
16 But that maybe part of the answer.

17 MEMBER BLEY: Not something you generally
18 count on.

19 CHAIRMAN STETKAR: It's not something I
20 would generally count on, but again the way the pump
21 head curves look, it would seem that at a 470 pound
22 back pressure on the pump, I can deliver more than
23 1,540 gpm which is much more than 1,320 gpm which is
24 the capacity of the relief valves, at 470 pounds. I'm
25 out somewhere here on the head curve. It just didn't

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 run it out beyond those nominal conditions.

2 MR. OGINO: Safety condition pump back
3 pressure high will decrease.

4 CHAIRMAN STETKAR: That's right.

5 MR. OGINO: So, --

6 CHAIRMAN STETKAR: In fact if I'm
7 deadheading the pump, the pump is deadheaded at
8 roughly 3,937 feet which I can't do the conversion but
9 its roughly 2-1/3 so its about 1,500 or 1,600 psig.

10 MR. OGINO: We have --

11 CHAIRMAN STETKAR: So at that point it
12 won't deliver any flow. That's well above the
13 pressure that I'm interested in. So the pump can
14 actually develop that pressure.

15 MR. OGINO: In the condition 4470 psi.
16 So of that back pressure safety condition pump relate
17 is near the same a if --

18 CHAIRMAN STETKAR: That's what I was
19 looking for. And if you have, do you have an analysis
20 that shows that?

21 MR. OGINO: Yes.

22 CHAIRMAN STETKAR: Okay. I would be
23 interested to see that analysis because it wasn't
24 clear from the information that's available in the
25 DCD.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. OGINO: Describe in the technical
2 report.

3 MEMBER BLEY: I'm sorry, what technical
4 report?

5 CHAIRMAN STETKAR: I'm sorry could you
6 speak up a little bit so we would have it on the
7 record.

8 MR. WILSON: Back on slide 15 if you can
9 just, in the first issue there under the item side you
10 can see a reference to a report. That's the report?

11 MR. OGINO: Yes.

12 MEMBER BLEY: 09.

13 CHAIRMAN STETKAR: 016?

14 MR. OGINO: Yes.

15 CHAIRMAN STETKAR: Okay.

16 MEMBER BROWN: Do we have that report?

17 CHAIRMAN STETKAR: I think we do.

18 MEMBER BROWN: I don't recall seeing that
19 in there.

20 CHAIRMAN STETKAR: I skimmed through it
21 and I didn't recall seeing it either. I did see a
22 statement, I think it was that report that said that
23 the maximum pressure increase would be limited to,
24 I've forgotten the number. I can't find it, 120 psi,
25 which is less than their limit. But I couldn't

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 quickly find any actual, the basis for that analysis,
2 those results. So I guess we'll take a look at that
3 report and see or perhaps the staff.

4 MEMBER BLEY: Or maybe you can point us
5 to exactly where in that report this would be.

6 MR. WILSON: The question you've asked is
7 I think you asked it pretty clearly and we'll come
8 back after the meeting, after we get the transcript
9 and we will provide you an answer. If its in that
10 report --

11 CHAIRMAN STETKAR: If its in that report,
12 I would be interested to see how the hydrodynamics
13 actually work out for it because there seem to be a
14 fairly large discrepancy between the stated relief
15 capacity and the SI pump available capacity.

16 MR. OGINO: Excuse me.

17 MR. WILSON: Yes.

18 MR. OGINO: This is described in Chapter
19 6 of MUAP-09016.

20 CHAIRMAN STETKAR: Chapter 6. Thank you.
21 We'll take a look at that.

22 MEMBER BLEY: Yes that's exactly what we
23 are looking for. Two relief valves operable,
24 inadvertent too high up.

25 CHAIRMAN STETKAR: Yes, I had seen that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 amount. I just, it wasn't clear to me how those
2 conditions eventually led to a -- I was curious
3 whether they were taking credit for other possible
4 relief pads for example and what those relief pads
5 might be.

6 MEMBER BLEY: They look like it.

7 CHAIRMAN STETKAR: Okay.

8 MEMBER BLEY: I just took a look at that.
9 Maybe we could keep that as a question. You could
10 point us to, because it kind of says its okay but it
11 doesn't give us enough information to understand why
12 its okay.

13 CHAIRMAN STETKAR: Okay, so let's keep
14 that as an open item.

15 MEMBER BLEY: It says a pressure plot but
16 it doesn't --

17 CHAIRMAN STETKAR: On why the pressure
18 plot behaves the way it does. You will have to bear
19 with me again so now I've lost all possible control
20 over these pieces of paper here in front of me. Are
21 we set on that one? Okay. There have been events, I
22 used to be a shift supervisor at an operating nuclear
23 plant back in a very long ago previous life. And we
24 had a number of events when we were in cold shutdown
25 on RHR cooling where because of either personnel

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 errors during maintenance, personnel errors during
2 testing or in some cases spurious protection signals
3 or even spurious electrical signals, we had
4 inadvertent closure of the RHR suction valves. And in
5 deed lost RHR cooling for some period of time until we
6 could determine the cause for the valve going closed
7 and get the valve reopened. There have been a number
8 of other similar type events documented at least in
9 U.S. operating history. The LTOP system does not
10 provide any over protection for heat up if the RHR
11 suction valves are closed. So the question is have
12 you considered events that cause spurious closure of
13 the RHR suction valves as part of your analysis which
14 would of course then by itself cause a heat up because
15 you've lost RHR cooling and could result in an
16 overpressure condition? Number one, have you
17 considered those events and number two, if you have
18 what type, what kind of time frames are we looking at
19 under conditions when the plant would normally be
20 water solid, which could be fairly early during a
21 shutdown period? What is the time frame before you
22 reach an overpressure condition so the operators,
23 before the operators can open those, reopen those
24 valves? Do you understand what I'm asking? I may not
25 be asking the question very well. The scenario would

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 be, have you considered spurious closure of the
2 suction valve, reactor coolant system then starts to
3 increase in temperature, pressure will start to
4 increase and at what time do you reach the limiting
5 pressure that determines the available time for the
6 operators to reopen at least one of those suction pads
7 to reopen the relief valve? Of course the limiting
8 pressure will increase as temperature goes up a little
9 bit but you look at a limiting, a hydraulic transient
10 of spurious safety injection. You looked at limiting
11 thermal transient of spurious startup of a reactor
12 coolant pump with 50 degrees higher secondary side in
13 that loop. I recognize, that's a very rapid, that
14 particular transient is a very rapid transient,
15 although it might be relatively rare in terms of
16 probability of occurrence, spurious startup of loop
17 under conditions where you have additional heat from
18 the steam generator. What I am curious about is how
19 you thought about other conditions that have been,
20 that have occurred in the operating plants where do
21 you have isolation of those suction lines that would
22 also cause a slower heat up, but a heat up?

23 MR. OGINO: This is not -- first thing I
24 just have, we have the open status. So after the
25 valve open we removed the power.

1 CHAIRMAN STETKAR: Oh you removed the
2 power after you open it?

3 MR. OGINO: Yes.

4 CHAIRMAN STETKAR: Ah.

5 MR. OGINO: So and after closed or RHR
6 system, so how much time to reach pressure. So that
7 kind of --

8 CHAIRMAN STETKAR: But what you said is
9 very important to me is you do actively, after you
10 open the RHR suction valves, you then remove power
11 from them?

12 MR. OGINO: Yes.

13 CHAIRMAN STETKAR: Is that documented any
14 where in the, either in the DCD or as a commitment to
15 the combined license applicant to instill that in the
16 procedure?

17 MEMBER RAY: It is in our technical
18 specification John.

19 CHAIRMAN STETKAR: It doesn't make any
20 difference. Or at least a commitment for the
21 combined, the COL applicant in their operating
22 procedures to ensure that feature, if its not in the
23 text?

24 MEMBER RAY: It is very important.

25 CHAIRMAN STETKAR: It is.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MEMBER RAY: To confirm what you are
2 saying.

3 MEMBER BLEY: What chapter?

4 CHAIRMAN STETKAR: 16. I couldn't, I
5 actually didn't look for that. I read through some of
6 the stuff in 16. I couldn't find it.

7 MEMBER RAY: It's overpressure
8 protection. You can't let it go shut.

9 CHAIRMAN STETKAR: The question is, if
10 indeed that's true, that particular configuration
11 resolves basically my concerns about those spurious
12 closures. The principal of how this can fall apart
13 mechanically but I'll give you that. It's just
14 operating experience has had a number of issues with
15 the other spurious signals to close the valve or human
16 errors that close the valve electrically. There have
17 been enough of those to raise that concern. If the
18 power is indeed removed from the valve, that's very,
19 very important, but I'd like to make sure that there
20 are either as Mr. Ray mentioned, that requirement is
21 either specified in the technical specifications or if
22 it is not, there is clear guidance to the COL
23 applicant that is a feature that they must ensure was
24 written into their RHR operating procedures because
25 that is a critical feature. And that indeed feature

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 would protect against that type of thermal
2 overpressure transient.

3 MR. OGINO: If that feature is
4 distracting some responsive --

5 CHAIRMAN STETKAR: I found in the DCD the
6 basic description that said the valves are normally,
7 the power is normally removed during normal power
8 operation. That seems rather clear. I didn't see
9 anything in there about during RHR system operation
10 that the power was also removed.

11 MR. OGINO: So maybe some other
12 responsive.

13 MEMBER BLEY: That would be good to
14 follow up in the tech spec I see the valve has to be
15 confirmed open by an inspection every 12th hour. I
16 didn't see anything about power.

17 CHAIRMAN STETKAR: I didn't look for
18 power. I saw that. So I think you probably
19 understand the question.

20 MEMBER BLEY: There are five association
21 suction isolation valves that is locked open with
22 operator power removed for each required RHR suction
23 valve.

24 CHAIRMAN STETKAR: Thank you Dr. Bley.

25 MEMBER BLEY: That is SR 3.4.12.7.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: SR 3.?

2 MEMBER BLEY: 4.12.7.

3 CHAIRMAN STETKAR: 3.4.12.7. That
4 answers that question. Thank you.

5 MEMBER BLEY: I'm sorry. Where I found
6 that, I'm not sure that is for open.

7 CHAIRMAN STETKAR: Well but I mean if you
8 found that statement that says during RHR, it doesn't
9 make any difference whether its for LTOP or another
10 purpose, as long as it is in the tech specs. It is
11 just a matter of if indeed, if its in the tech specs
12 and its fairly clear. I didn't look particularly for
13 that. One last question on RHR. And this has to do
14 with mid loop operations. The, actually I have two
15 questions on RHR. I lied. Let's talk about mid loop
16 operations first. The RHR suction line comes off the
17 hot leg at about 45 degrees below horizontal. So its
18 --

19 MR. OGINO: 45.

20 CHAIRMAN STETKAR: Yes. Its off to the
21 side about 45 degrees down. The point is its not from
22 the bottom of the highway. There are statements in
23 the DCD that says during and I think we are all aware
24 of this that mid loop operations are conditioned where
25 the, you are potentially vulnerable to drying air into

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the RHR suction lines and all binding system. That's
2 happened a number of times. I know that you have
3 installed level indication that provides the operators
4 alarms to do that. That level indication also closes
5 the lower pressure letdown valve. Is that correct?

6 MR. OGINO: Pardon me?

7 CHAIRMAN STETKAR: Does the low pressure
8 letdown valve from the RHR system receive an automatic
9 signal to close from low level?

10 MR. OGINO: Yes.

11 CHAIRMAN STETKAR: Okay. So you remove
12 that. The DCD and response to some of the staff RAIs
13 mention the fact that you can gravity drain from the
14 spent fuel pool into the reactor vessel through the
15 RHR system.

16 MR. OGINO: Yes.

17 CHAIRMAN STETKAR: In case the RHR pumps
18 are not available and you can make up to the spent
19 fuel pool from the RWSP through refueling water makeup
20 pumps. So indeed you can effectively pump the RWSP
21 through the spent fuel pool and gravity drain into the
22 reactor vessel. The, I believe the staff asked about
23 that mechanism and in the response it was noted that
24 gravity drain is available essentially as a core
25 cooling mechanism.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. OGINO: Yes.

2 CHAIRMAN STETKAR: A couple of
3 questions. When RHR is operating at mid loop. This
4 reactor coolant system normally vented at that point
5 so are you at atmospheric pressure in the reactor
6 coolant system?

7 MR. OGINO: Ours is.

8 CHAIRMAN STETKAR: Okay. It was at our
9 plant, I just wanted to make sure. Is the containment
10 normally closed at that time?

11 MR. OGINO: Condiment?

12 CHAIRMAN STETKAR: Containment?

13 MR. OGINO: If I, if more full so I
14 believe containment is closed.

15 CHAIRMAN STETKAR: It was at our plant
16 too according to tech specs. I just didn't have a
17 chance to follow the tech specs. Now here's the
18 question. Suppose I lose suction for the RHR pumps
19 and have air ingress into the RHR system because I
20 have an inadvertent reduction in level. I can then
21 align the RWSP through the makeup pump, through the
22 spent fuel pool to gravity drain and effectively cool
23 the core by now boiling core inventory through the
24 vent path into the containment condensing the steam.
25 The problem that I have in terms of long-term cooling

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 is that your containment spray RHR pumps are actually
2 your long-term containment and core decay heat removal
3 pumps. You eventually line those pumps up to cool the
4 RWSP through the RHR heat exchangers. They also
5 provide the containment spray function. How do you
6 establish long term core cooling in this configuration
7 if the RHR pumps are air bound?

8 MR. OGINO: After the accident, they are in
9 the accident.

10 CHAIRMAN STETKAR: This is, remember we
11 are starting from shutdown conditions that mid loop
12 operation. I add air ingress into the pumps. So now
13 I have air in the RHR system some place and in your
14 DCD you mention the fact that well core cooling is
15 supplied by gravity drain. That implies that I don't
16 get the RHR pumps back. If I don't get the RHR pumps
17 back, I have a problem with long term core cooling
18 eventually. I don't know what the time window but its
19 eventually I have a problem with both long term core
20 cooling and containment heat removal.

21 MR. OGINO: We have contemplated for such
22 concern. I believe that is described in Chapter 19
23 PRA, so I'm sorry, I don't know but I'll do --

24 CHAIRMAN STETKAR: Okay.

25 MR. OGINO: This is very complex

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 scenarios and so I cannot --

2 CHAIRMAN STETKAR: Okay. I guess we will
3 put that one off until we review the PRA. Let me make
4 a note. If I were there, you can see I followed
5 everything until I started to think about how we
6 eventually get heat removed if the RHR pumps aren't
7 available. So, I guess we'll put that one off until
8 we look at the PRA. By the way for your information,
9 we on the ACRS for each of the design certifications
10 write a separate letter. We've been tasked by the
11 commission to write a separate letter that applies our
12 findings related to long-term core cooling. So this,
13 I mean and its not restricted to particular operating
14 modes. So that's one of the reasons why I am asking
15 about this a bit.

16 Last question on RHR that I have is that
17 the test line valve from the discharge of the RHR
18 system that goes to the RWSP.

19 MR. OGINO: Yes.

20 CHAIRMAN STETKAR: Okay, that's the valve
21 that actually, when you establish RWSP cooling that's
22 the valve that you open to establish RWSP cooling.
23 Its also the full flow test line for the CSRHR pumps.
24 How do you control that valve either electrically or
25 administratively during normal RHR operation so that

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 you did not pump the reactor vessel inventory into the
2 RWSP. In other words if I am on normal RHR operation,
3 and I open that valve, I will drain the reactor
4 coolant system down to the RHR suction line, at which
5 point I will cavitate the pump and the fail the pump.

6 MR. OGINO: About from the suction line
7 to the RWSP is normally closed and to be controlled by
8 power.

9 CHAIRMAN STETKAR: Okay. So any time you
10 need to open that valve you must also go and put power
11 to it?

12 MR. OGINO: Right.

13 CHAIRMAN STETKAR: Good, thank you. That
14 would apply also in accident conditions. If you need
15 to use that line for RWSP cooling?

16 MR. OGINO: Yes.

17 CHAIRMAN STETKAR: Okay, thank you. Is
18 that valve powered from Class 1E power supply?

19 MR. OGINO: Yes, Class 1E.

20 CHAIRMAN STETKAR: Okay. I will never
21 remember all of this.

22 MEMBER BLEY: You can read the
23 transcript.

24 CHAIRMAN STETKAR: No I can't. Okay,
25 thank you. I think that's all I had on the RHR

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 system. As I said, that's why I wanted to wait until
2 after the break because there were a number of
3 questions.

4 MR. WILSON: Thank you.

5 CHAIRMAN STETKAR: And thank you for the
6 answers.

7 MR. WILSON: We just have a couple more
8 slides before we are done. 5.4.12 of the DCD deals
9 with high point vents. The concept is reactor vessel
10 head vent is used to enhance natural circulation to
11 the reactor coolant of the reactor coolant by
12 eliminating non-condensable gasses in the upper plenum
13 reactor vessel. SDVs are used to cool the reactor
14 core by feed and bleed operation when loss of steam
15 generators occurs. The DVs are used to pressurize,
16 depressurize the RCS and prevent both high pressure
17 meltage action and temperature induced steam
18 generation tube rupture. There is an open item on
19 this that I'll just read here. SRP acceptance
20 criteria for Section 5.4.12 requires development of
21 procedures to remove non-condensable gasses from the
22 steam generator U tubes and to operate the vent
23 system. If it is not provided in the DCD, a COL
24 information item should be provided for the COL
25 applicant licensee to develop operating procedures and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 fulfill this acceptance criteria. This response is in
2 process. The plan is to put into the DCD. That
3 concludes this item. As you saw in the SER there were
4 only -- next slide. There are eleven open items. And
5 there are a variety of items that may or may not have
6 been incorporated in the DCD Revision 3 but that's the
7 status at this time.

8 CHAIRMAN STETKAR: You still have 15
9 minutes and I have more questions. Any other members
10 can chime in any time you want to. Let me come back
11 to RHR because I really like the RHR system. The, I
12 notice that two of the RHR trains have, they are
13 operated flow control valves on the outlet on the RHR
14 heat exchangers and bypass valves around the RHR heat
15 exchangers and two trains do not. I read a little bit
16 about that in the DCD. During normal plant cool down
17 it seems that and the trains that have the control
18 valves on them are Trains B and C in particular. A
19 and D do not. They simply have normally closed motor
20 operated gate valves and then there is a motor
21 operated globe valve out finally in the discharge
22 line. The question I had is during a normal plant
23 cool down, is it necessary that I must have at least
24 Train B or Train C available? For example if I only
25 have Trains A and D available, not B and not C, can I

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 actually perform a controlled cool down?

2 MR. OGINO: In normal cool down we all
3 trains to use.

4 CHAIRMAN STETKAR: I understand you try
5 to have all four trains available. What I'm asking is
6 suppose you only have A and D available that B and C
7 are failed. Can you perform a controlled cool down?

8 MR. OGINO: Yes.

9 CHAIRMAN STETKAR: You can, okay.

10 MR. OGINO: Also we have motor operated
11 globe valves in all, in each train so we can control.

12 CHAIRMAN STETKAR: You just throttle flow
13 with that globe valve to control the coolant?

14 MR. OGINO: Yes.

15 CHAIRMAN STETKAR: Its not as easy but
16 you can do it. Okay. I felt that was the answer to
17 that. The discussion, there's a discussion of using
18 in Section for reference, you may want to write this
19 down, 5.4.7.2.3.4, 5.4.7.2.3.4 of the DCD regarding
20 safe shutdown. And its kind of a general discussion
21 but the purpose is to demonstrate that you can achieve
22 cold shutdown conditions using only safety related
23 equipment, I believe. That discussion says that the
24 decay heat removal and following the cool down through
25 the main steam relief safety and emergency feedwater

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 system is performed by the HRHS. Now, my question is
2 if I'm relieving steam through the main steam safety
3 valves --

4 MR. OGINO: Safety valves?

5 CHAIRMAN STETKAR: Well in the DCD, I'll
6 read it specifically. The statement says the decay
7 heat removal and cooling following cool down through
8 main steam safety relief valve for emphasis safety and
9 emergency feedwater system is performed by the RHR.
10 Now, the question that I had is does that parentheses
11 safety mean the operation in the safety mode or is it,
12 does it imply that the relief valve itself is a safety
13 valve? Okay, besides I didn't look far enough out
14 into the main steam system to see the qualification of
15 the relief valves.

16 MR. OGINO: This means --

17 CHAIRMAN STETKAR: It means that's a
18 safety related valve?

19 MR. OGINO: Yes.

20 CHAIRMAN STETKAR: Okay, thanks.
21 Otherwise I couldn't see how you were getting cool
22 down and depressurized RHR. I was hoping that was the
23 answer. And that believe it or not is all of the
24 questions that I have. Do any of the other members
25 have any questions for MHI because next according to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the schedule, we're going to have Luminant come up and
2 discuss Chapter 5 of the COL FSAR and then the staff
3 after lunch will come up and give the presentations on
4 the SERs for both the DCD and COL. So in terms of
5 numbers this is our last shot at MHI. Charles.

6 MEMBER BROWN: Okay, two questions. One
7 for my information because I am not familiar with this
8 is the contingent spray and contingent spray systems
9 typically fed as part of the removal systems. In
10 other words in this system residual heat removal pumps
11 feed both the containment spray and the residual heat
12 removal system. Is that a common approach to doing
13 business?

14 CHAIRMAN STETKAR: That is one way of
15 doing it.

16 MEMBER BROWN: Okay. When I was looking
17 going through the flow diagrams, I couldn't find out
18 where the containment spray flow rates were. I was
19 trying to look at the containment, if you add them
20 both on, what's the design basis for the flow rates.
21 I could find the design basis for residual heat was
22 like 2,000, 2645 or 3,000 gpm. All the containment
23 spray lines are listed in our four modes as zero. I
24 don't have any idea what the flow rate is required for
25 containment spray maintaining pressure. My only point

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 was if they are all on.

2 CHAIRMAN STETKAR: We'll read this at
3 this system in Chapter 6 for the containment spray
4 function and the RWSP cooling function. Its kind of
5 a strange system because its RHR and overpressure
6 relief functions are described in Chapter 5. Its
7 containment spray function and in a sense long-term
8 cooling function are described over in Chapter 6. I
9 didn't look over in Chapter to see whether the spray
10 flows are over there.

11 MEMBER BROWN: I found the residual heat
12 removal system so.

13 CHAIRMAN STETKAR: In Chapter 5?

14 MEMBER BROWN: In Chapter 5, yes it was
15 on the figure showing all of the four modes, shutdown,
16 startup, normal operation and refueling and obviously
17 there is no containment spray in any of those.

18 CHAIRMAN STETKAR: Keep that in mind.
19 We'll raise it certainly Chapter 6 if its not
20 documented there. But that's more of the Chapter 6
21 head of this.

22 MEMBER BROWN: Do you think I'm going to
23 remember this that long?

24 CHAIRMAN STETKAR: If you write it down
25 you will.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MEMBER BROWN: That's the next thing I
2 have to remember to write it down.

3 CHAIRMAN STETKAR: You had two things.

4 MEMBER BROWN: You answered them both.
5 One was it typical and the other one was the flow rate
6 type issue.

7 MEMBER SHACK: I just had a question
8 about the depressurization valves which you have which
9 are motor operated valves and that would seem to
10 indicate that they wouldn't be operable in a station
11 blackout situation. Why did you pick a motor operated
12 valve over say an air operated valve that could be
13 powered off a battery? It would be available in
14 essentially all scenarios.

15 CHAIRMAN STETKAR: These aren't
16 particularly what they call the DV valve.

17 MEMBER SHACK: Saved me from the high
18 pressure melt injection and the induced steam
19 generator rupture.

20 MR. OGINO: You discussed DV.

21 MEMBER SHACK: DV?

22 MR. OGINO: DV.

23 CHAIRMAN STETKAR: The ones that blow
24 down the containment. The one that go to the
25 containment. The two normally closed series valves.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MEMBER SHACK: The ones that I don't
2 really want to open unless I really need them.

3 CHAIRMAN STETKAR: But when you really
4 need them you would really like to have them.

5 MEMBER SHACK: I'd really like to have
6 them work and since they are motor operated, I believe
7 that I'm, so I'm in a station blackout situation,
8 which is one of the scenarios I might very well what
9 to be able to blow these things down. I can't do it.
10 So why not something that could be operated strictly
11 off of battery.

12 CHAIRMAN STETKAR: It could be a DC motor
13 operated valve. It doesn't have to be an air operated
14 valve. But essentially something that requires DC
15 rather than AC power.

16 MR. OGINO: I believe DV is powered from
17 battery, I believe.

18 CHAIRMAN STETKAR: Check that because I
19 think that the DCD says, it doesn't specifically say
20 AC. It says Class 1E power but with alternate, I
21 believe it says with alternate power backup or
22 something like that.

23 MEMBER SHACK: I believe it sounds like.

24 CHAIRMAN STETKAR: It sounds like its AC.
25 I mean it doesn't specifically say that it is AC. So

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 if you could confirm if they are DC operated that
2 would be good information. But if you could confirm
3 the specific power supplies for those valves, that's
4 what we are interested in. And if they are AC, why
5 are they not DC?

6 MEMBER RAY: Like Charlie I'll apologize
7 for things that perhaps I should know but I'll ask
8 anyway. Naturally circulate the steam generators and
9 reactor vessel allow the plant to naturally circulate?
10 Yes or no? I take a nodding head is yes.

11 MR. WILSON: Natural circulation.

12 MEMBER RAY: Natural circulation, yes.

13 MR. OGINO: Natural circulation to remove
14 the heater.

15 MEMBER RAY: I'm sorry, I couldn't
16 understand. It does naturally circulate, for example
17 it would be a startup text to demonstrate that it
18 would match or re-circulate. Is that right?

19 MR. OGINO: Yes we'll do that test, we
20 will do.

21 MEMBER RAY: Okay. And again forgive but
22 does a plant have a turbine driven feedwater pump, aux
23 feedwater pump? In other words, do I rely on
24 electricity to keep the secondary side of the steam
25 generator?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. OGINO: With the pump, we have four
2 images for the pump, two are turbine driven.

3 MEMBER RAY: Two are turbine driven?

4 MR. OGINO: Yes.

5 MEMBER RAY: All right. Well that's
6 fine. So then you can sit and remove decay heat with
7 a blackout. That's what I was trying to get at.
8 Okay.

9 CHAIRMAN STETKAR: Any other questions
10 from any other members? No? If not we finished with
11 two minutes to spare. Thank you very, very much for
12 a very good presentation and good discussion. And as
13 I said go through the transcripts, we'll try to
14 highlight some of the major open items and close out
15 of the meeting. I'll ask you also to go through the
16 transcripts to see if we miss anything in that summary
17 because there is quite a bit of discussion that has
18 transpired here this morning. And again thank you
19 very, very much for a good presentation.

20 And at this time I guess we will have
21 Luminant cover up and present the FSAR information for
22 Comanche Peak and I believe if I'm not incorrect this
23 is the first time we've actually heard from you folks.
24 So welcome to the jungle. And other than Dr. Shack
25 its certainly the first time that the rest of us have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 heard from you.

2 MEMBER SHACK: Not quite that long.

3 CHAIRMAN STETKAR: Not quite that long?

4 MEMBER SHACK: It just seems that way.

5 It's been a little less than four years for me and it
6 still seems that way.

7 MEMBER BLEY: Charlie just for a point.

8 RHR is 3000 gallons design for.

9 MEMBER BROWN: No that's, to the spray
10 system? 6.2.2.2.1, pages 82 PDF, page 82.

11 MEMBER BLEY: Oh okay.

12 CHAIRMAN STETKAR: We'll get back to all
13 of that. We will revisit this system when we get
14 there.

15 MEMBER BROWN: 6.2.2.81. I know where we
16 are. I was just going there myself since you all
17 illuminated that.

18 CHAIRMAN STETKAR: Are you folks ready?
19 Welcome.

20 MR. WOODLAN: Good morning. I appreciate
21 that you scheduled us before lunch instead of after
22 lunch like the original schedule. As someone pointed
23 out, Luminant is pleased to be here. It's our first
24 time in over 20 years to be able to address the ACRS
25 for Comanche Peak units there and four. We've reached

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 this point in the review process. This is our first
2 visit for this review. Again I appreciate getting
3 maybe one of the less challenging COLA chapters.
4 Before we leave the front side, some of you may not
5 have seen this before. This is a rendering of what
6 the site will look like for three and four. If you
7 look in the middle there, those two domes are Units 1
8 and 2, which are the current operating units. In the
9 upper left is where 3 and 4 are located and you can
10 see the flumes from the towers. And if you look right
11 in the upper right way in the back, that's Comanche
12 Peak itself. It's just kind of a little plateau there
13 in the background.

14 My presentation will give a little bit of
15 an introduction and then we talk section by section,
16 not subsection by subsection. We'll take a look at
17 what the FSAR has in it in the way of a summary.
18 We'll talk a little bit about what the SER has in it
19 with respect to each one of those sections. And then
20 we'll summarize the presentation. Next slide.

21 I guess I didn't introduce myself. I am
22 Don Woodlan. I'm the licensing manager for Comanche
23 Peak Units 3 and 4 of the, we call it New Build
24 Project. This chapter, Chapter 5 as is much of the
25 COLA when you review it, you will find its essentially

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 incorporated by reference. Being the R-COLA and
2 working essentially in parallel with the DCD and the
3 DCD review are really probably three to six months
4 behind. But I'm very close to them. We've been able
5 to work very closely with Mitsubishi. And we've been
6 able to provide our ideas and concepts as the DCD and
7 the design work was being done. That's why the next
8 bullet says there are no departures. We've been able
9 to identify areas where we thought we might want to
10 take a departure when every time we've identified one
11 of those, we've approached Mitsubishi. Mitsubishi has
12 taken into consideration what we've said and we came
13 up with a resolution that we were both happy with. So
14 we didn't need to take a departure. We are hoping we
15 make it all the way through the process that way but
16 that's where we are today.

17 Looking at the SER, kind of in summary
18 there is one plant specific open item, one generic or
19 broad open item if you will and then several
20 confirmatory items and I'll talk about them in a
21 little more detail in the future slides. COLA
22 Revision 2, which is the key to some of the
23 discussions here is scheduled to come out in June of
24 this year and it will close a lot of the items that
25 are listed in the SER. And it doesn't really relate

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 to what we are doing here but thought you might like
2 to know there are no contingents pending in front of
3 ASLB relative to Chapter 5. Actually we don't have
4 any contingents at all right now with the ASLB but as
5 you know that can change with time.

6 Okay, let's start with Section 5.1, the
7 summary description. In the FSAR, sections entirely
8 incorporated by reference, again with no departures or
9 supplemental information provided. And there were no
10 COL Information Items in the DCD for this section. In
11 the NRC summary, we do have the one generic SER open
12 item which is essentially that we must adopt as
13 certified DCD once the certification is complete. So
14 that will be there until all the way to just about the
15 end. There are no Confirmatory Items and there are no
16 Proposed License Conditions for 5.1.

17 5.2, the integrity of the reactor coolant
18 pressure valve. The FSAR summary, again its primarily
19 incorporated by reference with no departures. There
20 are ten COL Information Items which are addressed in
21 the COLA or the COL.

22 Looking at the SER summary from the NRC,
23 there was one identified open item and I'll address
24 there. There are three Confirmatory Items and there
25 are two Proposed License Conditions. Here is the open

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 item. It has to relate with the EPR Water Chemistry
2 Guidelines. The COL Information Item required that we
3 identify which version of the Chemistry Guidelines we
4 were going to use. We messed up when we wrote the
5 COLA. We weren't very specific about that. Once we
6 realized the problem, we talked to the NRC and this is
7 the response we provided the NRC that we intend to use
8 the Water Chemistry Program that's based on the latest
9 effective version of the Guidelines. And I believe
10 the NRC has taken a look at that and this may shifting
11 from an open item to a confirmatory item once they
12 complete their review.

13 CHAIRMAN STETKAR: Is that latest
14 effective revision at the time of COL issuance or the
15 time of fuel load or?

16 MR. WOODLAN: Ongoing.

17 CHAIRMAN STETKAR: Ongoing, okay.

18 MEMBER BLEY: Are you going to get the
19 steam generator chemistry later on?

20 MR. WOODLAN: No. It's not in my slides
21 but if you have a question.

22 MEMBER BLEY: Just a question. Have you
23 decided on the water chemistry through your steam
24 generators and is it something that really needs to be
25 matched up with the Japanese experience with these

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 generators?

2 MR. WOODLAN: I believe we have decided
3 what the water chemistry is and we're incorporating
4 both our own operating experience, having over 20
5 years of experience on our plants, as well as the
6 Japanese. This is one of the issues that was,
7 initially might be a departure. The Japanese were
8 proposing more of a chemistry -- what was the term?
9 Was it phosphate and sulfate type water controls as
10 used in Japan? I may not be getting that quite right.
11 But we used the volatile chemical controls on one or
12 two and found with experience that was the best way to
13 go. And that was one of the areas we talked with
14 Mitsubishi about and discussed the pros and cons and
15 in fact came to agreement on the approach that would
16 be used. So I know we have agreed on what we are
17 going to do.

18 MEMBER BLEY: I was just curious because
19 they were telling us of their very good experience and
20 I haven't read about their experience before and it
21 would be a shame not to keep with whatever led to that
22 experience if it is as good as they say.

23 MR. WOODLAN: Yes. And like I say, I
24 think we've worked with them and combined both of our
25 experience, theirs and ours, to come up with the plan

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 that we are using.

2 MEMBER BLEY: I'm just curious as to why
3 it doesn't come up here in Chapter 5, since the
4 primary water chemistry comes up here?

5 CHAIRMAN STETKAR: It's tradition. It's
6 either, I can't remember whether its Chapter 9 or
7 Chapter 10.

8 MR. WOODLAN: It's probably Chapter 10.

9 CHAIRMAN STETKAR: Yes, it's either 9 or
10 10. I can't remember, one of those two.

11 MEMBER BLEY: So we'll revisit this.

12 MEMBER SHACK: 1035.

13 CHAIRMAN STETKAR: 1035.

14 MR. WOODLAN: Although the answer is a
15 lot like the answer on the primary system. It puts
16 out some very good guidance. I know we were a 22 a
17 lot as we tried to solve the problems we were having
18 on one of the steam generators.

19 MEMBER BLEY: I understand that. But the
20 question, if they had such good experience compared to
21 all other steam generators, maybe there is something
22 unique here that wouldn't be in the standard.

23 CHAIRMAN STETKAR: Yes, is there anything
24 different from what they use --

25 MEMBER BLEY: For their particular

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 generators.

2 CHAIRMAN STETKAR: Yes, compared to the
3 Guidelines recommend on the secondary slide.

4 MR. WOODLAN: Next slide. Now I threw in
5 several slides here talking about license conditions
6 that probably don't relate as much as a lot of the
7 other material directly to what ACRS is interested in
8 but is an area that we're still dealing with the NRC
9 and they are discussed in the safety evaluation
10 reports. In some cases, as in this case, the NRC has
11 proposed a license condition in the SER. Luminant is
12 still working with the NRC to resolve these. In some
13 cases as in this case, we feel that a commitment by
14 Luminant is more appropriate than a license condition.

15 And some of the other ones we are agreeing with the
16 license condition but the words are not finalized yet
17 and that will be negotiated some time before this goes
18 to the commissioners with the COL will come up with
19 words that we both agree with, just like we did on one
20 and two.

21 Next Section 5.2 integrity of the RCPB.
22 This is the next license condition. This one had to
23 do with the preservice testing program. There are as
24 you may be familiar with, there's a lot of operational
25 programs that are required that we establish. We have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a table in the FSAR, 13.4-201 which lists almost all
2 of these operational programs and in particular it
3 identifies which of those programs need to be
4 implemented by a license condition and in general that
5 requirement comes out of the regulatory guidance that
6 we use to write the COLA from. And what we're
7 proposing the SER proposed a license condition
8 specifically for preservice testing program. What we
9 are proposing and this is consistent with the Model
10 COL that the staff has developed is a single license
11 condition that says that all the operational programs
12 will be implemented consistent with this table 13.4-
13 201. So it is a different way of solving this same
14 program.

15 CHAIRMAN STETKAR: Different bookkeeping?

16 MR. WOODLAN: Yes. Next slide 5.3
17 reactor vessel. The FSAR summary again primarily
18 incorporated by reference with no departures, the 05
19 COL information items, all of which were addressed in
20 this COL application. The SER summary shows no open
21 items, two confirmatory items and two proposed license
22 conditions.

23 The first license condition which was
24 number 5.3 has to do with the material surveillance
25 control program and this is the same category as the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 other one. The NRC proposed a separate license
2 condition for this. We filled this envelope to buy
3 the bounding license condition for Table 3.4.201.
4 Next slide.

5 License condition 5.4, this is the
6 pressurized thermal shock evaluation. This is one
7 where we agreed with the staff and we accepted the
8 need for a license condition in this area. The
9 wording that we had come up with and I believe the
10 staff based this primarily on their proposed wording
11 in an RAI and in Rev 1 of the COLA. In the response
12 to that issue, we proposed alternate wording. Again,
13 we don't disagree at all with the need for the license
14 condition. We just need to resolve the proper wording
15 to go into the license.

16 5.4, component and subsystem design. The
17 FSAR summary, again, incorporated by reference with no
18 departures or supplements and there were no COL
19 information items in this section. The SER showed no
20 open items, one confirmatory item and no proposed
21 licensed conditions.

22 In summary, the COL information items that
23 were included in the DCD have all been addressed in
24 the COLA. We have no departures and we only provided
25 supplemental information as needed to respond to the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 COL information items. We have one generic and plant
2 specific open item and we have five confirmatory
3 items.

4 In general, well no, not in general, but
5 across the board all the confirmatory items have been
6 responded to by Luminant and we have provided where we
7 felt was the information needed to resolve those items
8 including markups of how we intend to change the FSAR.
9 There are still confirmatory because they haven't
10 revised the FSAR yet but that should occur in June and
11 we expect that, since the NRC has already seen the
12 markups that Revision 2 should close out those
13 confirmatory items. We do have the five proposed
14 license conditions and we are addressing those with
15 the staff.

16 I guess I don't need to read all of this,
17 the acronyms.

18 CHAIRMAN STETKAR: Thank you. Any
19 questions from any of the members? No. As you said,
20 its an easy one. It's a big struggle. Thank you
21 very, very much for the presentation. That was very
22 efficient.

23 MR. WOODLAN: Is this the kind, if its
24 okay to ask, is this the kind of information you are
25 looking for from our presentation?

1 CHAIRMAN STETKAR: Well as you heard with
2 our discussion with MHI, if we identify any specific
3 issues, we aren't shy about asking. Certainly we
4 would, in this particular case, there were no
5 deviations or exceptions. Any place where you do in
6 the future, if there are any places where you do take
7 an exception.

8 MR. WOODLAN: Departure.

9 CHAIRMAN STETKAR: Departure. We
10 certainly are interested in hearing about it. Any
11 place that you in the future if there are any places
12 where you do take an exception.

13 MR. WOODLAN: Department is --

14 CHAIRMAN STETKAR: A departure.

15 MR. WOODLAN: Yes, okay.

16 CHAIRMAN STETKAR: We are certainly
17 interested in hearing about details about that
18 rationale and so forth.

19 MR. WOODLAN: Okay.

20 MEMBER BLEY: Yes, we would like details
21 when its plant specific things.

22 CHAIRMAN STETKAR: And of course anything
23 does come up plant specific, Chapter 2, some of the
24 Chapter 8 stuff, you will be plant specific, those
25 types of things.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. WOODLAN: Thank you.

2 CHAIRMAN STETKAR: Thank you. In the
3 interest of time and I'll ask the staff, we originally
4 scheduled to break for lunch at 12:15. Do you want to
5 start with your presentation. Can we go for about 45
6 minutes to maybe an hour.

7 MR. HAMZEHEE: Give me one minute to make
8 sure tech staff is --

9 CHAIRMAN STETKAR: Okay. That's what I
10 wanted to ask you. If you have the people here I'd
11 just as soon get started. It's a little early to
12 break for lunch but we can also do that.

13 MS. BERRRIOS: Do you mind if we do COL?
14 That would be shorter.

15 CHAIRMAN STETKAR: No, I don't care.
16 Let's, if you can do, if you have the people here for
17 COL let's do the COL and then we can break for lunch
18 and reconvene then. That's fine. No problem at all.
19 Nice thing about the subcommittee meetings is we're
20 not nearly as constrained to specific, hitting
21 specific time marks as we are in full committee
22 briefings.

23 CHAIRMAN STETKAR: Okay. Thank you for
24 accommodating the schedule in real time. I know
25 sometimes that's a bit difficult but I'm sure, we have

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 some constraints. There are some people who need to
2 leave a little bit early and I'm sure you all would
3 like to start your long weekend as soon as possible.
4 So with that, let's hear from the staff on the
5 Comanche Peak COL SER and then we'll break for lunch
6 after that. Jeff, you can wear Steven's hat.

7 MR. MONARQUE: Good morning. Thank you for
8 the opportunity or give me the opportunity to present
9 our first chapter, staff's first chapter of the ACRS
10 on Comanche Peak COL application. Our review was
11 conducted to thread one of this COL. My first
12 presentation I'll do an overview of the COL followed
13 by Paul Kallan and then Eduardo Sastre and that's on
14 page two. Next slide please.

15 CHAIRMAN STETKAR: And Jeff just for our
16 recorder, because he doesn't know who you are.

17 MR. MONARQUE: My name's Steve Monarque
18 and this is my first presentation related to the
19 article.

20 CHAIRMAN STETKAR: I'm sorry Steve.

21 MR. MONARQUE: That's okay. I'm the lead
22 project manager for the Comanche Peak R COLA review.

23 CHAIRMAN STETKAR: Thanks.

24 MR. MONARQUE: We'll go ahead to slide
25 three. Because this is the first time we presented an

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 article at Chapter ACRS, I want to give you a
2 presentation as to what has been accomplished to date.
3 We received the COL application in September 2008. We
4 published a schedule in March of 2009. We completed
5 a phase one milestone. Phase one milestone is
6 completion of safety evaluation, preliminary safety
7 evaluation and issuance of RAIs. That was completed
8 in October 2009. In November of that same year we
9 received revision 1 to the article. In the March of
10 2011 we had to change to our public schedule but we
11 extend the schedule by approximately 18 months. And
12 as Luminant alluded to earlier in June at the end of
13 June of this year, we will have received revision 2 of
14 the article. Next slide please.

15 What I present here, is our public
16 milestone. Public milestones as published on an our
17 NRC website of the COLs reduced schedule phases 1
18 through 6 and phase 1 has been accomplished to date.
19 We are in the middle of phase 2. And with that, I'll
20 go ahead, if there's no further questions and this is
21 a one time presentation, I wanted to give you.

22 MEMBER BLEY: By that schedule by July of
23 next year we will have made a pass through everything?

24 MR. MONARQUE: Correct, yes. And that
25 includes receipt of the letter and full committee

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 meetings as well. Correct. And with that I'll turn it
2 over to Paul Kallan who will introduce the technical
3 review staff.

4 MR. KALLAN: I just on this slide it is
5 basically its just mentioning all the people who work
6 on the technical staff who worked on Chapter 5, the
7 COL portion of it. Just a quick overview of the COL
8 review. What we did was we put the SRP section as
9 well as the number of questions and the amount of open
10 items and this one open item in this, on the COL. And
11 overall there was a total of 17 questions and one open
12 item. And now I will turn it over to Eduardo Sastre.

13 MR. SASTRE: Good morning everyone. My
14 name is Eduardo Sastre. I was in charge of the
15 chemical material part of the Section 5.2.3. As
16 Luminant explained there's an open item on the COL
17 information item on which version of the water
18 chemistry guidelines they are going to use. They
19 didn't provide a specific prohibition. The issue was
20 that they didn't address it. And after having a
21 conversation with them on the ROI they discussed that
22 they were going to use, it was Region 6 but as the
23 chemical control problem keeps being updated through
24 the years we asked for them to provide something in
25 the SAR that is stated that the program will be

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 updated with the latest of the chemistry guidelines.
2 I also heard the concern from the secondary side water
3 chemistry guideline. Right now I'm not prepared to
4 those questions but we will take that concern and when
5 I present Chapter 10 I will discuss those concerns.

6 MEMBER BLEY: Just as a heads I'm
7 probably going to ask you something about the
8 experience Mitsubishi has told about when their
9 generators and how this water chemistry guidelines --

10 MR. SASTRE: Yes we had a few ROIs about
11 those concerns because --

12 MEMBER BLEY: Let's wait on that.

13 MR. SASTRE: At the beginning they were
14 going to use the water chemistry guidelines but now
15 they are going to use it with some experience. I will
16 discuss it in more detail then.

17 MR. KALLAN: AT the end it's a list of
18 acronyms.

19 CHAIRMAN STETKAR: Did we have any follow
20 up questions? Do any of the members on this side of
21 the table have any following up questions? Now I'll
22 ask on this side. Do any of the members on this side
23 of the table have any follow up questions to the staff
24 on COL?

25 MEMBER REMPE: No on the stuff that was

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 presented.

2 MEMBER SHACK: We're on Chapter 10.
3 We're moving ahead.

4 CHAIRMAN STETKAR: You can share the
5 Chapter 10 meeting if you want to. Well that was
6 quick. Thank you very much. And again, thanks for a
7 accommodating the schedule. At least we can check off
8 that box. With that, I am going to recess for lunch
9 and let's reconvene at 12:45. I'll give you a full
10 hour for lunch and then we'll hear the staff
11 presentation on the DCD SER. So, we will recess until
12 12:45.

13 (Whereupon the foregoing matter went off
14 the record at 11:42 a.m. and resumed at 12:45 p.m.)

15 CHAIRMAN STETKAR: We're now back in
16 session if anybody can hear anything. And we'll hear
17 from the staff on the SER for the design certification
18 Chapter 5. And Jeff, I don't know if you want to say
19 something or will just have your staff --

20 MR. CIOCCO: I think we're ready to go.

21 CHAIRMAN STETKAR: Good.

22 MR. KALLAN: Hi this is Paul Kallan. I
23 am the Chapter PM for Chapter 5. We can go on to
24 slide two. This is the technical staff, John Wu and
25 next to him is John Budzynski, Steve Downey and John

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Honcharik and they are presenters for today. This is
2 the overall, slide three is the overall stock that
3 actually worked on Chapter 3, quite a number of people
4 that worked on it. Slides three and four are
5 basically the list of staff that worked on it.

6 Slide five is an overview, slide five is
7 an overview of Chapter 5 and just like the COL we had
8 the SRP section with a number of questions and a
9 number of RAIs.

10 The next three slides its basically, we
11 went section by section and we just gave you a list of
12 the section and questions was asked for each section
13 as well as the open items.

14 Slide eight is basically there is a total
15 of 134 questions with eleven open items.

16 And now I'll turn it over to John Wu for
17 the compliance for the optical COL cases.

18 MR. WU: Yes. My name is John Wu from NRO
19 division, branch one. Today I would like to cover
20 Section 5.2.1.2, a COL case. Label one open item, the
21 open item is related to RAI 5.2.1.2-7. Those as you
22 will see here also have RAI that is a, I think UPM
23 code, ERI number 575, question 4422, okay. And as you
24 heard early this morning from Mitsubishi about this
25 open item, your response to the staff, response to

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 staff RAI. The applicant aids the COL case N-782 to
2 DCD Section 5.2.1.2, Table 5.2.1-2. Full application
3 to USAPWR of 50.55(a) and the ASME codes 1140(a)(2).
4 The open item, we look at 10 CFR 50.55(a) before which
5 is allowed application of old ASME Code COL cases and
6 listed in NRC Regulatory Guide 1.84, Revision 35.
7 Without the prior NRC approval, we have several code
8 cases. However, the code cases to DCD. DCD in Table
9 5.2.1-2 is not listed in this reg guide for
10 acceptance. Therefore, this is, the HSA we're going
11 to, we are code case N-782 in the table that I just
12 mentioned. Therefore the applicant was requested to
13 provide justification for increasing the code case in
14 DCD in accordance regulation 10 CFR 50.55(a). We
15 received applicant supplement response in letter of
16 April 26, 2011 stating that the use of the code case
17 N-782 facilitates the use of the ASME Code, additional
18 addenda, including USAPWR design. Therefore it would
19 provide an acceptable level quality and safety. This
20 is consistent with our regulation in 10 CFR 50.55 item
21 (a)(3)(I) and therefore acceptable. So after we
22 receive it was open item, but after we receipt this
23 supplemental response and the issue is resolved and
24 the RAI is closed. Thank you.

25 MR. KALLAN: Okay. I'll turn it over to

1 Steven Downey.

2 MR. DOWNEY: Good afternoon everybody. My
3 name is Steven Downey. I'm a materials engineer with
4 the office of new reactors, division of engineering,
5 component integrity performance and technical branch.
6 And I'm the technical reviewer for Section 5.3.2,
7 Charpy Upper-Shelf Energy and I'll be presenting the
8 staff inspected on pressure temperature limits. As
9 stated in Mitsubishi's presentation, they've decided
10 to address the requirements of 10 CFR Part 50,
11 Appendix G related to pressure and temperature limits
12 by submitting a generic pressure and temperature
13 limits report that will be applicable to all plants
14 that reference the USAPWR design. This report follows
15 the guidelines of generic letter 9603 and which
16 provides seven technical criteria to be addressed in
17 order to submit the pressure temperature limits and a
18 complete methodology for their development. The
19 applicant also provided a COL information item to
20 address the submittal of plant specific P-T limits by
21 future COL applicants. And that is COL information
22 item 5.3.1. They have also stated in Mitsubishi's
23 presentation the USAPWR pressure and temperature
24 limits report has been submitted. However, the
25 staff's review of this report is not yet complete. As

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 such all open items identified in this SER section are
2 related to the staff's review of the pressure and
3 temperature limits report. And there are two open
4 items to date. The first open item tracks the ongoing
5 review of the pressure and temperature limits report
6 and will be closed upon approval of this report. And
7 the second open item is related to unresolved RAI in
8 which the staff asked the applicant to clarify how the
9 analyses performed to develop the P-T limits have
10 considered the entire reactor vessel. That concludes
11 my presentation. Are there any questions? There
12 being none I yield floor to John Honcharik.

13 MR. HONCHARIK: Hi. My name is John
14 Honcharik and I also work in the component integrity
15 branch. I am a materials engineer and this afternoon
16 I'll be discussing the reactor coolant pump flywheel.
17 USAPWR FSAR Section 5.4.1 basically describes the
18 materials used which basically is the SA 533, which
19 now is still currently used in operating plants, along
20 with the fabrication and inspection of flywheel to
21 ensure its integrity following the guidance of Reg
22 Guide 1.14 that flywheel has outlined in NUREG-0800.
23 This ensures that the flywheel design minimizes the
24 possibility of generating high energy missiles
25 consistent with the guidelines in the reg guide 1.1.4.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MHI also provided an analysis in accordance with the
2 reg guide and SRP Section 5.4.1.1 in order to meet the
3 requirements of the GEC report. The report evaluated
4 the critical speeds for various failure modes
5 including ductile and nonductile fracture. A fatigue
6 crack growth analysis also performed to determine the
7 crack growth rate of an initial size presumed to be
8 missed by inspection. There is one open item as
9 indicated on this slide. This is related to the MHI,
10 providing the critical crack size used to fracture the
11 flywheel so it could be compared to the fatigue crack
12 growth in the analysis. Also, to confirm that
13 inspection capabilities we can detect the initial flaw
14 size using analysis. And as we heard this morning,
15 MHI is addressing this open item.

16 CHAIRMAN STETKAR: Did you review the
17 probabilistic fracture mechanics analysis that was
18 done on the flywheel. I know the staff has found that
19 analysis provides adequate basis for their proposed 20
20 year flywheel inspection frequency. Did you review
21 that analysis?

22 MR. HONCHARIK: Yes I reviewed it.

23 CHAIRMAN STETKAR: Could you explain the
24 basis for their probability distribution for
25 overspeeds in excess of 1500 rpm? Did you ask them

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 about that? If you heard the questioning this
2 morning, the 1500 rpm seems to be a nominal 25 percent
3 overspeed that seems to be somehow justified by
4 perhaps leak before break considerations on at least
5 LOCA scenarios. I was curious, I didn't see any
6 record of RAIs related to their assessment of
7 probabilities that the overspeed might be higher or
8 their selection of a particular probability
9 distribution is a function of overspeed.

10 MR. HONCHARIK: I guess, trying to
11 remember, I think because you were talking about the
12 leak before break scenario and I think what they did
13 was they assumed that wouldn't be over that designed
14 overspeed and that kind of is consistent with other,
15 I guess, others that we used similar methodology and
16 in addition to that, they also do the critical speeds
17 for the pump and those critical speeds are like 3500
18 rpm which is way above anything I guess considered.
19 So I think it has been past presidents that would be
20 acceptable.

21 CHAIRMAN STETKAR: Okay. So essentially
22 if I can understand what you are saying you feel that
23 there's quite a bit of margin above that 1500 rpm even
24 if the different probability distribution were used,
25 you feel comfortable that there is still adequate

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 margin preserve. Okay.

2 MEMBER SHACK: You saw the critical flaw
3 sides this morning at 1500 was three inches so that a
4 --

5 MR. HONCHARIK: Yes, that's another --

6 MEMBER SHACK: Pretty large crack.

7 MEMBER SHACK: Yes. Well I think they
8 say its greater than three inches. I'm not sure how,
9 I think they are still working on that. I'm not sure
10 I might have misunderstood but I can't remember MHI
11 said, I heard something like ten, but I don't know.
12 It sounds like it is greater than three inches.

13 MEMBER SHACK: Greater than three inches
14 was big enough. Okay, thanks. I just had another
15 truly tacky question on that thing. I looked at that
16 analysis and it got the embedded crack and the
17 infinite space as one model. I can sort of see that's
18 okay. That's a conservative estimate of a finite
19 crack in a finite body. It wasn't so clear to me that
20 the surface crack done as a crack and a half space was
21 conservative although they seem to -- has anybody
22 looked, nobody made any comparisons with finite
23 element calculations to show that or something like
24 that. Has that been done before for this kind of
25 analysis so it is kind of accepted that you can use

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 those approximations for the fracture mechanic
2 solutions?

3 MR. HONCHARIK: Yes, typically because
4 like I said there are other applications that have
5 done that and they used somewhat similar methodology.
6 I think even discussion this morning about some of the
7 distributions. They kind of talk about a lot of
8 different things but in the end they kind of assume a
9 larger crack size anyway. So, in actuality they kind
10 of went a little more conservative than they could
11 have based on what they were presenting in the
12 beginning. It did seem that they were conservative in
13 some of the past applications that have used that
14 methodology.

15 MEMBER SHACK: Just for my own
16 information the most operating plants now work with
17 this like ten or 20 year interval rather than the Reg
18 Guide interval?

19 MR. HONCHARIK: Yes basically every one
20 uses at least ten and basically almost all the
21 Westinghouse and all the CE plants use 20.

22 MEMBER SHACK: Somebody has been through
23 this before.

24 MR. HONCHARIK: Yes, they have. And this
25 nothing really.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: I had one other thing
2 on reactor coolant pump overspeed. This is the danger
3 of being a little bit ahead of schedule. In the DCD
4 and its essentially the same words are repeated in the
5 SER. This is, an overspeed condition this is
6 referring to reactor coolant pump overspeed now, an
7 overspeed condition could occur due to an electrical
8 fault requiring immediate trip of the generator. The
9 turbine control system and the turbine intercept
10 valves, however, limit the overspeed to less than 120
11 percent. As additional backup, the turbine protection
12 system has a mechanical overspeed protection trip
13 usually set at about 110 percent of rotating speed.
14 My question was what does main turbine overspeed
15 protection control have to do with reactor coolant
16 pump overspeed after a main generator trip? It seems
17 totally irrelevant. Absolutely totally irrelevant
18 because this plant has a generator breaker such that
19 if you have a main generator trip the generator output
20 breaker opens, the reactor coolant buses remain
21 powered from offsite power and it would seem that
22 those pumps would remain rotating at essentially the
23 same speed that they were rotating before. Now, that
24 statement that I read was a direct quote out of
25 Section 5.4.1.4.7 of the DCD and I don't have the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 direct quote from Section 5.1. -- I'm sorry 5.4.1.2.4
2 of the SER but if the words are not repeated verbatim
3 they are essentially repeated. So, and you use that
4 as one more justification about the reactor coolant
5 pump flywheel overspeed conditions. So was really
6 curious about what the technical basis for that
7 justification was and whether you really questioned
8 what main turbine overspeed protection has to do with
9 reactor coolant pump overspeed after main generator
10 trip?

11 MR. HONCHARIK: Okay. I guess I'm a
12 little hesitant because I think that might have been
13 in a different section than I had to review.

14 CHAIRMAN STETKAR: Okay.

15 MR. HONCHARIK: So I think that might be
16 for other, so I think I might have to get back to you.

17 CHAIRMAN STETKAR: Okay. Why don't you
18 do that because it was something I really, really
19 tried to think about how they were relevant and I will
20 grant you it was late at night that I honestly
21 couldn't draw the link there and its clear that the
22 paragraph talks about main turbine overspeed
23 protection. That its not talking about anything else
24 and it seems like after the generator output breaker
25 opens the two issues are basically decoupled from one

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 another.

2 MR. HONCHARIK: Right.

3 CHAIRMAN STETKAR: So, yes, if you could,
4 the relevant section of the SER is 5.4.1.2.4 of the
5 SER.

6 MR. HONCHARIK: Okay.

7 CHAIRMAN STETKAR: Thanks.

8 MR. KALLAN: Okay, I'll turn it over to
9 John Budzynski.

10 MR. BUDZYNSKI: My name is John Budzynski.
11 I am a reactor system engineer and I did several
12 sections in Chapter 5 and reactor coolant pump Section
13 5.4.1.2. I reviewed that. The reactor coolant pump
14 is a vertical shaft, single stage mixed flow with a
15 diffuser. There are two events that I reviewed in
16 here. You also see a water injection and also
17 component cooling board. In each one of these events
18 I have an open item.

19 CHAIRMAN STETKAR: I'm sorry. Let me,
20 just for clarification, is your interpretation of loss
21 of cooling water the same as our interpretation of
22 loss of cooling water as we related this morning that
23 its loss of all component cooling water supplies to
24 the reactor coolant pump.

25 MR. BUDZYNSKI: That was my assumption.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: Not individual
2 coolers.

3 MR. BUDZYNSKI: Right, that was
4 assumption. That's why I had the open item here
5 because I thought if you lose it or you lose it to
6 every or just to a certain individual component. From
7 open item 5.4.1.2-1 respective loss of COL water
8 injection. Provided response is during a main control
9 room alarm I couldn't find that in there. And how
10 long can the RCP operate in this condition? I didn't
11 find that in there either. And for the loss of
12 component cooling water, open item 5.4.1.2-2 and
13 wanted to know the loss of the CCW including loss of
14 what we were just talking about. And what is the
15 limiting factor? Overheating of the pump or the seal?
16 That's what I got out of the SER. I was a bit
17 surprised when I heard NHI's response this morning
18 they were somehow interpreting the individual cooling
19 lines or something.

20 CHAIRMAN STETKAR: Right. I think we're
21 pretty clear on things.

22 MR. BUDZYNSKI: Any questions? Next
23 slide. Residual heat removal Section 5.4.7, system
24 design. This is a similar to most current PWR designs
25 except that it has four independent trains. Each

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 train has the capacity of, 50 percent capacity of heat
2 removal used during normal startup, shutdown or
3 refueling operations. If needed, it can maintain the
4 refueling water storage temperature under 120 degrees.
5 During normal shutdown operation, it is placed into
6 operation approximately around 400 psi and 350 degree
7 Fahrenheit. It was evaluated against NRC Bulletin 88-
8 04, NRC Generic Letter 89-04 and branch technical
9 position 5-4. We also evaluated against gas
10 accumulation, ISG DC/COL ISG-019. And open item
11 contains to the gas accumulation. And we request that
12 they provide additional information that supports the
13 RH design complies with ISG-019 with respect to
14 potential air ingestion and/or vortexing during
15 refueling operations. In the 019 they identified
16 three guidances. One is that the identifying, that
17 they want the applicant to then find the gas
18 accumulation locations and the gas intrusion
19 mechanisms. They also want to confirm that the pmds
20 and the isometric drawings are to the as built
21 condition of the plant and that's a high tech issue.
22 And the third thing would be surveillance and vending
23 procedures. And so we are waiting for a reply to that
24 open item.

25 CHAIRMAN STETKAR: Good not surprising

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 there's several questions on RHR. The first question
2 is that in Section 5.2.2.4 of the SER there is quite
3 a long discussion about provisions to enable to low
4 temperature overpressure protection function of the
5 RHR suction relief valves and without quoting verbatim
6 long paragraphs there's the discussion of RAIs and
7 responses from the applicant. It finally concludes
8 that the RHR system is automatically actuated below
9 the enabling temperature and that, this is a quote,
10 the RHR and LTOP systems cannot be manually activated
11 by the operator and those statements are apparently
12 used as a basis for your conclusion that indeed
13 enabling of the low temperature over pressure
14 protection systems is adequate for the plant. From
15 what I read in DCD and from what MHI told us this
16 morning, those statements are not correct. Its not
17 automatically activated and in fact it can only be
18 aligned manually and not only, only aligned manually
19 but the operators have to go out in the plant and
20 reconnect the electrical power to the valves before
21 they can open the valves. So this is not something
22 that happens in any way shape or form automatic so I
23 was curious.

24 MR. BUDZYNSKI: I agree with you.

25 CHAIRMAN STETKAR: Okay. So why does it

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 say in the SER that the thing works this way?

2 MR. BUDZYNSKI: I would have to go back
3 and review that section. I believe what was meant is
4 that when you get the load 400 psi and 350 degrees,
5 you can now enable it. It allows you to enable the
6 system below that section. But the system is not
7 enabled. Okay? It has to be done manually by the
8 operator and by the field operators in the plant.

9 CHAIRMAN STETKAR: Its certainly what the
10 SER says John.

11 MR. BUDZYNSKI: Okay. I will have to go
12 back.

13 CHAIRMAN STETKAR: I'll read you the --
14 "below the enable temperature the CS/RHR pump hot leg
15 isolation valves RHR RHS MOV", I won't read the valve
16 numbers, "automatically open placing the RHR and LTOP
17 systems in service." That's a direct quote. I'll
18 skip a couple of sentences. "The RHR and LTOP systems
19 cannot be manually activated by the operator." That
20 is also a direct quote from the SER. I didn't find
21 those statements anywhere in the DCD.

22 MR. BUDZYNSKI: I'll have to go back and
23 take a look at that.

24 CHAIRMAN STETKAR: Take a look at that
25 because and if indeed that is part of your basis for

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 determining that the adequacy of whether its main
2 control room alarms or operator prompts or whatever it
3 is to enable the overpressure protection at an
4 appropriate point. If that served as a basis, you may
5 need to rethink that.

6 MR. BUDZYNSKI: Okay. Yes because I know
7 I went over the RAI and it seemed to me like how you
8 stated it was once you get below the alarms in the
9 control room allows the operator now to manually set
10 up and use it. And that's my interpretation.

11 CHAIRMAN STETKAR: I tried to make sure
12 that going back up in pressure, I couldn't find and
13 reconfirm and we confirmed this morning, going back up
14 in pressure, there wasn't anything automatically that
15 would close those valves, thereby isolating the relief
16 valve.

17 MR. BUDZYNSKI: Okay. Jeff, do you have
18 anything to add to that?

19 MR. SCHMIDT: Hi. I'm Jeff Schmidt from
20 the same branch John is, reactor systems. I helped
21 review that section and the way I interrupt it was
22 that yes, power had to be manually restored to that
23 valve and then when it got to the right conditions it
24 would open automatically. That's what I, when I
25 reviewed 547, I thought that's what it said.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: Okay. Well I think
2 you may need to go back and either ask the applicant
3 for clarification because that doesn't seem to be at
4 least what I can read from the DCD or the responses to
5 the RAIs or what MHI told us this morning about how
6 the system works.

7 MR. SCHMIDT: Okay.

8 CHAIRMAN STETKAR: More on RHR suction
9 valves. Did, this is, we referred to a report this
10 morning that I didn't look through regarding questions
11 about the relief capacity of the RHR suction valves
12 versus injection capacity from the SI pumps and
13 whether or not the relief valves had adequate flow
14 capacity to prevent pressurization up to whatever it
15 is, 900 pounds or something like that. Did you look
16 at that, the analyses that are in that, I guess it's
17 a technical report?

18 MR. BUDZYNSKI: Yes I did, but its been
19 such a long time.

20 CHAIRMAN STETKAR: Okay.

21 MR. BUDZYNSKI: I mean we started this
22 several years ago I think, on this.

23 CHAIRMAN STETKAR: Well we asked MHI at
24 least to try to get back to us with a little bit more
25 clarification on those pressure responses.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. BUDZYNSKI: Okay.

2 CHAIRMAN STETKAR: The issues of their
3 ingress into the RHR pump and I know you do have an
4 open item on that. It's a little bit more complicated
5 as I tried to lay out this morning than simply loss of
6 the RHR cooling function because these RHR pumps
7 provide other things in the plant that might indeed be
8 much more important than close loop residual heat
9 removal, that being long term cooling in the RWSP and
10 things like that. So I'm hoping that as you follow
11 through on that open item, that doesn't get separated
12 simply because we are talking about Chapter 5 here and
13 those might be Chapter 6 issues for the same pumps.

14 MR. BUDZYNSKI: No, we just finished the
15 gas accumulation on AP1000 and they did an excellent
16 job on that. So, I will use that material that I gain
17 from that into this.

18 CHAIRMAN STETKAR: I recognize that its
19 not the role certainly of the staff nor the certainly
20 the ACRS to design nuclear power plants. That's not
21 our role at all but its curious that given what we
22 know about possible vortexing the RHR pumps especially
23 during things like mid loop operation that this design
24 has the suction valve coming off the side of the loop
25 rather than for example, the bottom of the loop which

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 would give you several more inches below that mid loop
2 value of margin. Did you ask MHI at all about that
3 from a design perspective?

4 MR. SCHMIDT: I didn't but I think Jeff
5 had something to do with that part.

6 CHAIRMAN STETKAR: And Jeff would like to
7 say something.

8 (Laughter.)

9 MR. SCHMIDT: Yes this is Jeff Schmidt
10 again. Yes, we looked at that and there's an I tack
11 to test that actually the mid loop level but normally
12 they keep it above mid loop for as their minimum
13 value.

14 CHAIRMAN STETKAR: Four inches though.

15 MR. SCHMIDT: Right.

16 CHAIRMAN STETKAR: Its .33 feet.

17 MR. SCHMIDT: Yes, right. I know its not
18 much.

19 CHAIRMAN STETKAR: You are not allowed
20 above --

21 MR. SCHMIDT: No and that's one of the
22 reasons for this question.

23 CHAIRMAN STETKAR: Okay.

24 MR. SCHMIDT: As the open item, yes. I
25 had the same concern. The other concern is you know,

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the RHR pump has a high gallons per minute and its
2 more than I've seen in other designs. So I was
3 worried that four inches wasn't going to be adequate
4 for the higher pump flows that I've seen. So that's
5 the reason for the open item.

6 CHAIRMAN STETKAR: Okay, good. As long
7 as you are tracking that?

8 MR. SCHMIDT: Yes, we are.

9 CHAIRMAN STETKAR: You know in principal
10 if everything works perfectly you know an inch is good
11 enough. But in practice.

12 MR. SCHMIDT: Right. Yes, that's --

13 CHAIRMAN STETKAR: Sometimes it doesn't
14 work perfectly.

15 MR. SCHMIDT: We are engaged with MSI.

16 CHAIRMAN STETKAR: Two more things --

17 MEMBER BLEY: I'm sorry. I wanted to
18 follow it up.

19 CHAIRMAN STETKAR: No sure go ahead.
20 Certainly.

21 MEMBER BLEY: I thought of it now and I
22 don't remember seeing it. It is probably Jeff again
23 for this one but I'll put it to you. Should in fact
24 an operation they not at some point maintain that
25 narrow margin and they actually vortex and pull air

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 into the eye of the pump, could you look at the
2 capability of them to vent that air and get RHR
3 started again? That's been a very difficult maneuver
4 and some plants depends on the design of the plants.

5 MR. SCHMIDT: I didn't hear all of the
6 question. Could you repeat the question please?

7 MEMBER BLEY: Did you look at the issue
8 and get satisfied that should an operation deliver
9 news that control and vortex and pull air into the eye
10 of the RHR pump that they have vent capability so that
11 they could restore flow because that's been a very
12 difficult maneuver at some plants that others it seems
13 pretty easy to get the pumps going again?

14 MR. SCHMIDT: We haven't specifically
15 looked at that. We've looked at the whole RHR system
16 and looked for places where gas could accumulate and
17 where they can vent it and they are basically
18 following NEI guidance 09-01 where they try not to,
19 they have capability of venting and you know, no high
20 points in there where you would not want high points.
21 They also have, I think, some capability to vent to
22 the RWSP as kind of, as a system to --

23 MEMBER BLEY: From the eye of the pump?
24 Near the pump?

25 MR. SCHMIDT: No.

1 MEMBER BLEY: The places people have
2 gotten into trouble are cases where the pump is a
3 relative high point and they actually vortexed and got
4 air all the way into the eye of the pump. Then it was
5 very hard to clear the pump and actually restore flow.

6 MR. SCHMIDT: Well, I think that's one of
7 the purposes of this open item is that we're looking
8 for --

9 MEMBER BLEY: That's why I asked.

10 MR. SCHMIDT: Is it the potential of
11 vortexing down to the pump and its effect on the pump.
12 You are basically carrying it farther and saying look
13 if I have vortexing to the pump, how can I then
14 restore the pump.

15 MEMBER BLEY: Its happened quite a few
16 times and that's why I think its worthy of a careful
17 look.

18 MR. SCHMIDT: Okay, I understand.

19 CHAIRMAN STETKAR: It's somewhat related
20 to a question I asked this morning about the function
21 of the spent fuel pool gravity draining. That's the
22 question. That can get suction above the pump,
23 restore suction to the pump but MHI seemed to say
24 that, they essentially were giving up on the RHR pumps
25 and going into a different cooling mode.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. SCHMIDT: Yes.

2 CHAIRMAN STETKAR: Which would lead me to
3 believe that perhaps there are concerns about their
4 ability to vent the pumps once you have air.

5 MR. SCHMIDT: My understanding of this
6 spent fuel pool was just to, not necessarily, in an
7 RAI response, they said its not to restart the pumps.
8 It is basically to make, to another water source to
9 keep the core covered.

10 CHAIRMAN STETKAR: But eventually, I
11 mean, you, eventually you are putting cold water in
12 from the spent fuel pool, refilling the spent fuel
13 pool from the makeup pump from the RWSP venting steam
14 out of the primary system and cooling the core that
15 way. It's sort of bleed and feed kind of cooling
16 mechanism eventually you've got to take heat out of
17 the containment.

18 MR. SCHMIDT: Right.

19 CHAIRMAN STETKAR: And the only way you
20 can take heat out of the containment is with those
21 pumps that you just gave up on.

22 MR. SCHMIDT: Right. Because they also
23 act as the containment spray pumps.

24 CHAIRMAN STETKAR: And the RWSP cooling
25 pumps.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. SCHMIDT: Right.

2 CHAIRMAN STETKAR: Your re-circulation
3 pumps if you want to call them that.

4 MR. SCHMIDT: Right.

5 CHAIRMAN STETKAR: So, regardless of
6 whether they will survive -- you know it could be
7 quite a while because you've got decay heat working
8 for you. But regardless of the time that you might be
9 able to survive in this sort of what's called a bleed
10 and feed cooling mode, eventually they should be,
11 there should be provisions to get those pumps back or
12 some sort of alternate cooling function.

13 MR. SCHMIDT: I don't think we looked at
14 that level of detail to get them restarted.

15 CHAIRMAN STETKAR: You've heard our
16 concerns.

17 MR. SCHMIDT: Right. Yes, I think it can
18 be addressed on this open item.

19 CHAIRMAN STETKAR: Yes. Okay. Two more
20 on RHR. I just look RHR systems. If you have ever
21 operated a plant, you love RHR systems. There was a
22 question on I believe I tack, let me just make sure I
23 have my notes correctly here. The I tack to verify
24 adequate net positive suction head for the RHR pumps
25 and apparently and I think there is an open item on

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 this and I guess it's the same open item. It is all
2 involved with the same type of issue. But, its my
3 understanding MHI proposed that that functional
4 testing be performed at mid loop operation because
5 they felt that was the most limiting condition. Is
6 there concern because the same pumps do perform the
7 RWSP cooling function and therefore must take suction
8 from some elevated temperature in the RWSP through
9 the, their own set of suction screens and provide
10 cooling. Is there any concern regarding available net
11 positive suction head for those same pumps under those
12 cooling modes? And the follow on question of course
13 is does this design include any credit for containment
14 accident pressure to maintain net positive suction
15 head for those pumps under accident conditions where
16 you require them to operate in the ultimate core
17 containment heat removal capability? So this is now
18 more of the Chapter 6 but it's the same issue of how
19 do I, what are the most limiting conditions that I
20 need to actually establish during the pre-operational
21 testing program, the I tack stuff to get us adequate
22 assurance that the pumps will have adequate net
23 positive suction head during any mode that we might be
24 operating those pumps?

25 MR. SCHMIDT: Yes, that is a 6.3 concern

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 because it really goes to the containment spray at
2 this point. They do take cap credit for the SI
3 injection. They take the vapor pressure curve. So
4 we've looked at it fairly heavily from SI injection
5 pump because it is a high energy pump. We haven't
6 really looked at it really from the containment spray
7 pump because its not as high energy as the SI pump.
8 But I think that's probably an action we should take,
9 is to, I mean we've done a very detailed audit on the
10 SI pumps. But we haven't looked at it --

11 CHAIRMAN STETKAR: I'm sure we'll hear
12 more about that in Chapter 6.

13 MR. SCHMIDT: Yes.

14 CHAIRMAN STETKAR: I was just a little
15 bit concerned because you know these pumps from
16 strictly the Chapter 5 perspective are our RHR pumps
17 and one might argue that the mid loop operation for
18 that function might be limited for that function but
19 their other function is also relevant.

20 MR. SCHMIDT: Yes, very much so. And we
21 did really look at this from more of an RHR decay heat
22 removal focus and 6.3 really covers I think your other
23 concern.

24 CHAIRMAN STETKAR: Okay. We'll make sure
25 to visit that in 6.3 then. Last question on RHR.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 There was some discussion about the pump minimum flow
2 recirculation line.

3 MR. SCHMIDT: Right.

4 CHAIRMAN STETKAR: And I see where the
5 line is. The line comes off the discharge side,
6 downstream side from the heat exchanger and goes back
7 to the pump. Pretty standard. There was some concern
8 that said the, let me see if I can abbreviate my notes
9 here. The reference is made to NRC Bulletin 88-04 and
10 NRC Generic Letter 89-04, in particular regarding
11 operation of pumps on minimum flow recirculation. And
12 as best as I can determine, reading NRC Bulletin 88-04
13 there were two concerns identified in that particular
14 bulletin. One is that in some plants apparently there
15 is a configuration where you may have a common minimum
16 flow circulation line for several pumps and that with
17 two or more pumps operating, depending on how the line
18 is configured and the differential pressures indeed
19 one of the pumps might be dead headed. So there's a
20 question about dead heading of the pumps during
21 minimum flow recirculation which pretty evidently is
22 not a concern on this plant because the design of the
23 plant.

24 The second concern in and let me go to 89-
25 04 before I get back to the second concern. There's

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 a concern about whether or not minimum flow
2 recirculation lines, in particular without the
3 capability for instrumented flow could be used to
4 verify functional performance of pumps because in some
5 plants they just use the mini flow line for the pump
6 functional testing. And MHI for this particular
7 design, doesn't do that. They do the full flow
8 functional test through the test line at RWSP. So
9 that's not an issue.

10 MR. SCHMIDT: Right.

11 CHAIRMAN STETKAR: Now back to the second
12 issue though in the Bulletin 88-04 there seem to have
13 been concerns about whether or not the actual flow
14 capacity through the minimum flow recirculation line
15 was adequate to protect the pump if it was placed into
16 a situation where it needed to operate for some
17 extended period of time under minimum recirculation
18 conditions. I didn't read all of the details or look
19 at all of the references but apparently there were
20 some concerns about some regimes of pump operation
21 where if you didn't size the minimum flow
22 recirculation line properly you could indeed get
23 problems with pump instabilities and damage to the
24 pump. Because I read through the responses. The
25 responses seem to adequately address the notion of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 potential dead heading through the mini flow
2 recirculation line and functional testing of the
3 pumps. I didn't see anything that addressed the
4 proper sizing of the minimum flow recirculation line
5 or any tests that would be performed to verify that
6 indeed the pumps could operate stably for an extended
7 period of time and I don't know what extended means so
8 I'm not going to try to quantify that. Under that
9 unit, minimum flow recirculation. So I was curious
10 whether you had thought much about that because the
11 initial conclusion was that the design is okay and
12 they need to do any pre-operational tests with flow
13 through, just the minimum flow recirculation.

14 MR. SCHMIDT: No, I don't think we really
15 addressed on the mini flow. We were more concerned
16 about the full flow test and whether that would be a
17 problem with the mini flow line that could potentially
18 occur. But we didn't really -- the only thing we
19 looked in the mini flow line whether if there was
20 active components that a single failure could cause
21 that would cause the pump to fail. But we did not
22 look at the sizing of the mini flow --

23 CHAIRMAN STETKAR: When I went back and
24 I read the Bulletin, that 88-04 it is a concern. Its
25 obviously design specific.

1 MR. SCHMIDT: Right.

2 CHAIRMAN STETKAR: Pump design specific
3 and line size design specific that was raised in that
4 bulletin and I didn't see where any of, dismissing a
5 pre-operational test with some sort of flow through
6 that line to confirm that indeed its sized and
7 configured properly would resolve that. And now I'll
8 stop talking about RHR. If anybody else wants to talk
9 about RHR, feel free, chime in any time. Okay,
10 continue, I'm sorry.

11 MR. BUDZYNSKI: Okay. The next section is
12 5.4.11 pressurizer relief tank. This is similar to
13 current PWR designs. It has the capacity, 100 percent
14 of the full power pressurizer steam volume, used on a
15 design basis events to prevent pressurization of the
16 reactor point system and pressurizer. Received steam
17 from the pressurizers via SRVs and the SDVs and
18 receives simple gasses from the high point vent
19 system.

20 We have three open items here. Open item
21 5.4.11-1 provides additional information support at
22 the PRD and are designed for full volume to prevent
23 PRD collapse without nitrogen blanket being there. I
24 believe I found enough information to close that out.
25 But I would like to see the response anyway.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Open item 5.4.11-2 provide additional
2 information to support that the PRT rupture disks do
3 not pose a missile threat with respect to design and
4 location within the containment. That too I think I
5 have enough information. I went back and I reviewed
6 a couple of additional prints, a couple different
7 sections. I think I have enough information on that
8 but I would like to see the response too on that.

9 And Open item 5.4.11-3 provide additional
10 information to support Seismic Category I/non-seismic
11 SSCs interfact requirement RG-128-C-3 regulatory
12 position. I think I also got information on that to
13 close that one out but I would like to see what they
14 have.

15 CHAIRMAN STETKAR: And it sounded, not
16 trying to pre suppose anything it sounded from MIH's
17 presentation that these are also relatively
18 straightforward.

19 MR. BUDZYNSKI: Yes.

20 CHAIRMAN STETKAR: There shouldn't be any
21 surprises at least on these three items.

22 MR. BUDZYNSKI: No, you're right. You
23 are right. Pretty straightforward. Okay, the last
24 section I have is 5.4.12. Reactor point system high
25 point vents required by 10 CFR 50.34(f)(2)(vi) and TMI

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 Action Plan Item II.B.1. Removes RCS to maintain
2 adequate core cooling and one is reactor vessel head
3 vent to the PRT. It also, the pressurizer SDVs to the
4 PRT and the pressurizer DVs to the containment vessel.
5 Standard configuration design, its basically standard
6 type of design. Reactor vessel head and SDVs have two
7 parallel events paths with two nominally closed MOV
8 valves and series. DVs have one path with two MOV
9 valves and series and the DVs are used for severe
10 accidents.

11 CHAIRMAN STETKAR: John, I was going to
12 ask you about and I'll interrupt you instead that
13 initial bullet under the standard configuration
14 design. It says reactor vessel head and SDV have two
15 parallel event paths with two normally closed MOVs and
16 series. That as best as I can find from the DCD is
17 certainly true for the reactor vessel head event. The
18 flow diagram that's shown in the DCD although there
19 are no words that specifically describe it. It seems
20 to indicate that the SDV block valves are normally
21 open and the SDV depressurization valves are normally
22 closed so that the SDV lines normal configuration is
23 with one normally open motor operated valve and one
24 normally closed motor operated valve.

25 MR. BUDZYNSKI: I will have to go back

1 and check that because my diagram indicates that they
2 are both closed but --

3 CHAIRMAN STETKAR: Oh, I'm looking at
4 Figure 5.1-2. Unfortunately I made a copy out of
5 Revision 3 of the DCD and I didn't go back and look at
6 Revision 2, but check that. I'll ask MHI, let me ask
7 MHI while they are here, somebody is here. Are the
8 SDV block valves normally open?

9 MR. OGINO: This is Ogino. SDV is
10 normally closed and block valve is normally open.

11 CHAIRMAN STETKAR: Okay. Block valves
12 normally open. Are there any signals that
13 automatically close the block, the SDV block valves?

14 MR. OGINO: This is Ogino. Block valves
15 is automatically closed. SDVs cannot be closed.

16 CHAIRMAN STETKAR: What signals close the
17 SCV block valves because I couldn't find any
18 information about that at least in Chapter 5?

19 MR. OGINO: Inconsistency and demand
20 signal. Inconsistency by concern and demand signal.
21 We want to close the SDV, we receive demand signal

22 CHAIRMAN STETKAR: Okay. That's an
23 interlock that if you try to close the SDV and it does
24 not close, then the block valve will close?

25 MR. OGINO: So sometimes happens. I

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 think this is same as plant.

2 CHAIRMAN STETKAR: Yes, what I was
3 looking for is are there any, for example, if you had
4 an SDV open spuriously, which would create a LOCA to
5 the top of the pressurizer, are there any, for
6 example, low pressure safety injection signals or
7 other signals that automatically close the blocked
8 valve to isolate that LOCA path or do you rely on only
9 manual operator action to isolate it?

10 MR. BUDZYNSKI: I don't recall that.

11 CHAIRMAN STETKAR: Let's see if we can
12 follow upon that with HR or someone.

13 MR. BUDZYNSKI: I put that note in there
14 just as a reminder that the steam generator tubes are
15 accumulate gas but they are not required to be vented
16 in 10 CFR50.46a. And there's open item, initially we
17 had this, we wanted them to include a COL but we
18 changed it after discussion to provide procedures or
19 a proposed change to the DCD that would essentially
20 address removal of the non vessel gasses from the
21 rapture system high point vent system. Identify each
22 of the flow paths and what the procedures or changes
23 are made for that. Any questions on that?

24 CHAIRMAN STETKAR: Not on that. Bill do
25 you want to ask it again? Do you know whether or not

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the DVs are powered from AC or DC power?

2 MR. BUDZYNSKI: The DVs?

3 CHAIRMAN STETKAR: The DVs.

4 MR. BUDZYNSKI: I believe they are AC
5 power but I'll check again.

6 CHAIRMAN STETKAR: That's something that,
7 you know, you probably heard the discussion this
8 morning so we don't need to reiterate it.

9 MR. BUDZYNSKI: No I missed that. I
10 wasn't available.

11 CHAIRMAN STETKAR: Oh, you weren't, okay.
12 Well part of the discussion is the DVs are your high
13 pressure melt protection valves. They are really much
14 less important from the high point venting than an
15 accident mitigation. Mitigation at least not
16 prevention perspective. One of the more important
17 potential contributors to high pressure melts are
18 station blackout scenarios and if indeed those valves
19 are AC powered its not all that easy to get them open
20 with no AC power. So the question is are they AC or
21 DC powered because many of the scenarios when you
22 really like to get those valves open to depressurize
23 the primary system, change the melt progression, you
24 would really like to have power available.

25 MR. HAMZEHEE: John also in addition you

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 asked if it AC. Why is it not DC? That was another
2 question.

3 CHAIRMAN STETKAR: Well, that's -- yes.
4 I mean if it is AC which division does it come off and
5 all that kind of thing.

6 MR. HAMZEHEE: The design basis that they
7 are not DC and they are AC. That was another
8 question.

9 CHAIRMAN STETKAR: Yes, but it's the
10 whole issue of, the purpose of those valves is to
11 change a potential high melt scenario into a low
12 pressure melt scenario. Station blackout is certainly
13 a, traditionally a visible contributor to potential
14 high pressure melt scenarios. In design questions
15 about life of batteries and theoretically in
16 deterministic design space you don't get into the
17 potential high pressure melt scenario as long as you
18 have one of the turbine driven aux feedwater pumps
19 available which survive until the batteries die. But
20 if the same battery supply these valves then they
21 don't help you in that scenario either. So, the power
22 supplies and the longevity of those supplies to those
23 valves in particular could be important. Again, not
24 necessarily from the perspective of high pressure
25 vents in Chapter 5 space but I think this is probably

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 the only part of the entire DCD and SER that talk
2 about those particular valves.

3 MR. HAMZEHEE: Right.

4 CHAIRMAN STETKAR: They are certainly not
5 design basis accident things that are addressed in
6 Chapter 6? This is the only place that we get a
7 chance to really question these valves.

8 MR. BUDZYNSKI: Any other questions?

9 CHAIRMAN STETKAR: Any other members have
10 any questions? Excellent. Well since we are so far
11 ahead, I could ask you to read all the acronyms but I
12 won't do that.

13 (Laughter.)

14 CHAIRMAN STETKAR: Thank you very, very,
15 very much. And with that I believe we are finished.
16 I would like to but unless you've been keeping very
17 coherent notes, I've lost track a long time ago. So,
18 what we normally do is as I mentioned at the outset,
19 is we're trying to keep a list of items for ourselves.
20 They are not as formal as action items but they are
21 more reminders for us as a subcommittee of questions
22 of merit that come up during our discussions that we
23 want to make sure that we follow up on. So I don't
24 want to try to make them sound too formal but I also
25 don't want to completely lose track of them. In the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 past what we've tried to do at the closeout at every
2 meeting is to go through the list of items that have
3 arisen during the meeting and make sure that at least
4 everyone is clear on what they are. As I said, I lost
5 track of them during the meeting.

6 MEMBER BROWN: Did they write some --
7 somebody was scribbling.

8 CHAIRMAN STETKAR: People have been
9 taking notes. My concern about on the public record
10 is that we miss a few, we might have a problem. So,
11 I guess, I don't know. I'll ask the members. Is it
12 worthwhile going through the list that Ilka has or
13 should we wait and try to collect our thoughts after
14 the meeting and then make sure we distribute the list
15 to the staff and you can get it to MHI?

16 MEMBER BLEY: I think if Ilka circulated
17 her list next week.

18 CHAIRMAN STETKAR: We've kind of been
19 doing that and that's probably the best idea.

20 MEMBER BROWN: On the other projects
21 we've gone through the list and if we picked up other
22 ones we did it on two other projects and it seemed to
23 work out okay.

24 CHAIRMAN STETKAR: It works okay if you
25 only have three or four items. But there was quite a

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 bit of discussion that might -- my only concern is
2 that something on the public record that's in the
3 transcript, if we miss something it might be missed.
4 So I think I would rather do that but we'll
5 collectively look through our notes, make sure that we
6 have all of the items and then make sure the staff and
7 MHI gets them within the next week or so.

8 MR. CIOCCO: That's good. That will be
9 very helpful.

10 CHAIRMAN STETKAR: Yes. With that is
11 there anything from anyone else on the committee? Any
12 questions?

13 MEMBER BLEY: Not about this but can I
14 raise something else?

15 CHAIRMAN STETKAR: Absolutely.

16 MEMBER BLEY: Sometime, we just got a new
17 PRA chapter, new PRA.

18 CHAIRMAN STETKAR: A new Chapter 19?

19 MEMBER BLEY: New Chapter 19. The PRA
20 was revised?

21 MR. SPRENGEL: No, this is Ryan Sprengel.
22 We did provide I think levels one and two of the PRA,
23 the previous report. There will be a revision coming
24 at the end of June.

25 MEMBER BLEY: Oh in June?

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

1 MR. SPRENGEL: Right, but the previous
2 meeting I think there was a request. So just to be
3 clear you know, this was the current one that we've
4 submitted, that's what was provided and then there
5 will be a revision.

6 MEMBER BLEY: There will be a revision in
7 the June time frame?

8 MR. SPRENGEL: The end of June, yes. And
9 that is already reflected in the DC Rev 3, Chapter 19.

10 MEMBER BLEY: Okay.

11 CHAIRMAN STETKAR: Which is what we just
12 got?

13 MR. SPRENGEL: No, you received the actual
14 revised PRA.

15 MR. CIOCCO: Jeff Ciocco, NRC staff. You
16 received probably both. You received the DCD Revision
17 3, the CDs and we provided you the PRA, the last
18 revision of the PRA. It was a special request you
19 had. So you have DCD Revision 3, which reflects the
20 newer PRA that you don't have yet that is going to be
21 submitted on the docket early July, end of June.

22 MS. BERRRIOS: So you have level 1, level
23 2 and level 3 but which one are you submitting in
24 June?

25 MR. SPRENGEL: Levels 1 and 2 will be

1 revised in June.

2 MR. HAMZEHEE: What you have is last time
3 some of the members expressed interest in having a
4 copy of the existing PRA. That's what this and some
5 did not have it so we just provided to you again.

6 MEMBER BLEY: The reason I raise this is
7 I understand there's going to be more substantial use
8 of the PRA.

9 MR. HAMZEHEE: Yes.

10 MEMBER BLEY: In this application than in
11 others, so was interested in when we would have the
12 most current PRA and some time here how the folks are
13 going to look at this, if you are going to look at it
14 differently than we have in the past. So we don't
15 need to address that now, but we are going to want to
16 know about that.

17 CHAIRMAN STETKAR: Let me do two more
18 procedural things and we'll close the meeting. Is
19 there any member of the public here who wishes to make
20 any comments or statements? Okay. If there isn't
21 then I will adjourn the meeting.

22 (Whereupon the above-entitled meeting was
23 concluded at 1:52 p.m.)

24

25



Presentation to ACRS

Chapter 5: Reactor Coolant and Connecting Systems

Mitsubishi Heavy Industries, Ltd.

May 27, 2011

MNES Presenters



Con Wilson – Lead Presenter

Mitsubishi Nuclear Energy Systems, Inc.

Yosuke Katsura – Technical Expert

Mitsubishi Nuclear Energy Systems, Inc.

Chapter 5 Lead in MNES

Hideki Fujimoto – Technical Expert

Mitsubishi Heavy Industries, Co. Ltd.

Chapter 5 Lead in MHI

Takafumi Ogino – Technical Expert

Mitsubishi Heavy Industries, Co. Ltd.

Chapter 5 Engineer

Takatoshi Hirota – Technical Expert

Mitsubishi Heavy Industries, Co. Ltd.

Chapter 5 Engineer

Acronyms (1/2)



CCW	:Component Cooling Water System
CL	:Cold Leg
CRDM	:Control Rod Drive Mechanism
CS/RHR	: Containment Spray/ Residual heat Removal
CSS	:Containment Spray System
CVCS	:Chemical and Volume Control System
CVDT	:Containment Vessel Reactor Coolant Drain Tank
DV	:Depressurization Valve
EFPY	:Effective Full Power Years
EOL	:End of Life
ESWS	:Essential Service Water System
HL	:Hot Leg
ISI	:Inservice Inspection
LTOP	:Low Temperature Overpressure Protection
MCR	:Main Control Room
MOV	:Motor Operated Valve
PRT	:Pressurizer Relief Tank

Acronyms (2/2)



PSV	:Pressurizer Safety Valve
P-T	:Pressure-Temperature
PTLR	:Pressure Temperature Limit Report
PWSCC	:Primary Water Stress Corrosion Cracking
RCL	:Reactor Coolant Loop Piping
RCP	:Reactor Coolant Pump
RCPB	:Reactor Coolant Pressure Boundary
RCS	:Reactor Coolant System
RT_{NDT}	:Reference Nil Ductility Temperature
RT_{PRS}	:Reference Pressurized Thermal Shock Temperature
RV	:Reactor Vessel
SCC	:Stress Corrosion Cracking
SDV	:Safety Depressurization Valve
SG	:Steam Generator
SGTR	:Steam Generator Tube Rupture
SSCs	:Structure, System, and Components
UT	:Ultrasonic Testing

DCD CHAPTER 5: REACTOR COOLANT AND CONNECTING SYSTEMS

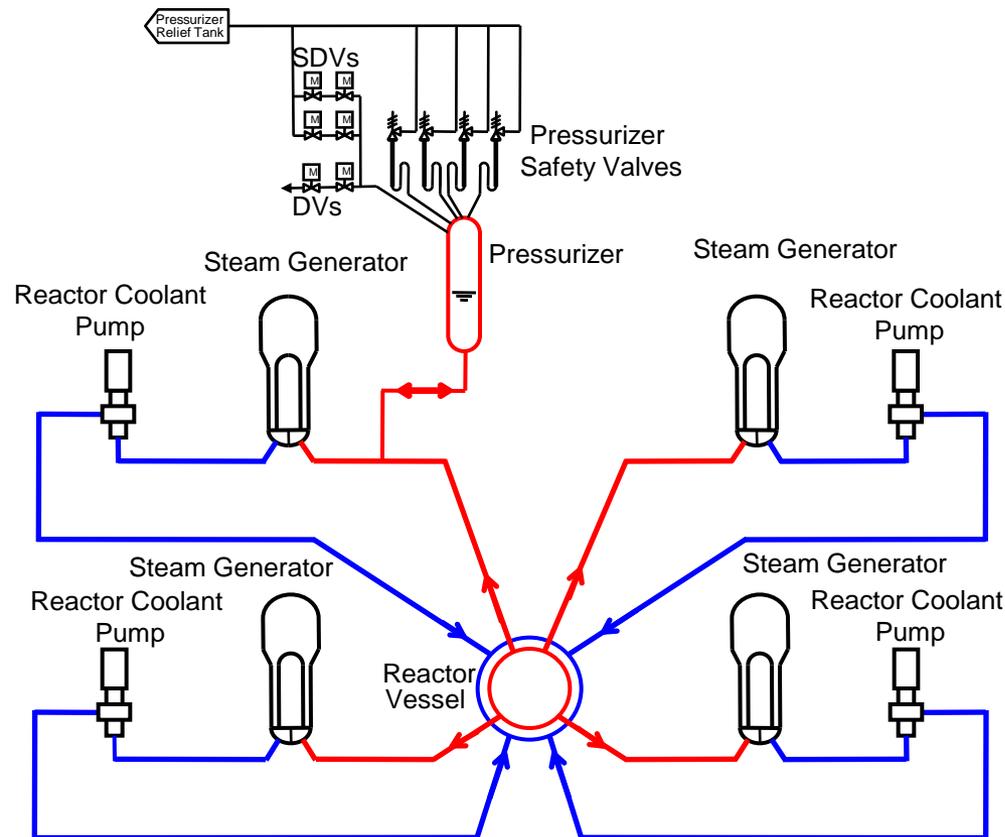


Section		Major Contents
5.1	Summary Description	Design Feature of Reactor Coolant System (RCS)
5.2	Integrity of Reactor Coolant Pressure Boundary (RCPB)	5.2.1 Compliance with Code and Code Cases (open item)
		5.2.2 Overpressure Protection
		5.2.3 Reactor Coolant Pressure Boundary (RCPB) Materials
		5.2.4 Inservice Inspection and Testing of RCPB
		5.2.5 RCPB Leakage Detection
5.3	Reactor Vessel (RV)	5.3.1 Reactor Vessel (RV) Materials
		5.3.2 P-T Limits, Pressurized Thermal Shock (PTS), Charpy Upper Shelf Energy (open items)
		5.3.3 RV Integrity
5.4	RCS and Subsystem Design	5.4.1 Reactor Coolant Pumps (RCPs) (open items)
		5.4.2 Steam Generators (SGs)
		5.4.3-5.4.11 RCL, RHR, Pressurizer, PRT, etc. (open items)
		5.4.12 RCS High Point Vents (open item)

5.1 Reactor Coolant System Summary



- A 4-loop plant with safety and performance enhancements



5.2.1 Compliance with 10CFR50.55a Codes and Code Cases



- *ASME Section II – 2001 Edition with 2003 Addenda*
- *ASME Section III – 2001 Edition with 2003 Addenda*
 - ✓ *For pipe seismic design – 1992 Edition with 1992 Addenda*
 - ✓ *Class 2 & 3 piping analysis – 1989 Edition with 1989 Addenda*
- *ASME Section IX – latest Edition at time of welding*
- *ASME Section XI – 2001 Edition with 2003 Addenda*

Open Item Subject	Description of Open Item
<p>SER & RAI 05.02.01.02-7 DCD 5.2.1.2 “Compliance with Code Cases”</p> <ul style="list-style-type: none">•NCA-1140•Code Case N-782•RG 1.84	<ul style="list-style-type: none">➤ NCA-1140 disallows use of Code Edition earlier than 3 years prior to construction permit.<ul style="list-style-type: none">• 9’08 R-COLA date implies violation of NCA-1140.• Code Case N-782 allows Code Edition endorsed by DCD• However, Code Case N-782 is not in RG 1.84➤ MHI Response<ul style="list-style-type: none">• Code Case N-782 will be added to DCD Table 5.2.1-2 along with a note of explanation justifying its use.

5.2.2 Overpressure Protection



- The Overpressure protection system has the following design features:
 - Pressurizer safety valves on 4 separate nozzles at the top of the pressurizer.
 - Low temperature overpressure protection (LTOP) is provided by the Containment Spray/Residual Heat Removal (CS/RHR) pump suction relief valves installed in each train of the RHR system.

All RAIs are closed in this section

5.2.3 RCPB Materials (1/2)



Category		Material	Technical Background
Low Alloy Steel	Forgings	SA-508 Grade 3	Good fracture toughness property
	Plates	SA-533 Type B	
	Welds	Low alloy steel electrode	
Austenitic Stainless Steel	Forgings	F316(*), F316LN	Low susceptibility to Stress Corrosion Cracking (SCC) in PWR
	Piping	TP 316(*), 316 LN, 316L	
	Castings	CF-3A, 3M, 8(*), 8M(*)	Δ -ferrite is limited to prevent thermal aging
	Cladding, Buttering	308L/309L 316L	Low susceptibility to SCC in PWR
Ni-Cr-Fe Alloy	Tube/Pipe	UNS N06690 (TT)	High resistance to Primary Water Stress Corrosion Cracking (PWSCC)
	Cladding, Buttering	Alloy 52/152	

(*) Limited carbon content materials

5.2.3 RCPB Materials (2/2)



➤ Major RAIs (closed)

RAI No.	Question 05.02.03-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
644-5077	27	Minimum Preheat Temperature	<ul style="list-style-type: none">➤ Minimum preheat temperature of ferritic RCPB material was accepted by showing the test data➤ MHI uses Post weld baking and it was permitted by revised RG-1.50 issued on March 2011
644-5077	29	Carbon Content of Stainless Steel	<ul style="list-style-type: none">➤ Limited carbon content stainless steel will be used➤ Especially for Stagnant region: $\leq 0.03\%$
644-5077	30	To avoid SCC susceptibility on cold work	<ul style="list-style-type: none">➤ Buffing after J-Groove weld and Dissimilar Metal Weld

5.2.4 Inservice Inspection and Testing



- **Accessibility of equipment and personnel**
Designed to allow personnel and equipment access in accordance with ASME Sec.XI IWA-1500
- **Compliance with 10 CFR 50.55a(g) and ASME Sec.XI**
- **Inservice Inspection (ISI) Program will be prepared as part of Chapter 13, “Operational Programs”**
- **Major RAIs (closed)**

RAI No.	Question 05.02.04-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
254-2075	8	Accessibility of Dissimilar and Austenitic SS welds	➤ In accordance with 10 CFR 50.55a(b)(2)(xv)(A)(2) and 10 CFR 50.55a(b)(2)(xvi)(B)

5.2.5 RCPB Leakage Detection



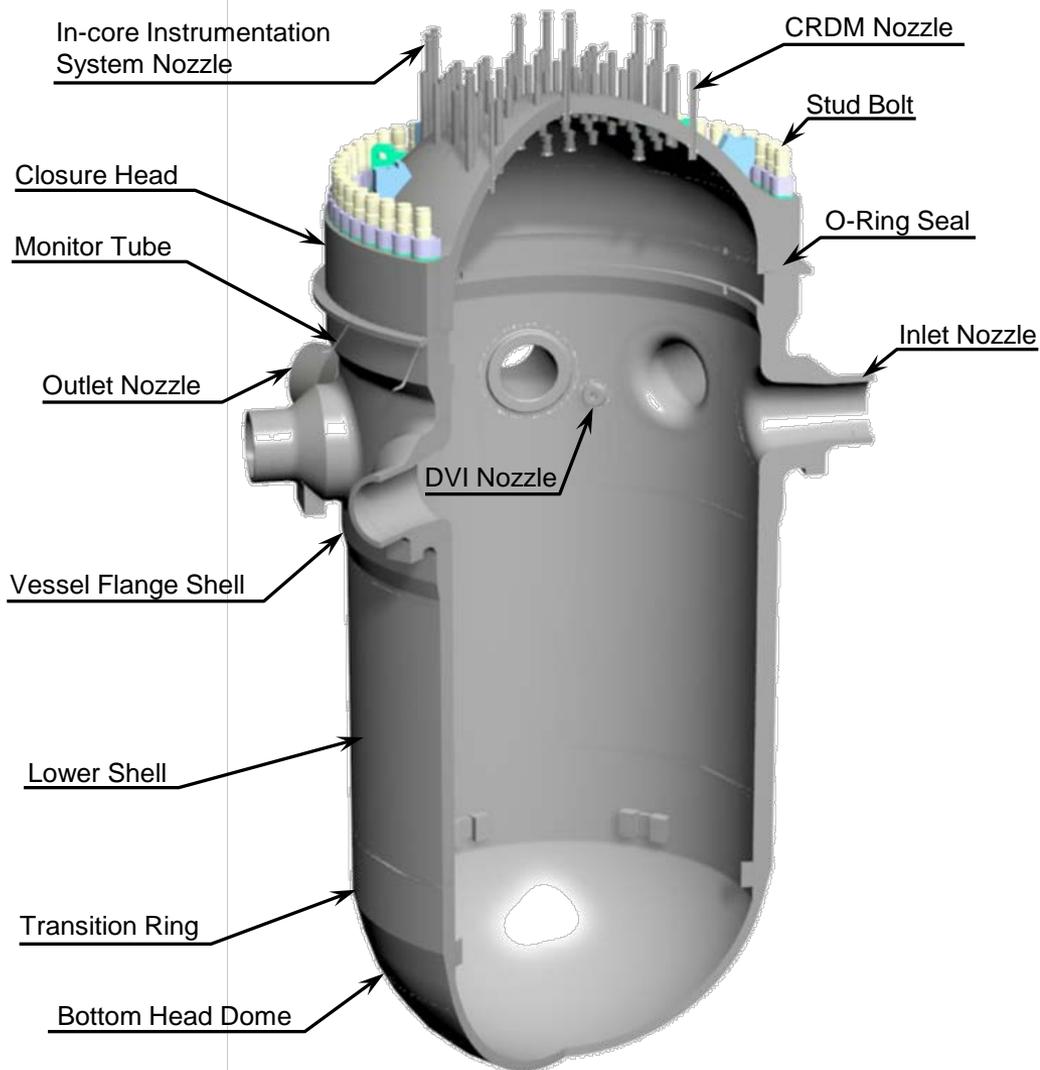
- **RCPB leakage is classified as either identified or unidentified leakage**
 - **Detection of Identified Leakage**
Monitored by Containment Vessel Reactor Coolant Drain Tank (CVDT) pressure, temperature, and level indications
 - **Detection of Unidentified Leakage**
Monitored by air particulate radioactivity monitor, airborne gaseous radioactivity monitor, air cooler condensate flow rate monitoring system, and containment sump level and flow monitoring system

➤ **Major RAIs (closed)**

RAI No.	Question 05.02.05-X	RAI Topic / NRC Concern	RAI Response / DCD Impact
165-1967	4	Detect for prolonged low-level unidentified leakage	➤ Leakage management procedure is developed as Operating and Emergency Operating Procedure

5.3 Reactor Vessel

Reactor Vessel Configuration:



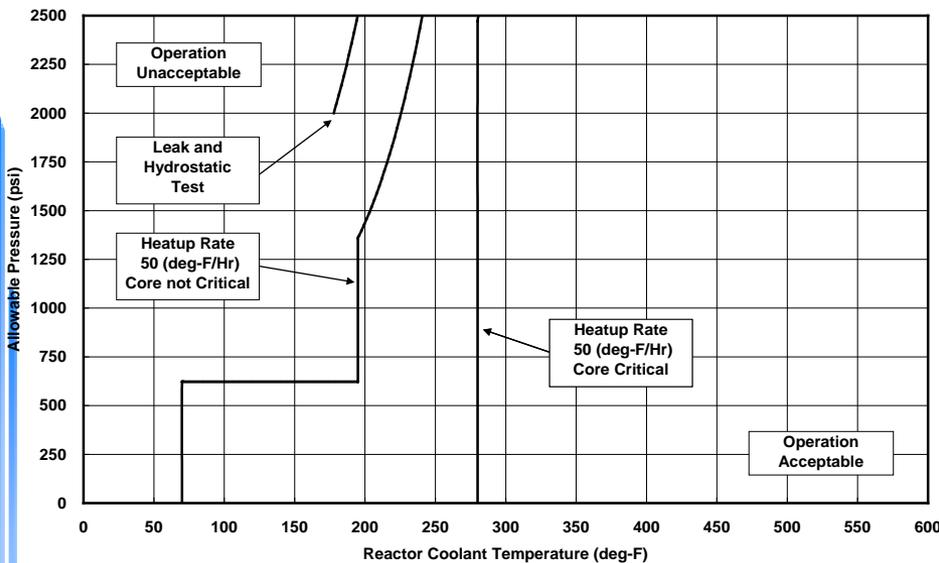
Structural Design Improvements

- No penetrations on Bottom Head Dome
- Reduced number of instrumentation nozzles
- SA-508 Gr. 3 Cl. 1 with inner stainless steel cladding
- Fracture toughness requirements of ASME Code Sec. III App. G and 10 CFR 50 App. G are satisfied

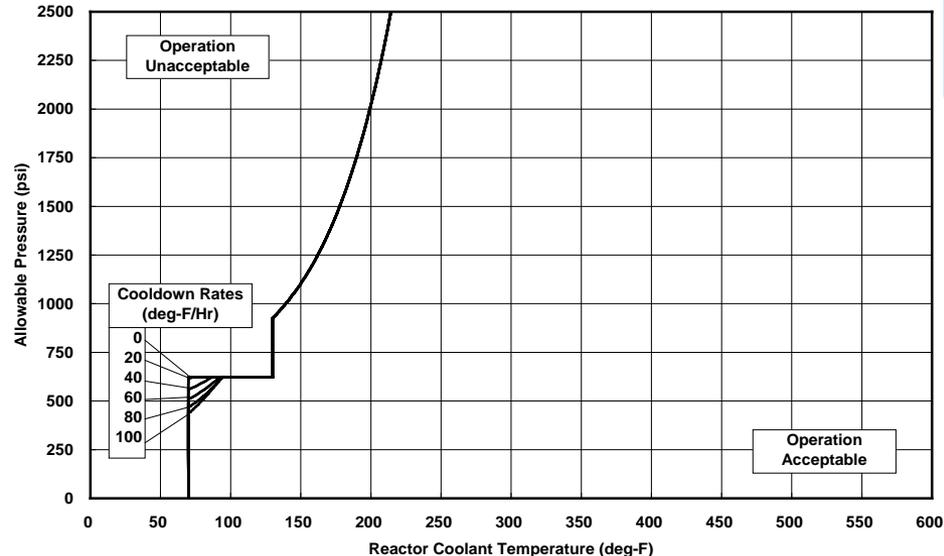
5.3.2 RV Pressure-Temperature Limits



- Heatup and cooldown P-T limit curves are established in accordance with 10 CFR 50 App. G and ASME Code Sec. XI App. G to protect the RV from fast fracture during heatup and cooldown.
- P-T limit curves are conservatively based on 60 Effective Full Power Years (EFPY) rather than the 60 year design life.



Representative P-T Limit Curve for Heatup up to 60 EFPY



Representative P-T Limit Curve for Cooldown up to 60 EFPY

5.3.2 RV Pressurized Thermal Shock



RT_{PTS} values at the end of plant life are evaluated and satisfy the 10 CFR 50.61 screening criteria.

End-of Life RT_{NDT} for Beltline Materials

Location	Fluence at ID [n/cm ²]	Cu Content [wt %]	Ni Content [wt %]	RT _{NDT} and/or RT _{PTS} [deg F]			
				Initial	End of Life EOL (60EFPY)		
					ID	1/4-T	3/4-T
Beltline Region Forgings	9.8 x 10 ¹⁸	0.05 max	1.00 max	< 0	76.7	67.8	53.0
Beltline Region Weld	8.5 x 10 ¹⁸	0.08 max	0.95 max	< -20	148.6	129.8	92.1

10CFR50.61 screening criteria: 270 deg. F for forgings
300 deg. F for weld materials

P-T Limit - RAI Open Item Summary



Open Item Subject	Description of Open Item
<p>SER & RAI 05.03.02-1 DCD 5.3.2 "Pressure-Temperature Limit"</p>	<ul style="list-style-type: none">➤ Generic P-T Limit Report (PTLR) with bounding P-T Limit curves based on bounding material properties and projected fluence following the guidelines of GL96-03 status.➤ MHI submitted US-APWR Reactor Vessel Pressure and Temperature Limits Report (MUAP-09016), Rev.1 on 2/1/10
<p>SER 05.03.02-2 RAI 05.03.02-11 DCD 5.3.2 "Pressure-Temperature Limit"</p>	<ul style="list-style-type: none">➤ The P-T Limits for the reactor vessel are based on evaluation of the RV beltline and closure flange regions. Explain how this relates to the nozzles and the remainder of the RV.➤ MHI Response<ul style="list-style-type: none">• RV fracture mechanics evaluation addressing P-T limits for the entire RV, including the nozzles is in-process

5.4.1 Reactor Coolant Pumps

➤ Pump Performance

- ✓ RCPs provide adequate reactor coolant flow rate.
- ✓ Shaft seals employ a well-established seal system that has been proven in many operating plants.

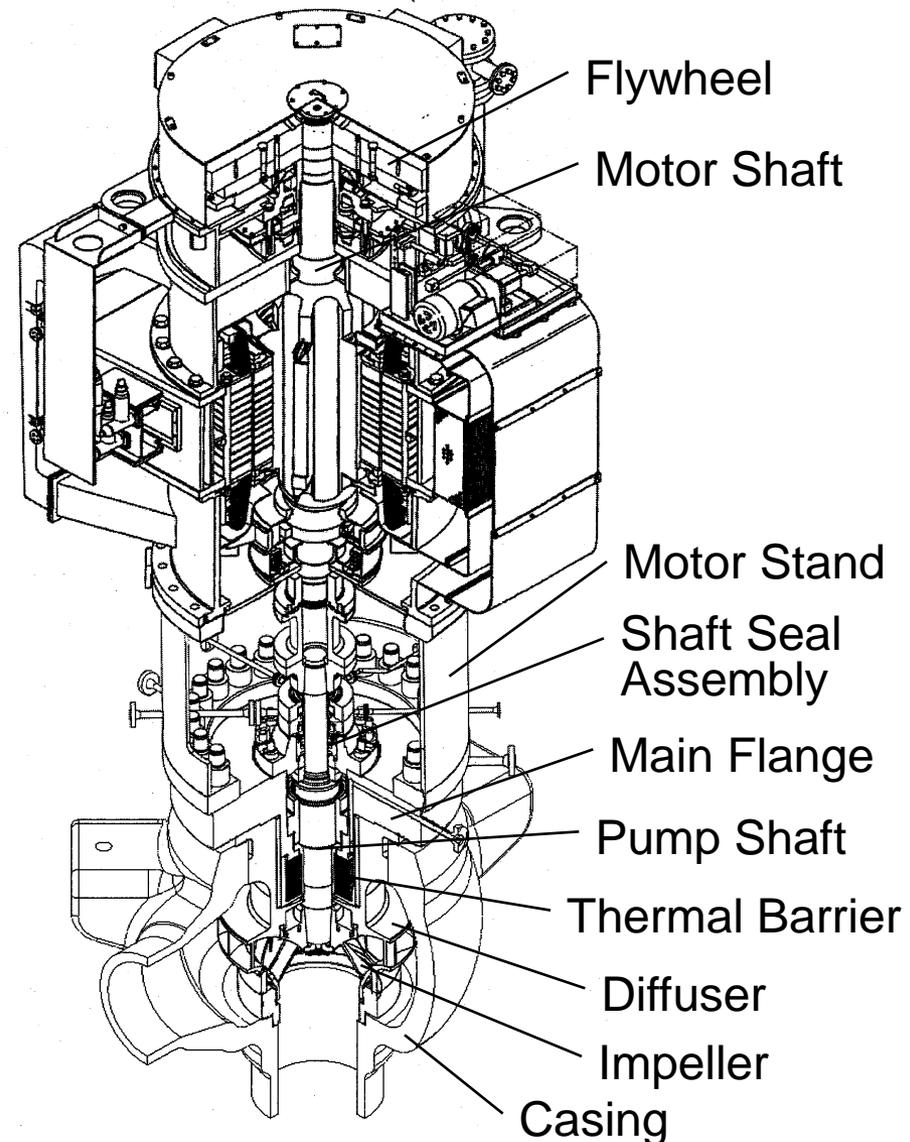
➤ Pump Flywheel Design

- ✓ RG 1.14 requirements are satisfied for:
 - Ductile failure analysis
 - Nonductile failure analysis
 - Fatigue Crack growth analysis
 - Excessive deformation analysis
- ✓ The flywheel ISI interval is set at 20 years
- ✓ Fracture mechanics analysis shows the probability of flywheel failure is negligible (on the order of 10^{-10}).

5.4.1 Reactor Coolant Pumps



Flow Rate	112,000 gpm
Head	306.9 ft
Rotating speed, synchronous	1,200 rpm
Unit design pressure	2,485 psig
Unit design temperature	650 °F
Unit overall height	28 ft
Power	8,200 hp
Voltage	6,600 V



RCP - RAI Open Item Summary



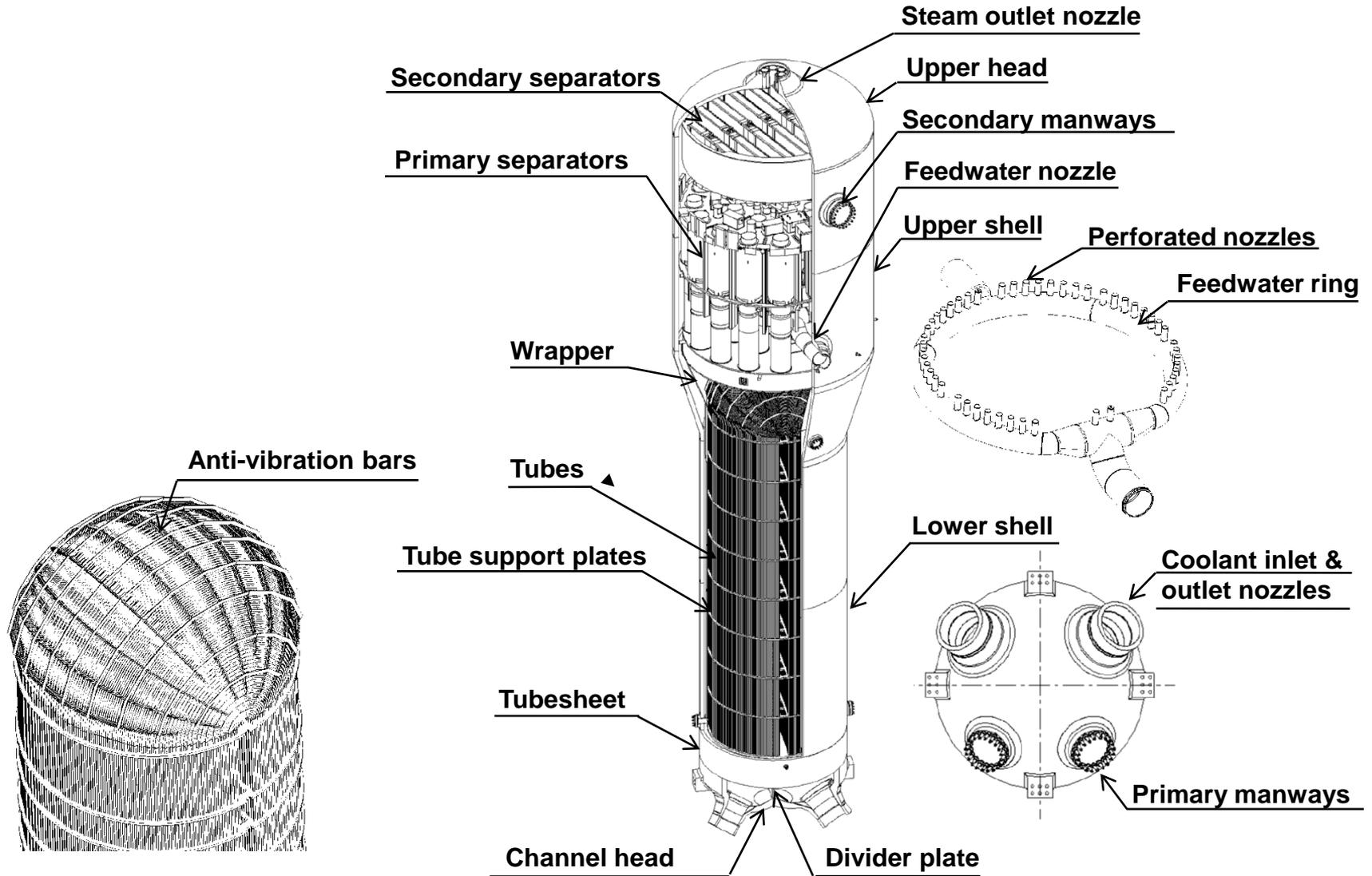
Open Item Subject	Description of Open Item
<p>SER 05.04.01.01-2 RAI 05.04.01.01-5 & 8 DCD 5.4.1.1 "Pump Flywheel Integrity"</p>	<ul style="list-style-type: none">➤ The staff requested additional information:<ul style="list-style-type: none">• Critical flaw size associated with 1500 rpm design speed• Reliable detection threshold for Ultrasonic Testing (UT) inspection ➤ MHI response is being prepared at this time:<ul style="list-style-type: none">• Critical flaw > 3" at 1500 design speed• UT threshold for reliable detection is much smaller
<p>SER & RAI 05.04.01.02-1 DCD 5.4.1.2 "RCP Operability without Seal Injection Water"</p>	<ul style="list-style-type: none">➤ Additional information requested:<ul style="list-style-type: none">• Is there a low-flow alarm in the Main Control Room (MCR)?• How long can the RCP operate without seal injection water? ➤ MHI response is being prepared at this time:<ul style="list-style-type: none">• There is a low-flow alarm in the MCR from a flow meter in the seal injection line• Subsection 5.4.1.3.3 refers only to loss of seal injection flow. The RCP can operate indefinitely without seal injection water because of the redundant cooling offered by the thermal barrier heat exchanger.

RCP - RAI Open Item Summary

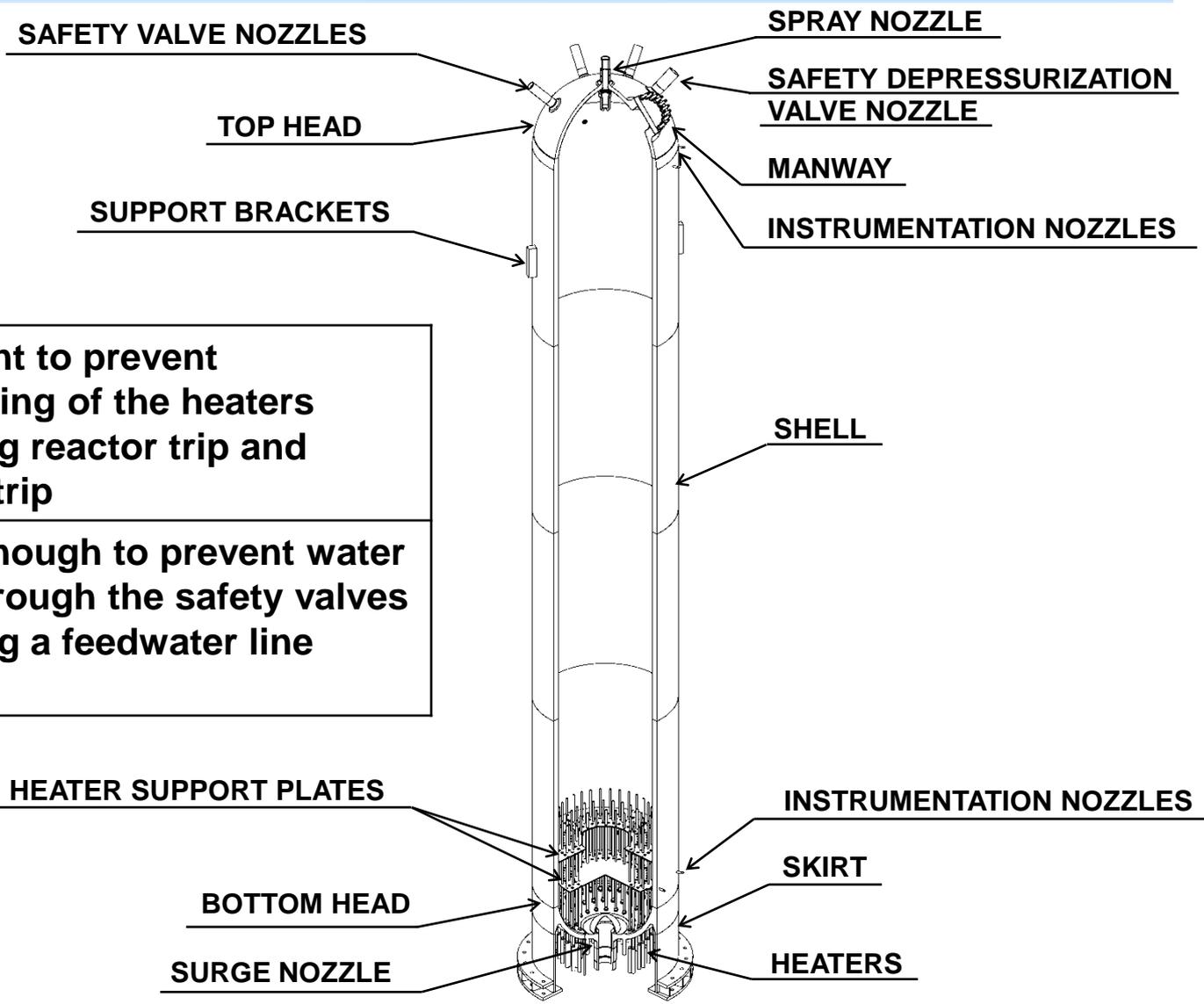


Open Item Subject	Description of Open Item
<p>SER & RAI 05.04.01.02-2 DCD 5.4.2.1 "RCP Operability without Component Cooling Water"</p>	<ul style="list-style-type: none">➤ Since the Component Cooling Water System (CCWS) supplies cooling water to both Chemical and Volume Control System (CVCS) (pump motor, seal water cooler, and oil cooler) and the thermal barrier, explain the meaning of "loss of CCW".➤ Identify the DCD section dealing with operator instructions for loss of CCW and seal injection.➤ MHI Response is being prepared at this time:<ul style="list-style-type: none">• Subsection 5.4.1.3.4 is intended to address loss of CCW to the motor bearing oil coolers or the thermal barrier heat exchangers independent of each other. It will be rewritten to make this clearer. "Loss of CCW" in subsection 5.4.1.3.4 does not mean "loss of all CCW."

5.4.2 Steam Generators



5.4.10 Pressurizer

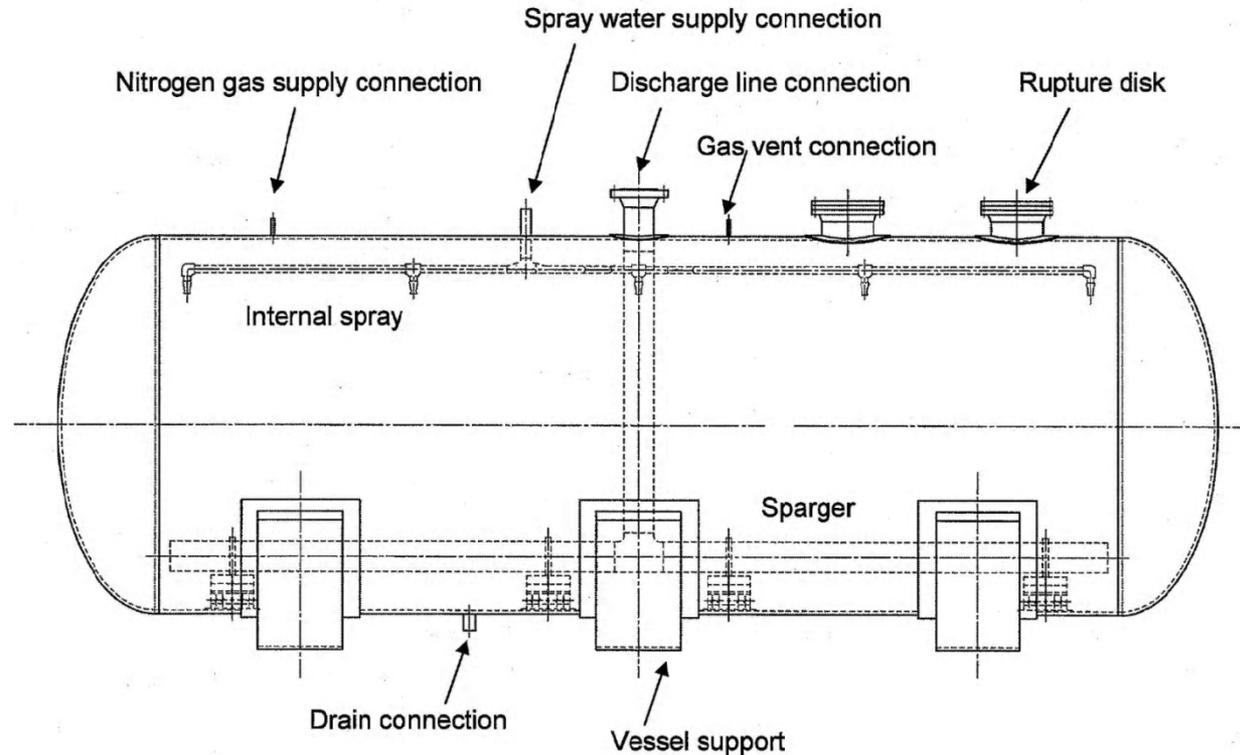


Water volume	Sufficient to prevent uncovering of the heaters following reactor trip and turbine trip
Steam volume	Large enough to prevent water relief through the safety valves following a feedwater line rupture

5.4.11 Pressurizer Relief Tank



- Designed to cool and condense steam discharged from the pressurizer safety valves
- In the event of excess pressure, rupture disks discharge into containment
- The Pressurizer Relief Tank (PRT) rupture disk capacity is greater than the combined capacity of the pressurizer safety valves



PRT - RAI Open Item Summary



Open Item Subject	Description of Open Item
<p>SER & RAI 05.04.11-01 DCD 5.4.11 "Pressurizer Relief Tank"</p>	<ul style="list-style-type: none">➤ Provide additional information about PRT & rupture disks:<ul style="list-style-type: none">• The rupture pressure vs PRT design pressure.• The rupture disk flow capacity vs. the combined capacity of the pressurizer safety valves.• The PRT external design pressure. ➤ MHI Response is being prepared at this time.<ul style="list-style-type: none">• The rupture disk design pressure is 190 psig +0/-5%. The PRT design pressure is 200 psig.• The pressurizer safety valve maximum flow is 432,000 lb/hr x 4. The PRT rupture disks are sized to a flow greater than this value.• The PRT is required to meet the ASME Section III rules for external pressure where the delta-P is -15 psi.
<p>SER & RAI 05.04.11-02 DCD 5.4.11 "Pressurizer Relief Tank"</p>	<ul style="list-style-type: none">➤ Identify a reference and provide a description that shows the PRT rupture disks do not pose a missile threat. ➤ MHI Response is being prepared at this time.<ul style="list-style-type: none">• The PRT rupture disks perform their pressure relief function without producing a missile of any type.

PRT - RAI Open Item Summary



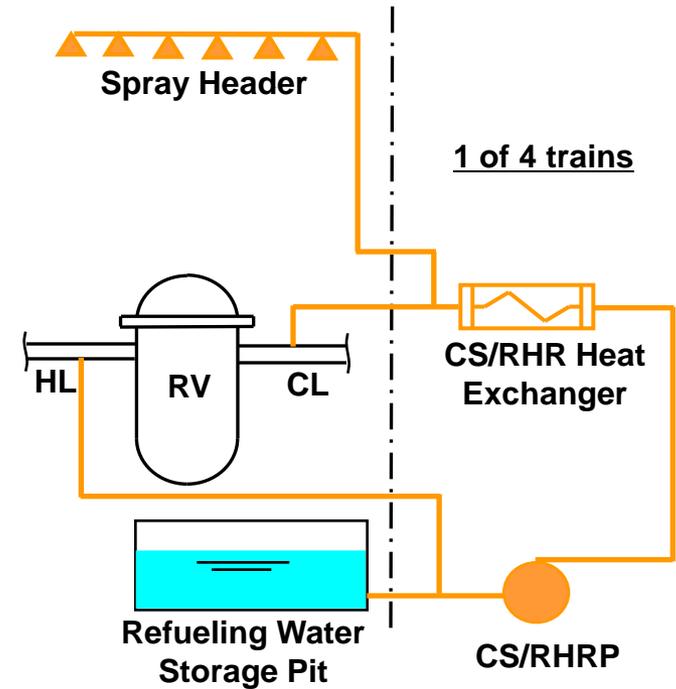
Open Item Subject	Description of Open Item
<p>SER & RAI 05.04.11-03 DCD 5.4.11 "Pressurizer Relief Tank"</p>	<ul style="list-style-type: none">➤ Provide a description and identify a reference where satisfaction of RG 1.29 position C.3 and SRP Acceptance Criterion 2.F are addressed (interface between Seismic Category-1 and non-Seismic Category-1 Structure, System, and Components (SSCs)).➤ MHI Response is being prepared at this time.• The US-APWR SSCs comply with these requirements and additional documentation will be provided.

5.4.7 Residual Heat Removal System



➤ RHR Design Concept

- ✓ The RHR transfers reactor core decay heat and residual heat from the RCS to the Essential Service Water System (ESWS) through the CCWS.
- ✓ The RHR is used to transfer refueling water between the refueling cavity and the RWSP during refueling operations.
- ✓ The RHR is a safety-related system consisting of four independent loops while sharing portions with the containment spray system (CSS).



RHRS - RAI Open Item Summary

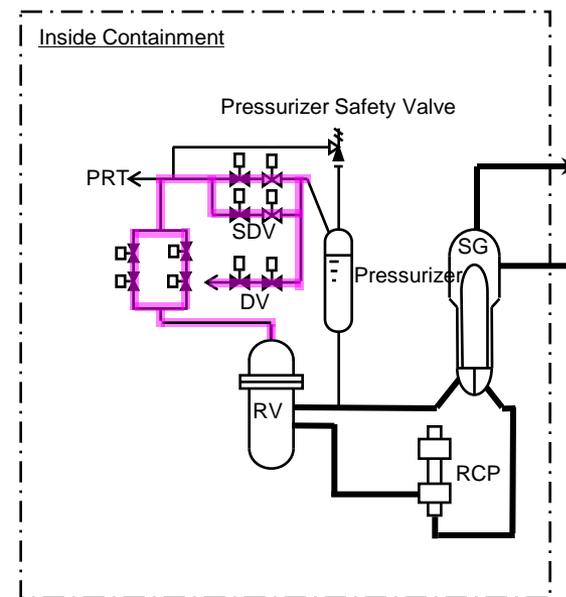


Open Item Subject	Description of Open Item
<p>SER & RAI 05.04.07-11 DCD 5.4.7 "Residual Heat Removal System"</p>	<ul style="list-style-type: none">➤ The current treatment of the gas accumulation issue with respect to the US-APWR is substantial and appropriate; however important aspects of this issue that are potentially unexamined remain.➤ Additional discussion is needed with the Staff

5.4.12 RCS High Point Vents

➤ Design Concept of RCS High Point Vents

- ✓ A Reactor Vessel Head Vent is used to enhance natural circulation of the reactor coolant by eliminating non-condensable gases in the upper plenum of the RV.
- ✓ SDVs are used to cool the reactor core by feed and bleed operation when loss of heat removal from the SGs occurs.
- ✓ The DVs are used to depressurize the RCS and prevent both high pressure melt ejection and temperature induced Steam Generator Tube Rupture (SGTR).



High Point Vents - RAI Open Item Summary



Open Item Subject	Description of Open Item
SER & RAI 05.04.12-05 DCD 5.4.12 "RCS High Point Vents"	<ul style="list-style-type: none">➤ SRP acceptance criterion of Section 5.4.12 requires development of procedures to remove non-condensable gases from the SG U-tubes and to operate the vent system. If It is not provided in the DCD, a COL information item should be provided for the COL applicant/licensee to develop operating procedures to fulfill this acceptance criterion.➤ MHI Response is being prepared at this time.

Status Summary



- There are 11 RAI Open Items.
- Confirmatory items are addressed in DCD Revision 3.



Luminant



LUMINANT GENERATION COMPANY

Comanche Peak Nuclear Power Plant, Units 3 and 4

ACRS, US-APWR Subcommittee



**FSAR Chapter 5 - Reactor
Coolant and Connecting
Systems**

May 27, 2011



Agenda – FSAR Chapter 5, Reactor Coolant and Connecting Systems

- ❑ Introduction**

- ❑ Subsection by Subsection Discussion**
 - ❑ FSAR Summary – COL Items, Departures**

 - ❑ SER Summary – Open Items, Confirmatory Items, Proposed License Conditions**

- ❑ Summary**



Introduction

- ❑ R-COLA authored using “Incorporated by Reference” methodology.**

- ❑ CPNPP COLA FSAR Chapter 5 takes no departures from the US-APWR DCD**

- ❑ All plant-specific SER Open and Confirmatory Items have been addressed and will be in FSAR Revision 2.**

- ❑ COLA Revision 2 is scheduled for June 2011.**

- ❑ No contentions pending before ASLB.**



5.1 Summary Description

- ❑ **CPNPP COLA FSAR Summary**
 - **US-APWR DCD Incorporated by Reference**
 - **No departures or supplements**
 - **No COL Information Items**

- ❑ **NRC SER Summary**
 - **1 “Generic” SER Open Item (1-1) related to US-APWR design certification**
 - **No Confirmatory Items**
 - **No proposed License Conditions**



5.2 Integrity of RCPB

- **CPNPP COLA FSAR Summary**
 - **US-APWR DCD Incorporated by Reference**
 - **No departures**
 - **10 COL Information Items**

- **NRC SER Summary**
 - **1 Open Item**
 - **3 Confirmatory Items**
 - **2 proposed License Conditions**



5.2 Integrity of RCPB (Open Item)

- **Open Item (05.02.03.01-1, related to COL Item 5.2(12))**
 - **EPRI Water Chemistry Guidelines: identify version to be used.**
 - **Luminant provided additional information, on May 2, 2011, via an RAI Response.**
 - **Included an FSAR markup**
 - **RCS water chemistry will be based on the latest effective revision of the EPRI guidelines.**
 - **Feedback from the NRC indicates that this will be changed to a confirmatory item.**



5.2 Integrity of RCPB (Proposed License Condition 5-1)

□ Proposed License Condition 5-1

- The licensee shall submit to the Director of NRO, a schedule, no later than 12 months after issuance of the COL, that supports planning and conduct of NRC inspections of the PSI/ISI program (including augmented ISI program). The schedule shall be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until either the PSI/ISI (including augmented ISI program) have been fully implemented or the plant has been placed in commercial service, whichever comes first.

□ Proposed Luminant Commitment

- Luminant commits to submit a schedule to the NRC that supports the planning and conduct of NRC inspections of operational programs, including the IST program, the PSI program, the ISI program and the reactor vessel surveillance program, no later than 12 months after issuance of the COL or at the start of construction as defined in 10 CFR 50.10a, whichever is later. This is similar to the approach for the ITAAC schedule required in 10 CFR 52.99(a).



5.2 Integrity of RCPB (Proposed License Condition 5-2)

❑ Proposed License Condition 5-2

- The licensee shall implement the preservice testing program prior to initial fuel load.

❑ Luminant Action

- The Preservice Testing Program added to FSAR Table 13.4-201 with an implementation milestone of prior to initial fuel load and implementation requirement of License Condition.
- Luminant proposed a License Condition to read:
 - The licensee shall implement the programs or portions of programs identified in FSAR Table 13.4-201 with the “Implementation” of “License Condition” on or before the associated milestones in FSAR Table 13.4-201.



5.3 Reactor Vessel

- ❑ **CPNPP COLA FSAR Summary**
 - **US-APWR DCD Incorporated by Reference**
 - **No departures**
 - **5 COL Information Items**

- ❑ **NRC SER Summary**
 - **No Open Items**
 - **2 Confirmatory Items**
 - **2 Proposed License Conditions**



5.3 Reactor Vessel (Proposed License Condition 5-3)

- **Proposed License Condition 5-3**
 - **The licensee shall implement a reactor vessel material surveillance program prior to initial criticality.**

- **Luminant Action**
 - **Reactor vessel material surveillance program added to FSAR Table 13.4-201 with an implementation milestone of prior to initial criticality and implementation requirement of License Condition.**
 - **Luminant proposed a License Condition to read:**
 - **The licensee shall implement the programs or portions of programs identified in FSAR Table 13.4-201 with the “Implementation” of “License Condition” on or before the associated milestones in FSAR Table 13.4-201.**



5.3 Reactor Vessel (Proposed License Condition 5-4)

- **Proposed License Condition 5-4**
 - In order to enable timely NRC review of the pressurized thermal shock (PTS) evaluation using the as-procured reactor vessel material properties, it will be provided within 12 months after acceptance of the reactor vessel.

- **Luminant Action**
 - Luminant proposed a License Condition to read:
 - The plant-specific PTS evaluation of the as-procured reactor vessel material properties will be submitted to the NRC within 12 months following acceptance of the reactor vessel.



5.4 RCS Component and Subsystem Design

□ CPNPP COLA FSAR Summary

- US-APWR DCD Incorporated by Reference
- No departures or supplements
- No COL Information Items

□ NRC SER Summary

- No Open Items
- 1 Confirmatory Item
- No proposed License Conditions



Summary

- ❑ **COL Information Items are addressed in FSAR Chapter 5**
- ❑ **No departures**
- ❑ **One generic and one plant-specific Open Item and five Confirmatory Items**
- ❑ **All RAI responses associated with plant-specific open item and confirmatory items will be in COLA Revision 2**
- ❑ **Five proposed license conditions are being addressed by Luminant**



Acronyms

- ❑ **ACRS** **Advisory Committee on Reactor Safeguards**
- ❑ **ASLB** **Atomic Safety and Licensing Board**
- ❑ **COL** **Combined license**
- ❑ **COLA** **COL application**
- ❑ **CPNPP** **Comanche Peak Nuclear Power Plant**
- ❑ **DCD** **Design control document**
- ❑ **EPRI** **Electric Power Research Institute**
- ❑ **FSAR** **Final Safety Analysis Report**
- ❑ **ISI** **Inservice inspection**
- ❑ **IST** **Inservice testing**
- ❑ **LC** **License condition**
- ❑ **OI** **Open item**
- ❑ **PSI** **Preservice inspection**
- ❑ **PTS** **Pressurized thermal shock**
- ❑ **R-COLA** **Reference COLA**
- ❑ **RCPB** **Reactor coolant pressure boundary**
- ❑ **RCS** **Reactor Coolant System**
- ❑ **SER** **Safety Evaluation Report**



Presentation to the ACRS Subcommittee

**Comanche Peak Nuclear Power Plant, Units 3 and 4
COL Application Review**

Safety Evaluation Report

CHAPTER 5: REACTOR COOLANT AND CONNECTING SYSTEMS

May 27, 2011

Staff's Presentation Order

- **Stephen Monarque** - Comanche Peak COLA Lead
Project Manager
- **Paul Kallan** - Project Manager
- **Eduardo Sastre** - Technical Staff Presenter

Major Milestones Chronology

9/19/2008	COL Application submitted
12/02/2008	COL Application accepted for review (Docketed)
03/16/2009	COL Application review schedule published
10/09/2009	Completion of Phase 1 milestone
11/20/2009	Revision 1 submitted
03/02/2011	Revision to COL Application review schedule

Review Schedule (Public Milestones)

Phase - Activity	Target Date
Phase 1 - Preliminary Safety Evaluation Report (SER) and Request for Additional Information (RAI)	October 2009 (Actual)
Phase 2 - SER with Open Items	March 2012
Phase 3 – Advisory Committee on Reactor Safeguards (ACRS) Review of SER with Open Items	July 2012
Phase 4 - Advanced SER with No Open Items	December 2012
Phase 5 - ACRS Review of Advanced SER with No Open Items	March 2013
Phase 6 – Final SER with No Open Items	June 2013

NOTE: The target dates shown above are currently published milestones.

Technical Review Team

- ♦ **Eduardo Sastre**
Component Integrity Branch
- ♦ **Robert Davis**
Component Integrity Branch
- ♦ **Timothy Steingass**
Component Integrity Branch
- ♦ **Chang Li**
Balance of Plant Systems Branch
- ♦ **Steven Downey**
Component Integrity Branch
- ♦ **Joel Jenkins**
Component integrity Branch
- ♦ **Gregory Makar**
Component integrity Branch

Overview of COLA Review

SRP Section/Application Section		No. of Questions	Number of OI
5.1	Summary Description	IBR	IBR
5.2.1.1	Compliance with 10 CFR 50, Section 50.55a	2	0
5.2.1.2	Compliance with Applicable Code Cases	2	0
5.2.2	Overpressure Protection	IBR	IBR
5.2.3.2	Compatibility with Reactor Coolant	1	1
5.2.4.	Inspection and Testing of the Reactor Coolant Pressure Boundary (RCPB)	2	0
5.2.5	RCPB Leakage Detection	3	0
5.3.1	Reactor Vessel Materials	3	0

Overview of COLA Review (continued)

SRP Section/Application Section		No. of Questions	Number of OI
5.3.2	Pressure-Temperature limits, Upper-Shelf Energy, and Pressurized Thermal Shock	1	0
5.3.3	Reactor Vessel Integrity	2	0
5.4	Reactor Coolant System Component and Subsystem Design	1	0
Totals		17	1

Section 5.2.3

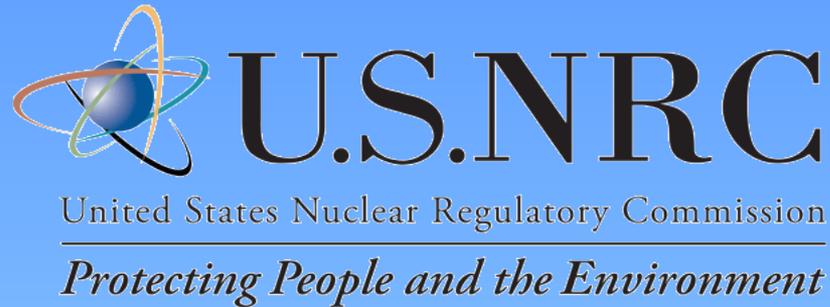
Reactor Coolant Pressure Boundary Materials

- ***Open Item No. 5.2.3.1-1***
 - ♦ COL Information Item No. 5.2-12
 - A COL applicant *should specify the applicable version of the EPRI “Primary Water Chemistry Guideline” that will be implemented.*
 - ♦ Issue: The COL applicant did not adequately address the COL Item by specifying the version to be used for CPNPP

- Since then, the applicant response was received and reviewed by staff and it is being considered a confirmatory item

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



Presentation to the ACRS Subcommittee

**Mitsubishi Heavy Industries (MHI)
US-APWR Design Certification Application Review**

Safety Evaluation with Open Items: Chapter 5

REACTOR COOLANT SYSTEM AND CONNECTING SYSTEMS

MAY 27, 2011

Staff Review Team

- **Technical Staff Presenters**
 - ◆ John Wu – DCD Section 5.2.1.2
 - ◆ Steven Downey – DCD Section 5.3.2
 - ◆ John Honcharik – DCD Sections 5.4.1.1
 - ◆ John Budzynski – DCD Sections 5.4.1.2, 5.4.7, 5.4.11 & 5.4.12
- **Project Managers**
 - ◆ Jeff Ciocco – Lead Project Manager
 - ◆ Paul Kallan – Chapter 5 Project Manager

Staff Review Team

- ◆ **Robert Davis**
Component Integrity Branch
- ◆ **Timothy Steingass**
Component Integrity Branch
- ◆ **Steven Downey**
Component Integrity Branch
- ◆ **Joel Jenkins**
Component Integrity Branch
- ◆ **Thomas Scarbrough**
Component Integrity Branch
- ◆ **Eric Reichert**
Component Integrity Branch
- ◆ **Gregory Makar**
Component Integrity Branch
- ◆ **John Honcharik**
Component Integrity Branch

Staff Review Team

- ♦ **Cheng-Ih Wu**
Engineering Mechanics Branch
- ♦ **John Budzynski**
Reactor Systems Branch
- ♦ **Amrit Patel**
Reactor Systems Branch
- ♦ **Michelle Hayes**
Reactor Systems Branch
- ♦ **Jeffrey Schmidt**
Reactor Systems Branch
- ♦ **Chang Li**
Balance of Plant Systems Branch

Overview of Design Certification Application, Chapter 5

SRP Section/Application Section		No. of Questions	Number of OI
5.2.1.1	Compliance with the Codes and Standards Rule, 10 CFR 5055a	3	0
5.2.1.2	Compliance with Applicable Code Cases	7	1
5.2.2	Overpressure Protection	8	0
5.2.3	Reactor Coolant Pressure Boundary Materials	31	0
5.2.4	Inservice Inspection and Testing of the Reactor Coolant Pressure	8	0
5.2.5	Reactor Coolant Pressure Boundary Leakage Detection	12	0

Overview of Design Certification Application, Chapter 5

SRP Section/Application Section		No. of Questions	Number of OI
5.3.1	Reactor Vessel Materials	1	0
5.3.2	Pressure-Temperature Limits, Pressurized Thermal Shock, and Upper-Shelf Energy Data and Analyses	11	2
5.3.3	Reactor Vessel Integrity	1	0
5.4	Reactor Coolant System Component and Subsystem Design	3	0
5.4.1.1	Reactor Coolant Pump Flywheel Integrity	8	1
5.4.1.2	Reactor Coolant Pump	2	2

Overview of Design Certification Application, Chapter 5

SRP Section/Application Section		No. of Questions	Number of OI
5.4.2.1	Steam Generator Materials	12	0
5.4.2.2	Steam Generator Program	9	0
5.4.3	Reactor Coolant Piping	0	0
5.4.4	Main Steam Line Flow Restrictor	0	0
5.4.7	Residual Heat Removal System	13	1
5.4.10	Pressurizer	1	0

Overview of Design Certification Application, Chapter 5

SRP Section/Application Section		No. of Questions	Number of OI
5.4.11	Pressurizer Relief Tank	3	3
5.4.12	Reactor Coolant System High-Point Vents	1	1
Totals		134	11

Technical Topics

Section 5.2.1.2 – Compliance with applicable Code Cases

Compliance with Applicable Code Cases

Open Item 5.02.01.02-07 (RAI 575-4422, Question 05.02.01.02.07)

- In response to RAI 575-4422, 05.02.01.02-07, the applicant added Code Case N-782 to DCD Section 5.2.1.2 Table 5.2.1-2 for application to U.S.-APWR plants in compliance with 10 CFR 50.55a and ASME Code NCA-1140(a)(2).
 - ♦ 10 CFR 50.55a (b)(4) allows the application of ASME Section III Code cases listed in the NRC Regulatory Guide (RG) 1.84, Revision 35 without prior NRC approval. However, Code Case N-782 is not listed for acceptance in RG1.84. The applicant was requested to provide justification for inclusion of the code case in DCD.
 - ♦ By letter April 26, 2011, the applicant indicated that the use of Code Case N-782 facilitates the use of the ASME Code edition and addenda included in the U.S.-APWR Design Certification. Therefore, it would provide an acceptable level of quality and safety. This is consistent with 10 CFR 50.55a(a)(3)(i) and acceptable.
- Therefore, this issue is resolved and RAI 575-4422, Question 5.02.01.02.07 is closed.

Technical Topics

Section 5.3.2 - P-T Limits, Charpy Upper-Shelf Energy, and PTS

Pressure – Temperature Limits

- MHI addressed submittal of P-T limits by providing a Pressure-Temperature Limits Report (PTLR) (MUAP – 09016)
 - ♦ PTLR
 - Follows guidelines of GL 96-03
 - Contains bounding P-T limits and complete methodology
 - ♦ COL Information Item 5.3(1)
 - COL applicant will address the use of plant-specific P-T limits curves
- Open items associated with the review and approval of the PTLR
 - ♦ **OPEN ITEM 05.03.02-1, (RAI 258-2334, Question 05.03.02-01):** Tracks the on-going review of the US-APWR PTLR
 - ♦ **OPEN ITEM 05.03.02-2, (RAI 694-5355, Question 05.03.02-11):** Ensure that the applicant has considered the entire reactor vessel in the development of its P-T curves.

Technical Topics

Section 5.4.1.1 – Reactor Coolant Pump (RCP) Flywheel Integrity

RCP flywheel analyzed to prevent fracture and possible missile:

- MHI provided
 - ◆ Material selection, fabrication techniques, preservice and inservice inspections and overspeed testing per NUREG-0800
 - ◆ Analysis (Per RG 1.14) (MUAP – 09017)
 - Critical speeds for ductile and non-ductile fracture
 - Fatigue crack growth
- **Open Item 05.04.01.01-2** (RAI 5663, Question 05.04.01.01-8):
 - ◆ Needs to provide critical crack size for fatigue and inspection capability

Technical Topics

Section 5.4.1.2 – Reactor Coolant Pumps

Technical Topics – RCP:

- Pump Design
 - ♦ RCP is a vertical shaft, single-stage, mixed flow pump with diffuser
 - ♦ Loss of Seal Water Injection Event
 - CVCS supplies seal water
 - Increase in seal and bearing inlet temperatures and No. 1 seal leak rate
 - CCWS continues to provide flow to the thermal barrier heat exchanger which maintains safe operating temperature long enough for safe shutdown
 - ♦ Loss of Component Cooling Water Event
 - CCW supplies upper/lower bearing oil cooler, air cooler, and thermal barrier
 - CVCS seal injection flow continues to the RCP seals
 - Motor designed to withstand loss of CCW for 10 minutes
- **Open Item 5.4.01.02-01 (RAI 5718, Question 05.04.01.02-01)** – With respect to Loss of Seal Water Injection, provide a response to: (1) whether there is a MCR low-flow alarm; (2) How long can the RCP operate in this condition
- **Open Item 5.4.01.02-02 (RAI 5718, Question 05.04.01.02-02)**– With respect to Loss of Component Cooling Water, provide a response to: (1) Whether the loss of CCW includes the loss of cooling to CVCS (2) Whether the limiting factor is over heating of the motor or seals

Technical Topics

Section 5.4.7 – Residual Heat Removal

Technical Topics – RHR:

- System Design
 - ♦ Configuration Similar to Current PWR Designs, except
 - Four independent trains – each train has 50% heat removal capability
 - ♦ Used during startup/shutdown and refueling operations
 - If needed, maintains RWSP below 120°F during normal operation
 - During shutdown and refueling RHR is placed in service below approximately 400 psig and 350°F
- Evaluated against NRC Bulletin 88-04, NRC Generic Letter 89-04 and BTP 5-4
- Evaluated against ISG DC/COL-ISG-019 – Gas Accumulation
- **Open Item 5.4.7-11 (RAI 464-3520, Question 05.04.07-11)** – Provide information to support that the RHR design complies with DC/COL-ISG-019 with respect to potential air ingestion and/or vortexing during refueling conditions

Technical Topics

Section 5.4.11 – Pressurizer Relief Tank

Technical Topics – PRT:

- Configuration Similar to Current PWRs Designs
 - ♦ Designed to condense/cool steam discharge equivalent to 100% of the full-power pressurizer steam volume
- Used during design-basis events
 - ♦ To prevent over-pressurization of the RCS and pressurizer
 - ♦ Receives steam from pressurizer via SRVs and SDVs
 - ♦ Receives non-condensable gasses from HPV
- **Open Item 5.4.11-01 (RAI 5688, Question 05.04.11-01)** – Provide additional information to support that the PRT and rupture disks are designed for full vacuum to prevent PRT collapse (w/o nitrogen being blanket)
- **Open Item 5.4.11-02 (RAI 5688, Question 05.04.11-02)** – Provide additional information to support that the PRT rupture disks do not pose a missile threat with respect to design & location within containment
- **Open Item 5.4.11-03 (RAI 5688, Question 05.04.11-03)** – Provide additional information to support the Seismic Category I/ non-Seismic SSCs interface guideline (RG 1.29, C.3, Regulatory Position)

Technical Topics

Section 5.4.12 – RCS High-Point Vents

Technical Topics – RCSHPV:

- Required by 10 CFR 50.34(f)(2)(vi) and TMI Action Plan Item II.B.1
 - ♦ Removes RCS non-condensable gases to maintain adequate core cooling (enhance natural circulation)
 - ♦ Vent paths: (1) reactor vessel head vent to PRT; (2) pressurizer SDVs to PRT; and (3) pressurizer DVs to containment vessel
- Standard Configuration Design
 - ♦ Reactor vessel head & SDVs have two parallel vent paths with two normally closed MOVs in series
 - ♦ DVs have one path with two MOVs in series
 - ♦ **Note: Reactor vessel head, pressurizer and the steam generator U tubes – only high points that could accumulate non-condensable gases; however, individual U tubes not required to have HPV (10 CFR 50.46a)**
- **Open Item 5.4.12-05 (RAI 48-840, Question 05.04.12-05)** – Provide procedures or propose DCD revisions that specifically address removal of non-condensable gases from the RCSHPV system (identify the procedure for each vent path)

ACRONYMS

10 CFR – Title 10 of the Code of Federal Regulations

CCW – component cooling water

CVCS – chemical and volume control system

COL – combined license

DV – depressurization valve

FSAR – Final Safety Analysis Report

MCR – main control room

MOV – motor operated valve

PRT- pressurizer relief tank

PTLR – Pressure – Temperature Limits Report

PTS – pressurized thermal shock

PWR – pressurized water reactor

RAI – request for additional information

RCP – reactor coolant pump

RCPB – reactor coolant pressure boundary

RCS – reactor coolant system

RCSHPV – reactor coolant system high point vent

RG – Regulatory Guide

RHR – residual heat removal

RVHVS – reactor vessel head vent system

RWSP – refueling water storage pit

SDV – safety depressurization valve

SER – safety evaluation report

SRP – Standard Review Plan

SRV – safety relief valve