



**UNITED STATES
NUCLEAR REGULATORY COMMISSION ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

January 15, 2014

MEMORANDUM TO: ACRS Members

FROM: Kathy Weaver, Senior Staff Engineer **/RA/**
Technical Support Branch
Advisory Committee on Reactor Safeguards

SUBJECT: CERTIFIED MINUTES OF THE ACRS U.S. EPR
SUBCOMMITTEE MEETING ON NOVEMBER 6, 2013,
ROCKVILLE, MARYLAND

The minutes of the subject meeting were certified on December 5, 2013, as the official record of the proceedings of that meeting. Copies of the certification letter and minutes are attached.

Attachments: As stated

cc: C. Santos
E. Hackett



**UNITED STATES
NUCLEAR REGULATORY COMMISSION ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

MEMORANDUM TO: Kathy Weaver, Senior Staff Engineer
Technical Support Branch
Advisory Committee on Reactor Safeguards

FROM: Dana Powers, Chairman **/RA/**
U.S. EPR Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS U.S. EPR
SUBCOMMITTEE MEETING ON NOVEMBER 6, 2013,
ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting are an accurate record of the proceedings for that meeting.

/RA/
Dana Powers, Chairman
U.S. EPR Subcommittee

Date **12/5/2013**

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF THE ACRS US-EPR SUBCOMMITTEE MEETING
NOVEMBER 6, 2013

The ACRS US EPR Subcommittee held a meeting on November 6, 2013 in Room T-2B3, 11545 Rockville Pike, Rockville, Maryland. The meeting convened at 8:30 a.m. and adjourned at 3:57 p.m. The entire meeting was opened to the public.

ATTENDEES/PRESENTERS

ACRS Members/ Staff

Dana Powers, Chairman
J. Sam Armijo, Member
John Stetkar, Member
Gordon Skillman, Member
Mike Ryan, Member
Kathy Weaver, ACRS Staff, DFO

NRC Staff

Mike Takacs
Peter Hern
Phyllis Clark
Kenneth Ewin
Eileen McKenna
Mike Lee
Gordon Curran
Larry Wheeler
Raj Goel
Antonio Dias

Other Attendees

Mark Finley, UniStar
Paul Infanger, UniStar
Bob Randall, UniStar
Dennis Williford, AREVA NP
Stephen Huddleston, AREVA NP
Ray Lewis, AREVA NP
Shankar Rao, Bechtel

SUMMARY

The purpose of the meeting was to hear presentations and discuss the information contained in Chapter 2, "*Site Characteristics*," Section 2.4, and Chapter 9, "*Auxiliary Systems*," of the Safety Evaluation Report (SER) with Open Items related to the review of the Calvert Cliffs Unit 3 Combined Operating License Application (COLA) FSAR, which references the U.S. EPR DCD.

There was a presentation on the FSAR Chapters from UniStar the Calvert Cliffs Unit 3 COLA applicant, followed by presentations from the staff of the Office of New Reactors (NRO) who performed the review and prepared the associated sections of the SER Chapters with Open Items. The meeting transcripts are attached and contain an accurate description of each matter discussed during the meeting. The presentation slides and handouts used during the meeting are attached to these transcripts.

The following table lists the significant issues that were discussed during the meeting with the corresponding pages in the transcript.

Significant Issues	Reference Pages in Transcripts
<p>Member Stetkar asked if UniStar, the applicant, looked at flooding from the essential service water basins, because they're the same grade elevation as the diesel generator buildings and slightly below grade from the rest of the main power block. UniStar stated that they would take an action and respond to Member Stetkar, regarding the rupture of the basin and how that affects flooding, and whether that was considered.</p>	<p>77 - 86</p>
<p>Member Stetkar stated that there seems to be some disconnect about the statement that says the turbine building or the switchgear building ventilation system does not supply any locations with anything important to safety. Member Stetkar further stated that in FSAR Table 17.4-2 in particular, there is a long list of systems that are included in the design reliability assurance program because they are not safety related but they are important to safety. UniStar stated that they will take an action in terms of any corrections or clarification that might be needed for the FSAR.</p>	<p>162 - 164</p>
<p>Member Stetkar had questions regarding fire protection. Member Stetkar questioned NRC fire protection staff regarding if the heat release rates that the staff currently accepts are no different from those in NUREG/CR-6850, then why are the transient heat release rates that are cited in both the certified design FSAR table and the corresponding table for the COLA FSAR lower by nearly a factor of two? The NRC staff stated that they would get a response to Member Stetkar.</p>	<p>234 – 241</p>
<p>Member Stetkar also commented that it was his understanding that in the deterministic fire analyses or fire hazards analyses that are performed, no transient combustibles are considered for a location that is designated as "THL 1". Member Stetkar asked why does the staff accept that, given the position that has been taken on the probabilistic side of the analysis. The staff commented that they would provide Member Stetkar a response.</p>	<p>234 – 243</p>

DOCUMENTS PROVIDED TO THE SUBCOMMITTEE

The following documents were provided to the members prior to the meeting:

- Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application – Safety Evaluation Report with Open Items for Chapter 2, “*Site Characteristics*,” Section 2.4, “*Hydrologic Engineering*,” dated October 3, 2013.
- Calvert Cliffs Nuclear Power Plant, Unit 3 Combined License Application, Final Safety Analysis Report, Portions of Chapter 2, “*Site Characteristics* , Section 2.4, “*Hydrologic Engineering*, Revision 9
- Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application, Final Safety Analysis Report, Chapter 9, “Auxiliary Systems,” Revision 9.
- Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application – Safety Evaluation Report with Open Items for Chapter 9, “Auxiliary Systems,” dated October 9, 2013

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
 UP EPR Subcommittee

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Wednesday, November 6, 2013

Work Order No.: NRC-383

Pages 1-256

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

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

US EPR SUBCOMMITTEE

+ + + + +

WEDNESDAY

NOVEMBER 6, 2013

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

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

COMMITTEE MEMBERS:

DANA A. POWERS, Chairman

J. SAM ARMIJO, Member

SANJOY BANERJEE, Member

CHARLES H. BROWN, JR. Member

HAROLD B. RAY, Member

JOY REMPE, Member

PETER G. RICCARDELLA, Member

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

MICHAEL T. RYAN, Member

STEPHEN P. SCHULTZ, Member

GORDON R. SKILLMAN, Member

JOHN W. STETKAR, Member

DESIGNATED FEDERAL OFFICIAL:

KATHY WEAVER

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

PAGE

Introduction - Dr. D. Powers, ACRS	4
NRC Staff Introductions - M. Takacs, NRO	7
PRESENTATION	
Calvert Cliffs Unit 3 Application FSAR, Chapter 2, Section 2.4 - UniStar by Mike Finley, UniStar	11
PRESENTATION	
Calvert Cliffs Unit 3 Application FSAR, Chapter 2, Section 2.4 - NRO by Mike Takacs, NRO	90
by Mike Lee, DSEA	91
by Lyle Hibler, PNNL	93
PRESENTATION	
Calvert Cliffs Unit 3 SER with Open Items for Chapter 9 - UniStar by Mike Finley, UniStar	116
PRESENTATION	
Calvert Cliffs Unit 3 SER with Open Items for Chapter 9 - NRO by Mike Takacs, NRO	191
by Pete Hearn, NRO	192
by Gordon Curran, NRO	193
by Larry Wheeler, NRO	211
by Raj Goel, NRO	238
Subcommittee Discussion/Closed Item Discussion by Dr. D. Powers, ACRS	
	242

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

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

(8:31 a.m.)

CHAIRMAN POWERS: Let's come into session.

This is a meeting of the Advisory Committee on Reactor Safeguards, U.S. EPR Subcommittee. I'm Dana Powers, chairman of the subcommittee. ACRS members in attendance include Dick Stillman, John Stetkar, Mike Ryan and Sam Armijo, the esteemed chairman of the ACRS so we've got to be on our best behavior.

MEMBER ARMIJO: Yes, sure.

CHAIRMAN POWERS: So we've got to be on our best behavior here or he will report us to the appropriate authorities. Steve Schultz has been called away to work on Fukushima related things. And Sanjoy Banerjee is dutifully studying GSI-191 to help us in the future.

Kathy Weaver is essentially functioning in the committee and is also our designated federal official for this particular meeting. So we've got to be nice to her as opposed to the rest of time, right?

MS. WEAVER: That's right.

CHAIRMAN POWERS: The purpose of this meeting is to continue our review of the Safety Evaluation Report with Open Items for the combined license applications submitted by UniStar Energy for the Calvert Cliffs Nuclear Power Plant Unit 3.

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 We will hear presentations and discuss
2 portions of Chapter 2, Site Characteristics,
3 specifically Section 2.4, Hydrologic Engineering. And
4 I will just note parenthetically that that particular
5 section was a challenging, mildly challenging part of
6 some of our early site permit applications, so we've
7 centered it out specifically just because of that past
8 experience.

9 That is not to say we have any challenges
10 here for Calvert Cliffs. It only says that we had
11 challenges in some of the early site permit activities.
12 And Chapter 9, Auxiliary Systems.

13 The subcommittee will hear presentations by
14 and hold discussions with representatives of UniStar and
15 the NRC staff and any other interested parties. The
16 subcommittee will gather information with plans to take
17 the results of these reviews along with other reviews by
18 the subcommittee to the full committee at a future full
19 committee meeting.

20 And I think that future is now December?

21 MS. WEAVER: It is, December the 5th.

22 CHAIRMAN POWERS: December the 5th, is our
23 definition of the future for the purposes of this
24 meeting. I mean we're trying desperately to get this
25 through in this calendar year. The scheduling doesn't

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 take priority over technical content, but we're not
2 trying to dilly-dally here. We want to move this along
3 as best we can.

4 The rules for participation in today's
5 meeting have been announced as part of the notice of this
6 meeting previously published in the Federal Register.
7 There is a bridge line established in the meeting room
8 for members of the public which is set for a listen in
9 only mode. And I understand we're going to have a line
10 for talk.

11 MS. WEAVER: Well, that would be a little
12 difficult. So what we may do with your permission is
13 when the gentleman from PNNL needs to speak we'll open
14 up the public line. Because right now there are no one
15 on that.

16 CHAIRMAN POWERS: Okay. Well, that should
17 work somehow.

18 MS. WEAVER: We're going to try that.

19 CHAIRMAN POWERS: We'll see how it works,
20 and if it doesn't work we'll try something else.

21 MS. WEAVER: Okay.

22 CHAIRMAN POWERS: We have received no
23 requests from members of the public to speak at today's
24 meeting. A transcript of the meeting is being kept and
25 will be made available as stated in the Federal Register

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 notice. Therefore, we request participants in this
2 meeting to use the microphones located throughout the
3 meeting room when addressing the committee.

4 Participants should first identify
5 themselves and speak with sufficient clarity and volume
6 so they may be readily heard. And that identify yourself
7 is a fairly important part of this because otherwise the
8 transcript has no clue what strange voice has suddenly
9 appeared. Copies of the meeting agenda and handouts are
10 available in the back of the room.

11 Before I start the general proceedings, do
12 any members of the subcommittee have any opening remarks
13 they want to make about this? General topics. Seeing
14 none, then I'm going to follow our usual practice and ask
15 Mike Takacs to give us some opening comments and help
16 guide us through an all-day meeting.

17 MR. TAKACS: Thank you Dr. Powers. Good
18 morning, and good morning committee members. My name is
19 Mike --

20 CHAIRMAN POWERS: Surinder doesn't like
21 us? Is this -- he's had enough of us, is that it?

22 MR. TAKACS: I won't speak for him just yet.
23 I recently transferred into this branch from the U.S.
24 APWR after five and a half years as a project manager.
25 I've taken the role as the lead project manager for Bell

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 Bend subsequent COLA, which is the subsequent COLA to
2 Calvert.

3 Today is pretty much, well, let me just step
4 back for a second. Surinder Arora is on vacation, so I'm
5 standing in --

6 CHAIRMAN POWERS: Vacation? Oh.

7 MR. TAKACS: I have to stand in for Surinder
8 for the month of November.

9 CHAIRMAN POWERS: So we will definitely
10 look for some extra activities on his return, right?

11 MR. TAKACS: I plan on transferring as much
12 as possible back to Surinder --

13 CHAIRMAN POWERS: That's good.

14 MR. TAKACS: -- when he's returning. John
15 Segala is the branch chief. He's not available today as
16 well.

17 Today from what I see is a major milestone
18 for this phase 2 review of Calvert. We have the final
19 scheduled phase 2 sections, 2.4, as you mentioned, Dr.
20 Powers, and Chapter 9, which will complete the SE
21 sections with open items. It's a very important pivotal
22 milestone that we're getting to today. Any actions or
23 any activity I will do my best to relay back to Surinder
24 upon his return.

25 For the first portion of the meeting though

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 as we kick off, we will be hearing from Mark Finley from
2 UniStar. He's the president, CEO and CNO. He'll
3 present the Section 2.4 which is the hydrologic
4 engineering section. I have no further comments at this
5 time, so with that I can turn this back to you, Dr. Powers,
6 or bring up --

7 CHAIRMAN POWERS: Yes, Mike, you're
8 absolutely right. Once we have completed this, then we
9 will move from phase 3 to phase 4 on this activity. And
10 I certainly see that as very important to do. We can do
11 that only if there are no technical objections to that.
12 But we do have some flexibility to resolve open items in
13 phase 4.

14 MR. TAKACS: Understood.

15 CHAIRMAN POWERS: And so we kind of have to
16 use a judgment on that on moving this thing through. But
17 I'm optimistic.

18 MR. TAKACS: So am I. That's why I came to
19 the group.

20 CHAIRMAN POWERS: Okay, so thanks Mike for
21 starting us off. Mr. Finley, are you ready?

22 MR. FINLEY: Yes, sir.

23 CHAIRMAN POWERS: Welcome back Mark.

24 MR. FINLEY: Thank you Dr. Powers, good to
25 be here. And thanks to Michael, Surinder obviously,

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 Kathy, and the subcommittee for keeping this schedule
2 even through the government shutdown. We appreciate
3 that. As has been said, this is an important milestone
4 for UniStar and as is the December 5th meeting to close
5 out phase 3. So thank you for that.

6 CHAIRMAN POWERS: And I will just interject
7 that the end of this meeting, the subcommittee really
8 owes it to both the staff and the applicant to give them
9 some guidance on what that 5th meeting should entail, and
10 there clearly has to be far more summary than what we have
11 here, because I think we only have two hours for that
12 don't we?

13 MS. WEAVER: That's correct. That's all
14 we have on the agenda right now.

15 CHAIRMAN POWERS: The chairman is very
16 parsimonious with the fact of the time he allows us.
17 So if any of the members have thoughts on what should be
18 presented to the full committee we will try to summarize
19 that at the end.

20 MR. FINLEY: We would very much appreciate
21 that. Thank you.

22 CHAIRMAN POWERS: In the past we've not
23 been able to give much guidance.

24 MR. FINLEY: Okay, so by way of
25 introduction I think most of you know me, Mark Finley.

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 I've been with UniStar for seven years. Before that with
2 Constellation about 19 years, and before that Nuclear
3 Navy. I graduated from the Naval Academy in,
4 professional engineer, state of Maryland.

5 So we have a lot of material here for you
6 today in 2.4. I think there's about 50 slides. We have
7 about an hour and a half on the agenda for the UniStar
8 presentation and then there's a staff presentation after
9 that. But even so, the 50 slides is going to be a lot
10 of information so I will go through quickly. But I
11 encourage you to stop me. If you have questions on any
12 slide we'll try to get you the answer there.

13 We do have one more expert that's on his way
14 up, a slight technical difficulty this morning. So the
15 staffer from Bechtel should be here shortly if there's
16 questions for him.

17 But okay, so to start Slide 2, John. So as
18 we said, the RCOLA is written using the Incorporate By
19 Reference methodology so we rely heavily of course on the
20 U.S. EPR FSAR from AREVA. But however in Section 2.4,
21 like in Chapter 9 it's mostly --

22 CHAIRMAN POWERS: If you could just --

23 MR. FINLEY: In Section 2.4 in Chapter 9
24 later this afternoon it's mostly site-specific, so
25 that's part of the reason there's a lot of material here

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 today. You did cover Chapter 2 with AREVA way back on
2 November 3rd of 2009.

3 CHAIRMAN POWERS: Question. Do you have a
4 corporate memory?

5 MR. FINLEY: So Slide 3, we have no
6 departures or no exemptions on Section 2.4, and there are
7 no contentions open. There are 15 COL items and we'll
8 discuss all of those today.

9 Slide 4, to continue the introductions, so
10 we have some experts supporting me here today. We have
11 Jamie from Rizzo who is our hurricane guy if we have
12 questions about the hurricane. Shankar from Bechtel who
13 is all-around Bechtel scope project manager. Bob
14 Randall who is my engineering manager at UniStar. John
15 Rucki who is operating the computer for me today.

16 So Slide 5, actually, move to Slide 7.
17 We'll just get right into it. So first COL item is the
18 applicant will provide a description of the hydrologic
19 characteristics of the plant site. I think the best way
20 to do that is to look at Slide 9. John, if you could go
21 to Slide 9.

22 It's a nice picture of the Calvert County
23 Peninsula in southern Maryland. You can see a red circle
24 there where the site is located. So it's on the
25 Chesapeake Bay which is probably the most important

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 hydrologic feature for the site.

2 The peninsula on the west side is bounded
3 by the Patuxent River. That is a tidal river in that area
4 so that's important for later. And of course Chesapeake
5 Bay is also quite a large body of water. St. Leonard
6 Creek you can see is -- I don't know if the pointer will
7 show up there, John, or not.

8 Yes, so that smaller body of water there is
9 St. Leonard Creek, and we have Johns Creek which actually
10 is a tributary of St. Leonard Creek which moves roughly
11 from the site to that body of water, and we'll be talking
12 about that a little bit later on. Those are the main
13 aspects hydrologically.

14 Slide 8 talks about, and we'll show better
15 diagrams of this later that the main block, power block
16 of safety structures is actually up pretty high above the
17 Bay, about 85 foot above sea water level of the Bay so
18 it's really not threatened by Bay flooding scenarios.
19 We do have one safety structure, however, which is on the
20 Bay, roughly a ten-foot grade and we'll talk about that.

21 So it is subject to some of the flooding
22 issues around the Bay. But it's purpose, that structure
23 is to house the ultimate heat sink makeup pumps which are
24 relied on for the Calvert Cliffs site after 72 hours to
25 provide makeup to the basins for the UHS cooling towers.

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 So the basins have about 72 hours of water,
2 but before 72 hours expires we need to be able to provide
3 makeup from the Chesapeake Bay. So that's the function
4 of the structure that's on the Bay. And we'll come back
5 to that in some detail.

6 Okay, Slide 10 actually shows maybe a little
7 better diagram of where the power block is, and I think
8 if you look hard you can see Johns Creek which we'll talk
9 about, which flows essentially from east to west as I
10 mentioned towards St. Leonard Creek, and we'll talk about
11 the some of the flooding evaluations that were done on
12 Johns Creek.

13 The dotted line there roughly depicts the
14 drainage divide, so water to the left, you know, flows
15 to the west there towards the Patuxent River and to the
16 right flows back to the Chesapeake Bay.

17 MEMBER SKILLMAN: Is that a natural ridge?

18 MR. FINLEY: Yes, right now that's a
19 natural ridge. I believe it'll be altered slightly when
20 we do grade the plant, but not significantly.

21 MEMBER SKILLMAN: Thank you.

22 MR. FINLEY: Yes. Okay, Slide 11. So
23 we'll start with perhaps the easy ones first. So dams
24 and reservoirs, essentially there are no dams on the St.
25 Leonard Creek which is that body of water we pointed out

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 to the west of the site.

2 There are two dams fairly fair upstream on
3 the Patuxent River about 75 and 85 miles upstream. We
4 have looked at potential failures of these dams.
5 There's really no influence at the site if those dams were
6 to fail, even both of them were to fail.

7 There is a slight influence, I think, at the
8 mouth of the St. Leonard Creek and Patuxent River a couple
9 of feet, but by the time you get around to the Chesapeake
10 Bay there's really no effect on the site.

11 So I think with respect to dams and dam
12 failure that's not a concern for the Calvert Cliffs site.
13 As far as surface water usage, nearby of course we do
14 have, and this is with respect to the Chesapeake Bay,
15 really. In the vicinity of the Calvert Cliffs 3 site we
16 do have Calvert Cliffs 1 and 2. And they draw a
17 once-through cooling water but return it to the Bay, and
18 I think in that sense we don't call it a surface water
19 consumption on the Bay.

20 There are some smaller consumers of surface
21 water on the Bay. You see them listed there, not a
22 significant impact on the sites. Slide 12, to continue
23 with the overall hydrologic characteristics. So ground
24 water, we will have a desalination plant which will
25 provide the fresh water needs for the site.

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 That desalination plant's going to be used to
2 maintain the UHS cooling tower basins full so we'll have
3 fresh water in those basins. I mentioned, before 72
4 hours we'll have the capability to provide Chesapeake Bay
5 water to those basins.

6 That is brackish water, but normally we
7 would have fresh water in the basins. That's going to
8 be supplied by the desalination plant. The desalination
9 plant will be used for normal makeup to the site, makeup
10 to the fire water main or fire water tanks. That's our
11 normal source of fresh water.

12 During construction we plan to have a well
13 and we will be using fresh water from that well to
14 supplement construction. And at this point in emergency
15 situations during operations we would also rely on ground
16 water using a well. Part of that is an open item with
17 the staff that they will talk about later this morning.

18 MEMBER RYAN: What's the depth of where
19 you're extracting the water?

20 MR. FINLEY: The depth is anywhere greater
21 than about 600 feet. I don't know that I have a diagram
22 of aquifers. Perhaps later we'll come to --

23 MEMBER RYAN: Okay, that's fine. I was
24 curious how a well it's isolated throughout here, whether
25 it communicates and how much. That kind of thing.

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 MR. FINLEY: Right. And part of the
2 commitment is to do some testing prior to making use of
3 that well during construction to make sure that we have
4 adequate flow. But we do have some analysis ahead of
5 time that shows it for the usage which is about 70 gallons
6 a minute. For the usage that we need during construction
7 there should not be a problem.

8 MEMBER ARMIJO: Is a desalination plant a
9 unique feature as far as --

10 MR. FINLEY: I'm aware that --

11 MEMBER ARMIJO: I'm not familiar with any
12 other plant that has --

13 MR. FINLEY: I believe Diablo Canyon also
14 has a similar desalination plant. I'm not sure what the
15 size of that plant compared to our proposal.

16 MEMBER ARMIJO: But you would operate it
17 intermittently or would it be continuous operation?

18 MR. FINLEY: No, it would be continuous
19 operation and we would design it so that it's very
20 reliable, multiple, you know, redundant features. So of
21 course subject to loss of all offsite power, but we think,
22 and I think the experience we saw at Diablo Canyon is that
23 these systems can be maintained very reliable. So we
24 think normally we'll always have the desalination plant.

25 MEMBER ARMIJO: But it provides potable

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 water. It provides makeup to the fire water --

2 MR. FINLEY: Makeups of fire water.

3 MEMBER ARMIJO: So it's your basic water
4 supply?

5 MR. FINLEY: It is the basic water supply.
6 We will have a raw water system. Obviously we'll talk
7 about that some. And a raw water system provides the
8 input to the desalination plant as well as some other
9 cooling water.

10 Yes, so the desalination facility is the key
11 facility for the site in terms of operating normally. We
12 rely on about, I think it was about 900 gallons a minute
13 from that desalination plant. But we had done some
14 benchmarking with the Diablo Canyon plant and they have
15 a reliable plant. So I don't think it's unique in terms
16 of --

17 MEMBER ARMIJO: But it's not Bay water
18 you're treating, it's --

19 MR. FINLEY: Yes, it is.

20 MEMBER ARMIJO: It's actually water from
21 Chesapeake Bay?

22 MR. FINLEY: That's correct. Yes. It's
23 not ground water but water from the Chesapeake Bay. Yes.
24 And ground water would only be used if the desalination
25 plant were out of service for some reason.

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 MEMBER STETKAR: I was going to say, so you
2 may want to answer Dr. Ryan's question. As I look
3 through your slides, you don't have a good cross section
4 profile that shows the different --

5 MR. FINLEY: Different aquifers?

6 MEMBER STETKAR: Yes, the different
7 aquifers. There are a couple of pretty good ones in the
8 FSAR so you may want to --

9 MR. FINLEY: Yes, I think we can come back
10 with that maybe --

11 (Crosstalk)

12 MEMBER STETKAR: No, there is not. That's
13 why I looked forward to see where it was, and it's not
14 in here.

15 MR. FINLEY: Well, certainly if we get a
16 little time in the break we can get the figure.

17 MEMBER STETKAR: It's only important
18 because he's asking. You know, when you do your ground
19 water pathways there is a vertical component down to --
20 I've forgotten the names of the --

21 (Crosstalk)

22 MEMBER STETKAR: But a down and out, if you
23 will --

24 MR. FINLEY: Right. Right. So we'll come
25 back to that.

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 MEMBER STETKAR: Thank you.

2 MEMBER SKILLMAN: Mark, did you say that
3 the cooling tower basins are fed by the desalinated water
4 supply?

5 MR. FINLEY: That's correct. And we'll
6 have a more detailed figure to show. But the normal
7 makeup to those basins is from the desalination plant,
8 yes.

9 MEMBER SKILLMAN: And that makeup rate
10 takes into consideration drift and evaporation during
11 the summer?

12 MR. FINLEY: Yes.

13 MEMBER SKILLMAN: And your most dry days
14 when you're evaporating?

15 MR. FINLEY: Yes, it does, and we'll cover
16 that in a little more detail with a flow rate and so forth.

17 MEMBER SKILLMAN: So for the SSCs they're
18 cooled by that water. To what extent are they dependent
19 upon that water being desalinated?

20 MR. FINLEY: So, and again we'll touch on
21 this a little in a slide too. So we have evaluated, since
22 the desalination plant is not safety related and it
23 relies on offsite power, we have the plan for the
24 eventuality of not having the desalination plant and
25 we've done that.

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 So we have makeup from the Bay, and we've
2 evaluated the change in water quality based on using that
3 brackish water from the Bay to make sure that the water
4 still maintains the quality needed to not affect the SSCs
5 in terms of safety functions. So you'll have another
6 chance to look at some more details when I get to that
7 slide.

8 But we've essentially evaluated the change
9 to a brackish water environment with increased hold of
10 dissolved solids, and we've evaluated the impact on SSCs
11 and there is no effect for 30 days.

12 MEMBER SKILLMAN: Okay, I'd like to --

13 (Crosstalk)

14 MEMBER SKILLMAN: -- just for a second
15 here. I'm thinking about some operating experience that
16 showed leafy green vegetables growing in diesel
17 generator jackets because it wasn't fresh water anymore
18 it was actually raw water, other surprises such as that.
19 And so I can understand a design based on desalinated
20 water, but the brackish water brings an entirely
21 different spectrum.

22 MR. FINLEY: Okay.

23 MEMBER SKILLMAN: As interrogators into
24 your equipment, I would like us to be comfortable that
25 you've really thought that through.

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 MR. FINLEY: I appreciate that as far as
2 part of that -- well, let's wait until I get to the slide.
3 I think there's more detail there.

4 MEMBER SKILLMAN: Thank you Mark.

5 MR. FINLEY: So I think we're done with
6 Slide 12. Slide 13, shifting gears a little bit to talk
7 about flooding. So as I mentioned previously, the main
8 feature with respect to flooding of concern for the site
9 is the Chesapeake Bay.

10 And we do have the one structure near the
11 Bay in terms of the makeup structure. So we've looked
12 hard at the varied flooding data, and in fact on Slide
13 14 show, I guess, the five highest floods for locales
14 nearby.

15 Unfortunately we don't have, I would say,
16 hourly recorded data at the operating units Calvert
17 Cliffs 1 and 2, so this is the data that we had to go to,
18 to go back a number of years on the Chesapeake Bay. And
19 you can see roughly six, seven feet are the flood levels
20 even through the storms that we've seen roughly over the
21 last, well, this goes back, I guess, close to 100 years.

22 But with respect to the Calvert Cliffs 1 and
23 2 sites which are right next door, we do know that there's
24 never been flooding since they've been operating,
25 roughly late '60s, early '70s time frame that exceeded

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 the ten-foot elevation which is roughly their grade for
2 the structures they have on the Bay.

3 MEMBER STETKAR: These are, and they're an
4 important point for the flooding analysis because these
5 are all associated with hurricane storm surges. Did you
6 measure, I'm sure you did. What was the storm surge
7 during Sandy? Do you have that information? Because
8 this data doesn't. I forgot the cutoff data. I think
9 it's 2010 or something like that so it didn't pick up
10 Sandy in that.

11 MR. FINLEY: Yes, this was cut off prior to
12 Sandy. I would need to confirm this, but I really think
13 there was not a significant flood on the Chesapeake Bay
14 during Sandy. In fact I think there was actually a
15 drawdown of the Bay because --

16 MEMBER STETKAR: You know, I tried to do
17 some searches on the Internet and I couldn't find
18 anything definitive except, you know, anecdotal news
19 stories and things like that.

20 MR. FINLEY: I'll take an action to confirm
21 that but it was not significant. I don't think there was
22 any, to my knowledge Calvert Cliffs 1 and 2 plants
23 operated through that and there was no significant
24 flooding issues.

25 MEMBER STETKAR: The only reason I brought

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 it up is the importance of the hurricane to the storm
2 surge analysis and whether or not you captured the --

3 MR. FINLEY: I appreciate that and we'll
4 talk more about the hurricane. What's actually worse
5 for the Bay is the storm that moves up on the west side
6 of the Bay, and of course Sandy was up north, and so the
7 wind pattern was different. It's when the wind blows up
8 the Bay.

9 Isabel, for example, you may remember, its
10 September 2003. It's not long ago. I remember it well.
11 There was a lot of trees down in Calvert County. So that
12 was a storm that went through Virginia basically, and the
13 winds were from the southwest up the Bay and they did
14 flooding in downtown Baltimore. So that's more of a
15 concern. And that's really the limiting hurricane that
16 we'll talk about in a few minutes.

17 Slide 15, more flood considerations. We
18 had looked at, I mentioned hurricanes of course, but
19 we've looked at the probable maximum flood of the streams
20 nearby the site. We'll talk about that. We have looked
21 at the potential dam failures. I've touched on that a
22 little bit.

23 And we've looked at the maximum surge and
24 seiche associated with the hurricane, and the probable
25 maximum tsunami as well related to landslides, and also

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 ice effect flooding. So we've looked at all these
2 scenarios in terms of their potential effect on flooding
3 for Calvert Cliffs.

4 MEMBER STETKAR: Mark, are you going to
5 talk anymore about the precipitation?

6 MR. FINLEY: Yes. On each of these type
7 scenarios I mentioned we'll have specific slides. And
8 I think we might talk about it later on, but the last
9 bullet on Slide 15. So one of the things we looked at
10 was Johns Creek. I mentioned that that's a tributary
11 that runs essentially to the west and dumps into St.
12 Leonard Creek and the Patuxent River. The maximum
13 flooding level on that creek is 65 foot. That's roughly
14 20 feet below plant grade for the power block, so not a
15 concern. A significant margin there.

16 MEMBER SKILLMAN: Just hold that thought
17 for a minute. If you say the power block's at 85 feet,
18 what SSCs are below 85 feet and are therefore subject to
19 precipitation flooding or other water intrusions, say,
20 through drains that when the plant was constructed were
21 not constructed in the way that drain out with the higher
22 water table?

23 MR. FINLEY: Okay, so there are a large
24 number I would say, a large number of SSCs that are
25 actually located in the structures, in the safety

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 structures at levels below 85 feet. I couldn't list them
2 here.

3 But we have a lot of measures, some of which
4 we'll talk about on future slides here, that prevent
5 ground water intrusion. We have margin to the surface
6 water intrusion, et cetera. So we don't think that these
7 SSCs are challenged by flooding. In the structures
8 they're located below grade, so below the 85-foot
9 elevation.

10 MEMBER SKILLMAN: How would you describe
11 the thoroughness of the evaluation to confirm what you
12 just said?

13 MR. FINLEY: I'll tell you what. I'm going
14 to defer to Shankar and maybe he can help me on this. So
15 introduce yourself, if you would, Shankar.

16 MR. RAO: Shankar Rao from Bechtel. I am
17 with Bechtel for the last 33 years, and I have been on
18 this project, UniStar's, U.S. EPR as well as Calvert
19 Cliff's Unit 3 from 2005.

20 Specifically related to your question we
21 have done calculations, detailed modeling and
22 calculations associated with the flooding surface, and
23 then our colleagues from Rizzo has done for the storm
24 water surges and the effect of the flooding due to that.

25 And like Mark said, in addition to the

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 structures that are at 85 and above there are structures
2 below 85, but we have provided storm drainage and other
3 features associated with the probable maximum
4 precipitation to divert water away from the safety
5 related structures in such a way that water intrusion is
6 not a factor into the building.

7 In addition to that we have also provided
8 from underground waters, water proofing and dampproofing
9 protection measures which will provide protection from
10 any water seeping in from the bottom due to water table
11 changes.

12 MR. FINLEY: We will actually have some
13 additional diagrams with respect to the water proofing
14 membrane that we use, in future slides. So you'll get
15 another chance to follow up on that.

16 MEMBER SKILLMAN: I will. Thank you.

17 MR. FINLEY: Okay, Slide 16. So the
18 structure with a hurricane in terms of these challenges,
19 and again this is really only a concern for the UHS makeup
20 intake structure on the Bay. We'll show you a diagram
21 of that structure shortly.

22 But first just to show some of the numbers.
23 Actually I think it's maybe easier seen on the Table on
24 Slide 17, if you shift to Slide 17. So first of all, we
25 calculate sort of the worst initial high tide before the

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 hurricane hits and that's about four feet, and then it
2 accounts for about an additional foot of sea level rise
3 in the future for whatever reason.

4 And then on top of that we look at surge.
5 And you can see in the bottom half of that Table there,
6 the surge due to the hurricane is another 13.2 feet.
7 We'll get into some details of that a little bit later.
8 And then a wave runup on top of the surge, so that's the
9 wave pushing against the structure itself. And a total
10 of 33.2 foot has been calculated for the impact of the
11 hurricane.

12 And the hurricane track was very
13 conservatively selected. Of course the size of the
14 storm was conservatively selected. The speed of the
15 storm was conservatively selected to maximize all of
16 these values here. To give you a feeling for the margin
17 that we have given that result, so Slide 18 --

18 MEMBER STETKAR: Mark, let me interrupt you
19 for a moment, because if you're going to get into water
20 depths and things like that I'd like to explore the
21 hurricane first a little bit, and I didn't see any slides
22 on that because you're getting into water.

23 The hurricane that you've selected is, I
24 believe, peak wind speeds at the site of 117 miles an
25 hour. And wind speeds at landfall of 152.6, which makes

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 it the high end of a Category 4 at landfall and right at
2 the bottom of a Category 3 when it passes by the site.

3 The FSAR says that there are historical
4 records of 12 hurricanes that have come up through that
5 area in the last 156 years or 155 years or something like
6 that. It's a pretty frequent event. I mean it's not a
7 rare event in terms of things to do with that. I'm sure
8 there is information. I couldn't find it or I didn't
9 have the time to go look for it. What were the
10 intensities of those hurricanes, the actual historical
11 experience? Because this is not, it's your design basis
12 hurricane, but I mean it's not the worst hurricane in the
13 world. It's kind of a Category 3-4ish sort of hurricane
14 which is pretty big for that part of the world, but I'm
15 just curious about where it lies within the range of
16 historical experience.

17 MR. FINLEY: Yes, so I'm going to ask for
18 Jemie from Rizzo to chime in. I think he can answer much
19 better than I.

20 MR. DABABNEH: Yes, I think the criterion
21 here is whether the hurricane was going over water or over
22 land. If it's over land you would see the wind speed is
23 decreased. If it's over water the wind speed would be
24 higher. So the rest of hurricanes that went through the
25 Chesapeake Bay, some of them caused draw downs that

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 caused surge.

2 So for the ones we developed, we developed
3 those with all the track. We made sure that the site is
4 on --

5 MEMBER STETKAR: Let me stop you because of
6 time constraints. I understand what you did with model.
7 You have wonderful computer models. But I'm asking you
8 about history. I would like to know what the intensities
9 of those 12 hurricanes that actually happened were. I
10 know what you've done with the model.

11 MR. FINLEY: We have that data, Dr.
12 Stetkar, and I think we can get that to you on a break
13 perhaps. I do know that --

14 MEMBER STETKAR: I just never got a sense
15 of --

16 MR. FINLEY: This hurricane is larger than
17 any of those in terms of --

18 MEMBER STETKAR: That's the kind of --
19 (Crosstalk)

20 MEMBER STETKAR: -- I was looking for.

21 MR. FINLEY: We've never had a landfalling
22 hurricane in Virginia, Maryland of this magnitude.

23 MEMBER STETKAR: That's the kind of
24 confirmatory information that I was looking for, so if
25 you can confirm that that's great.

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 MR. FINLEY: And I think as Jemie was
2 saying, where it hit landfall is important.

3 MEMBER STETKAR: I understand. I don't do
4 the kind of modeling so I don't, you know, I can't
5 converse with you on what you actually do. But I
6 understand what you did with the modeling.

7 MR. DABABNEH: And these parameters, like
8 I think NOAA developed certain parameters for the total
9 maximum hurricane based on the history of hurricanes.
10 They came up with like central pressure or maybe it's the
11 maximum wind that is worse than anything else that took
12 place.

13 MEMBER STETKAR: The first question was
14 item six on my list. You're a good straight man. And
15 the second question is item seven. Those parameters
16 were developed from National Weather Service Technical
17 Report NWS 23, 1979 date, and you list the parameters.

18 And you use those parameters, moved your
19 hurricane around, you know, looked at tracks, looked at
20 directions, looked at, you know, things. But essentially
21 you used those parameters in terms of pressure difference
22 and size of the hurricane and things like that.

23 The question I had is that some recent, more
24 recent analysis that were done to support guidance in
25 Regulatory Guide 1.221 that was issued in July of 2011,

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 it indicated that some of those very early National
2 Weather Service barometric evaluations were indeed
3 optimistic especially for coastal sites. And as a
4 result of that a lot of the Gulf Coast at least has
5 reindexed their probable maximum hurricane wind speeds
6 and parameters.

7 I was curious whether you looked at that and
8 how that might affect your parameters for the probable
9 maximum hurricane at the Calvert Cliffs site, because you
10 are using that old federal guidance. Did you look at the
11 newer --

12 MR. FINLEY: I'm going to defer it to Jemie
13 on that as well.

14 MR. DABABNEH: When we did the work the new
15 guidance was not in effect. However, when we developed
16 the track, the NOAA parameters were just at the mouth of
17 Bay. When we developed it they were all parameters based
18 on that.

19 We looked at the National Hurricane Center,
20 which was basically a list of hurricanes and their
21 central pressure and figures of maximum wind, and did
22 some comparisons for the hurricanes that you think would
23 cause the surge at the site. And I mean it was, I must
24 say, they were exactly the same, but we went upon a range.

25 MEMBER STETKAR: Okay.

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 MR. DABABNEH: And I think now, frankly,
2 NOAA is abating their SLOSH model to account for these
3 new hurricanes, like Sandy and --

4 MEMBER STETKAR: Yes, and it's not just the
5 SLOSH model but it's the historical, I mean if you want
6 to use the term statistics, it's the way they did their
7 analyses of historical hurricanes coming for U.S.
8 landfalls. The wind analysis, you know, peak winds and
9 stuff like that.

10 So that whole, the meteorological part of
11 it, you know, has been updated. And I know it has had
12 an effect along the Gulf Coast in southeastern U.S. I'm
13 not as familiar with, you know, mid-Atlantic and
14 northeastern sites. So I was curious whether you had
15 looked at that and considered it.

16 MR. FINLEY: I think informally, I think
17 that came out after we --

18 (Crosstalk)

19 MEMBER STETKAR: The data that, there was
20 a NUREG and the updated, the Reg Guide was 2011. So it
21 does post date the analyses that you've done.

22 MR. DABABNEH: But during the process, I
23 just want to emphasize during the process you don't have
24 an actual hurricane center. They list all the
25 hurricanes with their statistics and we're just

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 comparing them to --

2 MEMBER STETKAR: Okay, thanks.

3 MR. FINLEY: Yes, so on Slide 18, and I'm
4 going to jump ahead for just a second, but let's stick
5 with 18 just a moment. So this is a section view of the
6 structure we have on the Bay. The grade is about ten
7 foot. You can see that on the right hand side there that
8 lowest level nominal ten-foot grade.

9 Up above that you see the maximum wave runup
10 coincident with the numbers I showed you before, 33.2,
11 so that's the surge and the runup which is the water
12 pushing against that wall. And then the opening for
13 ventilation is up above that roughly at 36'6". So
14 roughly three foot of margin from that wave runup to the
15 ventilation intake.

16 And I'll also say that just the orientation
17 of this structure, so we're looking east. Essentially
18 it's plant east, so you're actually looking a little to
19 the northeast out toward the Chesapeake Bay. So the
20 waves would be coming in, I would say, out of the page
21 towards you, the viewer, here, not directly from the
22 right or from the left on this particular drawing.

23 So that just shows you the margin that we
24 have with respect to this worst case wave runup. I'm
25 going to jump ahead --

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 MEMBER STETKAR: What's the setback, Mark?
2 I couldn't find it easily. What's the setback from which
3 you do your analysis on, you know, the maximum spring high
4 tide? I don't care exactly where that is, but how far
5 back from the shoreline -- I know that's a big concept
6 -- is the building set?

7 MR. FINLEY: I'll tell you what. If you
8 look on Slide 35 -- John. If you go ahead and look at
9 Slide 35 we have maybe a better plan view picture. So
10 that section that we were just looking at was essentially
11 looking from lower left to upper right. So
12 we were looking up toward the northeast, essentially
13 toward where the waves would be coming from, and you can
14 see the setback there. I don't think we have a footage.
15 But that's roughly a ten-foot grade where the normal
16 shoreline is, well, I don't know, a couple hundred feet
17 maybe away from the structure. Something like that.

18 MEMBER STETKAR: You said a couple of
19 hundred?

20 MR. FINLEY: Yes, so a hundred foot or --

21 MEMBER STETKAR: Okay. I had no, you know,
22 none of the, they're always on the things, the drawings
23 in the FSAR, most of them say not to scale or things like
24 that. So I had no sense of -- a couple of hundred is fine.
25 I was just curious about, you know, because of the wave

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 models that you used, it just was a lot of attenuation
2 over that --

3 MR. FINLEY: Yes. And actually to the
4 point --

5 (Crosstalk)

6 MEMBER STETKAR: -- beach area or whatever.

7 MR. FINLEY: Let me interrupt, because I
8 think I have a better slide. I'm moving around. I'm
9 sorry about this. But Slide 31, if you go to Slide 31.
10 I don't think there's a dimension on here but it shows
11 --

12 MEMBER STETKAR: This is essentially what
13 I was talking about.

14 MR. FINLEY: Right. It shows you that
15 there is some land, if you will, between the normal
16 shoreline and where the structure is that actually we
17 take credit for in terms of reducing the wave size. So
18 large waves would actually break on the normal shoreline,
19 if you will, smaller waves would then reach the
20 structure. And there is some runup to 33.2 feet but
21 that's pretty significant. It's where sort of the green
22 water reaches on the splash up the building.

23 MEMBER STETKAR: I was just curious about
24 that horizontal. This is the drawing from the FSAR that
25 I was referring to. And, you know, at the bottom it says

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 not to scale so I --

2 MR. FINLEY: Maybe Jemie --

3 (Crosstalk)

4 MEMBER STETKAR: There's a couple hundred
5 feet. That's close --

6 MR. DABABNEH: I think it's 100, 115.

7 MR. FINLEY: Okay, okay.

8 MEMBER STETKAR: Yes, fine. Thank you.

9 MR. FINLEY: Okay. Let's stick with the
10 hurricane here. We got a little out of sync but --

11 MEMBER STETKAR: Yes, I'm sorry. You're
12 talking about wave runups and things like that so --

13 MR. FINLEY: Yes. No, no, it's good. I'm
14 glad that you're asking the hurricane questions now. So
15 Slide 30, John. If we go to Slide 30, just to stick with
16 hurricane. And I think we've talked about most of these
17 things already.

18 And this is a little bit more analytically,
19 we talked about the structure and the hurricane, I think,
20 until now. This is more the analysis. So we used the
21 sea, lake, overland surges from hurricanes model, SLOSH
22 model, which is something requested actually by NRC
23 staff, and we did that.

24 That's what was used with uncertainties to
25 calculate these worst elevations. We did include a 20

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 percent uncertainty for the SLOSH model, and that's what
2 resulted in the 33.2 overall elevation for the water.
3 And again, Slide 31 just shows sort of the total, maybe
4 a good visual picture of how that relates to the makeup
5 water intake structure.

6 Okay, so I'm going to ask, are there any
7 other hurricane questions? Because I think I've covered
8 all my hurricane slides.

9 MEMBER SKILLMAN: Yes, I would ask one.
10 Has anyone at the site who is involved in this project
11 looked at the numbers and looked at the bluff down onto
12 the Chesapeake and said, you know what, with a real runup
13 this thing could get, we are not as robust as we think
14 we are?

15 MR. FINLEY: Okay, so I'm going to ask if
16 Shankar could comment in a second. So the shoreline, and
17 actually Slide 31 might be the best place to talk about
18 this. So the waves also break on the shoreline past the
19 intake structure which I think is your point in terms of
20 stability of the bluffs.

21 All of the natural bluffs are going to be
22 changed and they'll be graded and they'll be reinforced
23 with rip-rap and other materials to make sure that it's
24 a stable slope. So that with respect to the hurricane
25 and the wave action on the bluff we're not concerned about

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 stability of the soil and any issues up on the power
2 block. Maybe Shankar, you could comment more on that.

3 MR. RAO: Yes, stability of slope and all
4 those analyses were performed for that, and any
5 preparation for the intake structure area if there was
6 a piece of, I think, mound or something I would call,
7 would be cut to make that adjustment.

8 And then the rip-raps and others would be
9 added for any effect of the waves that would, may erode
10 the bluffs, at least those which are being prepared for
11 the intake structure area. They would be that 200 feet
12 from the intake towards the plant which would be graded
13 along with adjustments for waves should anything exceed
14 11-1/2 foot elevation, which is our ten-foot elevation
15 that is the grade of the prepared for the intake
16 structure.

17 MEMBER SKILLMAN: Thank you.

18 MEMBER ARMIJO: Yes, on your Slide 35, I see
19 you referred to another slide, but anyway, the intake,
20 safety related intake pipes, what's the protection
21 against debris blockage in the event of a hurricane for
22 those?

23 MR. FINLEY: I'll tell you so as not to get
24 too far out of sequence, can I ask you to hold that
25 question?

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 MEMBER ARMIJO: Sure.

2 MR. FINLEY: Because we're going to come
3 back to that. Let me go through the rest of the slides
4 and build up to that point if I could.

5 MEMBER STETKAR: Yes, sorry to do that.
6 You said you were going to talk about hurricanes first,
7 early.

8 MR. FINLEY: We moved around too much.

9 MEMBER STETKAR: If you can go back to, I
10 don't remember where you are, about 15 or so.

11 MR. FINLEY: Yes, like 18 or 19.

12 MEMBER STETKAR: Yes, okay. If we can go
13 back to 18, your picture of the building. We kind of
14 talked a little bit about storm surges and things. One
15 of the questions I had, which is a building question, is
16 that if you look at the elevations on this slide which
17 obviously you can't see on the screen there, but the storm
18 surge elevation is well above the floor level of the pump
19 and electrical equipment which is nominally, grade
20 level's ten feet, it's like 11-1/2 feet, I think, the
21 floor levels if I remember right. It is stated
22 in the -- most pump rooms I've been in, this is obviously
23 not most pump rooms. The suction piping that comes up
24 through the floor is typically, you know, you can look
25 down and see water down there because you need clearances

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 for thermal expansion and vibration and things like that.
2 So it's typically an open suction line.

3 There's a statement in the FSAR that says
4 that entire floor, if I will, or the roof of the forebay
5 in that area will be sealed and watertight for any applied
6 hydraulic loads. Now a storm surge can bring in quite
7 a bit of hydraulic loads.

8 So I was curious. I couldn't find either,
9 there was no discussion of it here. There was no
10 discussion, I couldn't find it in Chapter 3. I couldn't
11 find it in Chapter 9. I couldn't find it anywhere.

12 How are you going to seal that area, in
13 particular the area around the suction pipes from the
14 makeup pumps against that type of hydraulic load?
15 That's got to be pretty --

16 MR. FINLEY: And actually, just before
17 answering maybe just to show on the figure, John, right
18 in the center of the figure you can see the vertical pump
19 Dr. Stetkar's talking about, and then the floor where the
20 suction line of the pump penetrates. That's, I think,
21 the --

22 MEMBER STETKAR: That's exactly. You
23 know, obviously I'm worried about, you've seen manhole
24 covers blow off of sewers.

25 MR. FINLEY: Let me ask Shankar to address

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 that.

2 MR. RAO: Yes, this pump has a barrel. And
3 then through the barrel there is a shaft that runs the
4 impellers down below. And the whole barrel will be
5 either sealed with some kind of material in such a way
6 that it allows for, especially because the temperature
7 is not extreme for the water. It's pretty ambient.

8 Therefore, it could potentially just be
9 grouted in place in the floor, because the barrel, it's
10 just a barrel which brings water up and the shaft goes
11 through that.

12 MEMBER STETKAR: Okay.

13 MR. RAO: Any seal that may be necessary for
14 it will be designed for the load, it will seal during the
15 --

16 MEMBER STETKAR: I can envision how you
17 might do that. I've just never seen that kind of
18 construction anywhere.

19 MR. RAO: They'll be done in new technique
20 to the designs.

21 MEMBER STETKAR: Okay, thank you. Thank
22 you.

23 MR. FINLEY: Okay. So we'll come back to
24 the question about debris, I think, in the sequence of
25 the slide, so if we don't hit that please stop me. Okay,

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 so Slide 19. So we're going to shift to precipitation
2 here now.

3 Precipitation, I would say, is the larger
4 concern on the power block area. Now we're moving away
5 from the Bay but up roughly 85 feet. And so we've
6 analyzed using the approved methods and using the worst
7 precipitation levels, which I'll show you in just a
8 second, and looked at the drainage on the site and been
9 conservative in terms of what kind of drainage we credit.

10 And we calculate with that worst scenario
11 an elevation of the water on the power block area about
12 81.5 feet. And I'll show you what that looks like on a
13 diagram in just a second. So it's about three feet below
14 the 84.6 feet which is the lowest reactor complex
15 entrance elevation.

16 So about three foot of margin, again with
17 some quite conservative assumptions regarding the
18 analysis. There's a table on the next page which shows,
19 on Page 20, Slide 20, shows the precipitation assumptions
20 we've made. Essentially eight and a half inches of rain
21 in one hour. This is actually less than the U.S. EPR FSAR
22 assumption which is 19.4 inches per hour in terms of the
23 generic structure design which we incorporate from the
24 design certification. And so it's a very significant
25 rainfall obviously, but in accordance with approved

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 references.

2 On Slide 21 we show for each of the
3 structures up on the power block, the ultimate heat sink
4 structures, the diesel building structures and then the
5 reactor complex, what the entrance elevation is, what the
6 peak water elevation is, and then margin that we have to
7 those water elevations.

8 Let me just, one more slide before you ask
9 questions. So Slide 22 is a plan view that shows the
10 grading up on the power block area. And you can see kind
11 of the bolder lines show the drainage ditches. It's
12 actually, this is graded for two power blocks, so the Unit
13 3 power block is there onto the left and it shows we have
14 a drainage away from the structures to the drainage
15 ditches.

16 And again with the 19 inches of rainfall in
17 an hour we calculated there will be some overflowing of
18 the drainage ditches and water will back up to some extent
19 on this grade, but we'll have margin to the entrances of
20 those structures.

21 MEMBER STETKAR: I'm glad you're at this
22 because I have the same thing up -- I think it's okay but
23 I'm not a hydrological or whatever engineer. The peak
24 elevations anyway that you show in that central ditch
25 there, it's like 81-1/2 feet, I think.

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 What I was concerned about, you focus
2 obviously on safety related structures and the power
3 block. I was curious about the turbine building. And
4 this, I think, but I'm not sure that the grade elevation
5 of the turbine building is 83 feet, but I don't know
6 whether it's 82 or 83. And I was curious about whether
7 you'd get turbine building flooding during this event.
8 It's not a safety related structure but --

9 MR. FINLEY: I understand, and let me ask
10 Shankar. Do you know the entrance elevation for the
11 turbine building?

12 MEMBER STETKAR: Because you certainly
13 will, at grade level you're going to have big openings
14 in the --

15 MR. RAO: 84'6".

16 MEMBER STETKAR: 84 feet?

17 MR. RAO: 84'6" is the nominal grade around
18 the turbine building.

19 MEMBER STETKAR: At the turbine building.
20 Okay, fine. Thanks.

21 MR. RAO: These other ones, the lowest one
22 in this vicinity is the diesel --

23 MEMBER STETKAR: Yes. I mean that's
24 pretty clear. I just couldn't tell from this because it
25 looked like in compass direction what's the southwest end

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 of the turbine building, or on this drawing, the bottom
2 of this drawing, down where the pipe chases go through,
3 I think those are pipe chases or transformers or
4 something, I wasn't quite sure what the elevation was
5 there.

6 Up closer to the power block it looks like
7 83 feet, so I'm assuming it was around 83 or so. You're
8 saying it's even higher than that. Okay, thank you.

9 MEMBER ARMIJO: Are both the emergency
10 diesel generators shown on this drawing at the same
11 elevation?

12 MR. RAO: Yes. You mean on the left and the
13 right?

14 MEMBER ARMIJO: Yes, left and right.

15 MR. FINLEY: All right, so if you look at
16 Slide 21, Dr. Armijo, it shows the two diesel generator
17 --

18 MEMBER ARMIJO: Yes.

19 MR. FINLEY: -- structures, so that they're
20 both at the same grade elevation. And I think we have
21 a better slide to come back to your question about
22 components below grade in these structures, so I'm not
23 forgetting that you have --

24 MEMBER SKILLMAN: I'd like to ask
25 forgiveness and go back to Page 18 for a minute.

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 MR. FINLEY: You are forgiven, by me
2 anyway. Dr. Powers can overrule it.

3 MEMBER SKILLMAN: John's question --

4 CHAIRMAN POWERS: Wouldn't dream of it.

5 MEMBER SKILLMAN: -- unearthed some
6 experience I had at TMI 1 on the river water pumphouse
7 in dealing with these long column pumps, years worth of
8 dealing with those when I was involved in that plant.

9 Why wouldn't you make a command decision
10 today to raise that pump? That's a safety grade pump.
11 Actually that's an NSR QA1 Seismic 1 critical SSC. Why
12 wouldn't you make a command decision to raise that pump
13 above 17.6?

14 You're never going to be able to seal that
15 pump and the floor openings to assure that that cavity
16 or that cubicle can't flood. And when you might need
17 that pump the most is when you may not have access to that
18 facility to take care of that pump. So it just seems to
19 me that for those who have dealt with that particular type
20 of equipment, those pumps are, they're dependable if
21 they're put together correctly, but the wrong pump, well,
22 actually the pump is at the bottom. So you have a bunch
23 of tubes, a long shaft. You've got supports like a
24 transmission for a bus or a truck. But the motor's
25 vulnerable.

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 So I'm just curious why you wouldn't simply
2 say, hey, we're going to put that pump and motor above
3 17.6.

4 MR. RAO: Actually the motor is at
5 elevation -- oh, well, we don't know for sure exactly
6 where the motor would end up once the whole detail of the
7 pump is established.

8 MEMBER SKILLMAN: If all of the electrical
9 supply is above 17.6, I think, I know my views are good
10 to go, but if you have the electrical equipment
11 vulnerable for that 17.6, I think you're building in a
12 safety issue that you don't need to build in given the
13 time that you have in advance of construction.

14 MR. FINLEY: Well, of course we have to pick
15 some elevation. We believe this 17-foot surge level is
16 --

17 MEMBER SKILLMAN: Not very probable.

18 MR. FINLEY: -- very conservative. The
19 existing sites have never seen water above the ten foot,
20 as I mentioned. And other sites on the Bay, maximum in
21 the last 100 years, seven foot, something like that.

22 So we try to balance cost of the structure
23 against the likelihood of these kinds of storms, and the
24 fact that the seal that Shankar talked about that I think
25 that's the critical component, the seal in the floor on

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 this pump is what's key.

2 We think we can seal that floor. There are
3 other watertight doors that we rely on on this structure,
4 but we also think we can rely on those watertight doors
5 as well. We'll be testing them as required, inspecting
6 them as required. We'll have tech specs on seals and
7 doors. So we think that's acceptable.

8 MEMBER SKILLMAN: Thank you.

9 MR. FINLEY: Okay, so anything on
10 precipitation? Let me see, yes, so it's a little more
11 on precipitation, I think on Slide 23. This talks about,
12 essentially, drainage of that worst precipitation down
13 our drainage ditches and alongside a road that comes up
14 from the Bay.

15 We've looked at this velocity of the water
16 and we're protecting those drainage ditches with
17 concrete or rip-rap to make sure that we can handle that
18 kind of velocity and not have scouring, so that
19 underground piping and structures and stability of the
20 slopes, et cetera, are not affected.

21 And there's a diagram on Slide 24 that shows
22 that road that I mentioned and then the drainage along
23 the road. And underneath that road or alongside that
24 road is where we do have some pipes, the makeup water
25 pipes that come up from that intake structure on the Bay.

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 And we'll have protection above those pipes related to
2 this drainage.

3 MEMBER STETKAR: Makeup water pipes and
4 electricity going down to the intake structure also.

5 MR. FINLEY: That's correct. That's
6 correct, yes. So that's an important feature. Slide
7 25. I think I'm coming back to something I commented on
8 briefly before.

9 So we looked at that Johns Creek which feeds
10 into the St. Leonard Creek. That's on the west side of
11 the plant. Again, we looked at the rainfalls of roughly
12 18 inches an hour and how that would drain through Johns
13 Creek.

14 Slide 26 just shows again that worst
15 elevation, that 65 foot, and I think that assumes that
16 the drainage that goes actually underneath the highway
17 to the west of the plant is blocked. And our worst
18 elevation of water on the Johns Creek is 65 foot, and
19 that's well below roughly that 98-foot drainage divide.

20 If you look on Slide 27, it shows roughly
21 the drainage divide at 98 feet. So there's a lot of
22 margin on the west side of the plant related to drainage
23 of that Johns Creek.

24 Okay, Slide 28. Potential dam failures
25 I've already touched on, but just to hit them again we've

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 looked at these two dams and reservoirs upstream on the
2 Patuxent River and if they both were to fail we'd see
3 about a two feet increase in the tidal river reach on the
4 St. Leonard Creek and affecting Johns Creek, but that
5 really never makes it around the peninsula to affect the
6 site at all. So the dams, not really a concern.

7 Slide 29 just shows where those dams, the
8 Brighton Dam and Rocky Gorge Dam are located, well
9 upstream on the Patuxent River. Slide 30, I've already
10 talked about on the hurricane, and 31, so you can skip
11 over those. Slide 32 talks about tsunami. So
12 we've looked at tsunami here. I'm not going to cover all
13 these bullets in the interest of time, but the third
14 bullet down shows the maximum worst case tsunami runup
15 of 11-1/2 feet, so you recall the hurricane. This is of
16 course on the Bay, basically in structures on the Bay.
17 So that's well below that 32.2 foot worst case for the
18 hurricane.

19 So the hurricane is what sets the design
20 basis for that structure, not the tsunami, with a lot of
21 margin.

22 MEMBER ARMIJO: What would trigger tsunami
23 for your site?

24 MR. FINLEY: Yes, what we analyzed was
25 landslides both underwater, and I think partially above

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 water and underwater. I don't know, Shankar may --

2 MR. RAO: Our colleagues here, Dr. Mustafa
3 Samad can explain a little bit more clearly.

4 DR. SAMAD: We actually looked at the
5 potential tsunami sources, that's marked here around the
6 site, and we have initially identified five sources and
7 came down to three that were actually, like, impacting
8 the site. And the most important of those was from a
9 landslide off the coast of Virginia, as part of that
10 landslide region.

11 We also looked at the tsunami coming across
12 that land portion, some of the areas in the regions around
13 the coast. And also we looked at the tsunami that came
14 from the Caribbean. So these are three that we analyzed.

15 CHAIRMAN POWERS: What does the sediment
16 buildup coming out of the Chesapeake Bay look like?

17 DR. SAMAD: The sediment impact from the
18 tsunamis particularly, we analyzed and we concluded
19 that, that there's almost no impact on the unit because
20 the tsunami waves that are heading across the ocean
21 coming into that --

22 CHAIRMAN POWERS: What I'm really
23 interested in is that you have a certain sediment flow
24 and build coming out of the Chesapeake Bay and it builds
25 up a mound someplace. What does it look like? I mean,

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 in the case of the Mississippi River which is the one I
2 know most about, it's huge. I don't know that that's the
3 case for the Chesapeake Bay. I just wondered what it
4 looked like.

5 MR. FINLEY: You mean the general --

6 MEMBER STETKAR: The contour under -- yes,
7 the contours at the Chesapeake Bay outlet.

8 DR. SAMAD: What happens in the Chesapeake Bay is
9 like when you have a large tsunami comes in --

10 (Crosstalk)

11 MEMBER STETKAR: No tsunami. If you went
12 today and did a contour map out under the water out from
13 the site through the Bay all the way out to the edge of
14 the continental shelf, what would that look like?

15 DR. SAMAD: At this time from the site, from
16 the existing site, existing plant at the site which draws
17 water --

18 MEMBER STETKAR: Sorry. Go to the mouth of
19 the Chesapeake Bay, forget I said the site. What does
20 it look like underwater from there on out? It sort of
21 goes like this but it's got some bumps in it.

22 DR. SAMAD: Exactly. But there's a deeper
23 section at the mouth and then there's a shallower section
24 right after the mouth, and then it goes into a deeper
25 section again in the Bay and then comes to the site.

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 And the site has, there is a channel, intake
2 channel that draws water --

3 (Crosstalk)

4 MEMBER STETKAR: This is it. If I have a
5 mountain here built up of silt from Chesapeake Bay, where
6 is that relative to the edge of the continental shelf to
7 precipitate a landslide at the mouth of the Chesapeake
8 Bay? Right? Dr. Powers, you got it. Thank you. Got
9 it?

10 DR. SAMAD: Yes. So let me rephrase the
11 question so that I'm hearing that what I understood is
12 the one you want. One is the variation of bathymetry for
13 the tsunami would come in from the --

14 MEMBER STETKAR: No, no. No tsunami. Is
15 there a mountain at the mouth of the Chesapeake Bay that
16 can go away and cause a tsunami right there, a tsunami
17 --

18 DR. SAMAD: At the mouth.

19 MEMBER STETKAR: -- at, near, I don't know.
20 How close do you want to get, Dr. Powers?

21 CHAIRMAN POWERS: Close. But close could
22 be defined as 100 miles away.

23 MEMBER STETKAR: Is there some local
24 feature that is different than just the continental shelf
25 that you looked at in the Virginia/Carolinas region? Is

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 there something local that might give you a larger
2 landslide potential there just because of the existence
3 of the outflow and deposition from Chesapeake Bay?

4 MR. FINLEY: Understand the question. I'm
5 going to defer to Mustafa.

6 DR. SAMAD: Yes, our indication is that
7 likely there is no such sources for landslides near the
8 Chesapeake Bay --

9 MEMBER STETKAR: Why do you know that?

10 DR. SAMAD: We looked at the geology and
11 formation of the Bay and for the eastern side and western
12 side and mouth at this time. And like, our geological
13 information come through there which is describing in
14 Section 2.51, there is no potential for a subaerine
15 landslide or submarine landslide near the Bay that can
16 cause a tsunami.

17 MR. FINLEY: Yes, the slopes in the Bay are
18 very gradual, you know, the channel might be 120, 150
19 feet. And it's --

20 CHAIRMAN POWERS: That I believe.

21 MR. FINLEY: But we do have some bluffs
22 along the side of the Bay, but those are 130 feet and
23 small.

24 CHAIRMAN POWERS: I'm more concerned about
25 the buildup of sediment. It could be clear out to the

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 continental shelf, in fact it probably is. Because at
2 the continental shelf it can fall off and go to --

3 MR. FINLEY: 2,000 feet.

4 CHAIRMAN POWERS: -- 5,000.

5 MR. FINLEY: Right, right.

6 CHAIRMAN POWERS: Okay, and it's that mound
7 building up that I'm interested in.

8 MR. FINLEY: Right, and I think that
9 that's, correct me if I'm wrong. That's what they looked
10 at is that kind of a landslide on or near the continental
11 shelf, no?

12 DR. SAMAD: Yes. The critical slide zone
13 is actually under the continental shelf. It is entirely
14 submarine landslide. And like we looked at it in 2006,
15 but since then there have been new studies done by USGS.
16 We got it from academia. It's a model of important shelf
17 landslide zones out on the continental shelf.

18 And we took results from one such studies
19 to get the bounding values at the mouth of Chesapeake Bay,
20 what the tsunami looks like inside the Bay. But the main
21 impact source the tsunami getting some so that it have
22 more impact at the site just because of the landslide on
23 the continental shelf.

24 MR. FINLEY: Right. That's the second
25 bullet on Slide 32 there speaks to the landslide. That

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 is the limiting tsunami scenario.

2 CHAIRMAN POWERS: Okay, so that's what
3 you're looking at and that's what causes your headache.

4 MR. FINLEY: That's right. Well, again
5 it's much lower than a hurricane so it's --

6 CHAIRMAN POWERS: Yes, so it's not much of
7 a headache.

8 MR. FINLEY: Right.

9 CHAIRMAN POWERS: Nothing at the Grand
10 Banks influence things? Grand Banks?

11 DR. SAMAD: Yes, the Grand Banks tsunami is
12 the largest recorded tsunami at the mouth of the
13 Chesapeake Bay. But again that's a landslide, and
14 although it may have some impact to the site but to all
15 information would not be the bounding tsunami high for
16 the site.

17 CHAIRMAN POWERS: But it all seems like
18 it's in the wrong direction to affect something like --

19 (Crosstalk)

20 MR. FINLEY: Right. And then it comes
21 through the narrow mouth of the Bay and dissipates.

22 CHAIRMAN POWERS: Does whatever it does.

23 MR. FINLEY: Right. Okay, other questions
24 on tsunami? Okay, Slide 33. So I think we can come back
25 to the question about debris here now. So this talks a

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 little bit about how we've considered the forces and
2 looked at the configuration with respect to debris and
3 erosion effects.

4 And I think Slide, doesn't Slide 34 talked
5 also about sediments? But I think the best way to look
6 at this problem is to first look at Slide 35. So Slide
7 35 first. It shows a plan view again of this intake
8 structure and where the intake pipes are.

9 So you can see for the upper left hand side
10 where the sheet pile wall which is existing now for the
11 Calvert Cliffs 1 and 2 units, and then a baffle wall --
12 I'm sorry. You can see the baffle wall which is
13 existing. The sheet pile, I think, will be new for us.
14 So that's the area that's protected in terms of debris.

15 But you can see better or another
16 perspective on Slide 36. So this is a blow-up of that
17 intake area where these intake pipes are. On the left
18 slide it's a plan view. So these intake pipes are about
19 five-foot diameter pipes and they're protected with
20 security bars basically, and also that sheet pile wall
21 that we talked about.

22 And the elevation view on the right hand
23 side shows that that particular intake area is dredged
24 to about minus 25 foot just inside the sheet pile wall.
25 And then the pipe elevation itself, centerline, is about

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 minus 15 foot. So there's about a ten-foot margin, if
2 you will, with respect to sediment that might be brought
3 in by a storm or over time.

4 Shankar, maybe you can comment on that?

5 MR. RAO: And that's why they were set up
6 higher from above the minus 22, which is the bottom of
7 the floor, so any sediment that would collect will not
8 be transmitted back to the intake water pumps.

9 MR. FINLEY: So as far as major debris like
10 trees and branches and that sort of thing, it's kept out
11 with these bars and the fact that it's a submerged pipe
12 down at about minus 15 feet. And then sediment, we have
13 some margin in terms of the depth of the dredging where
14 those intake pipes are located.

15 MEMBER ARMIJO: So the only thing that
16 could really get through would be sediment. I mean, wood
17 and debris would be floating way above.

18 MR. FINLEY: That's correct. Of course
19 you have storms in between, right. You don't always
20 overflow with everything. So you're going to have
21 debris potentially for storms at this level, but those
22 bars will help keep the big pieces out and then there is
23 a configuration into the forebay and then there's some
24 traveling screens before the makeup pumps in the forebay
25 as well. But the big pieces should be kept out by these

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 bars.

2 MEMBER STETKAR: Actually looked at, the
3 things you worry about more is the large quantities of
4 stuff about this big that gets through the bars, gets
5 through the rakes?

6 No, they're not rocks. It's gook. And
7 what characterized it is anything other than gook. It
8 tends to be things like leaves and vegetation and stuff.

9 MR. FINLEY: Jellyfish and --

10 MEMBER STETKAR: Jelly fish and, you know,
11 parts that get swept in during storms. There's
12 typically more during, for river in sites but could be
13 during a hurricane and things like that. And that can
14 go down to quite a depth also, you know, you get a
15 reasonable amount of turbulence. They tend to plug up
16 traveling screens because that's your last, and it's the
17 analogy of the GSI-191. Plug the fuel --

18 MEMBER ARMIJO: I don't know how these
19 things are maintained, but this region behind these
20 security bars, are they periodically cleaned out and
21 flushed to get rid of --

22 MR. RAO: I don't know the exact timing for
23 clean out but yes, maintenance will be conducted.

24 MR. FINLEY: Yes. Yes. All the pipe on
25 this configuration of the piping. And we do have the

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 ability, I think, to drain the intake pipe and do
2 inspections and maintenance on the pipes themselves. I
3 don't know exactly where the stoplogs would be. I think
4 we would have to use divers outside of the security bars
5 to check the elevation of the sediment. But that's
6 something that will be checked periodically.

7 MEMBER SKILLMAN: What is the experience of
8 Calvert Cliffs 1 and 2 with regard to intake structure
9 plugging? What I'm thinking about is the experience
10 that Salem and Hope Creek have had, where an artificial
11 inlet in the Bay there.

12 There is a time in the year when there is
13 a particular outcropping of biological matter that finds
14 its way through. In the case of the condensers, the
15 screens, and it really reduces the thermal efficiency.

16 MR. FINLEY: Yes. And I was going to
17 mention, Dr. Stetkar mentioned the size. So we have
18 access to the operating experience of the existing units
19 obviously. Bechtel was involved in constructing that
20 unit.

21 And the details of the design basis for the
22 traveling screens and so forth hasn't been set yet, but
23 we have access again to what's gone on at Calvert Cliffs
24 1 and 2. And the main issue there has been two things.
25 One, jelly fish, and secondly, fish kills due to oxygen

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 issues in the Bay, overloading the traveling screens.
2 So we have that again.

3 And they've addressed that through
4 modifications to their traveling screens, the speed of
5 the traveling screen and the screen wash flow, et cetera.
6 So we'll have all that as design input for our traveling
7 screens. But that's the main challenge. Grass has not
8 been an issue for Calvert Cliffs as it has at Salem.

9 MEMBER SKILLMAN: Power supplies for
10 traveling screens and mechanical components for
11 traveling screens, are those nuclear safety related?

12 MR. FINLEY: Actually we'll talk about that
13 this afternoon in Chapter 9, but they are safety related.

14 MEMBER SKILLMAN: Fair enough. Thank you.

15 MR. FINLEY: Okay, I think I'm on 37.
16 We're going to shift to ice unless there's more questions
17 about debris and storms. Okay, so ice essentially,
18 again drawing on experience from the existing units.
19 They don't have a frazil ice problem. We have
20 seen some ice on the Bay. We predict maximum ice
21 thickness of 13 inches, and we have the kind of depths
22 as we just saw in the previous diagram, minus 15 foot
23 roughly for the intake pipe that we should not have a
24 problem with ice affecting the intake.

25 We calculate a design low water level of

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 minus 7.7 feet and that's not going to affect our intake
2 piping or intake structure. And 38 continues with some
3 ice effects. We don't expect any real flooding to be
4 caused by ice on the Chesapeake Bay. It's just not
5 something that happens on the Chesapeake Bay, therefore
6 that shouldn't affect --

7 CHAIRMAN POWERS: Do you run into problems
8 of, not ice forming on the Bay, but ice forming on the
9 streams coming in, breaking loose and then you've got a
10 bunch of ice cubes, for want of a better term, coming down
11 the Bay and then collecting around the structures and
12 what not?

13 MR. FINLEY: Again, from the operating
14 units Calvert 1 and 2, no difficulty with that or
15 experience with that during its operating lifetime. I
16 don't know if -- Shankar, do you have any data or
17 background on that?

18 MR. RAO: I think all the ice history was
19 considered and we established the 13-inch. The maximum
20 ice that was recorded was five or six inches near the Bay.

21 CHAIRMAN POWERS: You don't have any major
22 tributaries below those dams?

23 MR. FINLEY: No. Of course you have the
24 Patuxent River, but the Patuxent River is tidal where the
25 site is.

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 CHAIRMAN POWERS: Right, I don't think that
2 one can, so there has to be something more like your
3 streams coming in.

4 MR. FINLEY: Right. Those are small.

5 CHAIRMAN POWERS: Everything's small.
6 There's nothing big.

7 MR. FINLEY: No. No big rivers near the
8 site. No. Okay, I think I'm on Slide 39. And this is,
9 again we have no canals or reservoirs that are part of
10 the design for Calvert Cliffs, so no concern in terms of
11 --

12 CHAIRMAN POWERS: Actually from these
13 kinds of perspective this is an awfully nice site.

14 MR. FINLEY: We think so too. We have a
15 source of water but it's relatively, it's not an ocean.

16 CHAIRMAN POWERS: It's a nice source of
17 water.

18 MR. FINLEY: We agree. Slide 40. This is
19 speaking about diversions of sources of cooling water.
20 But again I think we've talked enough about the physical
21 configuration. We don't expect to have diversions of
22 the Chesapeake Bay obviously. We've stabilized those
23 slopes and will prevent any changes in the physical
24 structure. There are no other canals or reservoirs that
25 would be relied on.

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 Slide 41. With respect to low water we have
2 looked at one other year low water level data. We looked
3 at the Annapolis station. That lowest level was minus
4 four feet roughly. But we calculate minus 7.7 feet as
5 the lowest low water level.

6 I think that's a drawdown from the hurricane
7 or tsunami. I don't know which one, one of those two.
8 But that's above what our design low water level is, minus
9 eight feet. And the centerline as I talked about before,
10 the centerline of those intake pipes is down at minus 15
11 feet, and the makeup pumps, I think, use as you see here,
12 minus 11 feet roughly. So we have margin to, I
13 will say that there is some pressure drop or water level
14 head loss through those intake pipes of two or three feet,
15 so we have to design that into the low level design point
16 for the makeup pumps and that's been done.

17 CHAIRMAN POWERS: Suppose, despite all
18 this, you did drop below this minimum level for your
19 pumps. What would happen?

20 MR. FINLEY: I'm going to defer to -- well,
21 first, let me set the stage here first. So this is not
22 going to cause a plant transient in the sense that unless
23 you're going to lose offsite power you wouldn't need
24 these pumps for operation, just that background, and
25 maybe, Shankar, you can tell me the effects of low water

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 level on the makeup pumps.

2 MR. RAO: You have some margins in the tech
3 spec limits here, pumps, operating margins. However,
4 the typically design basis events along with all this
5 happening within the 72 hours for which we have the
6 capacity without any makeup for the ultimate heat sink
7 cooling powers would have to be looked probably from that
8 perspective. And that's all I can probably point out to
9 that from the design perspective.

10 CHAIRMAN POWERS: If we cast the scene this
11 way that we've had some event like loss of offsite power
12 or something like that, we're using this after 72 hours
13 to make up, and then we have some transient event that
14 drops down below our expected level, you shut the pumps
15 down, right?

16 MR. FINLEY: Yes. At some point these
17 pumps are not going to pump water so you would shut them
18 down, yes.

19 CHAIRMAN POWERS: And sooner or later
20 nature's going to take its course and the water level is
21 going to come back up.

22 MR. FINLEY: Right.

23 CHAIRMAN POWERS: But again, I don't have
24 any --

25 MR. FINLEY: Doctor, you're into the, you

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 know, Fukushima type analyses of loss of ultimate heat
2 sink and loss of all AC.

3 CHAIRMAN POWERS: You're right.

4 MR. FINLEY: So we would have other
5 temporary equipment that we would rely on, portable
6 equipment that we would rely on.

7 CHAIRMAN POWERS: I mean, it seems to me it
8 would just shut the pumps down, because you've been
9 feeding water in and maybe haven't got as much as you
10 want, but you've got a few hours and eventually nature
11 has to take its course. I mean, I can't come up with a
12 scenario that permanently drops the water down eight
13 feet.

14 MR. FINLEY: Right. That's a good point.
15 I think these are all, both the hurricane and any drawdown
16 or surge situation is a temporary situation. And we do
17 have that 72-hour cushion such that if the event were to
18 occur at the time of the hurricane or tsunami, seismic
19 event, we really don't need additional water for 72
20 hours. So there is some time to react.

21 CHAIRMAN POWERS: Yes, I mean, I just don't
22 see anything. I mean, one can hypothesize that exactly
23 when you need --

24 MR. FINLEY: Right.

25 CHAIRMAN POWERS: -- to supply water, but

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 then you're getting off into probability, negligible
2 kinds of events. And again it's, okay, wait 15 minutes.
3 I mean --

4 MR. FINLEY: Right. They should be
5 transient situations.

6 CHAIRMAN POWERS: Yes, it has to be a
7 transient situation. Or if it's a nontransient
8 situation it's probably occurred so long that you realize
9 --

10 (Crosstalk)

11 CHAIRMAN POWERS: Yes, you repeat
12 structure or something like that.

13 MR. FINLEY: Right. I think we're on Slide
14 42 now. Now we're coming back to the question about the
15 buildings and how they're protected from ground water,
16 I think, and we can try to answer the question about those
17 components that are under ground level.

18 So ground water, we do have obviously ground
19 water at Calvert Cliffs, and we've talked before about
20 the caustic pH associated with our ground water.
21 Roughly 5.2 pH. So we have to take some corrective
22 measures, but that doesn't affect by the way the
23 structure on the Bay.

24 We don't have that low pH situation in that
25 water around the structure on the Bay, but we are going

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 to address any issues with brackish water based on the
2 recipe we used for the concrete that's 5,000 per square
3 inch strength. Concrete should address the brackish
4 water issues we have.

5 With respect to the pH issue, on Slide 43
6 we're going to have a geomembrane around the safety
7 structures. We'll have a groundwater removal system and
8 a monitoring system within that membrane. I'll show you
9 a diagram of that in a second. We will have a monitoring
10 program during construction and just after initial
11 operation to monitor that ground water and dewater is
12 necessary.

13 If you look at Slide 44, for structures that
14 are into that groundwater table. So that the highest
15 groundwater table elevation is calculated to be of 55
16 feet as you see there on Slide 44. And we will have this
17 geomembrane, which is waterproof, up to above that
18 elevation.

19 And I think there was a question at the last
20 meeting earlier in the spring about infiltration of
21 rainwater through the soil from up above. One thing we
22 didn't answer at the time was that this geomembrane is
23 essentially capped off to prevent that kind of
24 infiltration from rainwater up above, so we shouldn't get
25 rainwater within that membrane.

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 And as I said, we'll be dewatering within
2 the membrane and monitoring. So we'll be able to keep
3 the caustic groundwater away from the safety structures
4 is the bottom line. Now we have some structures --

5 MEMBER ARMIJO: But you'll also know that
6 it's leaking, right?

7 MR. FINLEY: We'll know if it's leaking.
8 That's correct. So we'll be monitoring any water that
9 gets within the membrane and we'll be able to pump,
10 dewater it as necessary to prevent the water from
11 reaching the structure.

12 Now for the next slide, Slide 45 shows we
13 do have safety structures obviously that are above the
14 water table. Now a little different protection for
15 these. We call it a dampproofing system. But still
16 we'll have some coating on the structure itself to keep
17 the ground moisture away from the safety structure. So
18 we feel we have a pretty robust waterproofing and
19 dampproofing system to keep water out of the structures.

20 So let me come back now to the question about
21 safety components below grade. So I'm not sure what
22 additional information we can give, but we'll keep water
23 out of the structures, away from the surface of the
24 structure.

25 We've calculated the surface flooding

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 condition to keep that level below the entrance of the
2 structure, and there are underground pipes that pass
3 through these structure walls that those will be sealed
4 and monitored. I'm not sure what else --

5 MR. RAO: And we do have internal flooding
6 protection mechanisms.

7 MEMBER SKILLMAN: I think you've answered
8 the main target of my question. Where I would go from
9 here is your PRA for internal flooding to find out what
10 protections you have to ensure that the SSCs that are
11 required can perform their duty.

12 MR. FINLEY: Okay. And we relied
13 primarily with respect to PRA for internal flooding, we
14 relied primarily on the design certification PRA that was
15 done. We really don't have any differences than what's
16 in the U.S. EPR FSAR.

17 And just an important concept there as for
18 the safety structures, we do have four divisions and all
19 independent in terms of flooding, right, all separated
20 by structure --

21 MEMBER SKILLMAN: Physical barriers.

22 MR. FINLEY: Physical barriers, yes.

23 MEMBER SKILLMAN: Thank you. Thank you.

24 MEMBER ARMIJO: I don't know anything about
25 these textured membranes, so could you fill me in a little

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 bit about the experience that you have as far as time
2 dependent degradation or how thick are they, how much
3 experience has there been with these things?

4 MR. FINLEY: Yes. I'm going to defer to
5 Shankar. We had a question before. Do you want me to
6 get that one sample?

7 (Crosstalk)

8 MR. FINLEY: I'm not sure how it's going to
9 enter the transcript, but I can give you --

10 MEMBER STETKAR: We did talk a bit about it
11 on the other meeting.

12 CHAIRMAN POWERS: This committee covers
13 all types of ground. We're on the ball.

14 MR. FINLEY: So it's a high density
15 polyethylene material and we have test data in terms of
16 the design life of the material. It will be underground.
17 It's not going to be subject to ultraviolet.

18 MEMBER ARMIJO: Is this actually sprayed on
19 or do you actually roll out a membrane and lay it up
20 against the wall?

21 MR. RAO: These are sheets, sheets that
22 will be put down below, right over the bottom part and
23 then on top of it you will have the foundation. And then
24 on the side you have, if you look at the picture on 44,
25 we do have a secondary membrane which is liquid applied,

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 or it could be this edged Epe. It will be attached by
2 some kind of adhesive device on it so that --

3 MR. FINLEY: And of course inspected as you
4 construct --

5 MEMBER SKILLMAN: Sam, if you become a
6 point where the building is so sealed it's potentially
7 buoyant, I'm serious.

8 (Crosstalk)

9 MR. RAO: And that is considered in the
10 design of the forces for coming out of the building from
11 that angle. And that's why --

12 MEMBER ARMIJO: You assume that's actually
13 hermetically sealed. That there's nothing coming
14 through.

15 MR. RAO: So the structure is more
16 foundation depth you need.

17 CHAIRMAN POWERS: I'm running a test for
18 you guys on a very similar material, and so far after
19 three years it's performing marvelously.

20 (Crosstalk)

21 CHAIRMAN POWERS: It's not biodegradable.
22 Actually I'm using it as a biobarrier rather than a water
23 barrier. Water's not a big issue into Mexico as far as
24 having too much.

25 MEMBER SKILLMAN: Isn't that why there's a

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 bag tax in Maryland?

2 MEMBER ARMIJO: On your buried pipe, it's
3 protected by wrapping. I'm assuming it's carbon steel
4 of some sort. Do you also have a cathodic protection
5 system?

6 MR. FINLEY: Yes, we do. So buried pipe,
7 we do have some carbon steel buried pipe. Those intake
8 pipes are made of carbon steel and they're either coated
9 or wrapped and they have cathodic protection. The
10 makeup piping from the makeup structure up to the power
11 block is actually austenitic stainless steel. So we
12 have carbon steel, we have austenitic stainless steel.

13 MEMBER ARMIJO: And some sort of transition
14 piece between those?

15 MR. RAO: No, they're independent. The
16 main inlet pipe terminates at the inlet forebay as we call
17 it. And then the pipes that are from the pumps up to the
18 cooling towers, they are a separate piece of pipe.

19 MEMBER ARMIJO: Okay, thank you.

20 MR. FINLEY: Okay, I think we're getting
21 close here. The last piece is liquid effluents. And if
22 you go to Slide 46, we talk a little bit. We've looked
23 at the different pathways, if you will, for groundwater
24 and use the source terms that we get from AREVA and the
25 U.S. EPR FSAR, assume some leakage of tanks. And

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 calculated the dose, essentially, due to these different
2 sources.

3 On Slide 46 you see the highest of those
4 doses is about 74 millirem per year. A diagram of the
5 different pathways analyzed is on Slide 47. Shows where
6 the groundwater has been analyzed to flow. Don't know
7 if there's any specific questions of that, but we've done
8 that of course in accordance with the approved methods.

9 Slide 48 just speaks to the fact --

10 CHAIRMAN POWERS: Do you calculate these
11 doses based on the source terms, do you focus just on
12 dissolved radionuclides? Do you consider colloidal
13 transport?

14 MR. FINLEY: So this is liquid. The source
15 is liquid rad waste, so it's liquid rad waste tanks, you
16 know, in the safety structures that are assumed then to
17 leak. I don't know. And I don't know if we have the
18 right people here to answer the question about colloidal
19 materials.

20 Shankar, do you want to --

21 MR. RAO: I wouldn't know that part but we
22 can take that as a --

23 CHAIRMAN POWERS: It's one I can tolerate
24 a later input.

25 MR. FINLEY: Okay. Well, we'll have to

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 follow up on that question. I don't know. Okay, and
2 Slide 48 just speaks here about surface releases. We
3 don't expect to have any spills, if you will, that are
4 released on the surface. Tanks that are well surrounded
5 by structures so that should not be a problem.

6 Slide 49 speaks more about piping and heat
7 exchangers. Again we have four divisions of separate
8 safety structures, Safeguards Buildings 1, 2, 3 and 4
9 that house these components. They're all physically
10 separated to keep the flooding effects independent of one
11 another.

12 We don't have any outdoor tanks. They're
13 all within these structures. So we don't see a surface
14 pathway, basically, for flooding from equipment.

15 And Slide 50, we have not in any of our
16 discussions here relied on emergency operations,
17 procedural operator type actions to respond to these
18 flooding scenarios, so we don't have requirements for
19 tech specs or procedures that relate to that, essentially
20 that the physical design of the structures will give us
21 what we need. So I think that's it. Hopefully I didn't
22 go over too much on the time.

23 Just to summarize, Slide 52, again we have
24 no departures or exemptions, no contentions. We've
25 talked about all of the COL items there. And I think the

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 staff, next, will talk about the confirmatory item and
2 two open items that we have that they're still reviewing.

3 Paul?

4 MR. INFANGER: We looked at some of the
5 information, some of the questions that the ACRS had. Do
6 you want to go over those now?

7 CHAIRMAN POWERS: Do we have them readily
8 available?

9 MEMBER STETKAR: I have one more question.

10 MR. FINLEY: One second, Paul.

11 MEMBER STETKAR: You went through it pretty
12 quickly. I was thinking about structures and things
13 like that. I know where pretty much everything is on the
14 site. One thing I was thinking about, and I didn't see
15 it addressed, is the essential service water basins.

16 And I don't have precise information. I
17 think I know things, but correct me if I'm wrong. I
18 believe the normal water level in those basins is about
19 8'9" above grade. Is that correct? In other words,
20 they're a mostly below ground but partly above ground
21 swimming pool.

22 And if I did, this is rough because I have
23 to sort of interpolate information from various sources.
24 But as best as I can tell, above grade level they contain
25 about 10,000, or 15,000 or 20,000 gallons of water above

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 grade. Did you look at flooding from those? Because
2 they're the same grade elevation as the diesel generator
3 buildings. I know they're the same grade elevation as
4 the diesel generator buildings. They're slightly below
5 grade from the rest of the main power block. Did you look
6 at flooding from that?

7 MR. FINLEY: I'm going to ask Shankar if he
8 knows. I'm not aware.

9 MR. RAO: These are safety related seismic
10 Category 1s.

11 MEMBER STETKAR: I understand that, but
12 you're looking at flooding sources that have much lower
13 frequencies than events that might cause failure of
14 these, so you've not introduced frequency in any notion
15 into your flooding analysis.

16 Frequency of the tsunamis that you've
17 evaluated or even the storm surges might be lower than
18 the frequencies of flooding of these things. I was just
19 curious whether you looked at them, because there was a
20 statement made that there aren't any above ground tanks
21 or structures that contribute to flooding.

22 And there was, I mean, you looked at the big
23 cooling tower. You looked at the desalination plant and
24 its tanks, and they're all down grade from everything.

25 MR. FINLEY: Right, right. So I would just

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 clarify. So yes, tanks aren't outdoors. You're right.
2 The structure itself is a tank, if you will, underneath
3 the cooling tower. So I don't know if we postulated
4 failure of that structure on flooding.

5 MR. RANDALL: No, but there's a pipe break
6 outside the wall because the pipes come in underground.
7 And there's a scour analysis of what happens to that --

8 MEMBER STETKAR: I looked at that Bob. But
9 that's if the plastic pipe coming in breaks.

10 MR. RANDALL: Yes, but the water's going to
11 come from both directions and then it scours away and
12 comes to the surface --

13 MEMBER STETKAR: Oh okay, so that's a good
14 point. Yes.

15 MR. FINLEY: And I know, and Shankar,
16 correct me if I'm wrong, we have sort of a limiting
17 internal flooding scenario that relates to the main circ
18 water flow and main circ water pumps. And essentially
19 we show that it could fill up --

20 MEMBER STETKAR: That's internal flooding
21 though.

22 MR. FINLEY: Right. Fill up the turbine
23 building and then spill out at some flow rate --

24 MEMBER STETKAR: I'm mostly interested in
25 the closest, and if I look at the, I don't want to

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 telegraph what I'm interested in too much because I don't
2 know enough about hydrology. I know that the ESWS basins
3 aren't at the same grade as the diesels, right? And I
4 know that they're slightly below grade, nominal grade for
5 the safeguards buildings, maybe a foot or foot and a half.
6 And that I know that the ESWS or UHS division two is
7 closest to the nuclear island.

8 So in terms of lateral proximity, you know,
9 that's the one that would have the closest chance of
10 actually, you know, having some water elevation. I was
11 just curious whether you looked at it.

12 MR. FINLEY: Okay, so I think we're going
13 to have to take an action, Dr. Stetkar. I don't --

14 MEMBER STETKAR: I mean, you know, if you
15 took that 800 and 1,000 or how ever many gallons it is
16 and immediately released it on the ground and could show
17 that it all goes away where it's supposed to go away
18 that's fine. It couldn't get any worse than that.

19 MR. FINLEY: In terms of the methodology I
20 know we consider pipe ruptures. I don't know if we
21 considered structure.

22 MEMBER STETKAR: I looked at the, because
23 especially of the nonseismic normal makeup pipes, you
24 certainly looked at those. And I know that water can't
25 get in the building. I know the water goes up and out.

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 I don't think the water coming back in would --

2 MR. FINLEY: Okay, so we'll take an action
3 on that question. I'm going to suggest, Dr. Powers it's
4 up to you, that we take a break. I need a biological
5 break for one. And then come back to the slide that I
6 think maybe would answer the question about aquifers, or
7 is that the one you have, Paul?

8 MR. INFANGER: A couple of them.

9 MR. FINLEY: Okay. So we can --

10 CHAIRMAN POWERS: And then Mike, we're
11 going to delay your staff's presentation for a few
12 minutes to cover those when we come back from a break.
13 We are taking a break until 25 of the hour.

14 (Whereupon, the foregoing matter went off
15 the record at 10:18 a.m. and went back on the record at
16 10:35 a.m.)

17 CHAIRMAN POWERS: We will come back into
18 session, and Mark Finley is going to try to answer a
19 couple of questions that arose in the previous
20 discussion. Mark, the floor is yours.

21 MR. FINLEY: Thank you Doctor. So I want
22 to introduce Paul Infanger. He's my licensing manager.
23 Been with UniStar several years. You can give yourself
24 a better introduction.

25 MR. INFANGER: Yes. Been with the project

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 since 2008, and prior to that I was licensing manager at
2 several operating plants. I have a masters in nuclear
3 engineering from Ohio State University, and working with
4 UniStar for about five and a half years.

5 CHAIRMAN POWERS: Sometime you're going to
6 have to explain to me why they call it The Ohio State
7 University.

8 MR. INFANGER: Yes. I know sometimes I
9 have to look under T when I'm looking for something.
10 What we did, we looked up a couple things. There was one
11 question about what was the effect of Hurricane Sandy,
12 a very large storm that happened just last fall.

13 And we did find an article that was in the
14 local paper where they talked about, you know, it showed
15 a measure of mercy at Calvert County so that sounds good
16 already, and I lost it. Okay, and it says that there,
17 you know, dodged the bullet remarkably well, but this is
18 the key statement here.

19 "Despite concerns that high waters from
20 storm surges could wreak havoc on operations, Calvert
21 Cliffs nuclear plant in Lusby also came through Sandy
22 with no reported problems." So the plant came through
23 with no reported problems. "We did some preparations
24 beforehand, said Constellation Energy Nuclear Group
25 spokesman Kory Raftrey, who added both of the plant's

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 reactors were on-line the entire time."

2 So the storm did not cause the plant any type
3 of --

4 CHAIRMAN POWERS: Trust, sir, we would have
5 known about it if you had a problem.

6 MEMBER STETKAR: I would have been able to
7 find that.

8 MR. INFANGER: So I think we can say that
9 the storm did not cause any undue problems.

10 CHAIRMAN POWERS: And the question is --

11 MEMBER STETKAR: That's anecdotal
12 experience we're going --

13 CHAIR MARKS: Well, the question is, could
14 a small perturbation of that storm have been more
15 horrific? I mean I think you've covered that.

16 MR. FINLEY: I probably have.

17 MEMBER STETKAR: The larger question I had
18 though is in the FSAR you have a table that lists up
19 through 2003 or whenever you did your cutoff date,
20 certainly before October of last year, the highest
21 recorded historical water levels, these are at Baltimore
22 and Annapolis, apparently, where they had gauges, and I
23 was curious whether or not Sandy would have made this
24 list.

25 In other words, the Baltimore and

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 Annapolis, the smallest value on this table is 4.3 feet
2 at Baltimore, Hurricane Hazel, and Hurricane Fran for
3 Annapolis, 3.48 feet. So I was curious whether Sandy
4 resulted in anything worse than --

5 MR. FINLEY: Yes, well, I know it wasn't
6 worse. So the 2003 storm, it's high on the list there
7 both in Baltimore and Annapolis, and there was not
8 flooding like that from Sandy in either one of those city
9 locations. Whether it would have made the list --

10 MEMBER STETKAR: See, I did find from
11 Annapolis, for example, it showed flooding in the streets
12 in Annapolis from Sandy. And in fact, there was a storm
13 later in the year, in December of last year that they said
14 the flooding was worse than Sandy but it was a local.

15 MR. FINLEY: So I think there might have
16 been some --

17 MEMBER STETKAR: But I was just curious
18 where it was on this list, you know, because it was a
19 notable event.

20 MR. FINLEY: But I think what's more
21 important maybe comes to Dr. Powers' question. So Sandy
22 was similar to the storm we analyzed in the sense that
23 was moving from east to west, which is the worst for storm
24 surge on the coast. And we postulated a storm moving
25 east to west at the mouth of the Chesapeake Bay with the

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 worst winds causing the worst surge right at the mouth
2 of the Chesapeake Bay.

3 MEMBER STETKAR: I'm not arguing with you.

4 MR. FINLEY: I'm confident that we bound
5 Sandy in terms of both the strength of the storm and the
6 direction, you know, the track of the storm. Whether or
7 not it would it make --

8 MEMBER STETKAR: I'm not disagreeing with
9 that.

10 MR. FINLEY: Okay. What was the other --
11 oh. Okay, so the question about aquifers, and this is
12 a document actually Bechtel did for us. They studied use
13 of ground water for the purpose of construction time
14 frame.

15 And so you see some different aquifers on
16 here. Calvert Cliffs 1 and 2 are in that Aquia aquifer
17 for their wells. We have done some analysis of drawing
18 that 70 gpm for construction support also from that Aquia
19 aquifer. However, we know that deeper aquifers are
20 available.

21 So if our testing of wells that we would dig
22 to support the construction process don't show the right
23 flow rate or there are any concerns about drawdown, we
24 can go deeper to deeper aquifers and those would actually
25 provide a greater flow rate and less concern about

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 drawdown.

2 So the Aquia aquifer, I think, is the answer
3 to the question that was asked about where we would draw.
4 That's about 600-700 feet deep. Okay, is that it Paul?

5 MR. INFANGER: Yes.

6 MR. FINLEY: Okay, I think that's all we
7 had. So I think we still have an action relative to the
8 rupture of the basin and how that affects flooding,
9 whether that was considered. We have some other notes,
10 perhaps some other action items as well.

11 Good, that was all I had. If there's no other
12 questions I'll stop speaking.

13 CHAIRMAN POWERS: I'm staying reasonably
14 on schedule despite our somewhat nonlinear progression
15 through the material.

16 MR. FINLEY: Okay, thank you.

17 CHAIRMAN POWERS: Mike, you're up.

18 MR. TAKACS: All right.

19 CHAIRMAN POWERS: Okay, we're going to have
20 the line -- Mike, you've got at least one person on this
21 team that I don't know.

22 (Crosstalk)

23 MR. TAKACS: Okay, good morning again, Dr.
24 Powers and committee members. I'm Mike Takacs. I'm the
25 acting lead project manager for the Calvert Cliffs

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 review. We're here to present the Section 2.4 of the
2 safety evaluation with open items.

3 One thing I just want to clarify, in the
4 Calvert presentation they mentioned two open items and
5 one confirmatory. We have a third open item which is
6 just a general EPR DC open item in our presentation. So
7 you'll see that in there.

8 It's in every section of course of the SE's
9 19 chapters. As I mentioned I'm the acting. Phyllis
10 Clark is the Chapter PM, she's situated over in the left
11 of the room there. And with me I have several --

12 CHAIRMAN POWERS: You can take Lee's place.
13 They wouldn't lose much there. I know no mercy, right?

14 MR. LEE: Not for the weak of heart.

15 MR. TAKACS: With me I have Mike Lee, Henry
16 Jones, Lyle Hibler and Philip Meyer. And we have a fifth
17 tech reviewer, his name is Rajiv Prasad, on the telecon,
18 I believe. If he has a question can he speak, or is it
19 listen only?

20 MS. WEAVER: I'm going to open the line.
21 Just let me know.

22 MR. TAKACS: Okay, very good. And with
23 that, Dr. Powers and committee members, I'm going to turn
24 it over to, I believe, Mike Lee. Are you going to present
25 the presentation?

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 MR. LEE: Right. Thank you. Okay, so I
2 think right now we're showing Slide 2. And Mike has kind
3 of gone through. There is a number of staff both here
4 and at remote locations that have supported this review.
5 On Slide 3, of course you see my name as well as Henry
6 Jones, Lyle and Philip from PNNL. So we'll be doing the
7 speaking and be prepared to respond to any questions that
8 the subcommittee might have.

9 If you turn to Slide 4, this is just a
10 summary of where we are right now, and Mike just basically
11 just spoke to this slide. So if we turn to Slide 5, the
12 items that we're currently tracking, specifically Slide
13 6 is, as Mike's pointed out already, that there's that
14 one existing RAI that's associated with the final safety
15 evaluation report which we're tracking
16 administratively.

17 And once that open item is closed and the
18 FSAR is finalized then we're going to come back to this
19 chapter and make sure that there's no loose ends.

20 Slide 7. The one RAI that we are currently
21 tracking as a confirmatory item concerns some typos that
22 we found in Chapter 2.4 regarding some numbers. We found
23 a few inconsistencies. We're going to go ahead and we've
24 got a commitment from the licensee that in the next
25 iteration of the FSAR those typos will be corrected. So

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 we're treating this right now as just a confirmatory
2 item.

3 Slide 8 are new open items. And then turn
4 to Slide 9, the staff's most recent review found an
5 anomaly in some of the, if you will, the illustrations
6 that were depicting the footprint of the Calvert site,
7 and we've asked that in the next iteration of the FSAR
8 that we get that footprint depicted consistently.

9 Turning to Slide 10, we have an open item
10 concerning subsidence -- I'm sorry. I picked it up ahead
11 of myself. I'm sorry. Okay, I'm done. What I'd like
12 to do now is turn the presentation over to Lyle Hibler
13 and Phil Meyer and they can speak to the current open
14 items. My apologies.

15 MR. HIBLER: I appreciate the fact that you
16 went over my slide. I was involved in the technical
17 review for the groundwater so I'm just going to talk about
18 this open item just briefly.

19 In one of the RAIs we asked about
20 groundwater use. and the applicant responded in that
21 with an analysis for subsidence based on drawdown for
22 construction water use, and that construction use of
23 water their rate of use is estimated to be 288,000 gallons
24 per day for six years.

25 So they calculated drawdown and then

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 estimated the rate of subsidence, based on that maximum
2 drawdown amount calculated total subsidence at the site
3 and gave us a bounding estimate which we reviewed and
4 agreed with.

5 Subsequently, the COL FSAR was updated and
6 stated that groundwater use that had not previously been
7 identified was included. That it was mentioned this
8 morning that when the desalination plant's out of service
9 groundwater would be used at a rate of about 900 gallons
10 per minute for a period of up to ten weeks. And this was
11 a new use and that's about all the information that was
12 provided.

13 But if you look at 900 gallons per minute
14 and assume that it's pumped continuously, that's about
15 1.3 million gallons per day which is greater than the
16 analyzed construction water use. So the essence of the
17 RAIs is that we want to verify that the estimate of
18 drawdown and subsidence documented in the previous RAI
19 response remains bounding given this new operational use
20 of groundwater.

21 So specifically in that RAI we request
22 information on the anticipated frequency of which the
23 desalination plant will be out of service and require a
24 backup water supply, and identification of the bounding
25 pumping scenario considering that the water source -- you

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 saw a previous slide.

2 There's multiple aquifers and we haven't
3 been told where that water is going to come from, and that
4 would add implications for drawdown and potential
5 subsidence at the site, and then any evaluation of the
6 effects of any associated long term site surface
7 deformation resulting from that subsidence.

8 MEMBER SKILLMAN: What is the absolute
9 amount of estimated subsidence or the rate of subsidence,
10 please.

11 MR. HIBLER: The bounding estimate that is
12 consistent with the information that we were able to find
13 is 3.7 millimeters per meter of drawdown.

14 MEMBER SKILLMAN: 3.7 millimeters.

15 MR. HIBLER: 3.7 millimeters of subsidence
16 per meter of groundwater at drawdown.

17 MEMBER SKILLMAN: Of ground water
18 reduction. Thank you.

19 MR. HIBLER: Yes.

20 CHAIRMAN POWERS: Okay, well, I'm a little
21 puzzled. This is unit problem that requires you
22 specifying the area. Are you doing that over one square
23 mile or --

24 MR. HIBLER: A unit problem? You mean the
25 3.7?

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 CHAIRMAN POWERS: Yes, the subsidence per
2 meter of drawdown.

3 MR. HIBLER: Right.

4 CHAIRMAN POWERS: But I have data in
5 gallons per minute, so I've got an area --

6 MR. HIBLER: Right.

7 (Crosstalk)

8 MR. HIBLER: What the applicant uses as a
9 model to convert, you pump from a well, you draw the head
10 down and that's, you know, a model that's used to
11 determine how much drawdown there will be at that
12 location and how it changes as you go out from the
13 location of the pumping.

14 MEMBER SKILLMAN: So this isn't like an
15 Indiana Jones movie where if you pump long enough things
16 just drop into this crevasse?

17 MR. HIBLER: Well, it depends. You're
18 taking water that's either confined out of the system so
19 you're reducing the head, but the system stays saturated.
20 So the flow of water responds to the changes in the heads.
21 And you're not saturating the Aquia aquifer or other any
22 other aquifer by pumping it.

23 But the conversion is from drawdown. You
24 go from gallons per minute or gallons per day of water
25 use to drawdown the modeling and then you apply the 3.7

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 millimeters per meter of drawdown to get the total
2 subsidence, the bounding estimate of subsidence for the
3 location.

4 MEMBER SKILLMAN: And what is that total?

5 MR. HIBLER: The total for the construction
6 use was -- I have to look it up. It was a few inches.
7 So at issue, and as I explained it, is that the potential
8 drawdown from the higher use when the desalination plant
9 is out of service could lead to more drawdown. That has
10 not been looked at. But we're just asking for that to
11 be analyzed.

12 MEMBER ARMIJO: These aquifers don't
13 recharge?

14 MR. HIBLER: Yes, they do. Primarily --

15 MEMBER ARMIJO: So is this the net? You
16 know, the recharge rate, I'd assume, is pretty slow
17 compared to the drawdown rate, but I don't know anything
18 --

19 MR. HIBLER: Yes. In the coastal plain
20 aquifers they're kind of sloped from the fall line. They
21 slope down towards the ocean. And the major recharge
22 area for the deeper aquifers are the upland areas where
23 they outcrop at the surface, and then the water flows,
24 you know, recharges there and then flows down towards the
25 ocean.

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 CHAIRMAN POWERS: So what you need from
2 them is what the drawdown is at the higher pumping rate.

3 MR. HIBLER: Yes. And also some
4 identification of where they're going to get the water.

5 CHAIRMAN POWERS: Water, okay. And they
6 probably can't answer you right now.

7 MR. HIBLER: There is an RAI.

8 CHAIRMAN POWERS: Yes, I understand. Can
9 I ask -- no, wait. First, are there any other questions
10 on this matter?

11 MEMBER SKILLMAN: I'm having a little
12 flash. It goes back to John's question about cooling
13 tower basins and this pump down, and I'm seeing this
14 cooling tower go. Is that what we should be thinking
15 about here? That the ground becomes sufficiently
16 unstable due to the subsidence that the structures that
17 have been designed are now somehow vulnerable?

18 MR. HIBLER: That's the potential issue,
19 yes. And that was addressed for the amount of subsidence
20 due to the construction pumping. That was addressed by
21 the applicant. So the geotechnical analysis has given
22 a certain amount of subsidence, are we stable, are the
23 structures stable?

24 MR. FINLEY: If I could interject. Mark
25 Finley, UniStar, again. So we haven't answered this

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 question yet and we're responding to that now. I just
2 want to reiterate that this is a nonsafety related use
3 of groundwater that we'll make sure it doesn't affect the
4 subsidence and the settlement of the safety structures.

5 CHAIRMAN POWERS: What I understood from
6 you is that from your presentation, Mark, and it may be
7 inaccurate, was that if your finished well coming out of
8 the Aquia aquifer is found to be for some reason
9 inadequate, that you had alternatives that were deeper
10 and thus less impactful.

11 MR. FINLEY: That's correct. And we
12 haven't finished the analysis, but we do have options.
13 And the options would include not allowing ourselves to
14 draw for ten weeks as was stated. We have a conservative
15 assumption to bring the desal plant back in service in
16 ten weeks.

17 CHAIRMAN POWERS: I understand.

18 MR. FINLEY: Again that's a nonsafety
19 function. We can restrict that duration. We can also
20 use other aquifers. We just haven't done the work yet.

21 CHAIRMAN POWERS: Yes, and so stay tuned,
22 you'll have an answer for that.

23 MEMBER SKILLMAN: Thanks.

24 CHAIRMAN POWERS: I think I understand.

25 MEMBER STETKAR: Now, I have a question

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 actually.

2 MR. HIBLER: Sure.

3 MEMBER STETKAR: Back to hurricanes. I'm
4 not going to let this drop necessarily. Did the staff
5 look at the guidance in Reg Guide 1221 and the hurricane
6 estimates in NUREG CR7005 with respect to the parameters
7 that are used for the what's called the probable maximum
8 hurricane for the storm surge analyses?

9 And in particular, I haven't done a lot of
10 homework on this and it's not my field of expertise, but
11 I can look at tables. In that NUREG depending on the
12 latitude and longitude, there are estimates of 10 to the
13 minus 6 and 10 to the minus 7 exceedance frequency wind
14 speeds that are on the order of a couple hundred, like
15 200, not 150, 200 hundred miles per hour.

16 So the question is, is the probable maximum
17 hurricane that is used for their surge analyses indeed
18 supported by current methods for evaluating wind speeds?

19 (Crosstalk)

20 MEMBER STETKAR: Stylized probable maximum
21 hurricane.

22 MR. JONES: There are two different issues.
23 The one that they use in the guide you're talking about
24 is for wind speeds on the structures. That's different
25 than the hurricane that would produce the maximum surge

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 at the site.

2 One is meteorological, and you can picture
3 it. You could have ridges, topography, and what I think
4 we did in that, he drove different storms in to try to
5 get the maximum winds on the structure.

6 MEMBER STETKAR: I understand that.

7 MR. JONES: And then in our case with the
8 storm surge, you try to get the hurricane that will bring
9 you the maximum storm surge. They're not the same.

10 MEMBER STETKAR: Okay.

11 MR. JONES: And I knew this question would
12 come up when I got here --

13 (Crosstalk)

14 MR. JONES: And I knew it would come up.
15 And that is a big difference. It's a big difference.
16 For example, like the applicant said, to get the maximum
17 surge you need to have the winds coming out of the south.
18 They're driving up the Bay pushing the water up.

19 But that's not necessarily will be the
20 maximum winds that you would have in on the structures,
21 that scenario. And so they're totally different. And
22 he came up with probabilities of exceedance which we're
23 now under the new ISG trying to do for storm surge as far
24 as the storm surge --

25 MEMBER STETKAR: And that's essentially

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 the genesis because we're licensing this plant as we're
2 going --

3 MR. JONES: But we don't have the
4 recurrence probabilities for the actual probable maximum
5 storm surge, whereas they're doing it for the maximum
6 wind --

7 MEMBER STETKAR: You know, I know the
8 reason for that or this particular analysis. Because
9 this is not my field of expertise, I don't have a decent
10 sense of how those two different wind speeds, when they
11 call them that, or two different purposes correlate with
12 one other, in other words, whether there's a direct
13 correlation.

14 MR. JONES: You have to think kind of in two
15 different, met and ocean space. In the met space you're
16 talking about topographical features that can block your
17 winds, how can the wind get to the site, what direction
18 will it come from. And in oceanographic you have to look
19 at how much fetch in the direction of wind coming over
20 the water line.

21 MEMBER STETKAR: On the other hand, in
22 principle we're developing information from the same
23 basic dataset of storms, right?

24 MR. JONES: It's likely you've been around
25 these --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

(Crosstalk)

MR. JONES: You can run all these synthetic storms at the site except when they did it for the maximum winds on the structure, you're looking for a different thing. And then when you're doing it for the storm surge, like you said, you've got Sandy which was going off the coast. And what you found there, most of the winds were coming out of the north going offshore into the low lull. So actually you were getting, and I was looking at this myself when it was happening, actually were getting a drawdown.

MEMBER STETKAR: Did you actually get a drawdown?

MR. JONES: It actually was unheard of. It was in the papers. Actually it was getting lower on the Chesapeake because --

MEMBER STETKAR: The upper reaches anyway.

MR. JONES: Yes, those upper reaches. Now if you go up to the Great Lakes where I have to deal with an application there, it was actually driving storm surge down towards our nuclear sites because --

(Crosstalk)

MR. JONES: It was a different scenario. But in this case it was driving things away from the site. So Isabel was a case where it actually mirrored the

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 scenario that they have here, where it was coming across,
2 came on land and was moving so that the winds were coming
3 up from the south.

4 And so you got about six to nine feet. You
5 flooded Annapolis, you flooded downtown Baltimore. But
6 you only have to have that type of scenario. Only in that
7 scenario you could have a huge hurricane off the coast
8 and you still won't flood unless you have that direction,
9 that precise direction.

10 MEMBER STETKAR: Henry, you mentioned the
11 staff is working on a Reg Guide or something like that
12 for probable maximum --

13 MR. JONES: Well, we advise but you review,
14 which we went over the case of the different
15 probabilistic methods of how to do storm surge. We
16 actually have one applicant who has actually come in with
17 a probabilistic storm surge analysis using our ISG.

18 And I expect there's going to be some more,
19 because what they're finding is if you do it
20 deterministically a lot of times you really get very high
21 storm surges, but if you come in probabilistically you
22 can probably bound it.

23 The only pressure we have now is did we use
24 10 to the 6, how do we justify that? We just haven't come
25 up with a reasoning of where do we cut it off for

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 probabilistically. But it's being done as we speak.

2 MEMBER STETKAR: Okay, thank you. Sorry.

3 Dr. Powers?

4 CHAIRMAN POWERS: No. Don't be apologetic
5 because I think it leads in just exactly. My own
6 curiosity has nothing to do with this review. I mean,
7 make that very clear. Nothing I'm asking now has
8 anything -- how are we handling the time dependence of
9 hurricane activity on the Atlantic coast?

10 MR. JONES: Time dependence?

11 CHAIRMAN POWERS: Yes. I mean we're
12 talking about building plants, 60 years, okay.

13 MR. JONES: Yes, definitely.

14 CHAIRMAN POWERS: Okay, if I go back and
15 look at the last 60 years, that hurricane frequency and
16 the intensity of hurricanes we've had in the last 60 years
17 is not going to be the same as for the next 60 years. And
18 in fact, they may have an inverse relationship. I mean
19 we're going through cycles and if we're down on the cycle
20 there or up on the cycle here and vice versa, what do we
21 do about that?

22 MR. JONES: Well, that's what we addressed
23 in the ISG. That's why we're trying to go to
24 probabilistic, the JPM method was that you use the
25 current database that NOAA has. You're not relying on

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 something that was fixed in a time. That you go right
2 to the current database that accounts for all the storms,
3 run these synthetic storms based on what you have, and
4 then you're able to assess it.

5 CHAIRMAN POWERS: Okay, so I build my
6 nuclear power plant, and low and behold, Al Gore is right,
7 the spin angle and momentum of the earth has changed and
8 we now start getting more frequent, very large storms.
9 Then what do I do?

10 MR. JONES: Well, see, that's the whole
11 thing about being site specific in the way we do it. You
12 have to have a specific type of track, a specific type
13 of radius, specific type of wind speed for each site is
14 different because the topography and bathymetry is
15 different. So you could get normal storms. You could
16 get more intensity. You could have big storms hitting
17 New York.

18 But from what I said, the scenario is they
19 would not create the storm surge actually on the
20 Chesapeake. For instance, if you have a whole bunch of
21 big storms coming up the east coast, the winds when you're
22 coming off the United States into that system, and
23 actually you would get drawdown at Calvert Cliffs. That
24 might be a different story at PSEG or somewhere else, but
25 at somewhere like Calvert Cliffs you would actually get

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 nothing.

2 And when I did the studies up in Michigan
3 even with Sandy they didn't even approach the record wave
4 heights on Michigan. So it's so site specific in how the
5 storm is going to track.

6 Now sea level wise is more of an issue
7 because we know that if that rises, and that's site
8 specific too, that as that water level rises and if you
9 get the same storm come in of course you may exceed your
10 margin. Of course that's slow and we have to monitor
11 that or we may put in things where we'll evaluate every
12 ten years or so.

13 But we addressed that and that's why we have
14 so many conservatisms even in the beginning back in the
15 '70s. So many conservatisms so that we can account for
16 exactly what you're talking about. Because this
17 scenario where you're actually driving it into the site
18 is actually rare, but rarely have we had sites that
19 actually, we haven't had sites flooded by the storm
20 surge.

21 So we have to actually create observations,
22 synthetic storms, and come up with these conservatisms
23 to actually determine, you know, and the terminal level
24 that would be hazardous to the site.

25 CHAIRMAN POWERS: Yes, we're certainly

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 very conservative. I'm just curious. You know, I've
2 applied changes and, you know, and you've had plans
3 conservatively designed, but you see those margins that
4 you've built in start to erode. You know, how do we react
5 to that?

6 MR. JONES: Well, see, that goes into the
7 regulatory space of how often do we reevaluate it? Does
8 the applicant if they see this is that going to trigger
9 them to do a review? That comes into that part which is
10 outside of this where we --

11 (Crosstalk)

12 MR. JONES: And that did happen. When
13 Sandy came up, I know one site I'm not going to name in
14 particular withdrew their hazard review and said we're
15 going to have to relook at this. And then quite a few
16 others took an account and said we'll look at bigger
17 storms and reanalyzed their storm surge based on what
18 happens.

19 CHAIRMAN POWERS: Yes, I mean that speaks
20 well of them being responsible.

21 MR. LEE: Applicant, plug your ears. To a
22 certain extent you're on the same kind of response
23 surface here in this question if you harken back to
24 GSI-199. It's kind of a fundamental question of what
25 kind of margin do you have for certain types of phenomena

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 relative to design?

2 CHAIRMAN POWERS: Yes, I mean it's exactly
3 that same plane.

4 MR. LEE: And as new information becomes
5 available, you know, if you want to put on your Bayesian
6 hat you're going to update your estimates based on new
7 information. What's that going to do in terms of
8 evaluating ultimately risk at a particular facility?

9 And that's kind of a more global, generic
10 issue that speaks, you know, that's kind of prevalent in
11 the earth science area or meteorological area.

12 CHAIRMAN POWERS: Yes, and I'm not sure,
13 that we will be careful to arm the Commission and be
14 prepared to deal with those kinds of things. Because I
15 mean, when is it going to have, when's the soonest you
16 could recognize it? Well, maybe it's ten years from now.

17 So whatever commissioners you have now are
18 not the same commissioners you'll have later on, so it
19 wouldn't be the current set. I mean it's just really
20 interesting.

21 MR. JONES: Well, the database isn't
22 static, and so the question is more of a generic issue
23 as to what --

24 CHAIRMAN POWERS: It has been my position
25 for some time is we've just got to stop giving PhDs to

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 geologists. Because, you know, those guys are going out
2 and finding all this paleo-earthquake information that
3 causes us to change things. So we just stop that and then
4 the database will be more static.

5 MEMBER SKILLMAN: What I find interesting
6 about this discussion, Dr. Jones, is the same phenomenon
7 that drew down the Chesapeake Bay pushed up Barnegat Bay.

8 And so if you look at these large storms on
9 the east coast, their track is the absolute center of this
10 discussion is that if they're coming up the east coast
11 60 miles off you've got one scenario, but if they're
12 coming up, if you will, the Appalachian corridor, Route
13 81, they're highly north of New Orleans and they're
14 coming up over Atlanta, then you can have the same kind
15 of situation at Calvert that Oyster Creek had.

16 That I'm satisfied, based on what Mark said,
17 that the scenario including what could be the increase
18 in water height have been addressed for this application,
19 but what Dr. Powers said, I think, is interesting. How
20 do we look at this in the longer run? Because it seems
21 as if the weather patterns have changed and we're seeing
22 some really significant storms that we really haven't
23 seen in years gone by.

24 MR. JONES: Especially on the east coast.

25 MEMBER SKILLMAN: Yes, especially on the

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 east coast.

2 MR. JONES: The last time they had one that
3 was in the 1930s, and then the next time you had one,
4 Isabel, and then you had Sandy, which is a much more
5 frequent and then anticipated and that's true.

6 But then you have to remember too that if you get
7 the warming that they're talking about, sometimes those
8 will actually knock down a number of storms because you
9 get, as a meteorologist too as well as an oceanographer,
10 you get the sheer, which actually will suppress the
11 intensity or the number of storms. And
12 then just say you have a number of storms, but how many
13 will make landfall? And there's so many factors, and
14 that's why we go through this thing where we don't care
15 about, we just drive the storm in to get the maximum
16 regardless of what the future scenario. We say this is
17 the scenario that will do it and we just drive the biggest
18 storms we can in there with the most conservatism to try
19 to account for all of that.

20 MEMBER SKILLMAN: I think another we're
21 seeing, at least that I see in my lifetime is like we saw
22 Camille. We saw Tropical Lee in central Pennsylvania
23 that just obliterated one section of the geography just
24 north of Three-Mile Island. TMI was protected. But had
25 that storm, had it stalled just ten miles to the south

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 I think there would have been other issues.

2 So I think we're seeing, maybe it's just a
3 realization of how these weather events are affecting us
4 because we have so much data available today that we
5 didn't have before. But it certainly seems as though
6 there have been some changes.

7 MR. JONES: I agree. I agree.

8 MEMBER SKILLMAN: Thank you Dana.

9 CHAIRMAN POWERS: Any other questions to
10 pose? Mike, are you done?

11 MR. TAKACS: I believe so. We are done,
12 Henry? Yes.

13 CHAIRMAN POWERS: Thank you very much.
14 I'm constrained by the rules of the Federal Committee Act
15 that you give the committee far too much free time. It's
16 usually that subcommittees you actually --

17 (Crosstalk)

18 MEMBER STETKAR: Ask your keeper over
19 there.

20 CHAIRMAN POWERS: I can?

21 MS. WEAVER: You can, Dr. Powers.

22 CHAIRMAN POWERS: I won't run into trouble
23 with members of the public after my hide of which there
24 were several --

25 (Crosstalk)

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 CHAIRMAN POWERS: And soon to be even more.

2 MEMBER STETKAR: We're just trying to
3 increase that percent of population.

4 CHAIRMAN POWERS: Thank you. I'll tell
5 you what. In that case, and for benefit of those that
6 are coming from out of town and want to go home tonight,
7 why don't we restart at a quarter after 12:00.

8 MEMBER STETKAR: That we can't do because
9 of P&P.

10 CHAIRMAN POWERS: Oh.

11 MEMBER STETKAR: We do have to stop at noon,
12 if you care about the two of us.

13 CHAIRMAN POWERS: This is the best news
14 I've had. How long do you need?

15 MEMBER ARMIJO: About 12:00 to 1:00 yes.

16 MEMBER STETKAR: Yes, we've got quite a bit
17 to discuss because of backup --

18 CHAIRMAN POWERS: So after all that you're
19 going to still make me go back to 1 o'clock.

20 MEMBER STETKAR: Well, you've still got a
21 half an hour or so if you wanted to.

22 MS. WEAVER: 45 minutes.

23 MEMBER STETKAR: 45, yes.

24 MEMBER STETKAR: You'll lose us at noon.

25 CHAIRMAN POWERS: Okay, so you want us to

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 go ahead and get started on the next item. Can you break
2 that at, say, 12 o'clock?

3 MR. FINLEY: Yes. We're not going to
4 finish by 12:00 I don't think but we can start --

5 CHAIRMAN POWERS: Okay, if there's a
6 logical breaking point.

7 MR. FINLEY: We'll find it.

8 (Crosstalk)

9 CHAIRMAN POWERS: Then we will do that and
10 plan to break at noon and let these people go off to their
11 silly meeting, which will only engender more work for me
12 and consequently is not in my best interest. Okay, thank
13 you.

14 MEMBER STETKAR: We do have an agenda item
15 though, increase the subcommittee chairmanship for Dr.
16 Powers right now.

17 (Crosstalk)

18 MR. FINLEY: Okay, so Chapter 9 is next.
19 And John has the slide deck up, maybe jump to Slide 2,
20 and we don't need to reiterate much here. We do have a
21 lot of material for Chapter 9. Again, a lot of this is
22 site specific so there's not at least with respect to
23 water systems a lot of site specific discussion.

24 So we have material here just like the last
25 presentation. We need to move quickly, but stop me if

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 you do have questions. Chapter 9 was last discussed with
2 the U.S. EPR FSAR on February 22nd, 2012.

3 CHAIRMAN POWERS: And that time we spent
4 quite a little while going over this rather novel fuel
5 handling system, and have some understanding what that
6 system is. I still chuckle at the idea of picking things
7 out of the bottom of the pool, but I don't think you need
8 to go through that design information that we --

9 MR. FINLEY: No, and we didn't intend to.
10 We do have one COL item I will discuss that relates to
11 the cask itself and the mechanism to handle the cask
12 essentially. So we'll talk briefly about that.

13 On Slide 3, so we do have three departures
14 at this time, no exemptions. We'll get into the details
15 of each of those departures. Actually two of those will
16 go away. They're just fixes that we need to,
17 inconsistencies between the COL and the U.S. EPR FSAR
18 that we'll fix going forward and one departure will
19 remain. But we'll talk about all of those.

20 And there are 35 COL items, so again, and
21 there's about 30 related to fire protection itself. I'm
22 not quite sure why, but anyway we'll talk about those.

23 CHAIRMAN POWERS: It always is that way,
24 trust me. You're not unique in that respect.

25 MR. FINLEY: So you know me. We still have

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 Shankar and Bob Randall, but we have Steve Huddleston
2 from AREVA. So with respect to Chapter 9, U.S. EPR FSAR
3 issues, Steve should be able to help us for cooling water
4 systems, I think.

5 Okay, Slide 5 just shows the agenda, the
6 different sections of Chapter 9. So we'll talk a little
7 bit about spent fuel handling with respect to casks.
8 Bulk of the presentation is around water systems. We'll
9 talk about the site specific water systems. We also have
10 material on air conditioning, ventilation systems. And
11 then fire protection in 9.5. So we'll start
12 with 9.1, and that first slide is on Slide 7. So as Dr.
13 Powers said, you've looked in detail at this beneath the
14 pool offloading of spent fuel with the U.S. EPR FSAR.
15 Our piece of this is really the spent fuel cask transfer
16 facility and the cask itself.

17 And so we have a COL item that relates to
18 that and since we don't have this equipment yet, detailed
19 design, or we don't have an approved cask for this
20 facility yet, we've really just taken a commitment to
21 meet certain design parameters that I'll talk about here,
22 and also some test requirements related to the spent fuel
23 cask transfer facility itself.

24 CHAIRMAN POWERS: My recollection, and
25 Dave, I think it was your issue that you raised, is you

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 bring this system in, you hook it up and something jams
2 in this transfer system that you have. Do you have any
3 responsibilities for addressing that particular issue?

4 MR. FINLEY: Certainly with respect to the
5 procedures themselves, there's a certain sequence that
6 this has to be carried off in and it's our responsibility
7 to have the procedures that enforce that sequence.

8 And I'm not an expert on this design, but,
9 you know, there will be procedures obviously, and part
10 of this requirement is to have those procedures and to
11 do testing every time you use the system, and then also
12 at some frequency, refueling type frequency as well.

13 And we also, I would mention that EDF has
14 experience with these systems in France, and so we have
15 the benefit of their operating experience as well, and
16 we'll factor that into our procedures.

17 MEMBER ARMIJO: What is the interface
18 between the AREVA design and where you take over, let's
19 say, with the cask? It's an adapter device or --

20 MR. FINLEY: Yes, to my knowledge this
21 spent fuel cask transfer facility and the cask itself,
22 so the handling of the cask and the interface between the
23 cask and the bottom of the pool is basically the
24 interface.

25 MEMBER ARMIJO: Okay.

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 MEMBER STETKAR: You guys basically, by and
2 on the cask and you have to make sure that it'll link up
3 to --

4 MR. FINLEY: That's correct. The cask has
5 an interface with the generic fitting beneath the pool
6 up above that flange.

7 So not too much detail here except to say
8 that if you look at Slide 8, because we don't have an
9 approved cask design that we can point to, what we do
10 reference is the table of design criteria, design
11 requirements in the U.S. EPR FSAR with respect to the
12 casks. So we commit to that.

13 We have to meet these seismic and structural
14 requirements and material requirements and we'll do
15 that. We'll do that. And we have to do that in advance,
16 and to get the cask licensed will take some time so we'll
17 do that.

18 The other 9.1 COL item on Slide 9 relates
19 to handling of heavy loads. And again, this is more of
20 a procedural commitment on our part to have heavy load
21 handling procedures, to have the appropriate inspection
22 procedures and testing requirements, load paths
23 identified, height limits identified.

24 And so we haven't identified all that in
25 terms of the details at this point, but we have

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 commitments and we describe the elements of the program
2 that would implement those requirements. And a lot of
3 detail here on heavy load handling in 9 and 10.

4 Again, these are more or less commitments
5 to have the procedures and the program in place. We have
6 the basic criteria that we'll need in terms of
7 methodology identified, but the specific procedures
8 themselves are not in place yet.

9 MEMBER SKILLMAN: Mark, I'd like to ask you
10 to confirm. Back on your Slide 8, the next to the last
11 line on that matrix, seismic requirements. I'm looking
12 at your application, and I should have looked at the
13 design cert.

14 But the question I have is, what confirms
15 that the seismic requirements are fulfilled both by the
16 cask when it's sitting by the side of the road and by the
17 cask and the jacking system that forces the cask up under
18 the transfer tube should the seismic event occur during
19 fuel transfer operations?

20 The machine's got to be able to be robust
21 against seismic when the transfer has been completed and
22 the pool is sealed from the cask, but the cask must also
23 be capable of resisting the seismic loads while the
24 transfer operation is occurring.

25 MR. FINLEY: Yes, so that's correct. And

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 all of this analysis hasn't been done but it must as you
2 say, it must cover all points at a time, if you will,
3 during the transfer process.

4 So when handling is in process, when the
5 cask is connected to the flange underneath the pool or
6 when it's, you know, separated and on the trolley, when
7 it's being transported to the dry storage facility, all
8 those points in time have to be addressed by the seismic
9 analysis, yes. And they will be.

10 MEMBER SKILLMAN: Thank you.

11 MR. FINLEY: Okay, so load handling I don't
12 really want to spend a lot of time with. That is mostly
13 a commitment to meet certain test and inspection
14 requirements. That moves us quickly to --

15 CHAIRMAN POWERS: And the testing and
16 inspection requirements, are they onerous or non-onerous
17 in comparison to previous plants. They're kind of the
18 same, right?

19 MR. FINLEY: Yes. So to my knowledge
20 there's no significant difference between current
21 operating plant requirements and ours.

22 CHAIRMAN POWERS: And I assume you're
23 relatively familiar with those.

24 MR. FINLEY: Yes. Yes. Okay, so move to
25 9.2 which is water systems now, and that begins on Slide

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 12. So the essential service water system is really a
2 U.S. EPR FSAR system. However, there is a COL item that
3 relates to the materials for the system that comes to us.

4 MEMBER STETKAR: Mark, can I, before you --
5 and again, stop me if you're going to cover this later.
6 I wanted to make sure that I understood, this is organized
7 according to individual systems and maybe you do cover
8 it.

9 But I wanted to make sure I understood all
10 of your underground piping, its materials and its
11 protections. Because I think I understand it, but I have
12 to really draw that information from a lot of different
13 places. And I didn't know whether you were going to
14 cover it, as I said I was trying to leap through here
15 quickly. Do you have anything on that?

16 And rather than doing it by individual
17 system, I wanted to see if I just had a kind of general
18 understanding of what's where and what it's made of and
19 how it's protected.

20 MR. FINLEY: I think on a system by system
21 basis we address it in the slides. So for ESWS, for
22 example, we'll have some discussion about --

23 MEMBER STETKAR: Okay, okay. Maybe try it
24 that way. I'll just sort of keep track of what I know
25 and what I don't know.

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 MR. FINLEY: And then makeup, the makeup
2 system has its underground piping. We'll cover that.

3 MEMBER STETKAR: Okay.

4 MR. FINLEY: Okay.

5 MEMBER ARMIJO: Just a general question.
6 Do you use any high density polyethylene piping? Do you
7 do a lot or a little or --

8 MR. FINLEY: Our intention is to use it in
9 nonsafety applications. We did some explorations of use
10 of HDPE for safety applications, but essentially the
11 codes and the methodology hasn't evolved to the point yet
12 to use it for safety. So no safety application.

13 CHAIRMAN POWERS: I mean, I know that it is
14 and we have a committee looking at HDPE.

15 (Crosstalk)

16 MR. FINLEY: Well, I know we were actively
17 following that three or four years ago, but frankly we
18 saw that it was a couple years off at that point and we
19 haven't --

20 CHAIRMAN POWERS: At least a couple years.

21 MR. FINLEY: We haven't followed it closely
22 in the last couple of years. I don't know, Shankar, if
23 you --

24 MR. RAO: No, not close as to our
25 application.

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 CHAIRMAN POWERS: Do you know who's heading
2 that committee or that study group?

3 MR. FINLEY: I don't, Dr. Powers. I don't
4 know.

5 CHAIRMAN POWERS: I'll find out.

6 MR. FINLEY: Okay. So on Slide 12 here,
7 our COL item relates to the materials of the essential
8 service water system. This is the system of course that
9 circulates water to the UHS cooling tower basin and then
10 back to the safeguards buildings.

11 This system in general, material, the
12 valves and the piping will be carbon steel and therefore
13 have to be protected. The underground portions of this
14 piping will be coated and wrapped and provided cathodic
15 protection to assure that we have protection against
16 corrosion.

17 The UHS cooling towers themselves are
18 reinforced concrete and the fill is ceramic tile. And
19 this material has been looked at in terms of the water
20 that would be affecting it.

21 MEMBER STETKAR: Those pipes, carbon
22 steel, external coating, some sort of, I mean it says,
23 for example, epoxy, but something like that on the
24 exterior, interior, make sure that I understand it. I
25 think the piping to the safeguards buildings, the 30-inch

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 stuff, said it's going to be lined with mortar internal
2 lining. Is that correct?

3 MR. FINLEY: I'm going to ask Shankar to
4 confirm. I don't believe it's lined with mortar.

5 MR. RAO: Not this one. It's the inlet
6 pipe from Chesapeake Bay.

7 MEMBER STETKAR: No, no, no, don't. That's
8 why I don't want to get confused. I am focusing strictly
9 on the 30-inch piping that goes to the safeguards
10 buildings right now.

11 And the reason that I want to, I found some
12 cases confirmatory and some cases conflicting
13 information about the piping and how it was protected
14 both internally and externally, which is why I kind of
15 wanted to address this.

16 But in COL FSAR Section 3E.5.1, that section
17 tells me that the pipes to the safeguards buildings are
18 30 inches in diameter. They are carbon steel lined
19 internally with mortar and coated externally with epoxy.

20 That same section also tells me that the
21 piping to the emergency power generation building are ten
22 inches in diameter, carbon steel, lined internally with
23 epoxy and coated externally with epoxy. In other words
24 that section, and that's the only part of the FSAR
25 anywhere that I could find any information about those

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 pipes.

2 So it may be right, it may be wrong but
3 that's the information that I have.

4 MR. FINLEY: Okay, let me ask Shankar.

5 MR. RAO: We do agree what is stated in 3E5
6 is the current design for the internal coating associated
7 with this carbon steel pipe from the UHS cooling tower
8 up to the safeguards building for the component cooling
9 water system for the 30-inch line. And as
10 you said, for the ten-inch line since it's a smaller IB,
11 they're just coating --

12 MEMBER STETKAR: Okay, so they are lined --
13 (Crosstalk)

14 MEMBER STETKAR: Because it is somewhat
15 relevant to Dick's questions when you get, let's say less
16 treated water, if I can put it that way, in the cooling
17 tower, in the SWS cooling tower basins, what's going on
18 on the interior of those pipes also.

19 MR. FINLEY: Yes, and so I was going to come
20 back. I think the next slide speaks to that. So this
21 normal, as we spoke about earlier this morning, the
22 normal water in this system is a fresh water. It's from
23 the desal plant. It's also chemically treated and the
24 coating materials long term are appropriate for that.

25 However, as we learned this morning, we do

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 in emergency scenarios add brackish water to this system.
2 And although from a long term perspective the design for
3 the coating materials is not for that brackish water, we
4 have looked at the 30-day design basis accident period.
5 If you look at Slide 13 it discusses this a bit.

6 We've done an evaluation of the corrosion
7 rates related to the brackish water and we see no effect
8 in terms of corrosion rates for the 30-day period on
9 safety system performance. So obviously, the
10 assumption that we're making, which we think is a valid
11 one, is that within the 30 days you will have this fresh
12 water available or chemical treatment available to clean
13 up the system for continued cooling.

14 So we addressed the brackish water
15 question, which I think came earlier this morning, by
16 doing the evaluation of corrosion rates over that 30-day
17 period.

18 MEMBER ARMIJO: Are those pipes welded?
19 Do they have weld joints? And if so, is the coating
20 applied to the weld region after it's been welded? So
21 is the coating applied after? The fabrication of the
22 pipe --

23 MR. FINLEY: I'll refer it to Shankar.

24 MR. RAO: Per specifications, the coating
25 will be applied at the end because it will potentially

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 affect the coating, if you will.

2 MEMBER ARMIJO: Yes, right. You'd have to
3 remove it to do the welding, but I was just wondering.
4 So the coating's applied after the whole piping system's
5 installed.

6 MR. RAO: Yes. Internally, and it's --

7 MEMBER ARMIJO: I guess that's okay if
8 people know how to do that. That's great.

9 MR. FINLEY: Okay, so back to the question
10 about brackish water affecting it. Does that answer it?
11 Do you have --

12 MR. RAO: Yes, it's another slide. I think
13 Slide 13 has a lot of details about it and what was --

14 MR. FINLEY: So 13.

15 MR. RAO: -- the question also is answered
16 there about internal coating.

17 MR. FINLEY: Okay, yes, so this on Slide 13
18 speaks to the internal coating, Shankar points out for
19 me, internal lining, two-layer fusion-bonded epoxy or
20 Type II cement. Okay.

21 MEMBER SKILLMAN: Let me just respond to
22 your question to me, Mark. This certainly addresses the
23 issue of the piping when you introduce brackish water to
24 components that have been bred to see fresh water you
25 introduce to those components biological species that

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 they haven't seen before. And unless those are removed
2 you will get biofouling in those components, and in
3 particular in the small heat exchangers, in the small
4 recesses where the biological growth items hide.

5 And so it seems that there needs to be
6 vigilance that when you've moved over to the brackish
7 water the systems that are commonly fed with fresh water,
8 you need to flush those at least in a reasonable time
9 period or have a maintenance program that ensures that
10 biofouling isn't going to degrade those components to
11 where they do not fulfill their function.

12 MR. FINLEY: Yes, understand. And I think
13 we have a later slide that talk about more details of the
14 chemical treatment of the water. Of course that's a
15 normal system. It's not a safety grade system. But
16 normally we would maintain the water quality in
17 accordance with some strict limits related to fresh
18 water.

19 If we did introduce brackish water, then as
20 you say it would be an emergency situation and we would
21 have a clean up procedure that would force us to again
22 get back within specifications for long term fresh water
23 operation. So we would have chemical treatment systems
24 available within 30 days and fresh water available within
25 30 days to do that.

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 MEMBER SKILLMAN: Thank you.

2 MR. FINLEY: Okay, Slide 14. I wanted to
3 talk briefly about potable water and sanitary water. We
4 have separate systems there. We have a potable water
5 system, sanitary water system, and I don't know that
6 there's a lot I need to say about that other than we do
7 keep the systems separate from other liquid systems that
8 would carry contamination. So neither of these systems
9 should be contaminated in any form.

10 Slide 15 talks more about potable water.
11 Its general design criteria in 60 there that it's not
12 connected to any components or other systems that have
13 radiological material. So we'll keep that in place
14 obviously.

15 MEMBER STETKAR: Where in your
16 presentation, Mark, are you going to talk, maybe the next
17 slide answers that. The FSAR talks about potable water
18 systems. It talks about raw water systems. It talks
19 about makeup systems and things like that.

20 Are you going to talk to us about the
21 desalination plant itself? Do you have separate slides
22 on that? I don't care about the plant its on, I don't
23 care. But that whole --

24 MR. FINLEY: So we have a couple slides on
25 raw water system which feeds, actually, the desalination

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 plant.

2 MEMBER SKILLMAN: Right. But if that's
3 cut off at the inlet to the desalination plant -- let me
4 just ask a question. Again I'm focusing on piping.
5 It's my understanding, and this is a little bit harder
6 for me to find, that the pipe from the desalination plant,
7 the makeup line to the ESWS basins is indeed nonmetallic
8 pipe. So beside the character, it says it might be
9 fiber-reinforced plastic or high density polyethylene or
10 something like that. Is that still the case?

11 MR. FINLEY: Let me ask Shankar. The
12 material for the nonsafety makeup.

13 MR. RAO: There are more details on Slide
14 37.

15 MEMBER STETKAR: Okay, if we're going to
16 get there, fine.

17 (Crosstalk)

18 MR. RAO: Quick answer to your question is
19 yes, the supply line to these are, up to the building is
20 --

21 MEMBER STETKAR: Good. And I don't want to
22 get into something that we did this morning so I'll just
23 --

24 MR. RAO: I agree. Thank you.

25 MR. FINLEY: Okay. Let me find out where I

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 am here, 15. Okay, so that's potable water and I don't
2 think I need to say anything more about that. Slide 16
3 again is a diagram of potable water so not much there.
4 Slide 17 is sanitary water.

5 So this collects the drain, again which are
6 not contaminated drains for the plant, and processes
7 them. From the last bullet on Slide 17 talks again about
8 design Criterion 60. We'll keep this separate from
9 contaminated or potentially contaminated systems.

10 MEMBER SKILLMAN: What about contaminated
11 human waste? Don't laugh. We've got the t-shirts for
12 it. You have part of your population that receives
13 nuclear medication and they are introduced to the men and
14 women's restrooms. And unless there's caution you can
15 end up with mixed waste that has a capital M for mixed
16 and it becomes radiological waste.

17 What attention might you have given to rad
18 waste, contaminated, coming from, if you will, a head
19 just off of your RCA?

20 MR. FINLEY: Okay, so that's a new one on
21 me.

22 MEMBER SKILLMAN: You don't have to answer
23 here. I'm raising a flag. And it becomes very
24 complicated because your waste water operators are not
25 capable of handling that waste form, and even if you treat

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 it you can't release it. And so if you've not given some
2 consideration to the potential that you might have
3 radiological human waste you may want to consider that
4 at this early stage in your consideration.

5 MR. FINLEY: Appreciate that and we'll take
6 that as an action.

7 MEMBER SKILLMAN: This is not a biggie.
8 It's beware.

9 MR. FINLEY: Yes, I appreciate that.

10 MEMBER SKILLMAN: Do you have your own
11 sewage operators?

12 MR. FINLEY: Yes.

13 MEMBER SKILLMAN: Okay, so you have your
14 own sewage plant and your own treatment plant? That's
15 where it shows up.

16 MR. FINLEY: Right.

17 MEMBER SKILLMAN: And if you're not aware
18 that it can be present it is a mighty surprise.

19 MR. FINLEY: Good heads up. Okay, Slide
20 18. Here we're talking now about the makeup system which
21 is essentially a site specific system. And we have both
22 normal and emergency as we have discussed.

23 During normal operation we would have two UHS
24 cooling towers in service and the normal demand for those
25 two cooling towers is a maximum of 660 gpm. I think there

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 was a question earlier about do we address evaporation
2 and drift losses, and we do.

3 Obviously in establishing this 660 gpm
4 maximum demand that would include the worst of the
5 evaporation and drift and blowdown requirements. They
6 all add up to give us that number or less than that number.

7 The design blowdown flow rate is based on
8 maintaining a certain chemistry condition in the basin,
9 roughly ten times the normal, or ten times the
10 contaminant levels of the makeup water system that sets
11 the blowdown flow rate.

12 Slide 19 talks about the emergency makeup
13 system. So this is the safety related system and we
14 talked about the structure that houses the makeup pumps
15 down on the Chesapeake Bay this morning. And the flow
16 rate for these pumps has been established. There's a
17 minimum of 30 gpm required.

18 And this again, remember the difference
19 between the 30 and the 660 is this comes after 72 hours
20 now so you don't have the same demand on the system. The
21 pump is actually oversized. The flow rate of each pump
22 would be about 750 gpm each.

23 And some of that we use for screen wash as
24 well. Even after screen wash we have about 510 gpm
25 available from that pump and we need 300. So we have

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 margin there. And again, each train has its own
2 dedicated pump so you have four different trains and
3 margin on each pump.

4 We made design requirements relative to
5 inspection and testing. You see there the last two
6 bullets on Slide 19. And Slide 20 shows, and this is busy
7 and the font is small so I apologize for that. I'll talk
8 just a little bit about how this is laid out.

9 So if you start with the UHS cooling tower
10 basin that's sort of the center and upper center left of
11 the diagram, it says cooling tower basin. So that's sort
12 of the focus of the makeup and blowdown systems.

13 And you see the support systems for that
14 basin. You have normal makeup and you have the desal
15 plant feeding the normal makeup to the right. You have
16 the chemical treatment plant just underneath the desal
17 plant would again keep the water quality requirements
18 met.

19 Down on the bottom shows the P&ID
20 simplified, if you will, for the UHS makeup structure and
21 the piping that goes from the makeup structure up the hill
22 to the basin. We'll talk more about that. That's also
23 underground piping and that's actually super austenitic
24 stainless steel, so there's different --

25 MEMBER STETKAR: Is that coated or lined

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 with anything or it's just stainless steel?

2 MR. RAO: No.

3 MEMBER STETKAR: Just asking. I wouldn't
4 think so either, but --

5 MR. RAO: No, it is not.

6 MEMBER STETKAR: It is not, thank you.

7 MR. RAO: It seldom provides the technique.

8 MEMBER STETKAR: Just asking, thank you.

9 MR. FINLEY: And there is a waste water
10 retention basin, so the blowdown from the cooling tower
11 basin will be retained in a retention basin for some
12 period before being discharged. That's an overview of
13 the UHS makeup system. Let me --

14 MEMBER STETKAR: Mark, don't leave that for
15 a second.

16 MR. FINLEY: Okay.

17 MEMBER STETKAR: Nobody else can see this
18 other than you perhaps. One of the things I was looking
19 at is that under safety, your safety injection signal,
20 it isolates the normal makeup to the ESWS and it opens
21 the emergency makeup valve. It doesn't start to pump.
22 It doesn't do anything.

23 But that valve, the vertical line there that
24 says open, opens. It's an eight-inch line. If the test
25 bypass valve, which is also an eight-inch line, were open

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 I would then drain -- well, there's no check valve in that
2 line anywhere. There's a nice check valve in the normal
3 makeup line. There's no check valve in the emergency
4 makeup line anywhere.

5 So if the test bypass valve were open, I
6 would now start draining my basin through the emergency
7 makeup valve through the test bypass valve onto the
8 ground.

9 Okay, that's why -- I'm glad that you said
10 no. I want to understand why you won't do that. And
11 don't tell me it's normally locked closed, because I used
12 to work in a power plant and I can tell you stories about
13 valves that were normally locked closed that were not.

14 (Crosstalk)

15 MR. RAO: We do have a plastic protection
16 for this piece of pipe that goes into the basin. It goes
17 on top of the, or highest elevation. It goes down and
18 in and have a syphon breaker on --

19 MEMBER STETKAR: Thank you. that's all I
20 needed to know. Because I was looking for that
21 information. I couldn't find it in the FSAR. If it's
22 in there I overlooked it. Thank you. That's all I
23 needed to know.

24 (Crosstalk)

25 MEMBER STETKAR: I had a different way in

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 my mind that it might be protected, but this is much
2 better. Thanks.

3 MEMBER SKILLMAN: And this one's for you.
4 Are you going to talk about a departure?

5 MR. FINLEY: Yes, I'm glad you mentioned
6 that. I was just going to say, and Dr. Stetkar mentioned
7 it. I should have mentioned it earlier. So again on
8 Slide 20, so you can see if you look hard, a line that's
9 underneath the UHS cooling tower basin called the post
10 DBA UHS makeup keep-fill line. So that's an important
11 line and we'll talk about it as a departure here in a
12 little bit.

13 But the purpose of that line is to maintain
14 the UHS makeup line, the emergency makeup line full at
15 all times so that when you do get a demand for emergency
16 makeup you don't have empty pipe and you don't have a
17 concern about water hammer.

18 So that keep-fill line is an important
19 addition that we've made in our site specific design
20 which is not discussed in the U.S. EPR FSAR and therefore
21 it's a departure, but we needed to keep the line full so
22 that we don't get water hammer.

23 MEMBER SKILLMAN: So this is a departure to
24 the benefit not a departure to the detraction. This is
25 a benefit.

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 MR. FINLEY: This is a --

2 MEMBER SKILLMAN: It's a design
3 enhancement.

4 MR. FINLEY: Well, I suppose I could answer
5 that two ways. The fact that we have a water hammer risk
6 is not good.

7 (Crosstalk)

8 MR. FINLEY: Right. So we addressed that
9 with a keep-fill line. So we need a keep-fill line
10 because we have the water hammer risk.

11 MEMBER SKILLMAN: Yes. Now the issue is the
12 pressure boundary isolation valves, pressure boundary
13 isolation valves. What's the quality classification?
14 What's the instrumentation? And how do you know you have
15 the capability to know when you need to use that and the
16 assurance they'll function when you tell them to
17 function?

18 MR. FINLEY: Okay, I think there was a lot
19 there. But with respect to the keep-fill, so we do
20 assume some boundary leakage to establish the design flow
21 requirements for the keep-fill system. It's small and
22 --

23 MR. RAO: Five is too much but --

24 MR. FINLEY: Five gpm. So as you can see on
25 this diagram that flow comes off of the ESW pump flow,

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 which is a very high, you know, flow rate, 1,000 gpm or
2 more. So the 5 gpm that we siphon off for keep-fill is
3 a very small in that regard. So I don't know if you were
4 speaking about boundary leakage with respect to
5 keep-fill or other --

6 MEMBER SKILLMAN: No, I was just talking
7 about the boundary isolation valves, but what is there
8 better --

9 MR. FINLEY: Okay, maybe Shankar --

10 MR. RAO: All the boundary isolation valves
11 associated with the safety function protection of the
12 pressure boundary are safety related class 3, ASME
13 Section 3, including the manual test bypass valve which
14 you see, which was the question --

15 All other isolation valves including the
16 blowdown isolation and the emergency blowdown isolation,
17 the normal makeup isolation, they're all boundary valves
18 are safety related.

19 MEMBER SKILLMAN: Thank you. Thanks.

20 MR. FINLEY: Any other questions about the
21 UHC makeup system, normal or emergency?

22 CHAIRMAN POWERS: Is this appropriate
23 place?

24 MR. FINLEY: I think this might, I was going
25 to say that. I think this might be a good place to break.

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 CHAIRMAN POWERS: Why don't we break until
2 1 o'clock then, and we'll resume this discussion. And
3 those of us that are going to the P&P meeting will look
4 for my veto power. Those of us not can study ahead,
5 anticipate, so we'll blind side Mark when he comes back.

6 MR. FINLEY: Thank you.

7 CHAIRMAN POWERS: We are recessed until 1
8 o'clock.

9 (Whereupon, the foregoing matter went off
10 the record at 11:53 a.m. and went back on the record at
11 12:59 p.m.)
12
13
14
15
16
17
18
19
20
21
22
23
24
25

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

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(12:59 p.m.)

CHAIRMAN POWERS: Let's come back into session and continue with the Mark Finley show.

MR. FINLEY: Okay, Dr. Powers, thank you. So I'm on Slide 21 and here, we talked a little bit about it, but with regard to chemical treatment we do treat the makeup water. Essentially we maintain the water quality in the UHS cooling tower basins within freshwater limits.

On Slide 22 it shows the different parameters that we'll control with the biocide, algaecide, pH, corrosion inhibitors, scale inhibitor, silt dispersant. That's the intention of the chemical treatment system, so we'll maintain that as a normal occurrence.

Slide 23 talks more about water quality and water chemistry. There's a COL item in the U.S. EPR FSAR that sets up parameters in a table, 9.2.5-5 there, and essentially we need chemical treatment to stay within those parameters and we have that chemical treatment system.

The normal freshwater makeup will be slightly outside those bounds but the chemical treatment brings it within the bounds, so we'll stay within bounds normally as we've said.

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 Slide 24, just to touch again on the
2 emergency conditions.

3 MEMBER ARMIJO: Mark, on that water
4 chemistry, is that basically what you're doing right now
5 at Units 1 and 2, same type of water chemistry treatment?

6 MR. FINLEY: So Units 1 and 2 have a
7 once-through cooling system, both for their --

8 MEMBER ARMIJO: Do they need this?

9 MR. FINLEY: They have a different need.
10 So they do have biofouling issues and they do have
11 treatment to control that, but they don't have a similar
12 basin so I imagine ours is going to be different to that
13 extent.

14 But to the extent that we learn lessons
15 about the Bay and brackish water, yes, you know, we keep
16 in contact with Calvert Cliffs 1 and 2 and the lessons
17 they've learned. So we'll have that chemical treatment
18 information from them, but our need is a little different
19 with the cooling tower.

20 So emergency situation, I mentioned once
21 before that after 72 hours we need brackish water in the
22 emergency situation and so, as a result of that, we'll
23 be outside of the parameters in that U.S. EPR FSAR Table
24 9.2.5-5.

25 So we've looked at that and evaluated that

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 for a 30-day period, specifically looking at total
2 dissolved solids and demonstrated through analysis that
3 that's acceptable.

4 We also offered an ITAAC, as you see in that
5 last bullet, to confirm performance of the towers and
6 verify with the final design analytically that we'll have
7 the performance we need for 30 days.

8 Slide 25, this is materials now for the
9 makeup system. So we've talked about the 60-inch pipes
10 already and these are also lined with cement, as were the
11 30-inch pipes we talked about, and they're coated on the
12 external side with an epoxy and they will also be
13 cathodically protected.

14 And we can isolate one or the other and still
15 maintain 100 percent flow, which gives us some capability
16 to do maintenance on those pipes.

17 With respect to the vertical pumps, we
18 talked about the makeup pumps themselves. Those will be
19 super austenitic stainless steel and that obviously can
20 deal with the brackish water in the Bay.

21 The next slide --

22 MEMBER ARMIJO: Mark, before you go on
23 there, you know, I'm a metallurgist and I've been in this
24 business a long time. I've never heard of the term super
25 austenitic stainless steel, austenitic stainless steel

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 of course, but is this a new alloy?

2 MR. RAO: It look like it say ASME-approved
3 material. SB 190 I think is the number.

4 MEMBER ARMIJO: Is it duplex
5 microstructure?

6 MR. RAO: Yes. It's a duplex stainless
7 steel also --

8 MEMBER ARMIJO: It's not a casting? It's
9 forged or --

10 MR. RAO: Pipes are made, these are
11 seamless pipes, pipe-wise as far as I know.

12 MEMBER ARMIJO: Yes, seamless is not the
13 issue. Is the microstructure very unusual or chemistry
14 very -- could you provide some information to us on that,
15 what the chemistry is?

16 MR. RAO: We can provide the detailed
17 material specification for it from the ASME.

18 MEMBER ARMIJO: Yes, the chemistry,
19 mechanical properties and microstructure.

20 MR. RAO: Sure.

21 MEMBER ARMIJO: Because, you know, if it's
22 a new material, I'd like to know more about it.

23 MR. RAO: It's also known as AL-6XN. I
24 don't know what --

25 MEMBER ARMIJO: There's lots of stainless

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 steel --

2 MR. RAO: It's a commercial name.

3 MEMBER ARMIJO: -- but I've never heard the
4 term super austenitic. It may be a vendor's term to
5 charge you more money.

6 (Laughter)

7 MEMBER ARMIJO: And I'm not going to
8 criticize that.

9 (Crosstalk)

10 MEMBER ARMIJO: I'm very wary of
11 introducing new materials that you haven't got a lot of
12 experience with so that's the only reason. It may turn
13 out to be something I'm familiar with.

14 MR. FINLEY: Okay, we'll take an action to
15 get you that information. And Slide 26 in terms of
16 piping and valves in the makeup --

17 MEMBER STETKAR: That actually might be
18 important because those lines are normally stagnant,
19 filled with stagnant, brackish water. I mean you're
20 going to flush them up through that test line but that
21 test line is up on the hill, right?

22 MR. FINLEY: Right, right.

23 MEMBER STETKAR: So under normal
24 circumstances they're full of brackish water.

25 MR. FINLEY: That's correct, which is why

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 we choose this material. However, as opposed to before,
2 you know, from the staff's questions and our response to
3 those questions, we have the capability to do periodic
4 flushes and we'll do that, I think quarterly, so with some
5 frequency. So it'll be stagnant in between but we'll do
6 testing and flushing on a quarterly basis.

7 MEMBER STETKAR: But it is exposed to
8 brackish water 365 days a year.

9 MR. FINLEY: Yes, yes. But this stainless
10 steel is super austenitic.

11 (Laughter)

12 MEMBER ARMIJO: It may be just fine. I'd
13 just like to know more about it, that's all.

14 MR. FINLEY: Slide 26 just states that we
15 do use that same material for the piping, the 8-inch
16 buried piping from the makeup water structure up to the
17 basins for emergency makeup with strainers on the
18 discharge side of those pumps that are also super
19 austenitic stainless steel.

20 Slide 27, this is sticking with materials
21 here and different aspects of the ESWS cooling tower, the
22 blowdown system, both emergency and normal. I don't
23 think we've identified the material specifically yet but
24 they will be compatible with the brackish water in both
25 cases.

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 The screen wash system, same way, be
2 constructed of materials compatible with brackish water.

3 Slide 28, okay, so we're out of the
4 materials questions with respect to ESW and the makeup
5 system and now we're into UHS cooling tower performance.

6 And this first COL item has to do with the
7 effects on safety-related ventilation resulting from the
8 UHS cooling tower plume interference effects.

9 And we've done some significant work here
10 on this particular COL item and, as well, one that is
11 similar, which is what is the recirculation effect of the
12 plume on the tower itself? This is more the effect of
13 the tower plume on other systems, but we'll talk about
14 both effects here shortly.

15 So what we did is we modeled the site, the
16 structures on and around the site that could affect the
17 plume and the flow paths associated with the wind and the
18 plume.

19 We've actually done some quantitative
20 analysis using computational fluid dynamics to model the
21 actual temperature increase at the intakes to the main
22 control room and safeguards building ventilation
23 systems.

24 We've determined that effect even under the
25 worst conditions. We looked at wind from directions all

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 around the compass, 360 degrees. We looked at wind
2 speeds up to that which is reasonable, which is about 22
3 miles an hour, 10 meters per second. Wind speeds higher
4 than that are really low probability for any duration.

5 And we calculated the worst increase in
6 temperature to be 2.5 degrees, or I should say something
7 less than 2.5 degrees.

8 And then we demonstrated that the design of
9 these ventilation systems have the margin to accommodate
10 that kind of an increase over and above what the ambient
11 temperature is. So through that quantitative analysis,
12 we've answered this COL item.

13 CHAIRMAN POWERS: One of the questions that
14 I'm sure the ACRS committee will have is why do you think
15 your computational fluid dynamics was an accurate
16 portrayal of the flow field around the plant?

17 MR. FINLEY: Yes so, you know, I'm not the
18 expert and Shankar can help here, but so we've done some
19 sensitivity studies, looked at perturbations of
20 different parameters, calculated uncertainty on the
21 order of 3-1/2 percent, which for this temperature is
22 small. It's .1/.2 degrees, something like that. So we
23 think this is pretty accurate and a good quantification
24 of the impacts.

25 CHAIRMAN POWERS: One of the pieces of

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 corporate knowledge that exists within the ACRS is a
2 portrayal of the CFD analyses, the flow field around an
3 automobile.

4 And as it progressed between the initial cut
5 and after, as experiments were done to further refine
6 that, and it went from completely unintelligible flow map
7 to one that actually looked like flow around a car, and
8 the point being that without some experimental
9 calibration that the CFD models tend to be precise but
10 not very accurate.

11 MR. FINLEY: And I see we have some experts
12 on the staff that I'm sure can better answer your
13 question, Doctor. They have done an audit of at least
14 the first version of this work that we did so they can
15 respond to that.

16 We did do a V&V process and took some test
17 cases and compared results from our methodology to
18 published results for those test cases, so that's been
19 done. More than that I can't say.

20 I don't know if now is a good time or maybe
21 during the staff presentation you can ask those same
22 questions. You'd probably get a better answer. I don't
23 have my CFD expert here. Shankar, you want to chime in
24 or --

25 MR. RAO: The only thing I was going to

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 point out, like you were talking now, a
2 validation/verification process was followed in
3 accordance with the ASME, V&V methodologies, where three
4 different test analyses were modeled and replicated in
5 the results also.

6 CHAIRMAN POWERS: I can assure you the ACRS
7 experts in this area will tell you that that is a
8 necessary condition but it is not a sufficient condition
9 to validate these things.

10 MR. FINLEY: Okay. Well, I have given you
11 my warning.

12 CHAIRMAN POWERS: You could have given me
13 almost any answer and it would have been impossible to
14 address it but I can forewarn you that that is a question
15 that --

16 MR. FINLEY: I appreciate that and I can
17 tell you that the staff has looked pretty closely at this.
18 We have had an audit and stuff, but I'm not an expert,
19 so.

20 CHAIRMAN POWERS: Well, Mike, I hope after
21 you will explain how the staff drew comfort from this
22 analysis.

23 MR. TAKACS: Yes, I will.

24 (Crosstalk)

25 CHAIRMAN POWERS: Quite frankly Dr.

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 Banerjee is less charitable in this area than I am.

2 (Crosstalk)

3 MR. FINLEY: I should also point out, Dr.
4 Powers, it's still an open item. This issue of
5 interference and recirculation is still an open item and
6 so technically we're not trying to close that today.

7 CHAIRMAN POWERS: I understand.

8 MEMBER SKILLMAN: Is this also the target
9 of a departure?

10 MR. FINLEY: No, we actually term this a
11 variance and we analyze it as sort of a transient
12 condition. We have not termed this a departure.

13 MEMBER SKILLMAN: Okay, thank you.

14 MR. FINLEY: Yes. Slide 30 now speaks to
15 the maximum evaporation and drift water loss. This is,
16 I'm sorry. Did I skip a slide, here? Okay, Slide 29.
17 This is the evaporation and drift losses during the first
18 72-hour period.

19 So what we've done here is reviewed our
20 30-year temperature data, hourly regional
21 climatological data and compared that to what's in the
22 U.S. EPR FSAR because they have a similar time frame
23 they've looked at, and our temperature data is actually
24 identical to what's used in the U.S. EPR FSAR.

25 MEMBER STETKAR: I wanted to ask about

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 that. I understand that the EPR FSAR uses the data from
2 the Patuxent Naval Air Station.

3 MR. FINLEY: Yes.

4 MEMBER STETKAR: They're identical.

5 MR. FINLEY: Yes.

6 MEMBER STETKAR: Which means that if I have
7 a site in Arizona, my evaporative losses are not going
8 to be bounded by the DCD and if I have a site in Louisiana,
9 let's say, or something like that, my minimum cooling is
10 not going to be bounded by the DCD, right?

11 MR. FINLEY: I can't speak to those sites
12 but it could be. It could be. Steve Huddleston --

13 MEMBER STETKAR: In other words, the DCD is
14 not bounding for the Calvert Cliffs site. It is
15 precisely the Calvert Cliffs site.

16 MR. FINLEY: It is precisely the Calvert
17 Cliffs site with respect to this data, yes.

18 MEMBER STETKAR: Yes, okay. Just wanted
19 to make sure that --

20 MR. FINLEY: Correct, Steve?

21 MR. INFANGER: We recognize the
22 difficulties and that's why we --

23 MEMBER STETKAR: It's no problem for you.
24 I'm just curious. I haven't seen that as --

25 MR. FINLEY: Steve Huddleston is with

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 AREVA. Maybe you can speak a little more, Steve, on --

2 MEMBER STETKAR: It said UniStar. That's
3 why I was --

4 MR. HUDDLESTON: Yes, our point is that all
5 of these values, of course, are going to be
6 site-specific.

7 MEMBER STETKAR: Sure.

8 MR. HUDDLESTON: And each site needs to
9 show in their own way that they're either valid or not
10 and how they're addressing it.

11 MEMBER SKILLMAN: Okay. Well, isn't that
12 the artifact of a Part 7, I mean, of a 52 license? This
13 is the RCOLA and, since it is, this is the reference.

14 MR. HUDDLESTON: No.

15 MEMBER SKILLMAN: Because most other
16 design cert applicants derive a temperature profile and
17 certify the design against that temperature profile.

18 It could be a made-up temperature profile
19 and then each individual applicant then says, well, that
20 temperature profile bounds it based on my site-specific
21 data so I don't have to do any other analysis or it
22 doesn't bound it and I have to do some additional
23 analysis.

24 MR. FINLEY: This is not the typical case
25 --

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 MEMBER SKILLMAN: This is not the typical
2 case.

3 MR. FINLEY: -- in terms of comparing RCOLA
4 to the design certification. Normally there's margin.
5 I think this is affected, and correct me if I'm wrong,
6 Steve, but this is affected based on a decision that was
7 made sort of late in the game in terms of submittal of
8 both the design cert and the RCOLA to put the UHS cooling
9 towers in the design certification. I don't think
10 that's always the case.

11 MEMBER SKILLMAN: That's why I think it's
12 really --

13 MR. FINLEY: Right.

14 MEMBER SKILLMAN: Because of the way Part
15 52 is written, this is in the design cert but it is also
16 the RCOLA. Now at Susquehanna, team's going to have to
17 take a look at this and either agree or disagree.

18 MR. FINLEY: Right, right, right, right.

19 MEMBER SKILLMAN: That's what I'm saying.

20 MR. FINLEY: No, you're right. And I'm
21 just saying in this case I think this data and this design
22 started as a site-specific Calvert Cliffs design that was
23 then migrated to the design certification.

24 MEMBER SKILLMAN: To the DC.

25 MR. FINLEY: So there's a different sort of

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 history to this than most other systems.

2 MEMBER SKILLMAN: But it ends up being that
3 exact --

4 MR. FINLEY: Right.

5 MEMBER SKILLMAN: Yes?

6 MR. FINLEY: Right.

7 MEMBER SKILLMAN: Okay.

8 MR. FINLEY: Right. Okay, so I'm on Slide
9 29. So for the first 72 hours we're identical,
10 essentially, to the design certification in terms of the
11 makeup water required. We have the same requirements
12 and we meet those requirements. In terms of the volume
13 of the UHS basin, it has adequate volume to handle this
14 kind of loss over the 72 hours.

15 The makeup then kicks in at 72 hours on Slide
16 30. Similarly we use the same temperature data after 72
17 hours until the 30-day period expires and this is the
18 analysis that demonstrates that 300 gpm is adequate to
19 provide makeup for one tower at this point and we've
20 already talked about that.

21 Our pumps have a capacity of 750 gpm and even
22 with some screen wash flow taken away there's plenty of
23 margin to that 300 gpm.

24 Okay, Slide 31, same topic here. We're
25 just continuing to talk about the meteorological

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 conditions, and after 72 hours our makeup is adequate.

2 Slide 32, okay, so here is a COL item that
3 relates to the UHS cooling tower recirculation and
4 interference.

5 So as you see in the COL item, it says,
6 "confirm that the site characteristic sum of the 0
7 percent exceedance maximum non-coincident wet bulb
8 temperature and the site-specific wet bulb correction
9 factor does not exceed the value."

10 Okay, so for the Calvert Cliffs site the
11 value that's in this table in the U.S. EPR is actually
12 exceeded. That value is 81 degrees for wet bulb
13 temperature. The Calvert Cliffs site non-coincident
14 wet bulb 0 percent exceedance temperature is actually 85
15 degrees.

16 So we looked at that 85 degrees in the
17 context of the worst 24-hour temperature data that we
18 found in a 30-year period and we calculated the
19 correction factor, which represents this recirculation
20 between towers.

21 And again using that same computational
22 fluid dynamics model that we just talked about for the
23 other impacts and we calculated that correction factor
24 as less than 2.5 degrees.

25 We added the 2.5 degrees to the 85 degrees,

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 actually the hourly temperature data before and after the
2 85 degrees, and determined that the maximum basin
3 temperature doesn't exceed 95 degrees, if you followed
4 all of that. Okay.

5 MEMBER STETKAR: It was actually easier to
6 follow when you said it than it was to follow when I read
7 it.

8 MR. FINLEY: Okay, good. However, there's
9 one complexity here, Slide 33. We do have a departure
10 now but it is going to go away, and the issue is we're
11 not aligned with the data in the design certifications
12 at this point.

13 We got a little bit ahead of the design
14 certification as it turns out. Not quite sure why, but
15 in any extent we adjusted our temperature, the timing of
16 our temperature data to coincide with the heat discharged
17 to the cooling tower in our transient analysis and when
18 we did that it put our data out of sync with what's in
19 the design cert.

20 However, it's only because the fact that the
21 design cert revision hasn't caught up with what we have
22 in the COLA now. They are also going to change the timing
23 of their data so this departure will go away and, again,
24 will be identical to their transient. Okay.

25 CHAIRMAN POWERS: We really should not

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 worry about this.

2 MR. FINLEY: Right, no, no. We're going to
3 get back to identical that we talked about before.

4 MEMBER SKILLMAN: But the question is does
5 the NRC staff concur with the change to the design cert
6 such that the design cert and Calvert Cliffs are one and
7 the same?

8 MR. FINLEY: That's one for them I think.

9 MEMBER SKILLMAN: That's one for them,
10 okay. Okay, thank you.

11 MR. FINLEY: They haven't reviewed. I
12 don't think it's been submitted yet but, anyway, they'll
13 answer it.

14 MEMBER SKILLMAN: You're betting on the
15 cone.

16 MR. FINLEY: They'll answer it.

17 CHAIRMAN POWERS: I can't keep track of all
18 the resubmissions and things like that, but they're all
19 in Phase 4 in the design cert so it'll be a while before
20 it comes back to us, okay.

21 And I think Mark's point here is that we
22 don't need to spend a lot of time on this until Phase 4
23 because it's just not going to be operational if we just
24 wait a while.

25 MR. FINLEY: Right. To stick with

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 departures just a second, you remember I said that there
2 were three and two of them were going to go away, so this
3 on Slide 34 is the second departure and this one also will
4 go away.

5 We took a departure because at least the way
6 we read the U.S. EPR FSAR table that depicts the alarm
7 and permissive logic related to the makeup pump that's
8 driven by the basin water level, that we could not
9 manually start our makeup pump until after the water
10 level got below low, low, low. We felt that we wanted
11 to depart from that and be able to manually start that
12 pump sooner.

13 And AREVA also agrees and they're in the
14 process of working a change. Actually I do think this
15 one's been submitted already that corrects this wording
16 and so this is also a departure that in our next revision,
17 Revision 10, we should pull out.

18 MEMBER STETKAR: Mark, I wasn't going to
19 ask you this but --

20 CHAIRMAN POWERS: But you're going to
21 anyway.

22 MEMBER STETKAR: But I'm going to anyway
23 since we have Dr. Powers running such an efficient
24 meeting that we now have extra time.

25 I read and I can't quote sections here, but

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 in the FSAR I believe it says, I know how the system
2 starts. You get a safety injection signal. The
3 isolation valve up at the ESWS opens up and then the
4 operators decide at some time to start the pump and
5 deliver the flow.

6 There are some words in there that says
7 after that point level is controlled automatically,
8 which implies that there's some sort of level sensor that
9 cycles or throttles some valve. Is that correct --

10 MR. FINLEY: I'm going to defer --

11 MEMBER STETKAR: -- or is it strictly
12 manual on/off control of level?

13 MR. FINLEY: I'm going to defer to Shankar
14 on that.

15 MR. RAO: The level is indicated in the
16 control room?

17 MEMBER STETKAR: Yes.

18 MR. RAO: And the operator has the control
19 of the pump in such a way that he can terminate the pump
20 if needed or turn it in the recirculation mode by closing
21 the isolation valve.

22 MEMBER STETKAR: You may want to look at the
23 FSAR because there's some implication that once that --
24 now, I can't quote. This is something I just remembered.
25 I didn't write it down because it's not super important.

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 But just in terms of accuracy I believe
2 there's some implication that once the operator turns it
3 on it's basically hands off and there's some sort of
4 automatic level control in the point ESWS basin, which
5 would imply throttling of some valve someplace or cycling
6 of a pump or something like that.

7 MR. RAO: I will double-check that.

8 MEMBER STETKAR: Double-check. Just, as I
9 said, I didn't write it down because I wasn't
10 particularly concerned about it, but since you brought
11 up this other thing, I thought I'd mention it.

12 MR. FINLEY: Yes, in general I should add
13 that we didn't want automatic start of the makeup pump
14 just because of the brackish water/freshwater situation.
15 We wanted that to be controlled by the operator through
16 procedure.

17 Okay, Slide 35, so this is the third
18 departure and this is the one that will remain. I
19 already spoke about this. This is the keep-fill piping
20 that we added to make sure we don't have dry piping
21 associated with that makeup pipe which goes a significant
22 distance from the Bay up to the power block area, so we'll
23 keep that filled with water.

24 It's from a safety-related source,
25 essentially the essential service water system, and it

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 draws very little demand from that system. Okay, that's
2 Slide 35.

3 And no need to repeat the discussion on 36.
4 I think we pointed out that keep-fill piping once before
5 on Slide 36 so don't need to talk about that.

6 So Slide 37 is the raw water system and this
7 is Chesapeake Bay water basically and it feeds the
8 desalinization plant. There'll be no cross-connects
9 between the raw water system and any other system that
10 has the potential to carry radioactive material.

11 We have done flooding analysis associated
12 with this system such that failures of piping or
13 components, any flooding caused by that, have been
14 evaluated.

15 And Slide 38 is also raw water and so we do
16 have storage tanks, raw water supply storage tanks and,
17 again, graded the sites such that that water, if the tank
18 were to fail, the water would be diverted to the drainage
19 system and not affect the plant.

20 MEMBER STETKAR: Oh, by the way, I found the
21 statement if you -- I'll help you guys now. It's in
22 Section 9.2.5.5 of the FSAR. It says, "Once the UHS
23 makeup water pumps are started manually, subsequent
24 operations are accomplished automatically to provide
25 flow to the UHS cooling tower basins," which implies some

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 sort of levels are falling.

2 MR. FINLEY: Okay, okay.

3 MEMBER STETKAR: That's where I stumbled
4 across it.

5 MR. FINLEY: Okay, so that does it for the
6 water systems. 9.3 really is process auxiliaries and we
7 don't have COL items in this area. I mean, incorporate
8 by reference completely what's in the U.S. EPR FSAR, so
9 there's really nothing to discuss there. That's
10 compressed air, sampling, equipment and floor drainage
11 and chemical and volume control.

12 Then to Section 9.4 on Slide 42, so the
13 site-specific ventilation systems we have. I'm not
14 going to talk about the generic systems. We incorporate
15 all of those generic safety ventilation systems by
16 reference.

17 So I'll talk about the site-specific
18 systems. The first is the turbine building ventilation
19 system. It's nonsafety related, doesn't serve any
20 safety-related functions. Maintains the turbine
21 building within the proper equipment operating
22 temperatures. Its just nonsafety function is to keep
23 dirt and dust out of the turbine building.

24 And there are no radiation functions it
25 performs, no safety actuation signals provided to this

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 system from other systems and there's no operator action
2 required to respond to plant events associated with this
3 system, so there's no safety function.

4 Similarly, Slide 43, switchgear building
5 ventilation system. Switchgear building is actually
6 tied directly to the turbine building so it's essentially
7 the same structure.

8 However, we have a separate ventilation
9 system. In this building, of course, we have all the
10 electrical switchgear. We also have the station
11 blackout diesels. However, the station blackout
12 diesels have their own ventilation system which is
13 described in the U.S. EPR FSAR.

14 For the switchgear building ventilation,
15 similar to the turbine building ventilation there are no
16 safety functions or radiation control functions that the
17 system performs. It strictly maintains equipment
18 operation.

19 Slide 44, we do have site-specific -- yes,
20 I'm sorry.

21 MEMBER STETKAR: Two things. There is an
22 open item because you don't have the design for the
23 switchgear building ventilation system yet.

24 I bring this up repeatedly, is the term.
25 You carefully in this presentation used the term there

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 is no safety-related equipment in the turbine building
2 or the switchgear building, which is a statement of
3 licensing fact.

4 The phrase that is used repeatedly in the
5 FSAR is that there is no equipment important to safety
6 in the turbine building or the switchgear building
7 ventilation system.

8 In the COL FSAR, there is a long list of
9 systems that are included in the design reliability
10 assurance, I'm sorry, in the EPR FSAR, the design cert
11 FSAR.

12 In Table 17.4-2 in particular, there are a
13 long list of systems that are included in the design
14 reliability assurance program because they are not
15 safety related but they are important to safety.

16 And they include things like the feedwater
17 system, the main steam system, non-class 1E
18 uninterruptible power supply, normal power supply,
19 12-hour uninterruptible power supply, turbine generator
20 instrumentation control system, a lot of stuff that is
21 located in the turbine building and the switchgear
22 building.

23 So there seems to be some disconnect about
24 the statement that says these ventilation systems don't
25 supply any locations with anything important to safety

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 versus the design certification that lists nonsafety
2 related but important to safety, at least within the
3 construct of the reliability assurance program
4 definition of important to safety. You may --

5 MR. FINLEY: Right, so I think we --

6 MEMBER STETKAR: I'm going to ask the staff
7 about this also because they basically signed off that
8 everything is okay.

9 MR. FINLEY: I think we have to look at
10 that. I'm not sure the definition of important to safety
11 --

12 MEMBER STETKAR: Well, it's a problem these
13 days because especially with the new plants there are --
14 active plants are less susceptible than passive plants
15 but there are large numbers of systems that are now not,
16 quote/unquote, "safety related" from a licensing basis
17 but are designated as important to safety for enhanced
18 maintenance, enhanced reliability, enhanced
19 availability controls outside of the tech specs let's
20 say.

21 MR. FINLEY: Right, right. Okay.

22 MEMBER STETKAR: And in terms of the
23 general design criteria, they say important to safety.
24 It doesn't say safety related. And the staff in other
25 guidance has interpreted safety related as a subset of

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 important to safety. This is a subtle licensing point
2 but I'm going to ask the staff so I hope the staff --

3 MR. FINLEY: We will take an action in terms
4 of any corrections that might be needed or clarification
5 that might be needed for the FSAR --

6 MEMBER STETKAR: I was going to say orally,
7 as you stated, is purely a statement of truth. There is
8 no safety-related equipment in those locations.

9 MR. FINLEY: Shankar, did you want to add
10 anything to that?

11 MR. RAO: As pointed out, there may be some
12 other enhanced features that should be provided by
13 augmented quality principle for some of this equipment
14 where we have multiple off-site power supplies and/or we
15 do have more than one train of electrical supply in the
16 switchgear building, those kind of things. We have
17 provided multiple feedwater pumps.

18 MEMBER STETKAR: It's okay except for the
19 fact that their just blanket statement says that this
20 isn't important because it doesn't supply anything
21 that's important to safety.

22 MR. FINLEY: We have to look at that.
23 Sounds like a conflict in the FSAR itself, so we'll have
24 to fix that or clarify it.

25 MEMBER STETKAR: I just wanted to raise

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 that because it's, as I said, raised it in some cases.
2 In many cases on the passive front designs it's much more
3 important because most of their active equipment is not
4 safety related but it is, quote/unquote, "important to
5 safety."

6 MR. FINLEY: Okay, good point. Slide 44
7 speaks to the nonsafety-related ventilation system we do
8 have in the RCOLA, so that UHS makeup water intake
9 structure we've talked about this morning. That's a
10 ventilation system and it will maintain temperature
11 within the structure acceptable for equipment.

12 We have four trains I spoke about earlier.
13 There are also four ventilation trains so they're
14 independent of one another and they'll maintain the
15 conditions needed for the equipment to operate.

16 Slide 45 speaks again to this UHS makeup
17 water intake structure ventilation system, some more
18 details of that for the different rooms and the traveling
19 screens, et cetera. Don't think I need to go into detail
20 there.

21 And we have additional ventilation system
22 for the fire protection building, Slide 46. Fire
23 protection building we have two, 100 percent capacity
24 diesel-driven fire pumps.

25 We also have an electric motor-driven fire

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 pump and we have ventilation in that building for the
2 equipment to maintain temperatures as you see there,
3 maximum 120, minimum of 40.

4 We also have a self-contained,
5 diesel-driven power supply for ventilation system so
6 that essentially we have a backup to normal offsite power
7 since the power there in the diesel building is not backed
8 by station blackout diesel or the normal safety diesel.

9 We have a separate diesel in that building
10 to provide power for ventilation for the structure as a
11 backup to normal offsite power.

12 MEMBER STETKAR: Unfortunately I have to
13 babble a bit more here. First question is if I look at
14 your third bullet there, the system is designed based on
15 an ambient temperature of -10, maximum 100.

16 The other plant ventilation systems are
17 based on a minimum temperature of 0 dry bulb and a maximum
18 of 102 dry bulb. I don't care that you've designed this
19 for colder weather.

20 I was curious why this particular system
21 uses a maximum ambient temperature of 100 degrees and
22 everything else uses 102. I suspect it doesn't make much
23 difference to the system design in the real world.

24 MR. FINLEY: I'm also wondering whether we
25 have a typo here but --

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 MEMBER STETKAR: No, you don't.

2 MR. FINLEY: No?

3 MEMBER STETKAR: It's in the FSAR.

4 MR. FINLEY: Nonsafety.

5 MEMBER STETKAR: You may want to look at
6 that.

7 MR. FINLEY: We'll look at that.

8 MEMBER STETKAR: I know, as I said, as a
9 practical matter it probably doesn't make any difference
10 but --

11 MR. FINLEY: It's not a --

12 MEMBER STETKAR: It says somebody looked at
13 a different temperature to design this system but then
14 it tells me --

15 MR. FINLEY: It's not a safety-related
16 system.

17 MEMBER STETKAR: No, it's not.

18 MR. FINLEY: I will say that, but --

19 MEMBER STETKAR: Yes, it's not a
20 safety-related system. The fire protection system is
21 one of these enhanced controls world, the fire protection
22 stuff.

23 MR. FINLEY: Yes, yes, yes. Okay, we'll
24 look at that.

25 MEMBER STETKAR: Now, regarding the

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 system, we're not going to talk much more about the system
2 itself, right, the fans and the dampers?

3 MR. FINLEY: The ventilation system, no.

4 MEMBER STETKAR: Right, okay. I did have
5 some questions about that system in particular because
6 I look at fans and dampers and things like that.

7 This statement in the FSAR in Section
8 9.4.16.2.2 so you have it on the record, it says this
9 system, in the fire protection ventilation system, has
10 motor-operated air supply dampers, and I don't want to
11 get into the reliability. It says there's two. I don't
12 know why there's two. That's okay.

13 However, there's a statement that says,
14 "The motor-operated dampers fail to the open position in
15 the case of a power loss."

16 Me, I've seen a lot of motor-operated
17 dampers and you can, in principle, design them to fail
18 open on loss of power but if it's a straightforward
19 motor-operated damper they tend to fail wherever they
20 were on loss of power. So you may want to check that
21 statement.

22 The reason I raise this is that there are
23 several discussions of how this system performs and it's
24 alluded to in your last bullet there and perhaps the
25 explanation is these diesels that you talked about, but

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 I don't know what they power because they're not really
2 described in anything that I saw in there.

3 There are statements like this that says
4 dampers fail open on loss of AC power which are curious
5 and statements that says, "In the event of a station
6 blackout, emergency power is supplied to the fire
7 protection building ventilation system."

8 Now, station blackout, by definition you
9 don't have emergency power so that can't be correct.
10 That can't be a statement of fact.

11 I don't need answers today. You probably
12 don't have the people here, but I think you need to look
13 at that section of the FSAR that describes that system
14 design and in particular its response on presumed loss
15 of power or station blackout.

16 As I said, that last bullet that you have
17 here, I actually didn't see anywhere a description of the
18 fact that that diesel existed.

19 MR. FINLEY: So that's a recent submittal
20 and I'm not sure it made Rev 9 --

21 MEMBER STETKAR: Okay. I'll tell you it's
22 not. I read these. I trust you. I've never seen a
23 diesel.

24 MR. FINLEY: It's on the docket but I don't
25 believe it's in Rev 9 yet so --

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 MEMBER STETKAR: So I don't know, for
2 example, if that's just a diesel engine to drive the fan
3 or whether it's a little diesel generator that also
4 supplies power.

5 MR. RAO: It's a diesel generator.

6 MR. FINLEY: But go ahead. Look for
7 answers.

8 MEMBER STETKAR: But if it's a diesel
9 generator then, you know, it didn't exist in Rev 9.

10 MR. FINLEY: Right.

11 MR. RAO: It was added --

12 MEMBER STETKAR: Okay.

13 MR. RAO: Staff question and RAI and, but
14 it --

15 MR. FINLEY: Well, I was just going to say
16 we might also in Rev 10 clarify that wording you just --

17 (Crosstalk)

18 MEMBER STETKAR: Check. It sounds like
19 this part is in a bit of a state of flux between Rev 9
20 and Rev 10 so it's --

21 MR. FINLEY: Right, right. It's really a
22 loss of off-site power. It's not a station blackout
23 scenario. This system doesn't get the safety diesel or
24 station blackout diesel or --

25 MEMBER STETKAR: Yes, okay.

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 MR. FINLEY: Shankar, you were going to
2 maybe speak about dampers.

3 MR. RAO: Yes. The point I was going to
4 make for that was the motor-operated dampers will fail
5 as is typically.

6 MEMBER STETKAR: Typically they do. This
7 is --

8 MR. RAO: So what we meant probably, and we
9 will double-check that, is that they fail to open
10 position because they're normally open, but we will
11 confirm that.

12 MEMBER STETKAR: Okay, that may be the
13 --Okay, thanks.

14 MR. FINLEY: So that does it actually for
15 ventilation unless there's other questions on
16 ventilation.

17 The last section is 9.5, which is plant
18 protection and this is where, as I mentioned earlier, we
19 have a number of COL items so I'll go over these quickly.

20 But the first one is so we need to describe
21 the simplified fire protection system, P&ID. So let's
22 flip to Slide 49 and I know it's hard to read but we're
23 not going to look at the small print hopefully.

24 Start with sort of the lower left-hand
25 corner of this figure. You've got the fire protection

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 building there. You can see the two diesel fire pumps
2 and one electric-driven fire pump.

3 So that's the supply for all the rest of the
4 distribution system on the site so that supplies directly
5 the nuclear island fire protection loop as you see. It's
6 kind of in a reddish ink there.

7 And then the turbine building loop is
8 connected to that, and then connected to the turbine
9 building loop is the main cooling tower loop to provide
10 fire water distribution to the main cooling tower.

11 There is also an offshoot on the top left
12 side. John, if you go up here, yes, top left side. So
13 that's piping that comes off the NI loop and goes down
14 to the structure on the Bay, the UHS makeup water intake
15 structure. So this is the fire, sort of a high-level
16 P&ID for the fire water distribution system.

17 One of the things to mention here is this
18 system, at least with respect to the nuclear island,
19 needs to function after an earthquake so this, although
20 not safety related, it is going to be seismically
21 qualified so that it's functional after a seismic event.
22 That's a requirement in Reg Guide 1.189.

23 Okay, so Slide 50 speaks to fire protection
24 for the cooling towers and so I showed you that there is
25 a loop that surrounds the main cooling tower to provide

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 the fire protection we need in accordance with the NFPA
2 24, supplied two independent supply lines as you saw in
3 the P&ID. We have automatic fire detection, fire alarms
4 and portable fire extinguishers there as well.

5 Slide 51, this is monitor and maintain
6 acceptable level of quality in the fire protection
7 system, freshwater storage tanks.

8 So this water is fed from that
9 desalinization plant that we talked about earlier.
10 We'll provide makeup as necessary. We maintain storage
11 in two separate tanks and we'll treat it as necessary with
12 corrosion inhibitors as required.

13 Slide 52, perform a supplemental fire
14 protection analysis for site-specific areas. In
15 Appendix 9 Bravo we have performed a fire hazards
16 analysis to supplement that which is in the U.S. EPR FSAR.

17 Demonstrates that we achieve and maintain
18 safe shutdown conditions for a fire in any area of the
19 plant including the alternative shutdown fire areas. I
20 don't know that there's any other points that I need to
21 make on this slide.

22 MEMBER STETKAR: Yes, there is.

23 MR. FINLEY: Obviously there is.

24 MEMBER STETKAR: What's in there is a
25 summary and I didn't study it in detail because it's not

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 what I get paid to do. However, I'll come back to this
2 notion of important to safety stuff.

3 And in the table, there's a big table that
4 summarizes the result, 18-page table, whatever it is, 9
5 Baker dash 2, 9B-2, and in that table there are line items
6 that says, it goes fire area by fire area. It summarizes
7 what's in it, whether the pipes are fire hazards, et
8 cetera.

9 If I looked at that table, there were four
10 fire areas that had yes under important to safety
11 equipment. Those are the four UHS makeup pump divisions
12 because they're kind of combinations, and I understand
13 that. That's correct.

14 None of the other turbine building
15 locations, we already talked about turbine building
16 ventilation so the whole turbine building and the
17 switchgear building, and none of those buildings had
18 anything that was important to safety so I don't need to
19 say that again.

20 However, when you looked at auxiliary
21 transformers there are fire areas for each of the, normal
22 auxiliary transformers has one, the main power
23 transformer has one and the two emergency auxiliary
24 transformers are each separate fire areas.

25 I was really curious of why the emergency

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 auxiliary transformers are not important to safety.
2 They are the normal power supplies, each to two safety
3 busses. They're probably not safety related, but they
4 are the normal power supplies to two safety busses.

5 MR. FINLEY: I'm not sure the scope of this
6 but it was just site specific, you know.

7 MR. RAO: Emergency auxiliary transformers
8 is --

9 MEMBER STETKAR: It's the emergency
10 auxiliary transformers in particular. I mean they were
11 the most curious. They're less esoteric than, for
12 example, the feedwater system in the turbine building.

13 MR. FINLEY: What I'm wondering out loud,
14 and I think we need to take an action unless Steve can
15 help, is whether that was covered in the design
16 certification.

17 MEMBER STETKAR: No, it's in your Table
18 9B-2.

19 MR. FINLEY: Okay.

20 MEMBER STETKAR: It's my understanding the
21 configurations of those transformers and fire protection
22 I think are probably your scope to supply, you know, where
23 you want to place them or something like that. But,
24 anyway, it's in your COL FSAR Table 9B-2 so it's --

25 MR. FINLEY: So your question is why aren't

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 these classified as --

2 MEMBER STETKAR: My general question was,
3 you know, how carefully did someone who did this analysis
4 think about things that are, quote/unquote, "important
5 to safety?"

6 They obviously identified the,
7 quote/unquote, "safety-related" for rooms in the UHS
8 makeup structure but it's not at all clear to me how
9 carefully they thought about it.

10 Now, what implications that has on the
11 site-specific fire hazards analysis I don't know because
12 these are just some of the tables. Somebody had to look
13 at a fire at each location and make the determination that
14 safe shutdown could be accomplished given a fire in that
15 location.

16 But just simply those line items and in
17 particular for those two transformers, you know,
18 dismissing them as they're not important to safety seemed
19 pretty curious --

20 MR. FINLEY: Okay, so we'll take an --

21 MEMBER STETKAR: -- which raised the
22 question in my mind about how carefully people really
23 thought about that whole process.

24 MR. FINLEY: Okay. It sounds like sort of
25 an extension of the previous comment on ventilation.

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 MEMBER STETKAR: It is for a large, you
2 know, as I said, fires in the, there are several locations
3 in the turbine building, there are a few locations in the
4 switchgear building.

5 Those are also characterized as not housing
6 any equipment that's important to safety and that is
7 directly analogous to the ventilation. These two
8 transformers, though, are a little bit more --

9 MR. FINLEY: Of concern.

10 MEMBER STETKAR: -- focused because,
11 indeed, they are the normal power supplies to
12 safety-related busses. I don't know how they're treated
13 in license. They're not safety-related transformers
14 because the line is drawn at the circuit breakers that
15 separate the transformer from the bus. But to say that
16 they're not important to safety is curious.

17 MR. FINLEY: Okay, so unless you had more
18 to say, we'll have to take that action and clarify --

19 MR. RAO: It's the broad definition of
20 important to safety versus safety related.

21 MEMBER STETKAR: Yes.

22 MR. FINLEY: Okay, and Slide 53 here begins
23 a series of, again, fire protection COL items, first
24 relating to design and procurement document control;
25 second one, instructions, procedures and drawings; third

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 one, control of purchased materials.

2 So these are all QA aspects of managing the
3 fire protection system and essentially we have
4 commitments in our FSAR that we'll put the proper quality
5 procedures in place to make sure we maintain augmented
6 quality for the documentation for this system.

7 Slide 54, additional COL items, first
8 relating to changes, deviations from code; second one,
9 change evaluations; third one, reporting; fourth one,
10 modeling.

11 Again, these are all specific COL items that
12 essentially we make commitments in our FSAR to put the
13 appropriate program in place to make sure we meet the
14 standards required in each case.

15 CHAIRMAN POWERS: The maintenance of the
16 design basis of fire protection is a failing of just about
17 every plant in America right now. To the extent that you
18 can avoid that I recommend that you do so because it costs
19 a lot of money to reconstitute the licensing basis.

20 MR. FINLEY: I appreciate that, yes.

21 CHAIRMAN POWERS: I think it's easier to do
22 nowadays because of computerized documents and things
23 like that.

24 MR. FINLEY: Yes, yes.

25 CHAIRMAN POWERS: It was running about a

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 million dollars a plant to reconstitute the licensing
2 basis for fire protection.

3 MR. FINLEY: Yes, yes, yes. Slide 55,
4 still on COL items related to fire protection here, safe
5 shutdown procedures for the first three and the fourth
6 one is repair procedures. So, again, we have
7 commitments to put the procedures in place to ensure safe
8 shutdown under fire conditions will be in place.

9 The last bullet relates to repair. I think we say
10 here consistent with the U.S. EPR FSAR, we don't require
11 repairs to achieve hot or cold shutdown conditions so we
12 don't require procedures in this case. Slide 56 --

13 MEMBER STETKAR: And it's good. I noted
14 that you explicitly said you're not a self-induced
15 station blackout plant.

16 MR. FINLEY: Right. That's always a good
17 thing.

18 MEMBER STETKAR: That's always a good
19 thing.

20 MR. FINLEY: In Slide 56, still with fire
21 protection here, and this is protection for independent
22 spent fuel storage areas. We don't have that yet.
23 Although long term we will have that, we have not
24 submitted our license application for that so we won't
25 have procedures to address that yet.

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 And then site-specific information to
2 address Reg Guide 1.189, Regulatory Position C -- oh,
3 nearby facilities. So we do address this through our
4 Appendix 9 Alpha and, well, actually Appendix 9 Alpha is
5 the U.S. EPR FSAR.

6 We have supplemented that with Appendix 9
7 Bravo in the RCOLA to provide analysis of site-specific
8 fire hazards so that's how we address this COLA.

9 Slide 57, okay we're done with fire
10 protection now and this is communication. The first COL
11 item relates to off-site communication.

12 We don't have the details of this system
13 designed yet but it certainly will be compatible with the
14 on-site communication system. It'll be powered from
15 Class 1E, uninterruptible power supply system so it'll
16 be diesel backed. It will have interfaces with the plant
17 security system and that's addressed in the physical
18 security plan, not in this chapter.

19 And the emergency notification system will
20 be powered locally, either from safety-related or
21 nonsafety-related power source, having either battery or
22 generator backup. I don't think the details of that have
23 been designed yet.

24 Slide 58 is still offsite communication.
25 With respect to the emergency notification system, it's

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 routed through this private branch exchange such that we
2 can make multiple outbound calls and we will take
3 advantage of the NRC direct access lines to the federal
4 long distance service for offsite comms too.

5 Slide 59 is onsite communications. We have
6 to address in the RCOLA the communication system down in
7 the UHS makeup water intake structure.

8 We'll have multiple systems available to do
9 that, the digital phone system, a PA system, an alarm
10 system, sound-powered phones and also we expect to have
11 a portable wireless communication system for our
12 operators.

13 And lastly, Slide 60 is a COL item that
14 relates to diesel generator fuel oil and it's just a
15 requirement to have sites that describe site-specific
16 sources of acceptable fuel oil.

17 I don't think we go into a lot of detail in
18 our FSAR but we do say that we do have multiple sources
19 that could be brought in, either by truck, barge, or air.

20 We have relationships well established
21 similar to what's established at the Calvert Cliffs Unit
22 1 and 2 sites now so we'll have multiple options to
23 provide diesel fuel oil if the necessity arises, and
24 that's it for the material. Let me open it up to
25 questions before we close.

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 CHAIRMAN POWERS: Any additional
2 questions?

3 MR. FINLEY: Just in summary then, on Slide
4 62 there were three departures. We expect two of those
5 to go away. The only remaining departure, as you recall,
6 was the keep-fill line which we need to prevent water
7 hammer.

8 There are no ASLB contentions. We do have
9 35 COL items. There are 13 confirmatory items
10 identified. Four of those have been incorporated into
11 Revision 9, and nine will be addressed in Revision 10,
12 which should be early next year. There are four SER open
13 items that the staff will discuss. That's all I have.

14 CHAIRMAN POWERS: All right.

15 MR. FINLEY: Thank you.

16 CHAIRMAN POWERS: Any other questions?

17 MR. FINLEY: Thanks.

18 CHAIRMAN POWERS: Why don't we go ahead and
19 just take a 15-minute break and then we'll turn to the
20 staff. Great, so we will reassemble at 20 after.

21 (Whereupon, the foregoing matter went off
22 the record at 2:03 p.m. and went back on the record at
23 2:19.)

24 CHAIRMAN POWERS: We've got a quorum.
25 Let's get started.

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 MR. TAKACS: Okay, good afternoon again,
2 Dr. Powers and Committee members. I'm Mike Takacs, the
3 acting --

4 CHAIRMAN POWERS: You haven't changed?

5 MR. TAKACS: I haven't changed. Very
6 boring fellow, you notice that?

7 MEMBER STETKAR: He's still the acting.

8 MR. TAKACS: Still the acting lead PM for
9 Calvert COL. I have with me Pete Hearn, the project
10 Chapter 9 lead PM, as well as Larry Wheeler who's going
11 to do the beginning presentation, and Gordon Curran.

12 And with that, I believe we can just go ahead
13 and turn this tech review over or presentation over to
14 the tech staff now. Larry, you're starting.

15 MR. WHEELER: Pete was going to start with
16 a little intro.

17 MR. TAKACS: Oh, I'm sorry. Take that
18 back. Pete Hearn, the --

19 CHAIRMAN POWERS: You've screwed up
20 already and you've barely even gotten started.

21 MR. TAKACS: I'll let Surinder know this
22 too.

23 MR. HEARN: We'll start with Slide 1 and 2.
24 There's a list of reviewers that contributed to the
25 safety evaluation for Chapter 9, the lead PM Surinder

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 Arora and Mike Takacs who's acting --

2 MEMBER ARMIJO: Could you speak a little
3 louder? I can't hear you.

4 MR. HEARN: On the second slide we have a
5 summary of the number of questions asked and the open
6 items that resulted from the review. It has it by each
7 section of Chapter 9 and then the totals at the bottom,
8 69 questions overall. We had four open items.

9 On the next slide are the four open items
10 that are left to be closed in the next phase. First one
11 involves ensure the COL information is incorporated in
12 the next COL FSAR revision.

13 09.02.05-32 is a clarification related to
14 the CFD computer model uncertainties, meteorological
15 conditions and boundary scenarios.

16 And then there's 09.04.04-4. There's
17 detailed design information on the SWBVS. And, let's
18 see, there's 09.04.03-1 on ITAAC information for the
19 power supplies for the two diesel driven room vent
20 systems.

21 That brings us to the first technical
22 reviewer, which is Gordon Curran.

23 MR. CURRAN: Hi. I'm Gordon Curran. I'm
24 the tech reviewer for NRO tech spec branch, and this is
25 relatively straightforward. This is a COL item, an EPR

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 DCD that requests the applicant to identify that a cask
2 exists, an approved cask for cask loading.

3 And the scope of applicant is basically to
4 provide the cask and make sure that it connects up to the
5 facility so that they can prove that they have capability
6 to remove spent fuel from the pool.

7 In response to the COL item, the applicant
8 committed to a test or analysis to demonstrate that the
9 cask actually can be connected, safely connected to the
10 spent fuel cask facility.

11 The staff finds it reasonable that they
12 committed to providing that cask and demonstrating that
13 it'll actually fit. That's really all I have.

14 CHAIRMAN POWERS: What constitutes a
15 verification, verify the penetration leak tightness with
16 loading pit filled with water?

17 MR. CURRAN: That's about it, connect it up
18 to it. You go through the sequence of and the operation
19 of connecting it up to it and make sure that connects and
20 --

21 CHAIRMAN POWERS: It connects and it
22 doesn't leak that time?

23 MR. CURRAN: Right.

24 CHAIRMAN POWERS: Very good. Is there any
25 perturbation on that that should be done to demonstrate

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 that it's going to, any conceivable perturbation on that?
2 I mean it's kind of specified. I mean once you back that
3 kind of robotic vehicle up everything's kind of, you
4 know, if it fits, then everything -- did it fit?

5 Are there any perturbations that could
6 conceivably arise that might interfere in that fit?

7 MR. CURRAN: Well, that's one of the
8 reasons why they run a test, to make sure that that
9 doesn't occur. There might be a case where the cask is,
10 I don't know, not balanced properly so --

11 CHAIRMAN POWERS: Oh, okay.

12 MR. CURRAN: -- so it could be skewed a
13 little bit.

14 CHAIRMAN POWERS: Yes.

15 MR. CURRAN: And it could rub the ceiling.
16 I don't know. I'm just --

17 CHAIRMAN POWERS: You're just guessing,
18 yes.

19 MR. CURRAN: Yes.

20 CHAIRMAN POWERS: Okay. That's
21 essentially what they're going to do. They're going to
22 fit it and, make sure it fits and --

23 MR. CURRAN: There was one thing in France
24 that they had discussed where they had a hard time
25 balancing the cask and getting it flush and so that's the

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 only thing that I, that's the basis for my --

2 CHAIRMAN POWERS: At least when they showed
3 us this design and whatnot one of the questions, I think,
4 Dick, you were the one that raised this question, is you
5 get it all in there and something happens, you lose power,
6 something goes wrong and in order to fix it you have to
7 get a guy. Well, there's no room for that guy to get in.
8 How do you fix it?

9 MR. CURRAN: That's kind of a process
10 question that's probably outside the scope of this
11 particular review. All they have to do is provide the
12 cask and make sure they work or connects up to it.

13 CHAIRMAN POWERS: They have to have some
14 process for -- if things get interrupted and you cannot
15 complete the automatic stuff, what do you do about it?
16 That has to exist. That's not outside the scope.

17 MR. CURRAN: Yes, right.

18 MR. TAKACS: Dr. Powers, you're asking
19 about a manual function override or some aspect of that
20 process?

21 CHAIRMAN POWERS: Something happens.

22 MEMBER SKILLMAN: Yes, let me jump in.
23 This is --

24 CHAIRMAN POWERS: Yes, I mean, it was your
25 story. You're the one that spotted this.

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 MEMBER SKILLMAN: Yes, this hydraulic
2 connection from the base of this water column introduces
3 issues of draining that portion of the fuel transfer
4 canal that is contained in that single fuel assembly,
5 issues of draining on the floor and having water running
6 all over the floor.

7 And if the fuel assembly is a weeper or a
8 leaker, you now have a source term, predominantly
9 cesium-137, if you run this fuel for any length. And so
10 with a slight misalignment or a goof on the locking
11 system, you now have --

12 MR. CURRAN: Which locking system are you
13 referring to?

14 MEMBER SKILLMAN: To lock the cask up on the
15 bottom of the transfer.

16 MR. CURRAN: Okay.

17 MEMBER SKILLMAN: You've got a real
18 problem. You've got a situation where you've lost water
19 inventory. You may have a fuel assembly that's
20 partially inserted into the cask. You may have a
21 misalignment problem.

22 And the question that I was asking several
23 months ago was what do you do? And it would seem to me
24 that that would have been an area of focus for the NRC
25 staff.

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 What is the backup plan if this elegant
2 automatic machine somehow is misaligned, it's off by
3 several degrees or its X and Y axes are not made up
4 precisely where they need to be such that you now have
5 an anomalous situation and you've got to manually
6 approach it? What do you do?

7 MR. CURRAN: Well, you would have a
8 leak-tight connection before you actually move fuel into
9 the cask.

10 MEMBER SKILLMAN: You would hope you would,
11 but if you're in midstream and it begins to weep what do
12 you do?

13 MR. CURRAN: Then you would have to move
14 that element back into the pool or down into the cask.

15 CHAIRMAN POWERS: I think a more
16 interesting one is who's getting in there? Everything's
17 fine, but now something breaks.

18 MEMBER SKILLMAN: It won't work.

19 CHAIRMAN POWERS: It's stuck there and the
20 only way to address it is to have somebody go in there
21 and hit it with a tool or something. I don't know what
22 it is.

23 MEMBER SKILLMAN: I'll give you an example.
24 I was involved in a removal of the reactor vessel head
25 and the head was on the pendant and the pendant was over

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 the fuel transfer canal and the break on the hoist failed
2 and the head was wreathing down and it was moving slowly.

3 So the question was where do you put this
4 156-ton machine so you don't fill the floor of the fuel
5 pool? That's the scenario that I see in my mind. Here
6 you have this very complicated machine, highly
7 engineered, it's very elegant, it's supposed to work,
8 it's probably been tested, but something goes wrong.

9 What interrogation has the NRC staff done
10 to question that, to make sure that this design really
11 is one that you all would want to put your stamp of
12 approval on?

13 MR. CURRAN: We've discussed this in detail
14 with AREVA, their design and their backup plan if
15 something goes wrong with this.

16 They've indicated that there's a makeup
17 that would make up for the worst case that they've
18 analyzed, leakage for when the cask actually, if there
19 was an event, there's a leakage of a seal of, I think,
20 I don't know exactly what they analyze. Raul might know.

21 But there's dual seals around almost all
22 interfaces between the system and the cask and there's
23 a leak detection in between so if they had a leakage they
24 would have a leakage light in their control room and they
25 would be able to do something like close the lid and move

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 the fuel element that's en route or placed wherever,
2 either down into the cask or back into the spent fuel pool
3 and close the gate so that you're in a safe configuration,
4 I mean relatively.

5 It would be no different than having in the
6 spent fuel pool, having a fuel element that you have
7 halfway in a rack. Granted, it's not going to be
8 draining down, but you have makeup so your draining down
9 is going to be similar to the spent fuel pool. You're
10 not going to uncover the fuel element that's actually
11 there.

12 MEMBER SKILLMAN: Shouldn't. It depends
13 on how great the leak is between the cask and the --

14 MR. CURRAN: That's true and that's why I
15 said the makeup exceeds the leak rate --

16 MEMBER SKILLMAN: Expected leakage rate?

17 MR. CURRAN: Yes. We have an audit that
18 we're going to make sure that that actually is the case
19 because we have two values from AREVA. Once they gave
20 us, I don't know, 400 leakage and then they told you guys
21 250 or something like that. So we're going to audit that
22 value to make sure it's acceptable.

23 MEMBER SKILLMAN: Are you comfortable,
24 Gordon, that you've done enough due diligence to confirm
25 that you're comfortable with this new design? This is

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 a not-proven design in this country.

2 MR. CURRAN: That's right.

3 MEMBER SKILLMAN: Are you comfortable that
4 you've done enough review?

5 MR. CURRAN: At this point, yes. From what
6 I've seen so far, yes.

7 MEMBER ARMIJO: Is there a recovery
8 procedure for the kind of event that Mr. Skillman is
9 talking about? There must be. You know, I don't know.
10 Can't imagine there wouldn't be.

11 MR. CURRAN: Yes, there would have to be.
12 We don't have one to date, but I would assume it would
13 be in their operating procedures.

14 MEMBER ARMIJO: Wouldn't that be an AREVA
15 document or a licensee document, let's say the French
16 licensee or --

17 MR. CURRAN: It would be an applicant
18 document I believe, but it would be --

19 MEMBER SKILLMAN: Have you asked for one?

20 MR. CURRAN: I have not, no. That specific
21 one, but --

22 MEMBER SKILLMAN: Should you?

23 MR. CURRAN: The operating procedures
24 would be part of the heavy load handling where they have
25 all the, what you saw earlier, where they had all the

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 procedures and training and operator training and stuff
2 like that. I have no problem having them put a COL in
3 there to make sure they have emergency procedures.

4 MEMBER ARMIJO: Yes, recover from the
5 unusual event that, and it may exist and we just haven't
6 --

7 MR. CURRAN: I don't believe so, that
8 specific anyway.

9 MEMBER ARMIJO: Yes.

10 MR. HERNANDEZ: Excuse me. I'm Raul
11 Hernandez, the reviewer for this plant. I look into the
12 different areas and the barrier.

13 All the, I don't want to call them
14 pressure-retaining barriers. But all the surfaces of
15 the machine has been classified as a seismic 1 component.
16 There are dual seals with leakage indication in between
17 the seals at different stages, including at the
18 connection point between the machine and the cask.

19 And so we evaluated several different
20 scenarios and in the scenario that you're mentioning, you
21 know, when you are in the middle of a loading if something
22 happened, prior to opening the gates that separate the
23 machine with the spent fuel pool, there's a series of
24 tests that they've got to go through with.

25 And one of them is verifying that you don't

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 have leakage anywhere, that you have proper alignment,
2 proper connections and you are checking that all the
3 seals are properly working as you go up and filling up
4 a cavity.

5 Then you open the bottom gate that connects
6 the machine with the fuel cavity and you also verify
7 leakage there before you open the spent fuel pool gates
8 and initiate your loading of the cask.

9 Like Gordon already mentioned, we look into
10 different scenarios and without postulating a failure of
11 a major seismic test, all those overload, expected
12 leakage rates, it's within the capability of the makeup
13 system.

14 MEMBER SKILLMAN: Have you considered what
15 can go wrong?

16 MR. HERNANDEZ: Can you be a little more
17 specific? Because we looked into it and I went through
18 the procedures of the connection and I asked what would
19 happen, you know, at different stages of the process and
20 then all you're doing, the series of tests prior to
21 opening the gates to make sure that you've got a proper
22 seal and leakage prevention.

23 If a component fails after it's connected,
24 it's not like the whole, the connection is not going to
25 separate. You're not going to have a 2.5-meter opening

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 at the bottom of the cask. You're going to have a small
2 opening that is not going to be beyond the makeup
3 capability.

4 And in that case, then they would move back
5 the fuel assembly to a safe location. It may be back into
6 the pool or it may be inside the cask, depending on where
7 they are in the moving process.

8 We looked into different components and,
9 like I said before, all the components that could cause
10 a large failure would be seismic core components.

11 MEMBER SKILLMAN: I guess I'm just pushing
12 back from the perspective that you're very comfortable
13 that this is highly engineered, highly precise, going to
14 work exactly as planned and it probably will, but what
15 if it doesn't? What's different here is you've got
16 gravity working against you. It's going to try to
17 uncover that fuel assembly.

18 Let's say the grapple in the fuel assembly
19 fails and the fuel assembly is now caught. What do you
20 do? I would just suggest that there needs to be some
21 serious front-load thinking about what do you do when
22 things go wrong, particularly with this new design.

23 Let's go to a present licensed plant. You
24 drop a fuel assembly, we know what to do. If you drop
25 a fuel assembly into a rack, we know what to do. If you

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 load a fuel assembly into the cask, pull the cask over
2 into probably your transportation bay, to your railroad
3 car, to your truck, we know what to do.

4 I hope that between AREVA and the licensee
5 they'd follow through what do we do if this doesn't work,
6 if this doesn't function as precisely as we intend it to?

7 This is a new design. We haven't seen it
8 in this country. Experience would tell us we're going
9 to have some surprises. Hopefully they're not
10 significant. Hopefully it doesn't result in a release.

11 But at least we ought to be thinking that
12 way. I think Rule 1 in nuclear is what can go wrong?
13 What are the barriers? What can you do?

14 And it seems to me that this is one of those
15 situations where we should be abundantly curious, not
16 skeptical or cynical but really aware that this is a new
17 machine and we really haven't tested it.

18 We don't have experience with it and we
19 ought to be doggone sure we're not going to drop a fuel
20 assembly, have one get caught, have the grapple do
21 something that we hadn't anticipated and end up with
22 actually a plant that's stuck because you can't get near
23 the fuel assembly.

24 Yes, I can tell you in the campaigns I've
25 been involved in a fuel assembly's worth 250,000 R per

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 hour. If you get them nearly uncovered, it's very
2 difficult to get near them, to grab them, to place them,
3 whatever it is. So I've got some experience with this
4 stuff and I'm thinking we better be real careful with
5 this.

6 MR. CURRAN: I agree.

7 MEMBER SKILLMAN: So my challenge to you is
8 have you queried that enough so that you are comfortable
9 with what is being proposed?

10 MR. CURRAN: We've queried AREVA pretty
11 extensively on what could go wrong and what features they
12 have to ensure that nothing like this or no failure does
13 go wrong.

14 We've asked them the exact question you're
15 asking about a dangling assembly, if it starts draining
16 down and you have an assembly. Unfortunately I can't
17 recall exactly what they said but --

18 MEMBER STETKAR: I think they said, if I
19 recall, they'd pick it up and they'd put it back in the
20 pool. I believe that's what we heard.

21 MR. CURRAN: I think you're right, either
22 put it in the pool or put it into the cask.

23 MEMBER SKILLMAN: But it's picking it
24 that's the trick. You have got to get it somehow. It's
25 tough.

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 MR. CURRAN: Picking. You mean if it
2 drops?

3 MEMBER SKILLMAN: Somehow you got to grasp
4 the assembly.

5 MR. CURRAN: I was referring to if you had
6 it in the grapple already and you were lowering and for
7 some reason it gets stuck. It's halfway in the cask.
8 That would be the case --

9 MEMBER ARMIJO: If you're carrying it and
10 you drop the assembly, you would never let go of it until
11 it's in the cask, you would hope. So you would know the
12 thing was leaking when you opened the big gate.

13 MR. CURRAN: Know that the --

14 MEMBER ARMIJO: Seal was leaking.

15 MR. CURRAN: The seal was leaking.

16 MEMBER ARMIJO: Yes.

17 MR. CURRAN: You do have a seal leak
18 detection system so you will know the seal is leaking or
19 not. And to protect the bellows that are in between
20 there they have a shield for just that case, if you drop
21 an assembly, to protect the bellows from leakage.

22 CHAIRMAN POWERS: My impression was then
23 all those operations were well thought out and had been
24 tested extensively by experience in France.

25 MR. CURRAN: Yes.

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 CHAIRMAN POWERS: The question that got
2 posed that I really came away saying I'm not sure we have
3 a good answer is after you've done everything, you've got
4 a cask in there, whatever, the thing cannot be moved back
5 out. It's stuck.

6 MR. CURRAN: What is stuck? The cask or
7 the --

8 CHAIRMAN POWERS: The carrier.

9 MR. CURRAN: Okay.

10 CHAIRMAN POWERS: And, I mean, there's no
11 clearance. In the tunnel going in there, there's no
12 clearance and there didn't seem to be a man way to get
13 in. How do you fix it?

14 MEMBER SKILLMAN: It actually locks itself
15 in place. That's part of your seismic design. That is
16 the assurance that the cask trolley and the building are
17 unified, and that's good.

18 What happens when something goes wrong, and
19 I'm not trying to be cynical. I'm just saying have you
20 really thought it through or have you requested the
21 licensee to give you some assurance that there is going
22 to be a backup plan, some kind of a procedure or at least
23 a thought process so that if things do go wrong there is
24 assurance that they will be successful in how they pursue
25 this.

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 MR. CURRAN: Right. Well, I intend to
2 question them, to add a COL item for a procedure just like
3 you're talking about. In case something goes wrong, for
4 them to have one in place, an emergency procedure of some
5 sort on how they address and how they address access of
6 a human into the facility.

7 I do know that they can somehow get in there,
8 though, because in France they had a situation where I
9 think they put the wrong element into the cask and then
10 they couldn't straighten it out in order to get the lid
11 back on the cask, the biological lid station.

12 So what they had to do is move it back
13 somehow to the penetration assembly and offload all the
14 elements and in the meantime it was so hot that the water
15 was coming over the side of the cask.

16 MEMBER ARMIJO: That's the sort of thing
17 we're --

18 (Crosstalk)

19 MEMBER ARMIJO: That's exactly the sort of
20 thing we're, you know, something goes wrong that
21 shouldn't and is there a --

22 MR. CURRAN: This was the only one that
23 France had brought up to us that we actually, you know,
24 that we know about.

25 CHAIRMAN POWERS: Whatever they did may

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 explain then what gets done but nobody's ever acquainted
2 us with it, so to the extent you can help us out I would
3 really appreciate it.

4 MR. CURRAN: Okay. What they did is they
5 backed it up. They pulled the lid. They didn't put the
6 lid on because it wasn't --

7 CHAIRMAN POWERS: They couldn't do it, yes.

8 MR. CURRAN: -- balanced, yes. So they
9 just backed it up, offloaded it and cleaned up I'm
10 assuming.

11 CHAIRMAN POWERS: Thank you, good.

12 MEMBER SKILLMAN: Thank you, Mr. Chairman.

13 CHAIRMAN POWERS: Yes. I sure got a kick
14 out of seeing it but, I mean, you raised a good point.
15 The best-laid plans of mice and men oft gain annuity as
16 they say. Actually Stetkar says that. I don't.

17 MEMBER STETKAR: I can't pronounce those
18 words so you can't blame that on me.

19 CHAIRMAN POWERS: You have a hard time
20 pronouncing most words so --

21 MEMBER STETKAR: Monosyllables and grunts
22 are about all I can manage most of the time.

23 CHAIRMAN POWERS: Let's continue on.

24 MR. WHEELER: Good afternoon. My name's
25 Larry Wheeler, NRO, technical reviewer for balance of

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 plant.

2 On this next slide, these are the open
3 items. We will talk a little bit further on these open
4 items, RAI 393 and 398. Next slide.

5 Now, UniStar did such a good job of talking
6 about the COL information items, they kind of duplicated
7 my slides so I'll kind of hit the highlights.

8 CHAIRMAN POWERS: That's fine.

9 MR. WHEELER: And fill in some of the blanks
10 that I had in my slides that they may not have covered.
11 So for the ESW system, COL information item 9.2-4, this
12 is dealing with materials. Piping's carbon steel.
13 They're --

14 CHAIRMAN POWERS: Did you jump over a
15 slide?

16 MR. WHEELER: -- currently designed for 60
17 years. I'm sorry?

18 CHAIRMAN POWERS: Did you jump over a slide
19 or did I blank out?

20 MR. WHEELER: The slide right before this
21 is just the open items.

22 CHAIRMAN POWERS: Oh, okay. I have 9.2.1
23 and that seems to be right.

24 MEMBER SKILLMAN: I think you back up one,
25 you'll find, there you go.

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 CHAIRMAN POWERS: There we go. That's --

2 MR. WHEELER: No, let's go back even
3 further. There we are. So like I said, COL information
4 9.2-4, this is materials for the ESW system.
5 Compatibility, once again we're talking about carbon
6 steel. It's designed for a 60-year life against
7 corrosion.

8 One of the RAI responses they gave me, they
9 did go on and say that the corrosion allowance is 0.24
10 inches, so it's almost a quarter of an inch for 60 years.

11 Buried piping, again internally lined,
12 external coatings, cathodic protection, points to FSAR
13 8.3.

14 CHAIRMAN POWERS: I would not expect you to
15 know, but I'll ask anyway.

16 MR. WHEELER: Go ahead.

17 CHAIRMAN POWERS: Do you happen to know
18 what kind of epoxy they're using?

19 MR. WHEELER: I think in the RAI responses
20 it was in very general terms. I didn't think that it kind
21 of specified what those materials were.

22 CHAIRMAN POWERS: It's going to be a kind
23 of epoxy.

24 MR. WHEELER: Yes.

25 CHAIRMAN POWERS: Yes. That's fine.

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 MR. WHEELER: One thing that I did see in
2 an RAI response, they gave me the ASTM number for the
3 internal coatings. If that's important to you, I'll
4 spit it out. If it's not, I'll just move on.

5 CHAIRMAN POWERS: You could spit out any
6 number you wanted to and I would say, oh, okay, yes.

7 MR. WHEELER: It's ASTM Charlie 150 if that
8 matters to you, so. The most important thing here, at
9 least on the COL information items, is the staff's
10 finding and what we're saying, it meets all applicable
11 GDCs.

12 And what we're talking about, in all these
13 future slides we're talking about GDC 2, 4, 5, 44, 45,
14 46 and we also balance this against the guidance criteria
15 in the Reg Guide 127 and SRP 9.2.1 and 9.2.5. We also
16 looked at ITAAC and we also looked at 20.1406
17 contamination.

18 CHAIRMAN POWERS: Do we have an
19 experiential base with this kind of buried piping?

20 MR. WHEELER: I'm sorry, say that again.

21 CHAIRMAN POWERS: Do we have an
22 experiential base with this kind of buried piping? In
23 other words, you know, with all our plants, do they have
24 this kind of piping?

25 MR. WHEELER: Well, I can say from

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 experience, I worked at Surry. Surry is on the James
2 River, brackish water, and it was not coated. It was
3 carbon steel pipe.

4 And they got licensed in '72 and I was there,
5 you know, five/six years ago and we were constantly
6 fighting pinhole leaks in the service water pipe,
7 safety-related service water pipe and circ water line
8 pipe.

9 So we know what this type of water chemistry
10 is going to do carbon steel pipe so anything above carbon
11 steel pipe, like cathodic protection, external coatings,
12 internal coatings, has got to be a significant
13 improvement than what we licensed back in the '70s.

14 CHAIRMAN POWERS: That I'm sure of. Okay,
15 let's go ahead.

16 MR. WHEELER: Now, I can certainly go into
17 the INPO database or even NRC database and pull some
18 information together and look at this type of material
19 and see what kind of failures there are from a maintenance
20 role standpoint but, like I said, this is by far an
21 improvement based on what we've licensed years ago.

22 MEMBER STETKAR: There's been a lot of
23 attention paid to specifically carbon steel, like buried
24 carbon steel piping, in the license renewal process.
25 That's a big issue at many plants.

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 CHAIRMAN POWERS: No kidding?

2 MR. WHEELER: EPRI has --

3 MEMBER STETKAR: I wouldn't kid you.

4 CHAIRMAN POWERS: Well, I mean my question
5 really is do we have other people using them and know
6 something about this? The problem, of course, is
7 whatever epoxy coating got used is not the epoxy coating
8 you can buy today and so some of that experience base is
9 --

10 MEMBER STETKAR: Well, in a lot of that, I'm
11 not sure that a lot of the currently operating plants,
12 I can't say this with certainty, actually had epoxy
13 coating. It tends to be wrapped, you know, traditional
14 --

15 CHAIRMAN POWERS: Wrapped, yes, sure.

16 MR. WHEELER: Yes. I do know that INPO,
17 not INPO, EPRI has a working group on buried piping. I
18 attended one of their meetings and the industry as a whole
19 is well aware of the issues that are out there.

20 And it looks like UniStar is going down the
21 right path by just not putting carbon steel in the ground,
22 not coating it, not internally coating it. You know,
23 they are taking some steps. They've got the corrosion
24 margin, a quarter inch, so I think they're going down the
25 right path.

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 If we could move on to the next slide. This
2 is COL information item 9.2-1. This is on the ultimate
3 heat sink. Of course, as UniStar talked about, there's
4 two means of getting water to the cooling towers.

5 They've got the normal makeup which is
6 nonsafety. It does have safety-related isolation
7 valves. This normal makeup system, valves do isolate on
8 safety injection signals.

9 The other water makeup system is, of course,
10 we talked about the emergency ultimate heat sink makeup
11 system. This equipment is actually in a safety-related
12 Seismic Cat. I Structure down by the Chesapeake Bay.
13 We've got two buried safety-related 60-inch diameter
14 pipes that are bringing water in from the Chesapeake Bay
15 into the water intake structure.

16 It's estimated the emergency flow from the
17 Chesapeake Bay is on the 92 to 1,500 gpm so we're not
18 talking about a lot of flow coming from the Chesapeake
19 during emergency conditions. Of course, the
20 safety-related makeup system's designed post-DBA
21 starting at day 3 out to day 30 so about 27 days.

22 The ultimate system makeups or emergency
23 makeup system does have four safety-related pumps, has
24 four safety-related strainers, four safety-related
25 traveling screens, four safety-related screen wash, so

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 we've got four of each because of the four cooling towers.

2 The ultimate heat sink makeup pumps were
3 evaluated for NPSH. The pumps' self-cleaning
4 strainers, valves are all safety related, powered with
5 Class 1E. Talked about the pumps are mainly started from
6 the control room post-DBA plus 72 hours.

7 Freeze protection is addressed with
8 safety-related heaters that are actually in the
9 pumphouse and the traveling screens are in those rooms
10 with the safety-related heaters. And kind of a defense
11 in depth, there's nonsafety heat tracing. That's
12 actually on the bar screens down at the pumphouse.

13 So NPSH, it looks like we are looking for
14 about 7.2 feet and we've got available 40 feet, so we've
15 got lots of margin there for NPSH. Next slide, please.

16 MEMBER STETKAR: Larry, just for --

17 MR. WHEELER: Yes, go ahead.

18 MEMBER STETKAR: For the record, during the
19 break it's the staff's understanding that, indeed, the
20 I'll call it isolation valve, I'm not sure what to call
21 it, from the makeup system in the ESWS basin area, I don't
22 know if it's inside or outside, is throttled
23 automatically to control levels. You showed me
24 information that you had on this.

25 MR. WHEELER: The ultimate heat sink makeup

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 system, once pumps are turned on manually there's a valve
2 that cycles based on sense level in the ESW basin and that
3 is described in my SER. If you need that valve number,
4 it is --

5 MEMBER STETKAR: No, I know which valve
6 we're talking about. It's the valve at the basin, not
7 the valve down in the --

8 MR. WHEELER: C021 valve. That's the
9 throttle valve.

10 MEMBER STETKAR: The one that comes open
11 automatically.

12 MR. WHEELER: Yes.

13 MEMBER STETKAR: That seemed to be
14 different from what I thought I heard UniStar saying
15 today so we need to make sure that that's consistent.

16 MR. WHEELER: Okay, if it's okay to move on,
17 we're still in 9.2-5 ultimate heat sink. This is COL
18 information item 9.2-5. This is the materials used for
19 the ultimate heat sink are appropriate for the site
20 location. And as UniStar had said, and I'm not going to
21 really repeat anything here, the staff's finding here is
22 it meets all applicable GDCs.

23 The next slide is related to ultimate heat
24 sink, COL information 9.2-6. This is confirm that the
25 highest average site wet bulb and dry bulb temperature

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 over 72 hours is bounded by the values in the EPR DC.

2 And in this case there is a 100 percent match
3 between EPR and the Calvert Cliffs and, once again, it
4 meets all applicable GDCs.

5 Moving on to the next slide, ultimate heat
6 sink again, COL information 9.2-7. This is confirm the
7 site-characteristic sums of 0 percent exceedance maximum
8 non-coincident wet bulb temperature and site-specific
9 wet bulb correction factors did not exceed 81 degrees.
10 Otherwise, confirm that the cold water return
11 temperature is less than 95 degrees.

12 So this is where we get into the cooling
13 tower interference and recirculation, and what we had
14 looked at was the data that came from the Naval Air
15 Station determined that the wet bulb temperature is 85.3.

16 There is a correction factor. That was
17 analyzed using the CFD runs, and through the analysis
18 that was done, they had determined that it's less than
19 2.5 wet bulb related to interference and recirculation.

20 So that brings the correction in
21 non-coincident wet bulb up to 87.8. So based on the
22 cooling tower analysis, maximum cold water return
23 temperature was determined to be less than 95.

24 And if you turn to the next page, we kind
25 of get into a little bit of discussions of why this is

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 an open item.

2 The staff wrote an RAI 298 about six, maybe
3 eight weeks ago, and what we had received from UniStar
4 up to that point was -- an earlier RAI talks about this
5 analysis that went in to determine the cooling tower
6 plume interaction.

7 And the RAI that came in we felt had a lot
8 of holes that we needed to have questions resolved so
9 that's why we wrote this RAI. There's about 20 subparts
10 to this RAI and a lot of it was the uncertainties of the
11 model.

12 At that point that we wrote the RAI, we did
13 not have the audit. We've had the audit since, so we've
14 had our staff actually go to meet with UniStar and Bechtel
15 and AREVA to review their CFD model.

16 We walked away from that audit thinking that
17 Bechtel and UniStar had did a tremendous amount of work
18 to the number of runs that they had done, somewhere in
19 the 50-plus range of models.

20 And we kind of walked out of there thinking
21 that they might not have zeroed in on coming up with the
22 peak number for wet bulb.

23 The AREVA number that they needed to stay
24 under was 2.5 and they are in the neighborhood of 2.1/2.2
25 and we asked them how many times did they slice and dice

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 the compass, the 360-degree compass, and the answer was
2 16 times. So they had 22-1/2 degree slices and they
3 looked at wind speed at five meters per second and ten
4 meters per second.

5 Then we said, well, what about six meters
6 per second, what about nine meters per second? How do
7 you know you really zeroed in on the right number? How
8 do we know for certain that that 2.5 number is correct?

9 So since then, UniStar and Bechtel and AREVA
10 have gone back and sharpened their pencils. They came
11 up with a confirmation that they are still below 2.5.

12 And I'm not quite sure, I'll have to ask
13 Bechtel how many runs did you finally do to end up getting
14 down to the number of less than 2.5? Do you remember?

15 MR. RAO: Shankar. We have about five
16 different cases where we had looked at some angles
17 specifically because of the angle was more of a concern
18 from our CFD experts from NRC.

19 And a five-degree increment angle of both
20 sides of the angle we had before and we have established
21 that the angles were where we get the peak and then the
22 thesis again was established. That's where we have
23 indicated that it went up a notch but it's still less than
24 2-1/2.

25 MR. WHEELER: The reason I wanted to ask

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 Bechtel that question here is we just got an RAI response
2 in this morning on this 20-subpart question and I really
3 haven't had time to digest it and didn't know how many
4 more runs that they did.

5 But still, you know, give us some time to
6 look over the RAI but the important thing is it sounds
7 like the RAI response is still indicating they're below
8 the EPR value of 2.5, but give the staff some time to look
9 over that RAI response.

10 CHAIRMAN POWERS: That all proceeds under
11 the presumption that the CFD model is, in fact, an
12 adequate model of the flow field around these things.
13 You're using Fluent or something like that?

14 MR. WHEELER: We have an expert from
15 research that might --

16 CHAIRMAN POWERS: I know and I wanted to
17 give him the floor.

18 (Laughter)

19 MR. WHEELER: That had gone to the audit
20 with us because I myself was nowhere close to
21 understanding what was going on, so Christopher had gone
22 with us on the audit and he might have some good
23 information to help you understand.

24 MR. VAN WERT: We did go down. We were
25 happy to see that there was a lot more than was initially,

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 I guess, reported to us. So we went down with the
2 concerns about, you know, was the mesh adequate, did you
3 do any sensitivities, things like that.

4 What we found in general was there was a V&V
5 document that kind of laid out some of the basis for the
6 turbulence selection, the wall modeling approach, and
7 that's a positive thing so there was a basis. Of course,
8 there's always uncertainty with these things.

9 The V&V document, for instance, looked at
10 wakes behind structures. They went up to a six-meter
11 cube in a field. They did a read and on the basis of
12 several scales they picked that. There was also some
13 good sensitivities that we saw which, again, reduces the
14 uncertainty a little bit.

15 The other thing in general is given the
16 number of runs overall that were completed, this number
17 is not super-sensitive.

18 So in other words, if your number is 2.3,
19 you don't get a 10. You know, so if the limit is 2.5,
20 you know, there is uncertainty. It's not quantified, or
21 at least I didn't see it.

22 But it's reasonable, and I think in the
23 bigger picture I was happy to see that they did a
24 reasonable job and some due diligence and then these peak
25 values come from a maximum heat load with a worst-case

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 temperature and worst case wind angle.

2 We had argued that maybe you didn't find
3 that worst case wind angle if you're only looking at
4 22-1/2 degree increments. But given all of that and
5 looking at the big picture, we felt it was a reasonable
6 --

7 CHAIRMAN POWERS: Well, I mean what you're
8 telling me is they did a professional job with the tool.

9 MR. VAN WERT: That's right. It's a 600
10 meter high domain so, of course, they didn't use 1 cm
11 cells to do all that kind of stuff.

12 CHAIRMAN POWERS: Exactly, yes, right.
13 And the question comes, I mean I guess there are a couple
14 questions that come to my mind. One of them I think you
15 hit upon is if I'm looking at a 2.5 limit, is my tool any
16 good for telling me the difference between 2.3 and 2.5?
17 Probably, maybe.

18 The other question is do we know that in this
19 kind of calculation this particular computational tool,
20 which I assume is Fluent but I don't know that for a fact.

21 MR. VAN WERT: They used the STAR-CCM+.

22 CHAIRMAN POWERS: STAR-CCM, okay. Do we
23 have some confidence this tool is any good for this
24 analysis?

25 MR. VAN WERT: I get asked that question a

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 lot and, in my opinion, no tool is good enough for this
2 analysis because it's not good enough until you
3 demonstrate it.

4 So in other words, if the tool was good
5 enough, that's not enough and there's plenty of tools
6 that aren't good enough but it's a matter of the due
7 diligence up front to demonstrate that it's good enough.

8 So the STAR-CCM+ is, you know, it's kind of
9 industry standard, what you may call state of the art.
10 It has all of the physics that would be appropriate for
11 this case.

12 That doesn't mean that as a model it's good
13 enough. So there's no limitation in the tools they used,
14 I guess, if that answers your question.

15 CHAIRMAN POWERS: I think I know what
16 you're saying, is that they've done the obvious things
17 to qualify their answer, okay. What we don't know is,
18 as you say, is any tool good enough to give us what we're
19 after here and I guess that's still an open question.

20 MR. VAN WERT: You know, the tools have been
21 demonstrated to, you know, it balances mass and energy
22 and things like that and some of their benchmarking
23 focused on can we calculate the recirculation zone, the
24 reattachment point behind large structures?

25 Now, none of the benchmarks have a variety

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 of structures and wakes that one building hitting another
2 building in this multidimensional way kind of phenomena
3 that you see on a complex plant layout like this. And
4 then, you know, test data like that aren't readily
5 available of course.

6 But for the available, what you could do,
7 they demonstrated that they could calculate these kind
8 of recirculation zones and kind of the volume of that zone
9 was reasonable.

10 CHAIRMAN POWERS: Okay, okay.

11 MR. VAN WERT: So is there uncertainty?
12 Yes, but given the number of sensitivity studies that
13 they did you sort of get at least a feel, and this
14 parameter is not a parameter that jumps around
15 drastically. Now, if we were looking at, you know,
16 velocity somewhere, that would be all over the map.

17 CHAIRMAN POWERS: Yes, yes.

18 MR. VAN WERT: But given this integrated
19 parameter of this wet bulb temperature --

20 CHAIRMAN POWERS: Okay. Okay, I
21 understand. Good, good. Thanks, Chris.

22 MR. WHEELER: Keep in mind that wet bulb
23 cycles from January to January and peaks in July, August
24 and September and daily it peaks between noon and 3:00.

25 So you're almost talking about, like, the

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 perfect storm for this type of event to occur where you
2 start with four cooling towers, you take one out of
3 service, you take the single failure on two, you have the
4 DBA in the middle of summer at 2:00 in the afternoon is
5 where this analysis is going to focus on whether my return
6 temperature back to the plant is greater than 95.

7 Of course, after a DBA your heat load drops
8 off fairly quickly. So as you approach 95 degrees, maybe
9 going back in the plant because you're 2:00 or 3:00 in
10 the afternoon with the right wind direction, the correct
11 speed, the 95 is going to go below 95 as the heat load
12 drops off.

13 So just kind of keep that in perspective,
14 right? This is the perfect storm where all those things
15 have to line up where we kind of get ourselves into
16 potentially going above 95.

17 Okay, if I can move on to the next slide,
18 this is 9.2-5, COL information 9.2-8. This gets into the
19 makeup capacity related to the 72 hours and similar type
20 of sliding UniStar gave us.

21 We need pumps greater than 300 gpm. They
22 are giving us 750 gpm pumps, even though if you get into
23 this intermittent traveling screen wash, you know, the
24 margins we're talking, over 200 gpm with sprays on and
25 450 with sprays off. And once again, staff's finding,

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 it meets the GDCs. Next slide.

2 MEMBER STETKAR: Larry, before you --

3 MR. WHEELER: Yes, go ahead.

4 MEMBER STETKAR: Before you leave that
5 slide, there's a section in the SER that is only in the
6 SER. It's not addressed in the FSAR regarding makeup
7 water support for the dedicated essential service water
8 pump.

9 MR. WHEELER: Yes, that's on division four?

10 MEMBER STETKAR: Yes, and there are several
11 statements in the SER that seem curious. I understand
12 that the dedicated ESW pump has lower net positive
13 suction head requirements so, therefore, you can allow
14 level to go lower in the basin.

15 But there are statements that say things to
16 the extent, that says, "Makeup water to the Train 4 UHS
17 tower would not be necessary for well beyond 72 hours as
18 the heat load during this event is low compared to a DBA."
19 What's the basis for that statement?

20 MR. WHEELER: Yes, I see where it is.

21 MEMBER STETKAR: It's the middle of the
22 third paragraph. As you just mentioned earlier, the
23 design basis accident heat load is based on the fact that
24 two of the normal essential service water trains are
25 operating.

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 So, therefore, half of the design basis
2 accident heat load is going through each train. The
3 dedicated pump train takes all of containment heat
4 whenever it's aligned and provides enough cooling so that
5 you don't fail the containment.

6 And it's not clear to me that that heat load
7 is less than the design basis accident heat load, nor is
8 it clear to me that that heat load is applied by
9 definition more than 72 hours after the initiating event
10 occurs because this is a severe accident. It's a core
11 melt.

12 MR. WHEELER: Right. That's right.

13 MEMBER STETKAR: It happens when it
14 happens. It might happen a very few hours after the
15 initiating event.

16 So I was curious about the arguments
17 regarding timing and heat load. I will grant you that
18 you can let level get lower before you need to makeup.
19 Certainly the makeup capacity is more than enough. Five
20 hundred gallons is more than enough to take away decay
21 heat, you know.

22 But the timing, you know, do the operators
23 necessarily need to wait as long as 72 hours before they
24 start the makeup? It's not clear to me. They might need
25 to start it earlier.

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 Now, this is all beyond design basis. It's
2 only for severe accidents so it's not clear that it's part
3 of the licensing basis.

4 But as long as it's addressed in the SER,
5 it's not clear to me that the rationale necessarily holds
6 together. It's not clear to me that it doesn't, but just
7 I don't understand the severe accident well enough. Dr.
8 Powers understands these things much better than I do.

9 CHAIRMAN POWERS: Severe accidents, nobody
10 understands them very well.

11 MEMBER STETKAR: But if anyone understands
12 them, you do.

13 CHAIRMAN POWERS: There are a great number
14 of specialists in the field of severe accidents. There
15 are no experts.

16 MEMBER STETKAR: Anyway --

17 MR. WHEELER: I see the statement and --

18 MEMBER STETKAR: It is but because it is a
19 succinct statement I was a bit curious about it.

20 MR. WHEELER: And all I can remember from
21 when I wrote this is the severe accident, when you
22 actually put that pump into service is way beyond 72
23 hours.

24 MEMBER STETKAR: How do we know that? I'll
25 take away all decay heat removal. How do I know that if

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 I don't have a lot of heat input to the containment --

2 MR. WHEELER: Well, beyond design basis,
3 that means everything has failed, right? Everything.

4 MEMBER STETKAR: Well, that's a different
5 issue. I mean you have to at least have some electric
6 power.

7 MR. WHEELER: Everything has failed. That
8 means you have no heat sink. That means I've lost
9 everything.

10 MEMBER STETKAR: There are some conceptual
11 disconnects between why this thing is powered from Train
12 4 but I guarantee you, I'm a PRA guy, I can dream up a
13 scenario where you can actually get electricity to this
14 thing during core melt accident when nothing else is
15 running.

16 Frequency, you know, of that I'm not going
17 to try to speculate but it's not clear to me that the heat
18 load, because it is a severe accident, would always, by
19 definition, be after 72 hours.

20 There may be other arguments to justify that
21 this is okay. It's just I'm not quite comfortable with
22 this.

23 CHAIRMAN POWERS: I mean it's not required
24 to be licensed to severe accidents.

25 MEMBER STETKAR: That's true. This issue

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 is not addressed in the COL FSAR. It is not. It is
2 strictly addressed in the SER. It's the only reference
3 to this issue that exists in the written --

4 MR. WHEELER: I thought it needed to be
5 addressed, so that's why it's in the SER and maybe I need
6 to go back and validate my references and come see you
7 or --

8 MEMBER STETKAR: That would help or, you
9 know, when we get into Phase 4 see what the SER says then.
10 I don't know how you want to do this.

11 CHAIRMAN POWERS: Well, to the extent --

12 MR. WHEELER: It's possible --

13 MEMBER STETKAR: Or between now and
14 December. I mean, you know, we're going to revisit,
15 theoretically, this except we don't have much time in
16 December.

17 CHAIRMAN POWERS: Our going-in position
18 was that these open items exist and our decision to move
19 from Phase 3 to Phase 4 is motivated on the committee has
20 not identified anything that the staff has missed and
21 needs to do more on it before we make that move. I don't
22 think that falls in this category. It's an issue that
23 has to be resolved prior to going from Phase 5 to final.

24 MR. WHEELER: It is possible I might have
25 got that information from an earlier RAI that I did not

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 put the RAI number down so I may verify my reference.

2 MEMBER STETKAR: Okay. How we close the
3 loop is a matter of process. It's not --

4 CHAIRMAN POWERS: Yes, I mean anyway we can
5 do so, whatever's easiest.

6 MR. WHEELER: So I think I completed my COL
7 information 9.2-8 that we're talking about the pumps and
8 the flows.

9 Moving on, COL information item 9.2-9,
10 still talking about 9.2-5. This is pretty much a
11 duplicate to the UniStar slide, the chemical treatment,
12 reduce scaling and corrosion.

13 The cooling tower's designed for initial
14 TDS of 5,000 ppm. During the post-DBA, the TDS
15 concentrations can reach as high as 72,000 which is about
16 14 times that original design value.

17 Thermal performance at cooling towers was
18 performed by a cooling tower vendor. They determined,
19 based on the decline in the heat load, that the water
20 return temperature would still be below 95 degrees.

21 This was determined to be an open item
22 because what I was looking for was an ITAAC,
23 site-specific ITAAC, and UniStar and I went back and
24 forth on whether it's a site-specific ITAAC or it could
25 be an existing EPR ITAAC.

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 And they have given me an RAI response and
2 said that I think the EPR ITAAC item 7.9 resolves that
3 and I'm looking at that RAI response. I would say it
4 looks favorable. I haven't decided for sure if that
5 closes it out but I think we're on a success path.

6 Moving on to the next slide. Once again,
7 FSAR 9.2.5, information item 9.2-10. This gets into the
8 cooling tower interactions between what comes off the
9 plume and the safety-related intakes.

10 We looked at the main control room, the
11 safeguards building ventilation, emergency power
12 generation ventilation, combustion air in the diesels,
13 essential service water pumphouse ventilation.

14 And looking at the CFD model, some of the
15 margins that we saw related to main control room
16 safeguards. Staff finds that that's been adequately
17 addressed.

18 However, we wanted to keep this still as an
19 open item because of the open RAI that discussed the CFD
20 uncertainties that we still need to look at.

21 And next slide, once again still on 9.2.5,
22 COL information 9.2-11, confirm that the maximum
23 ultimate heat sink cooling tower return temperature of
24 95 degrees is met.

25 This is a duplicate to the UniStar

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 presentation that the peak heat loads and the peak wet
2 bulb temperature together, the cold water return still
3 did not exceed 95 degrees.

4 The EPR value on that table, the peak wet
5 bulb was at between nine and ten hours and UniStar
6 proposed to back that up to the three to four hours of
7 the DBA and that seemed reasonable to align the peak heat
8 load of the DBA and the peak wet bulb, you know, on the
9 same timeline.

10 So there is an ITAAC that is going to cover
11 that. I think the cooling towers are capable of removing
12 design heat load without exceeding the return
13 temperature of 95 degrees. Now, once again, this all
14 meets the applicable GDCs. So that ends 9.2.5.

15 We're going to move off to 9.2.9, raw water
16 system, COL information item 9.2-3 plus conceptual
17 design.

18 As UniStar had mentioned, the raw water
19 draws water from the Chesapeake Bay. This is untreated.
20 It's nonsafety function. We've got a couple pumps at 790
21 gpm each.

22 The worst type of ESW basin flow that we need
23 is about 1,500 to support the plant cool down and
24 shutdown.

25 The areas in corrosion-resistant materials

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 and the RAI response says they could use HDPE or
2 fiberglass. That's still something for them to decide
3 as they get into the details.

4 There is one other thing that we looked at
5 is the staff was concerned about the raw water line
6 shearing off before it goes into the cooling tower basin.

7 And we looked at that and the response that
8 came in from UniStar said that the pipe anchor, the
9 interface at the concrete structure, is essentially
10 going to keep the raw water or pipe break water from
11 actually entering into the cooling tower basin, so we
12 were comfortable with that. And that ends 9.2.9. Once
13 again, the staff finds it meets applicable GDCs. And I
14 am finished.

15 MR. TAKACS: Raj, you're going to come up
16 now for your part.

17 MR. GOEL: I reviewed this Section 9.4, air
18 conditioning, heating, cooling and ventilation system,
19 Section 9.4.

20 It has 16 subsections and 13 of them are the
21 IBR. They are site related and one is the line building
22 and switchgear, the line building ventilation system,
23 another of this makeup water. Makeup water building
24 structure, ventilation system and otherwise is fire
25 protection building water ventilation system.

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 And there are two open items, RAI 382 is
2 about open item 9.4-2 regarding switchgear building
3 ventilation. The applicant has said the design is not
4 complete, sufficiently complete, and so we send this RAI
5 382 back to provide this information.

6 The applicant has provided a markup of the
7 FSAR that is not included so I looked at it. It looked
8 to me okay but we're going to take this --

9 (Crosstalk)

10 MEMBER STETKAR: I was going to ask. You
11 preempted me. Thanks.

12 MR. GOEL: Sorry, it's not closed out item.
13 I have not written. And same thing in this fire
14 protection building. They said they have emergency
15 power supply on loss of outside power but there was no
16 information in the FSAR.

17 So I wrote the RAI 384 supplying this
18 information of an ITAAC which applicant had provided and
19 in first instance it look okay but we're going to look
20 at more material.

21 MEMBER STETKAR: One question I had, Raj,
22 and I don't know whether what's in the SER and what's in
23 Revision 9 of the FSAR are out of sync on this.

24 There's a discussion in the UHS makeup
25 building ventilation system regarding ventilation for

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 the electrical switchgear area. And in the SER there's
2 a long discussion about the fact that the electrical
3 switchgear rooms are below grade and there are no outside
4 air intakes.

5 As best as I can tell, they're at grade level
6 and there's some outside air intake for them so I wasn't
7 quite sure how the SER matched up with what I can see in
8 the design, and Mark seems to have some information.

9 MR. FINLEY: So Mark Finley, UniStar, just
10 to interject, Raj. So we did make a change to the
11 structure. I think it was maybe Revision 8 of the COLA,
12 somewhere around there, where we did have prior an
13 electrical building that was essentially underground
14 without ventilation but we changed the structure so Rev
15 9 has the new structure but maybe the SER does not.

16 MEMBER STETKAR: The SER apparently hasn't
17 caught up to that because it does talk about below grade,
18 no intake and, okay, that helps. Thanks.

19 MR. GOEL: I took up in between.

20 MEMBER STETKAR: Yes. No, that's --

21 MR. GOEL: So I'm going to look.

22 MEMBER STETKAR: Occasionally we get
23 caught up with this moving design issues. Thank you.

24 MR. TAKACS: That brings the technical
25 presentations to a close.

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 CHAIRMAN POWERS: Okay. Any other
2 questions on any of these matters?

3 MEMBER STETKAR: Does the staff, who
4 reviewed the fire protection stuff? Do you have your
5 reviewer here?

6 Okay maybe, because I had a couple questions
7 on the fire protection that are fire-related stuff. And
8 now I don't know what you want to do procedurally, so.

9 CHAIRMAN POWERS: Procedurally I'm going
10 to go ahead and we'll fill in as we can.

11 MEMBER STETKAR: Yes.

12 CHAIRMAN POWERS: Our plan is in December
13 to bring to the full committee discussions of Chapter 2,
14 Section 2.4, hydrologic engineering; 2, 2.5,
15 geotechnical engineering; Chapter 3, design of SSCs
16 except for 3.7, seismic system analysis; Chapter 9,
17 auxiliary systems, we discussed a little bit today;
18 Chapter 13, conduct of operations; and Chapter 14,
19 verification programs ITAAC. Okay, and we intend to do
20 that in two hours.

21 MS. WEAVER: Two hours, yes, sir.

22 CHAIRMAN POWERS: Split between the staff
23 and the applicant.

24 MS. WEAVER: That's correct.

25 CHAIRMAN POWERS: So this is a modest tour

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 in December. It's very formidable amount of material to
2 try to present to the full committee and so I can implore
3 you on two things.

4 The applicant in this case should recognize
5 that many on the committee are going to have had episodic
6 exposure to this and they're not going to be completely
7 familiar to the plant and so you're going to have to come
8 in with a little bit of background, explanation of what
9 it all is and present at a fairly high level.

10 To the staff, let me encourage you in this
11 regard. The committee is going to be relatively
12 disinterested in the number of RAIs that you sent out and
13 whatnot.

14 They're going to be much more interested in
15 two things, one, what analyses that you have done to
16 validate and verify the claims made by the applicant and
17 especially in the independent and what remains to be done
18 and why it's important.

19 Those items that are of a bookkeeping nature
20 or formalism nature, Committee's going to be relatively,
21 they can't advise you on those matters. Those that are
22 of a technical or substantive nature should get some
23 emphasis and whatnot.

24 For instance, the fact that you had Chris
25 Boyd go down and look in detail at their CFD analysis and

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 come away with a reasonable feeling based on his
2 experience, that's a very good thing to acquaint the
3 committee with so that they know, have some feeling for
4 the depth to which you've gone on these matters. That's
5 the biggest advice that I can give you.

6 A tabulation of we had 600 open items and
7 now we only have 3, it's information I'd put on a slide
8 in the presentation and spend exactly zero time in the
9 presentation. They can read it faster than you can say
10 it and they're not going to be interested.

11 They are going to be interested in what you
12 have done to verify and validate the claims and they're
13 going to be very interested in what remains to be done.

14 MR. TAKACS: Dr. Powers, Mike Takacs here.
15 I just want to verify or clarify that second statement,
16 what remains to be done, and maybe some here know what
17 you're referring to specifically, not specifically but
18 is it open items, the issues, what you're concerned --

19 CHAIRMAN POWERS: Yes, the open items are
20 going to be of interest. They're not going to be
21 interested in those that are of a verification, I mean,
22 of a bookkeeping nature.

23 MR. TAKACS: Sure.

24 CHAIRMAN POWERS: Those where you are
25 expecting something from the licensee, how you look at

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 it, how you're going to look at it, they're going to be
2 interested in that.

3 MR. TAKACS: Got you.

4 CHAIRMAN POWERS: Okay. Those that say,
5 well, you have to do something in your documentation,
6 there's nothing they can advise you on on that matter.

7 MR. TAKACS: Right, okay.

8 CHAIRMAN POWERS: So, you know, they're
9 going to spend zero time thinking about it because
10 there's nothing they can say to you. You know your
11 procedures better than ACRS will ever know them.

12 But things where you're going to have to
13 look and think about things as professional engineers,
14 they're going to want to know how do you think about
15 these, because many of them are as challenging to the ACRS
16 as they are to you, trust me.

17 And, again, the applicant here, again, it
18 is far more of interest to the ACRS knowing how you
19 approached these problems and got resolution than it is
20 to know when you submitted and things like that.

21 And understand many on the committee are not
22 paying attention day-to-day on this. They're involved
23 in other sections, so they'll need a little more
24 background and whatnot on this.

25 There will be, needless to say, a great deal

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 of interest in, for instance, your hurricane analyses,
2 your tsunami analyses as you well might expect in the
3 aftermath of Fukushima, and so you may want to go into
4 a little more depth on those than other items and whatnot.

5 And you'll have to make those judgments but,
6 I mean, think from the perspective of someone who has
7 intense technical interest in these things but probably
8 has not plunged into the details. Any other questions
9 you'd like to pass on?

10 MEMBER ARMIJO: I have a comment.

11 CHAIRMAN POWERS: Yes, sir.

12 MEMBER ARMIJO: Yes, well, I recently
13 looked up on the Internet this super austenitic stainless
14 steel, so I think I can save everybody a lot of trouble.

15 It's really not a stainless steel. More
16 than half of the alloy is not iron and steels are normally
17 iron based, but it is a really good material, very high
18 chromium, very high nickel, high molybdenum and high
19 nitrogen and it's fine.

20 CHAIRMAN POWERS: And it costs a fortune.

21 MEMBER ARMIJO: It's not as expensive as
22 Inconel. It's damn close.

23 (Laughter)

24 MEMBER STETKAR: Four times a large number
25 of linear feet of this stuff.

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 MEMBER ARMIJO: Yes, and it's good in
2 brackish water, which is great.

3 MR. RAO: I can attest to that, because he
4 bought one elbow, \$900.

5 MEMBER ARMIJO: I can see why. It's --
6 (Crosstalk)

7 MR. WHEELER: You'll have to buy, like
8 2,000 feet of pipe times four.

9 (Crosstalk)

10 MEMBER STETKAR: This big.

11 CHAIRMAN POWERS: Okay. Mike, are you
12 prepared to answer questions about the fire?

13 MR. TAKACS: Yes, we are. I believe the
14 technical reviewer is here now.

15 MS. WEAVER: Could you introduce him,
16 please?

17 MR. TAKACS: Bob Vettori from the plant
18 systems group. Okay, we'll switch out.

19 MEMBER STETKAR: I only have two questions
20 and I'm not sure how they relate to the details of the
21 fire hazards analysis because I've not looked at those
22 details except as they're summarized in that FSAR table.

23 But a couple things that I noticed. The
24 first thing, that there is a Table 9 Baker dash 1 in the
25 FSAR that lists heat release rates, 75th percentile, 98th

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 percentile, heat release rates for a variety of water
2 characterized as, I've forgotten the word that's used but
3 kind of standard things. It's like, you know, a pump and
4 that sort of thing.

5 And those values, at least in the
6 documentation in the FSAR, are derived from
7 NUREG/CR-6850 which provides a basis for both
8 deterministic and probabilistic fire analyses.

9 And, indeed, the same values appear in a
10 corresponding Table 9A-1 in the EPR FSAR, the certified
11 design FSAR.

12 If I look at those, I noticed that there was
13 a difference, in particular for transient, combustible
14 heat release rates and in particular the difference is
15 in the FSARs, both now. The 75th percentile heat release
16 rate is listed as 70 kilowatts and the 98th percentile
17 is 200 kilowatts.

18 If I go to NUREG/CR-6850 Table G-1, it lists
19 75th percentile heat release rate of 142 kilowatts, about
20 twice, and 98th percentile 317 kilowatts. CR-6850 is
21 very precise about these things.

22 Now, my question is that I personally
23 haven't followed every bit of the transient heat release
24 rate discussion that has evolved over a few years in the
25 risk-informed fire protection NFPA 805 analysis area.

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 So I don't know, for example, today in
2 November of 2013 whether or not those transient heat
3 release rates that I just mentioned from that table in
4 NUREG/CR-6850 are, indeed, the staff, I don't want to say
5 approved, but accepted heat release rates that people are
6 using for transient combustibles in their risk-informed
7 NFPA 805 probabilistic analyses.

8 I don't know that because I haven't tried
9 to follow all of the frequently asked questions, so I
10 don't know. Do you know? Are they, or are the same heat
11 release rates that are in the NUREG/CR-6850 still used
12 for transients?

13 MR. VETTORI: I don't know.

14 MEMBER STETKAR: Transients have been one
15 of the areas that the staff and the industry have been
16 at loggerheads for a while. So I don't have that
17 personal information so I couldn't say, well, I know that
18 heat release rates are X and Y.

19 So my question to you is if the heat release
20 rates that the staff currently accepts are no different
21 from those in NUREG/CR-6850, at least that table where
22 I could find them, why are the transient heat release
23 rates that are at least cited in both the certified design
24 FSAR table and the corresponding table for the COLA FSAR
25 lower by nearly a factor of two?

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 MR. VETTORI: I have to look into it for
2 you.

3 MEMBER STETKAR: I wanted you here because
4 you're the fire guy and you understand what I'm saying
5 about them.

6 MR. VETTORI: Yes, sir. I understand what
7 you're saying.

8 MEMBER STETKAR: Okay. So that was one
9 question. The other question, and it also relates to
10 transient fires and this also applies for both the COL
11 FSAR and the design FSAR, EPR FSAR.

12 There are three different categories of
13 transient fire locations, if I can do that. In other
14 words, if I walk into a location I will allocate it to
15 one of three transient fire bins if I recall. They're
16 called THL 1, 2 and 3.

17 And THL 1, the lowest of those bins, it's
18 my understanding transient fires are not evaluated for
19 those locations.

20 THL 2 is basically a sort of normal amount
21 of transients which are associated with sort of average,
22 maybe somebody goes in there once a shift, maybe you can
23 do maintenance on things, things like that.

24 THL 3 is a lot of transients. You know,
25 these are places that you either do a lot of work or high

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 traffic areas, things like that.

2 The THL 1 in particular, there are a list
3 of qualifications, normally closed to any type of traffic
4 or not visited often, not more than once per week or not
5 occupied during normal plant operations and where
6 maintenance active these would generally be disallowed
7 during that power modes plant operations.

8 Important to get on the record, such fire
9 areas should also be subject to administrative controls
10 that disallow leaving or storing unattended transient
11 combustible materials.

12 This is another issue that has received
13 extensive discussion between the staff and the industry
14 in the risk-informed fire analyses.

15 And it's my understanding, here I did a
16 little bit of homework, there's a frequently asked
17 question, FAQ 12-0064, it's titled, "Hot work/transient
18 fire frequency, influence factors," that specifically
19 addresses this, among other issues.

20 And it's my understanding that the staff,
21 at least in the risk-informed analyses, says that unless
22 you cannot physically enter an area during power
23 operation you must account for some amount of transient
24 combustibles.

25 Now, the probability of it being there is

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 variable, which is these influencing factors, but you
2 can't simply say that just because I have administrative
3 controls I have zero transient combustibles.

4 So this THL 1 category seems inconsistent
5 with that notion. And my question is why can I do that
6 in a deterministic analysis when I can't do it in a
7 probabilistic analysis? It doesn't seem consistent.

8 As I said, I have no idea what the
9 implications are for my deterministic fire analyses, but
10 if the probabilistic guys have to account for it with some
11 non-zero probabilities, it's not clear why the
12 deterministic guys are allowed to assign zero
13 probability, in effect not account for it. So I don't
14 know if you have any insights on that.

15 MR. VETTORI: I'll look into it again.

16 MEMBER STETKAR: Okay. Those are the two
17 issues I wanted to get out on the table.

18 MR. VETTORI: On the second one, can you
19 write down your question to me?

20 MEMBER STETKAR: Well, the question is --

21 MR. VETTORI: So I get it right.

22 MEMBER STETKAR: Yes. In particular this
23 THL 1 category and, as I said, this applies equally to
24 the design certification as the COL so it's a broader
25 question than perhaps just your review. I don't know if

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 you did the review for the design cert or not.

2 MR. VETTORI: Not initially.

3 MEMBER STETKAR: Okay. And my problem, I
4 didn't look at that, the design cert, in enough detail
5 to trigger the right neurons at the time they asked this
6 question and we looked at Chapter 9 in that venue.

7 But the question is it's my understanding
8 that in the deterministic fire analyses or fire hazards
9 analyses that are performed, no transient combustibles
10 are considered for a location that is designated THL 1.

11 MR. VETTORI: Got you.

12 MEMBER STETKAR: And the question is why is
13 that? Why does the staff accept that, given the position
14 that the staff has taken on the probabilistic side of the
15 fence?

16 MR. VETTORI: Side, okay.

17 MEMBER STETKAR: Okay?

18 MR. VETTORI: Understand.

19 MEMBER STETKAR: Okay, good. Thank you.

20 CHAIRMAN POWERS: Good.

21 MR. VETTORI: Got it.

22 CHAIRMAN POWERS: Okay. Bob, thank you.

23 MR. VETTORI: You're welcome.

24 CHAIRMAN POWERS: Appreciate that. Let's
25 see, we've covered points for the next meeting. Did you

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 have any questions or --

2 MR. TAKACS: Yes, Dr. Powers. I just want
3 to kind of get a capture or summary of what your
4 expectations are for responding to that, what we need to
5 do as a staff to get back to you and do we need to do this
6 at a certain time frame before the full committee?

7 CHAIRMAN POWERS: The answer to that one is
8 no.

9 MR. TAKACS: Okay.

10 CHAIRMAN POWERS: Okay. The second
11 question, our expectations from you are, I mean we posed
12 a lot of questions and you consider them as you will as
13 you move forward.

14 MR. TAKACS: Okay.

15 CHAIRMAN POWERS: Okay? To the extent
16 that you can answer them, that's great. To the extent
17 that you don't, you're likely to hear them in a more
18 formal sense from the full committee.

19 I cannot tell you what the full committee
20 will do but they do tend to listen to what the
21 subcommittee has to say and so you'll tend to hear them
22 again if you don't have an answer to them.

23 Because of this stage thing, we don't expect
24 all questions to be answered until the final stage, okay?
25 And telling us we'll get back to you is a fine answer.

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 MR. TAKACS: Okay. So we can continue to
2 move forward as we would in Phase 4? This is not a hold
3 up or a showstopper, any of the questions?

4 CHAIRMAN POWERS: That was my next question
5 to the committee. My perception is that we are in a
6 position to recommend to the full committee to move this
7 COLA application from the current Phase 3 to Phase 4.

8 That is a movement with open items forward
9 to the resolution of those open items, that we have
10 identified nothing here that the staff and the applicant
11 don't seem to have a success path ahead. Is there any
12 contrary opinion on the committee?

13 MEMBER STETKAR: No, from my perspective.

14 MEMBER ARMIJO: No, not from my
15 perspective.

16 CHAIRMAN POWERS: So my draft
17 recommendation is essentially going to be that those
18 chapters that I listed out here, to the full committee,
19 is to recommend that we move from Stage 3 to Stage 4 on
20 those things.

21 And in doing so, that will have moved the
22 entire COLA from Stage 3 to Stage 4. Okay? So that's
23 our intention, all parties concerned, from the
24 subcommittee.

25 I cannot make any vouchsafe on what the full

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 committee itself will do, okay? But I can tell you what
2 our recommendation is going to be.

3 MR. TAKACS: Okay.

4 CHAIRMAN POWERS: Okay? Again, I would
5 thank all the presenters for being very informative today
6 and staying on schedule.

7 Now, I want you guys to all plug your ears
8 because I have another issue to bring up with our
9 chairman.

10 MEMBER STETKAR: On the record?

11 CHAIRMAN POWERS: I think so. I think so.

12 MEMBER STETKAR: I want a lawyer.

13 CHAIRMAN POWERS: The vice chairman has
14 once again raised this issue of safety-related versus
15 important to safety. It has come up in many, many
16 contexts.

17 You guys are supposed to have your ears
18 closed. You're not supposed to hear this.

19 MEMBER STETKAR: Read the transcript.

20 CHAIRMAN POWERS: This has nothing to do
21 with this application. This is a different, persistent
22 issue that I think the ACRS needs to come down and
23 acquaint the Commission with the fact that they have some
24 un-clarity in their regulatory guidance on how to handle
25 these various things. And it comes from the Commission

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 declaring their PRA policy statement with inadequate
2 support for it. And they need to straighten this thing
3 out.

4 MEMBER ARMIJO: We made a crack at that
5 previously.

6 CHAIRMAN POWERS: We've made a crack at
7 that but it looks like we need to hit it again.

8 MEMBER ARMIJO: Yes.

9 MEMBER STETKAR: I mean it can potentially
10 have headaches in the real world once plants get
11 operating --

12 CHAIRMAN POWERS: Absolutely.

13 MEMBER STETKAR: -- because the scope of
14 things that are in or out of things that look like the
15 maintenance rule can vary significantly.

16 Thus far it's only on paper and everybody
17 says, well, after we get the COL, once we get operating
18 we'll have our operating reliability assurance program,
19 but most of those same criteria are applied. What is
20 important to safety, to populate that list?

21 And for some plants that list right now is
22 very, very long and if, indeed, that is the, in a
23 regulatory space, this in-between level of attention,
24 then the same consistent in-between level of attention
25 ought to be given to not only how do you maintain a

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 particular pump but also the ventilation systems and, you
2 know, the evaluation of fires in those areas and so forth
3 and so on.

4 CHAIRMAN POWERS: Yes, and at the same
5 time, you know, the difficulty we're presenting both the
6 inspector of course and the licensee is that we have all
7 these things that in our risk analysis don't amount to
8 anything being treated with an equal fashion with a bunch
9 of stuff that does amount to something.

10 And, you know, we need to get some
11 clarification, at least so that I understand it better
12 and whatnot. We need to put this on our agenda. Again,
13 has nothing to do with this application, but it has to
14 do with the regulatory structure and how we communicate
15 with the rest of the world. We pass that information on
16 to you --

17 MEMBER ARMIJO: And we will do something.

18 CHAIRMAN POWERS: Well, I think, you know,
19 to some extent it's the --

20 MEMBER ARMIJO: We've seen it before and
21 it's going to come back again and again and --

22 CHAIRMAN POWERS: Yes, regulatory policies
23 and procedures needs to look at it and the PRA
24 subcommittee needs to look at it and we need some help.

25 I mean everybody needs some help on this

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 thing and we need to say what it is that we think is really
2 important and we can't say that everything is important
3 because it's silly.

4 MEMBER ARMIJO: Right. No, it's useless.

5 CHAIRMAN POWERS: All right. Just doesn't
6 help anybody. That said, I'm prepared to adjourn this
7 subcommittee meeting.

8 (Crosstalk)

9 CHAIRMAN POWERS: We're adjourned with
10 thanks to everybody involved.

11 (Whereupon, the meeting in the
12 above-entitled matter was concluded at 3:57 p.m.)
13
14
15
16
17

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com



UNISTAR NUCLEAR ENERGY

**Presentation to ACRS
U.S. EPR™ Subcommittee
Calvert Cliffs Nuclear Power Plant Unit 3
FSAR Chapter 2.4, Hydrologic Engineering
November 06, 2013**

Introduction



- RCOLA authored using 'Incorporate by Reference' (IBR) methodology.
- To simplify document presentation and review, only supplemental information, site-specific information, or Departures/exemptions from the U.S. EPR FSAR are contained in the COLA.
- AREVA U.S. EPR FSAR ACRS Meeting for Chapter 2 – Site Characteristics occurred on November 3, 2009.

Introduction



- No Departures and No Exemptions from the U.S. EPR FSAR for Calvert Cliffs Unit 3, Chapter 2.4.
- No ASLB Contentions
- Fifteen (15) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 2.4.

Introduction



- Today Mark Finley, UniStar - President, CEO and CNO will present the Calvert Cliffs Unit 3 FSAR Chapter 2.4.
- Today's presentation was prepared by UniStar and is supported by Bechtel, Rizzo Associates and AREVA.
 - Ahmed “Jemie” Dababneh, PhD., Rizzo Associates –Technical Director
 - Shankar Rao, Bechtel – Project Engineer
 - Mustafa Samad, PhD., Bechtel – Sr. Engineering Specialist-Hydrology
- The focus of today's presentation will be on site-specific information that supplements the U.S. EPR FSAR.



Chapter 2.4 Hydrologic Engineering Agenda

- **2.4 - HYDROLOGIC ENGINEERING**
- **CONCLUSIONS**

A decorative graphic at the top of the slide consisting of a thick blue curved line that starts from the left edge and curves towards the right, ending near a blue five-pointed star.

Chapter 2.4 Hydrologic Engineering

2.4 HYDROLOGIC ENGINEERING

2.4 Hydrologic Engineering

COL Information Item 2.4-1



- COL applicant will provide a site-specific description of the hydrologic characteristics of the plant site.
- Hydrological Characteristics
 - The Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 site is located on the Calvert peninsula within the Chesapeake Bay watershed, adjacent to and southeast of CCNPP Units 1 and 2.
 - The Chesapeake Bay constitutes the main water body influencing the siting of CCNPP Unit 3.
 - The Calvert peninsula is formed by the Chesapeake Bay to the east and the Patuxent River to the west.
 - Drainage in the vicinity of the CCNPP site includes several small streams and creeks, which fall within two sub-watersheds of the Chesapeake Bay with the drainage divide running nearly parallel to the shoreline.
 - All streams and creeks near the CCNPP Unit 3 site east of Maryland State Highway (MD) 2/4 are non-tidal.

2.4 Hydrologic Engineering

COL Information Item 2.4-1



- COL applicant will provide a site-specific description of the hydrologic characteristics of the plant site. (continued)
- Plant Siting
 - The CCNPP Unit 3 safety-related structures, systems and components (SSCs) will be located within the Maryland Western Shore Watershed at the Power Block area and at the Ultimate Heat Sink (UHS) Makeup Water Intake Structure (MWIS) area.
 - Access to safety-related structures, systems and components (SSCs) in the power block area will be located at or above Elevation 84.6 ft.
 - The deck of the UHS MWIS will be at approximately Elevation 11.5 ft with openings or entrances to the MWIS located at or above Elevation 36.5 ft.

2.4 Hydrologic Engineering

COL Information Item 2.4-1

Aerial View of CCNPP Unit 3 Site on the Calvert Peninsula



2.4 Hydrologic Engineering

COL Information Item 2.4-1



- COL applicant will provide a site-specific description of the hydrologic characteristics of the plant site. (continued)
- Dams and Reservoirs
 - There are no dams or reservoirs on St. Leonard Creek or its tributaries.
 - There are two dams on the Patuxent River.
 - These are Rocky Gorge Dam and Brighton Dam, located approximately 75 and 85 miles from the mouth of the Patuxent River, respectively.
 - Potential failure of these dams would have no influence on conditions at the Calvert Cliffs Unit 3 site.
- Surface Water Usage
 - Use of surface water near the Calvert Cliffs Unit 3 site is mainly non-consumptive involving the Chesapeake Bay and the Patuxent River.
 - The nearest surface water withdrawal locations include the Morgan State University Estuarine Research Center (ERC), located approximately 4 mi northwest of the site, and Dominion Cove Point Liquid Natural Gas (LNG) facility, located approximately 4 mi to the south-southeast of the site.

2.4 Hydrologic Engineering

COL Information Item 2.4-1



- COL applicant will provide a site-specific description of the hydrologic characteristics of the plant site. (continued)
- Ground Water Characteristic
 - The proposed water source to meet the water demand requirements during the operation of Calvert Cliffs Unit 3 is a desalinization plant utilizing water from the Chesapeake Bay.
 - An additional source of water will be required during construction activities until the desalinization plant is operational.
 - Construction water needs are expected to be satisfied by appropriating water from CCNPP Units 1 and 2 using the established ground water permits.

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11



- A COL applicant will identify site-specific information related to flood history, flood design considerations, and effects of local intense precipitation.
 - A COL applicant will use site-specific information to compare the location and elevations of safety-related facilities, and of structures and components required for protection of safety-related facilities, with the estimated static and dynamic effects of the design basis flood conditions.
- Flood History
- The CCNPP site is subject to flooding from the Chesapeake Bay, Johns Creek and two small unnamed streams identified on Figure 2.4-1 as Branch 1 and Branch 2.
 - The five highest recorded water levels at Baltimore and Annapolis are presented in Table 2.4-26. Each of these high water levels is associated with surges from tropical storm events.
 - Since the construction and operation of CCNPP Units 1 and 2 there have been no instances of flooding of the CCNPP Units 1 and 2 grade area surrounding the pump intake area at Elevation 10.0 ft.
 - There are no records of any landslide (submarine or subaerine) or distant tsunami source induced flooding events at the CCNPP site.

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

Table 2.4-26— {Five Highest Historical Water Levels at Baltimore and Annapolis} it10022

Baltimore			Annapolis		
Hurricanes	Date	Above MHHW ft (m)	Hurricanes	Date	Above MHHW ft (m)
Unnamed	August 1933	6.75 (2.056)	Isabel	September 2003	5.76 (1.756)
Isabel	September 2003	6.48 (1.976)	Unnamed	August 1933	5.55 (1.691)
Connie	August 1955	5.22 (1.591)	Connie	August 1955	4.09 (1.248)
Unnamed	August 1915	4.53 (1.381)	Hazel	October 1954	3.90 (1.190)
Hazel	October 1954	4.33 (1.319)	Fran	September 1996	3.48 (1.060)

MHHW-Mean Higher High Water

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11



- A COL applicant will identify site-specific information related to flood history, flood design considerations, and effects of local intense precipitation. (continued)
- A COL applicant will use site-specific information to compare the location and elevations of safety-related facilities, (continued)
- Flood Design Considerations
 - The design basis flood elevation for the CCNPP site is determined by considering a number of different flooding possibilities. The flooding possibilities applicable and investigated for the site include:
 - ✓ The probable maximum flood (PMF) on streams and rivers, potential dam failures, probable maximum surge and seiche flooding, probable maximum tsunami, and ice effect flooding.
 - Each of these flooding scenarios was investigated in conjunction with other flooding and meteorological events, such as wind generated waves, as required in accordance with guidelines presented in ANSI/ANS 2.8-1992.
 - The maximum PMF water level for Johns Creek is Elevation 65.0 ft. Safety-related facilities for CCNPP Unit 3 are located at Elevation 85.0 ft.

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11



- A COL applicant will identify site-specific information related to flood history, flood design considerations, and effects of local intense precipitation. (continued)
- A COL applicant will use site-specific information to compare the location and elevations of safety-related facilities, (continued)
- The probable maximum storm surge (PMSS) water level on the Chesapeake Bay is estimated to be at Elevation 17.6 ft.
 - ✓ Wave action from coincident winds associated with the storm surge produce a wave run-up height of 15.6 ft above the PMSS resulting in a maximum flood level of Elevation 33.2 ft on the UHS MWIS.
 - ✓ The PMSS and coincident wave run-up water level at the CCNPP Unit 3 site produce the highest potential water levels on the Chesapeake Bay and become the design basis flood elevation for the CCNPP Unit 3 Ultimate Heat Sink (UHS) makeup intake structure area.
 - ✓ The UHS makeup intake structure will be provided with flood protection measures such as water tight doors, roof vents, and piping and conduit penetrations.
 - ✓ The CCNPP Unit 3 power block site grade is at nominal Elevation 85.0 ft. Safety-related facilities other than the UHS makeup intake structure are located above the PMSS and wave run-up water level.

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11



Tidal and Surge Levels

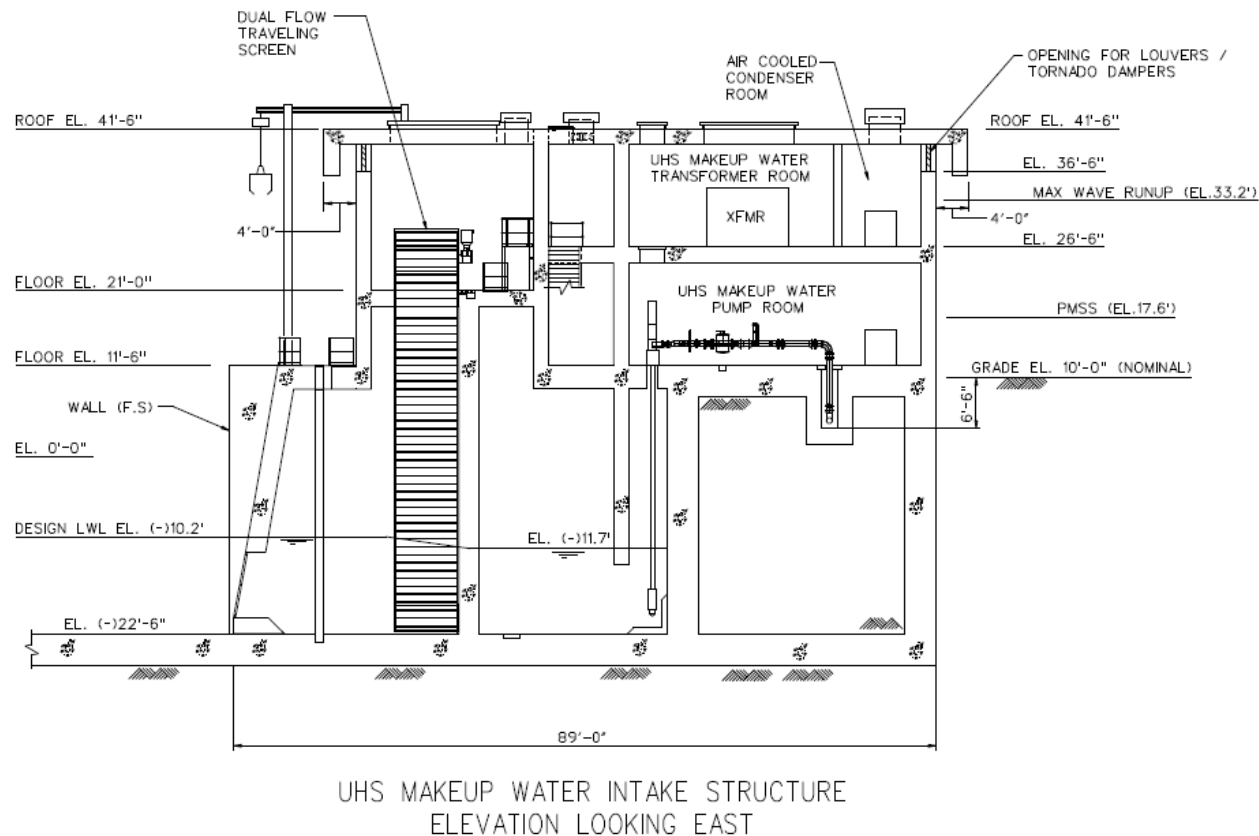
Antecedent Water Level Components		
Component	Estimate (ft)	Datum
10% exceedance high tide	1.53	MSL
Initial Rise	1.1	MSL
Sea Level Rise	1.07	MSL
Adjustment factor to NGVD29	0.64	
Total Antecedent Water Level	4.34	NGVD29

Total Storm Surge Level (ft)		
Component	Estimate (ft)	Datum
FSAR Antecedent Water Level	4.4	NGVD29
Maximum Surge Level	13.2	NGVD29
Maximum Wave Runup	15.6	NGVD29
Total Water Level	33.2	NGVD29

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

UHS MWIS Cross Section



2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

- A COL applicant will identify site-specific information related to flood history, flood design considerations, and effects of local intense precipitation. (continued)
- A COL applicant will use site-specific information to compare the location and elevations of safety-related facilities, (continued)
- Effects of Local Intense Precipitation on Calvert Cliffs Unit 3 Power Block Area
 - The U.S. Army Corps of Engineers (USACE) computer program Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) was used to determine peak discharges in the site drainage ditches.
 - The USACE computer program HEC – River Analysis System (HEC-RAS) was used to determine the maximum PMP water level at a safety-related structure.
 - The maximum PMP water level in the Power Block area is Elevation 81.5 ft . This water level, which becomes the design basis flood elevation for the safety-related facilities in the Power Block area, is 3.1 ft. below the lowest reactor complex entrance at Elevation 84.6 ft.
 - Table 2.4-16 gives the entrance elevations at the various safety-related facilities and compares them with the PMP water levels near those facilities.
 - The design basis for the local intense precipitation is the ‘all season 1 square mile’ or point PMP (probable maximum precipitation) as obtained from the U.S. National Weather Service (NWS) Hydro-meteorological Report Number 52. Table 2.4-22 presents the 1 square mile PMP for various durations at the CCNPP site.

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11



Table 2.4-22— {Point (1 mi²) Probable Maximum Precipitation Depths}

Time (min)	PMP Depth in (cm)
60	18.48 (46.94)
30	13.86 (35.20)
15	9.70 (24.64)
5	6.15 (15.62)

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

Table 2.4-16— {Safety-Related Facility Entrance Elevation Summary}

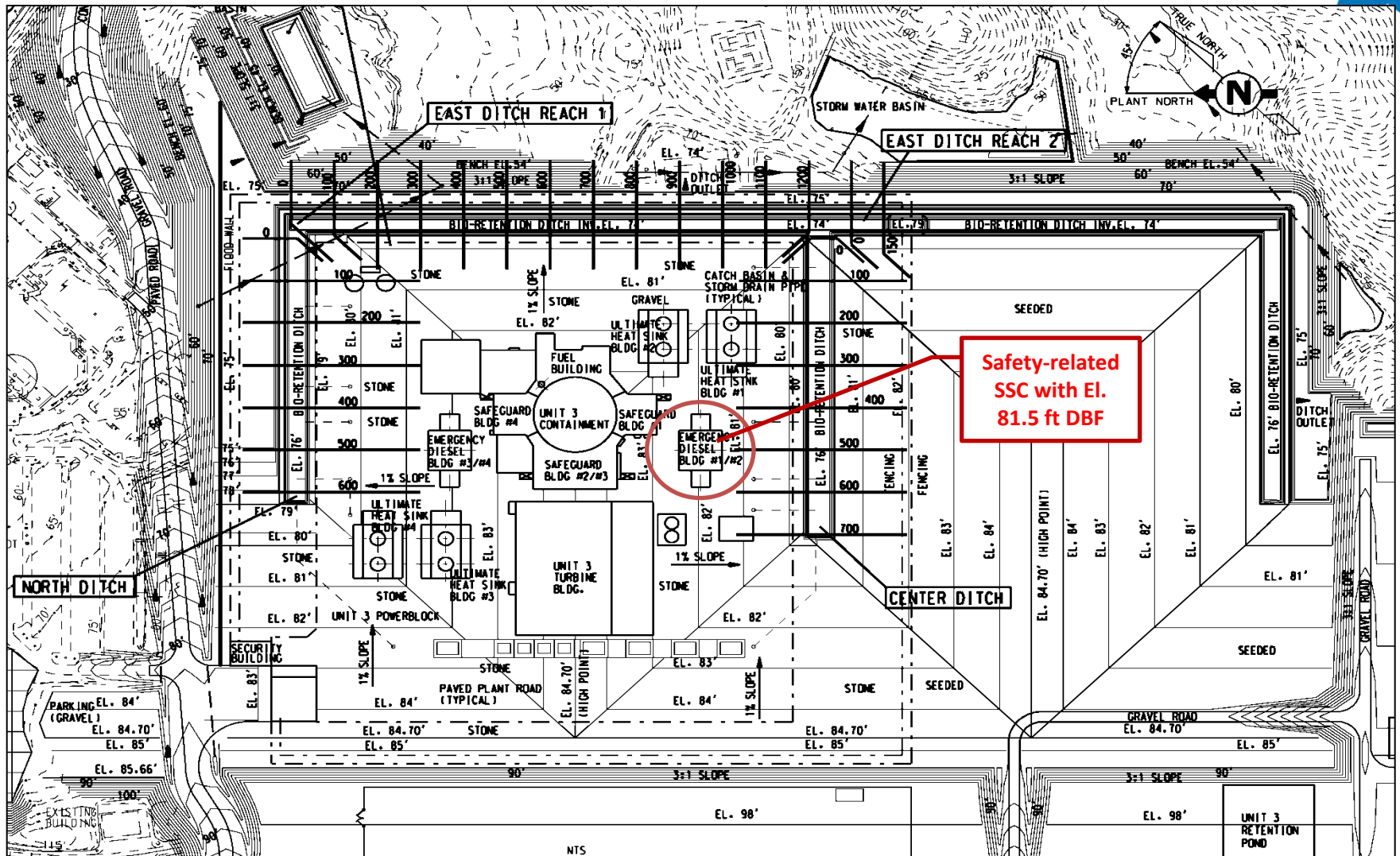
Safety-Related Facility	Entrance Elevation (ft)	Associated Cross Section	Ditch	PMP Peak Water Elevation (ft)	Freeboard (ft)
Northwestern UHSs	98.6 ft	600	North	79.8	18.8
Southeastern UHSs	98.6 ft	300	Center	81.3	17.3
North Diesel Generator	85.1 ft	500	North	79.8	5.3
South Diesel Generator	85.1 ft	500	Center	81.5	3.6
Reactor Complex*	84.6 ft	400	North	79.7	4.9
		400	Center	81.4	3.2

* Includes containment, fuel and safeguards buildings

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

Figure 2.4-16— CCNPP Unit 3 Drainage Ditch Cross Sections



2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

- A COL applicant will identify site-specific information related to flood history, flood design considerations, and effects of local intense precipitation. (continued)
- A COL applicant will use site-specific information to compare the location and elevations of safety-related facilities, (continued)
- Effects of Local Intense Precipitation on Calvert Cliffs Unit 3 UHS Makeup Water System
 - The design basis flood elevation near the UHS Makeup Water Intake Structure (MWIS) is due to the probable maximum storm surge and coincidental wind wave actions.
 - The buried UHS pipeline follows an alignment part of which could be affected by the local PMP discharge from Calvert Cliffs Units 1 & 2 and Unit 3 areas.
 - The USACE computer programs HEC-HMS and HEC-RAS were used to develop the hydrologic and hydraulic models and determine peak discharges, maximum water levels and velocities over the UHS pipeline.
 - In order to protect the UHS pipeline from potential scouring during a PMP event, the stormwater drainage swales, as well as the Haul Road, will be lined with concrete to resist the erosive forces. This applies to the section of makeup water pipe crossing between the Unit 3 flood wall and the end of the stormwater swales (Figure 2.4-8).
 - Riprap placements on the Chesapeake Bay shoreline and on the slope behind the MWIS would prevent any erosion impact to the MWIS, intake pipeline and UHS pipeline.

2.4 Hydrologic Engineering

COL Information Items 2.4-2 & 2.4-11

Figure 2.4-8— {Calvert Cliffs Unit 3 Utility Corridor (with UHS Makeup Water Buried Piping)}



2.4 Hydrologic Engineering

COL Information Item 2.4-3



- A COL applicant will provide site-specific information to describe the probable maximum flood of streams and rivers and the effect of flooding on the design.
- Probable Maximum Flood (PMF) on Streams and Rivers
 - Sources of potential PMF at the site are the Chesapeake Bay to the east, and the Johns Creek-St. Leonard Creek-Patuxent River System to the west.
 - River discharges into the Chesapeake Bay can have some effect on water levels in the Chesapeake Bay. However, the effect is minimal in comparison with flood water levels generated by e.g., tide levels, and storm surges. Thus, the water levels in the Chesapeake Bay due to the PMF on streams and rivers that are tributaries to the Chesapeake Bay are not assessed.
 - Johns Creek, St. Leonard Creek, Patuxent River system is tidally influenced at the mouth of Johns Creek and is an extension of the Chesapeake Bay.
 - The CCNPP site is located far enough away from the limit of the tidally influenced areas that flood flows on these water courses have no influence on the water levels near the site. Thus, neither St. Leonard Creek nor the Patuxent River is analyzed for the PMF on streams or rivers for the CCNPP site.

2.4 Hydrologic Engineering

COL Information Item 2.4-3



- A COL applicant will provide site-specific information to describe the probable maximum flood of streams and rivers and the effect of flooding on the design. (continued)
- A portion of Johns Creek, upstream of the tidally influenced reach, is located immediately west of the proposed switchyard area. Thus, a PMF analysis is performed on Johns Creek to determine the PMF water levels near the site, conservatively assuming that the culvert on MD 2/4 is completely clogged.
 - ✓ The results of the analysis indicate a maximum PMF water surface elevation of 65 ft on Johns Creek at the CCNPP site.
 - ✓ The water level in Johns Creek would have to exceed the drainage divide boundary at Elevation 98.0 ft, which passes through the CCNPP Unit 3 switchyard. The drainage divide boundary is about 33.0 ft above the maximum PMF elevation on Johns Creek.

Figure 2.4-7— CCNPP UNIT 3 Sub-Basin Drainage Boundaries



2.4 Hydrologic Engineering

COL Information Item 2.4-4

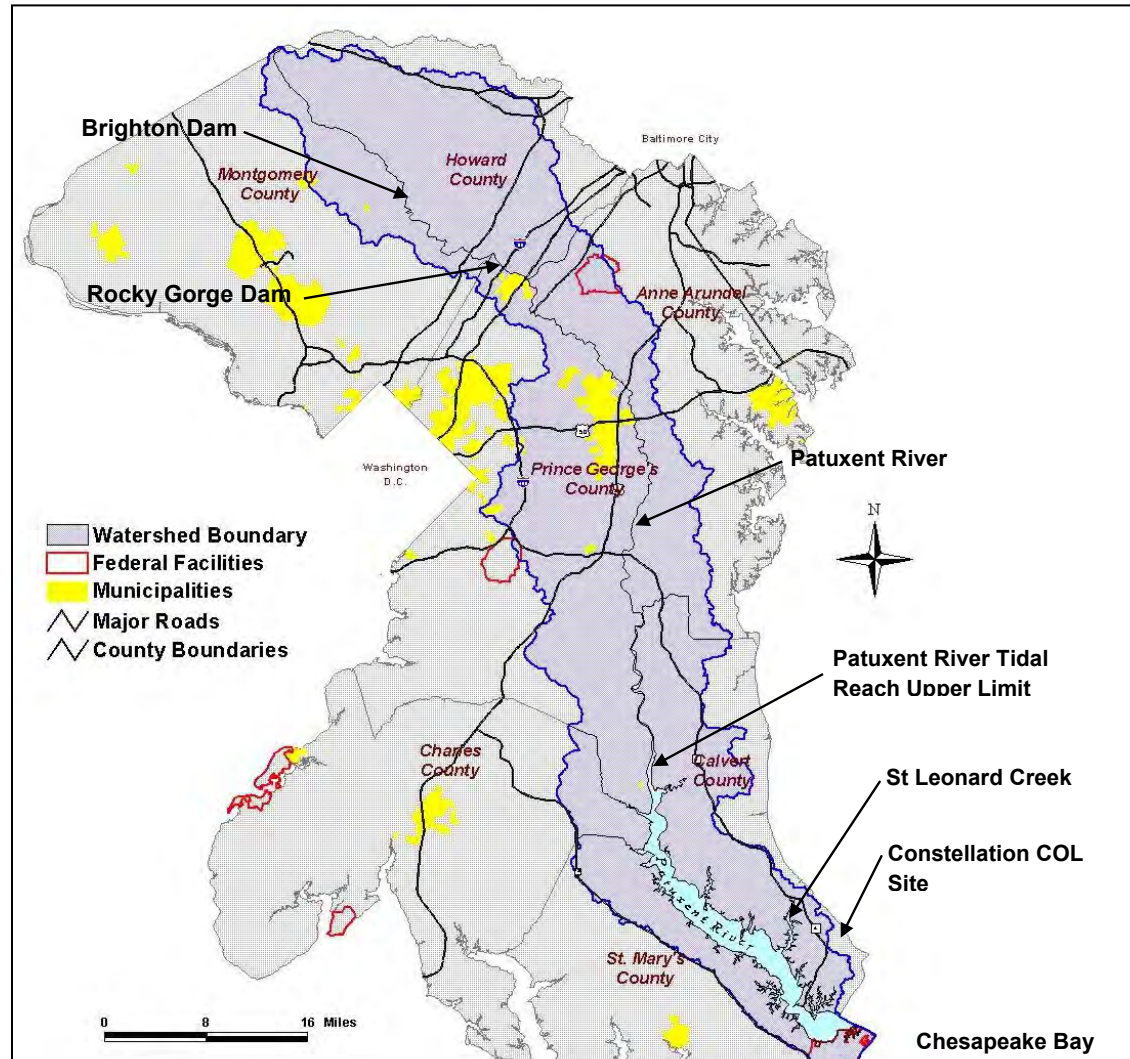


- A COL applicant will verify that the site-specific potential hazards to safety-related facilities due to the failure of upstream and downstream water control structures are within the hydrogeologic design basis.
- Potential Dam Failures
 - There are no dams on Johns Creek or St. Leonard Creek.
 - There are two dams on the Patuxent River.
 - ✓ If the total volume of these two reservoirs were to be instantly added to the tidal region of the Patuxent River and not allowed to escape into the Chesapeake Bay, the water level increase in the tidal river reach would be approximately 2 ft.
 - ✓ Flood levels in the upper reaches of Johns Creek and near the CCNPP site would not be affected.
 - Several other dams are located on other tributaries to the Chesapeake Bay upstream of the CCNPP site.
 - ✓ Dam failures from these other dams would have negligible flooding effect to the CCNPP site, as the flood waves would discharge directly into the Chesapeake Bay far upstream of the CCNPP site.

2.4 Hydrologic Engineering

COL Information Item 2.4-4

Figure 2.4-27 – {Patuxent River Watershed And Dam Locations}



2.4 Hydrologic Engineering

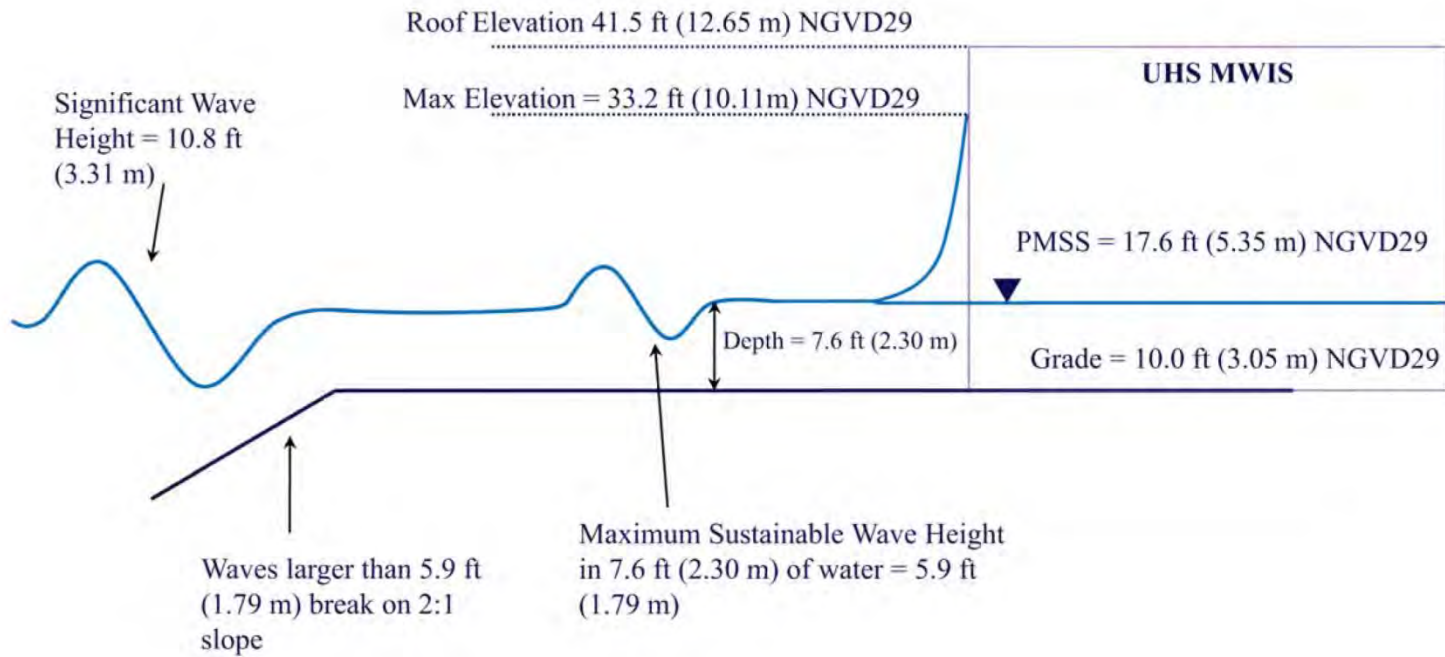
COL Information Item 2.4-5

- COL applicant will provide site-specific information on the probable maximum surge and seiche flooding and determine the extent to which safety-related plant systems require protection. The applicant will also verify that the site-specific characteristic envelope is within the design maximum flood level, including consideration of wind effects.
- Probable Maximum Storm Surge (PMSS) and Seiche Flooding
 - The Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model predicted a maximum surge elevation at the site of 11.0 ft from a water level of 0.0 NGVD 29. The simulated surge height was then adjusted to take into account the 20% margin (SLOSH model uncertainties) suggested in Technical Report NWS 48 (Jelesnianski, 1992) and the antecedent water level of 4.4 ft NGVD 29. The final PMSS elevation thus obtained is 17.6 ft NGVD 29.
 - The maximum wave runup on the intake structure was computed to be 15.6 ft. This runup, combined with the PMSS, will reach an elevation of 33.2 ft NGVD 29 as shown on Figure 2.4-33.
 - Because the effects of seiche oscillation are eliminated by a change in sustained wind direction, any existing seiche oscillation in the Chesapeake Bay prior to the arrival of any hurricane will be eliminated by the strong and changing wind field of the hurricane. Hence, resonance of seiche oscillation with PMSS is precluded.

2.4 Hydrologic Engineering

COL Information Item 2.4-5

Figure 2.4-33— {Schematic Diagram Wave Runup on the UHS Makeup Water Intake Structure (MWIS)}



Drawing not to scale

2.4 Hydrologic Engineering

COL Information Item 2.4-6



- A COL applicant will provide site-specific information and determine the extent to which the plant safety-related facilities require protection from tsunami effects, including Probable Maximum Tsunami Flooding.
- Probable Maximum Tsunami (PMT) Flooding
 - The PMT amplitude and drawdown at the CCNPP site were computed for the three potential tsunami sources using the maximum and minimum tsunami-induced water surface elevations.
 - The maximum simulated amplitude and drawdown at the CCNPP site were obtained from the postulated submarine landslide at the Virginia-North Carolina continental shelf off the coast of Norfolk, Virginia.
 - The PMT amplitude was estimated to be 1.71 ft above the antecedent water level. Combining with the antecedent water level of 4.34 ft and tsunami runup of 5.13 ft, the PMT high water level is estimated as 11.18 ft or rounded up to 11.5 ft.
 - The PMT drawdown was estimated to be 1.24 ft below the antecedent water level. Combining with the mean lower-low water antecedent water level, the PMT low water level is estimated as -1.23 ft or rounded down to -1.5 ft.
 - Because the maximum and the minimum water levels at the CCNPP site would be affected by storm surges, the maximum and minimum water levels from the PMT did not represent limiting flood or low water design bases for the CCNPP site.

2.4 Hydrologic Engineering

COL Information Item 2.4-6



- A COL applicant will provide site-specific information and determine the extent to which the plant safety-related facilities require protection from tsunami effects, including Probable Maximum Tsunami Flooding. (continued)
- Effects on Safety-Related Facilities
 - The CCNPP Unit 3 Power Block elevation is set at approximately 85.0 ft NGVD 29. The safety-related facilities on the power block will not be affected by the PMT.
 - The maximum water level at the safety-related UHS Makeup Water Intake Structure would be governed by the probable maximum storm surge height, not the PMT.
 - The hydrodynamic wave force on the UHS makeup water intake structure is controlled by the PMSS event.
 - The CCNPP Units 1 and 2 forebay baffle wall, CCNPP Unit 3 intake sheet pipe wall and inlet protection screen, protect the inlets of intake pipes that convey water to the UHS intake structure from debris and water-borne projectiles.
 - The Units 1 and 2 baffle wall and Unit 3 sheet pile wall protect the CCNPP Unit 3 intake pipe inlet area. Erosion effects near the intake pipe inlet would be negligible.

2.4 Hydrologic Engineering

COL Information Item 2.4-6

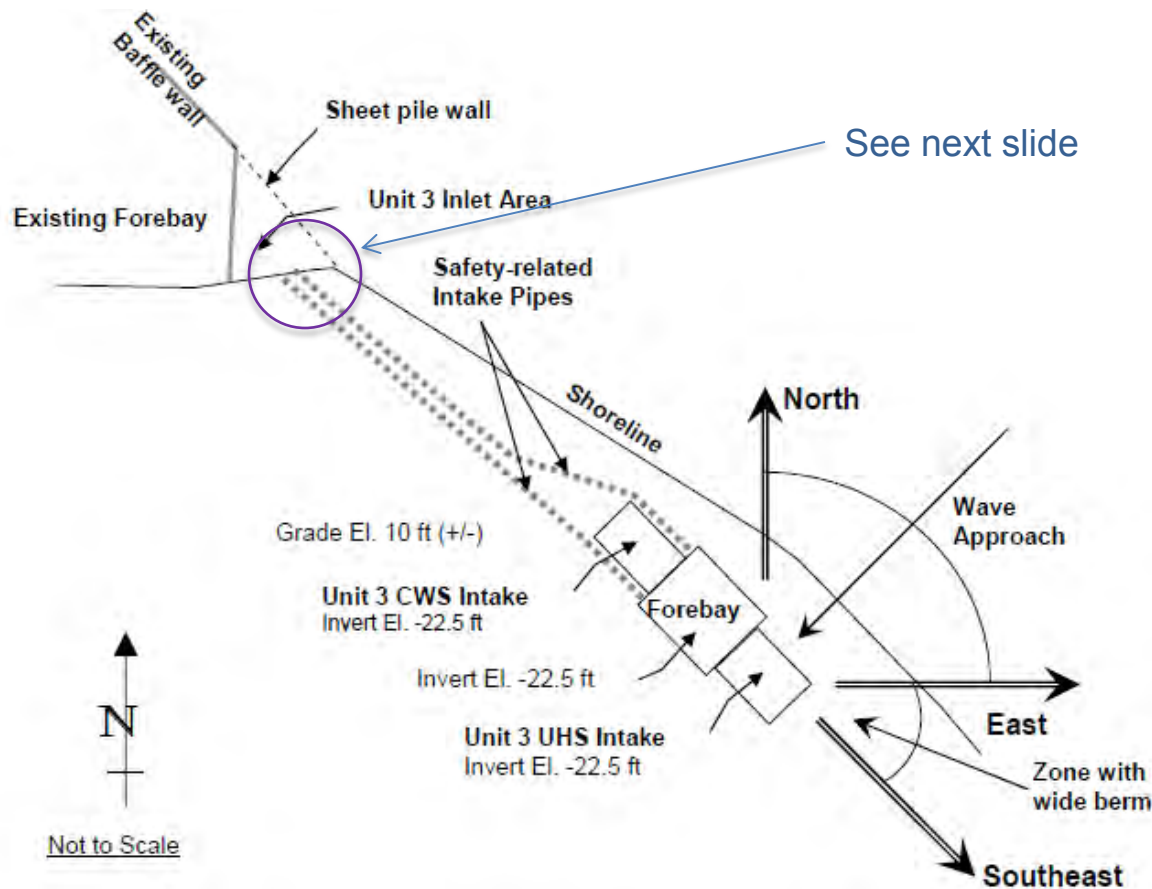


- A COL applicant will provide site-specific information and determine the extent to which the plant safety-related facilities require protection from tsunami effects, including Probable Maximum Tsunami Flooding. (continued)
- Effects on Safety-Related Facilities (Continued)
 - Suspended sediments flowing toward the CCNPP Unit 3 intakes would travel through the opening underneath the Units 1 and 2 forebay baffle wall and would likely deposit in the CCNPP Unit 3 inlet area sheltered by the baffle wall and the sheet pile wall. Because the inlets of the intake pipes are located at about 10 ft. above the bed elevation, blockage of intake pipes due to sediment deposition is unlikely as a result of the PMT.

2.4 Hydrologic Engineering

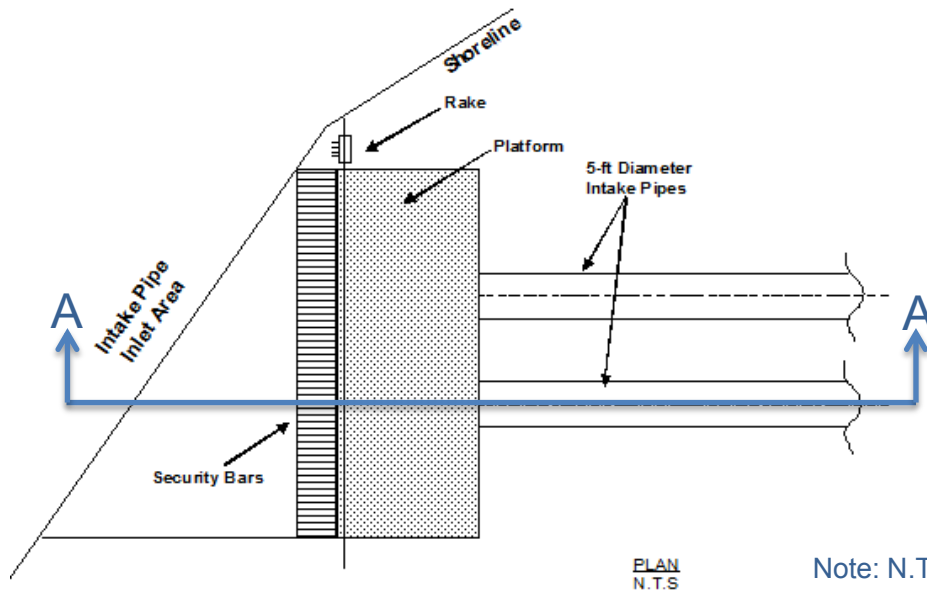
COL Information Item 2.4-6

Figure 2.4-25 – {Schematic Description of UHS Makeup Water Intake Location and Exposure for Wind Wave Estimation}



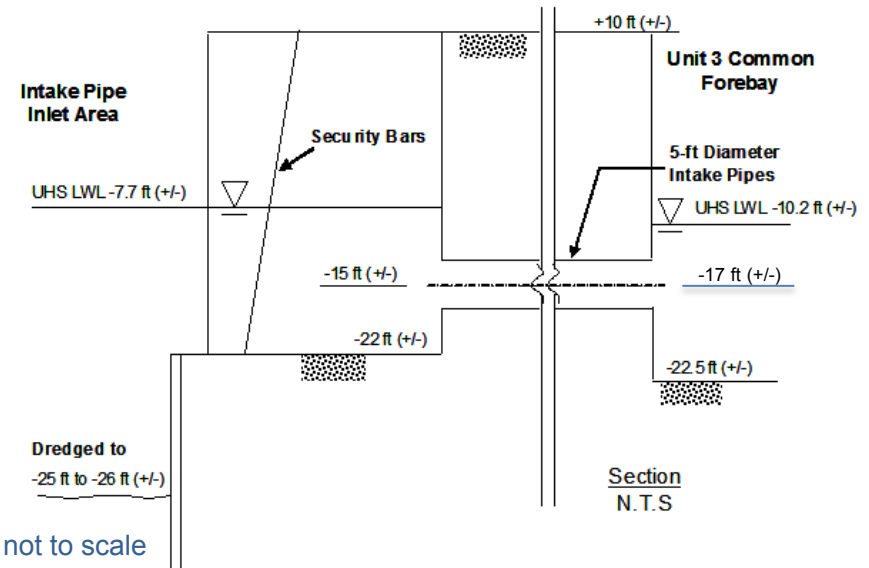
2.4 Hydrologic Engineering

COL Information Item 2.4-6



Inlet Area Plan View

Note: N.T.S = not to scale



Section A-A

2.4 Hydrologic Engineering

COL Information Items 2.4-7 & 2.4-8



- A COL applicant will provide site-specific information regarding ice effects and design criteria for protecting safety-related facilities from ice-produced effects and forces with respect to adjacent water bodies.
- A COL applicant will evaluate the potential for freezing temperatures that may affect the performance of the ultimate heat sink makeup, including the potential for frazil and anchor ice, maximum ice thickness, and maximum cumulative degree-days below freezing.

➤ Ice Effects

- The maximum ice thickness, 13 inches, that could form at the CCNPP site was estimated using historical air temperature data from the nearby Patuxent River Naval Air Station meteorological tower for the period of 1945 through 2006.
- Because the UHS intake pipe inlets are at Elevation -15 ft, the design low water in the Unit 3 inlet area is Elevation of -7.7 ft, there is no possibility that the Unit 3 inlet and the downstream UHS makeup water intake structure would be impacted by drifting ice or unrestricted ice sheets.
- Ice sheets formed within the common forebay for the CWS and UHS makeup intakes would be restricted by the skimmer walls at the entrance of the intake structures

2.4 Hydrologic Engineering

COL Information Items 2.4-7 & 2.4-8



- A COL applicant will provide site-specific information regarding ice effects and design criteria for protecting safety-related facilities from ice-produced effects and forces with respect to adjacent water bodies. (continued)
 - A COL applicant will evaluate the potential for freezing temperatures that may affect the performance of the ultimate heat sink makeup, including the potential for frazil and anchor ice, maximum ice thickness, and maximum cumulative degree-days below freezing. (continued)
- Ice Effects (Continued)
- Neither frazil ice nor anchor ice have been observed in the intake structure of the existing CCNPP Units 1 and 2 since the start of operation.
 - Additionally, continuous raking of the bar screens, frequent rotation of the traveling water screens and heat tracing of the equipment is be used to mitigate ice buildup at the intake.
 - The flood protection design of the CCNPP Unit 3 safety-related facilities assumed that catch basins, storm drains, and culverts are blocked rendering them inoperative during a local probable maximum precipitation (PMP) event.
 - Therefore, temporary blockage of site drainage areas will not affect the operation of safety-related facilities.

2.4 Hydrologic Engineering

COL Information Item 2.4-9



- A COL applicant will provide site-specific information and describe the design basis for cooling water canals and reservoirs used for makeup to the UHS cooling tower basins.
- Cooling Water Canals and Reservoirs
 - Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 does not include any canals or reservoirs used to transport or impound plant safety-related cooling water or for heat dissipation.
 - The safety-related Ultimate Heat Sink (UHS) Makeup Water Intake System utilizes the Chesapeake Bay as the water source.
 - The design of the safety-related SSCs will comply with the requirements of Regulatory Guide 1.27.

2.4 Hydrologic Engineering

COL Information Item 2.4-10



- A COL applicant will provide site-specific information and demonstrate that in the event of diversion or rerouting of the source of cooling water, alternate water supplies will be available to safety-related equipment.
- Channel Diversions
 - Given the seismic, topographical, geologic, and thermal evidence in the region, there is very limited potential for upstream diversion or rerouting of the Chesapeake Bay (due to channel migration, river cutoffs, ice jams, or subsidence) and adversely impacting safety-related facilities or water supplies.
 - The stabilized shoreline near the intake structures prevents any shoreline retreat.
 - Due to the submerged entrance of water under the existing baffle wall, surface ice in the Chesapeake Bay has no effect on the cooling water supply at the Unit 3 intake pipe inlets.
 - A postulated collapse of the shoreline cliffs to the north or south of the CCNPP site, during a seismic or severe weather event, is not expected to result in silt depositing in the Units 1 and 2 forebay; to such an extent that it would cause a loss of cooling water supply to the Unit 3 intakes.

2.4 Hydrologic Engineering

COL Information Item 2.4-12



- A COL applicant will identify natural events that may reduce or limit the available cooling water supply, and will verify that an adequate water supply exists for operation or shutdown of the plant in normal operation, anticipated operational occurrences, and in low water conditions.
- Low Water Considerations
 - CCNPP Unit 3 relies on the Chesapeake Bay to supply water for safety-related and nonsafety-related purposes.
 - As a conservative approach, the 100-year low water level at the CCNPP Unit 3 site is selected based on the Annapolis station, which is lower than Solomons Island. Therefore, the 100-year low water is -3.90 ft.
 - Since the minimum design water level in the Forebay is set at -8 ft for the safety-related UHS makeup intake, the UHS makeup pumps supply sufficient water during the lowest water level due to negative surge from the PMH or tsunami (estimated at -7.7 ft).
 - With a centerline elevation of the intake pipes at Unit 3 inlet is at -15 ft, there is no risk of vortices and air entrainment in the intake pipe.
 - The Technical Specification Limit for the UHS Makeup Water Pump Forebay is ≥ -11.7 feet NGVD 29.

2.4 Hydrologic Engineering

COL Information Item 2.4-13

- A COL applicant will provide site-specific information to identify local and regional groundwater reservoirs, subsurface pathways, onsite use, monitoring or safeguard measures, and to establish the effects of groundwater on plant structures.
- Groundwater in the surficial aquifer at the Calvert Cliffs Unit 3 site is aggressive (pH, sulfates, chlorides).
 - This affects structures below the water table. (30' below power block grade, but not at MWIS).
 - Waterproofing system will protect the portions of the NI and Essential Service Water Buildings (ESWBs) below the groundwater water table.
 - Emergency Power Generating Buildings (EPGBs) are above groundwater table but still protected by a dampproofing system.
 - Duct banks will be protected as necessary.
 - Buried pipe will be protected by wrapping and/or coating.
- UHS Makeup water (from Chesapeake Bay) is brackish.
 - Concrete structures subject to brackish water (MWIS and ESWB) will use concrete with a maximum water-cementitious materials ratio of 0.4 and a minimum compressive strength of 5000 pounds per square inch (psi).

2.4 Hydrologic Engineering

COL Information Item 2.4-13



- A COL applicant will provide site-specific information to identify local and regional groundwater reservoirs, subsurface pathways, onsite use, monitoring or safeguard measures, and to establish the effects of groundwater on plant structures. (continued)
- A groundwater monitoring system is provided inside the geo-membrane envelope within the sand layer to monitor and pump out any water that may leak through the primary geo-membrane.
- Throughout the power block area will be monitored:
 - Record baseline pH values, geochemistry concentrations
 - ✓ Prior to start of excavation,
 - ✓ After backfill is completed and
 - ✓ Six month intervals thereafter
 - One-year after backfill is completed:
 - ✓ No negative trend-increase interval of inspection
 - ✓ Negative trend is identified- evaluate need dewatering provisions

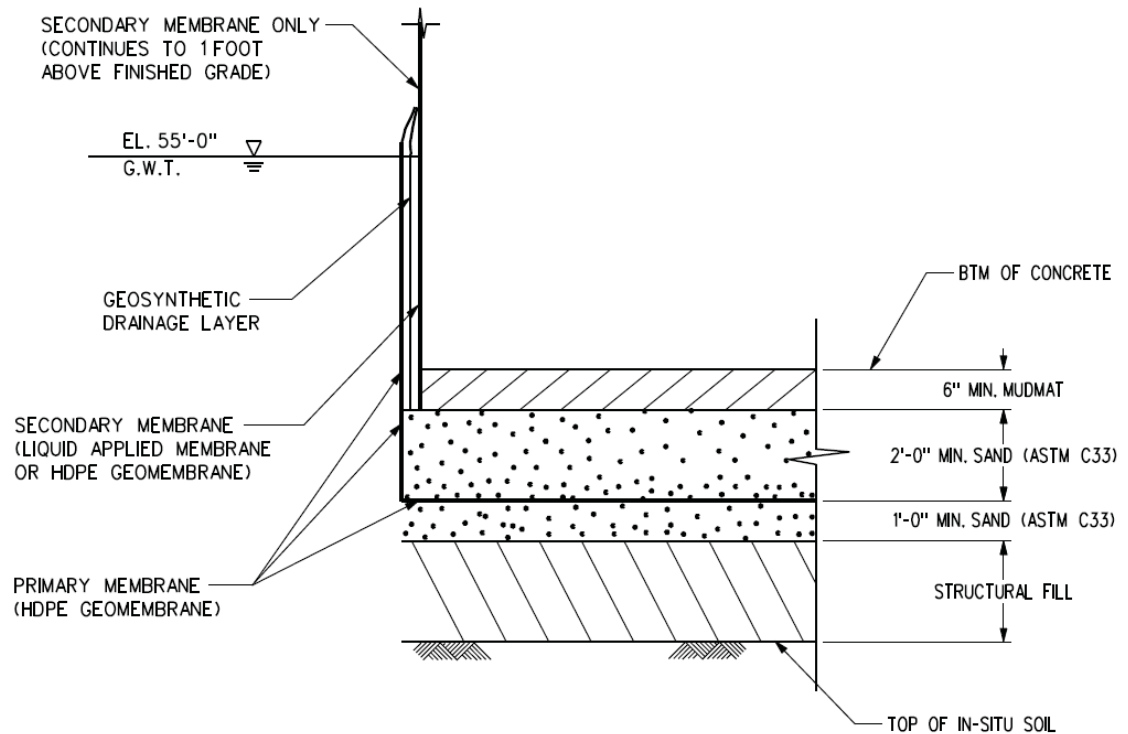
2.4 Hydrologic Engineering

COL Information Item 2.4-13

Waterproofing system will protect the portions of the NI and Essential Service Water Buildings (ESWBs) below the groundwater table.

➤ Waterproofing system

- Primary and secondary membranes
- Groundwater monitor system
- Vertical drainage system placed between primary and secondary systems to facilitate flow of leaked groundwater down to sump pumps



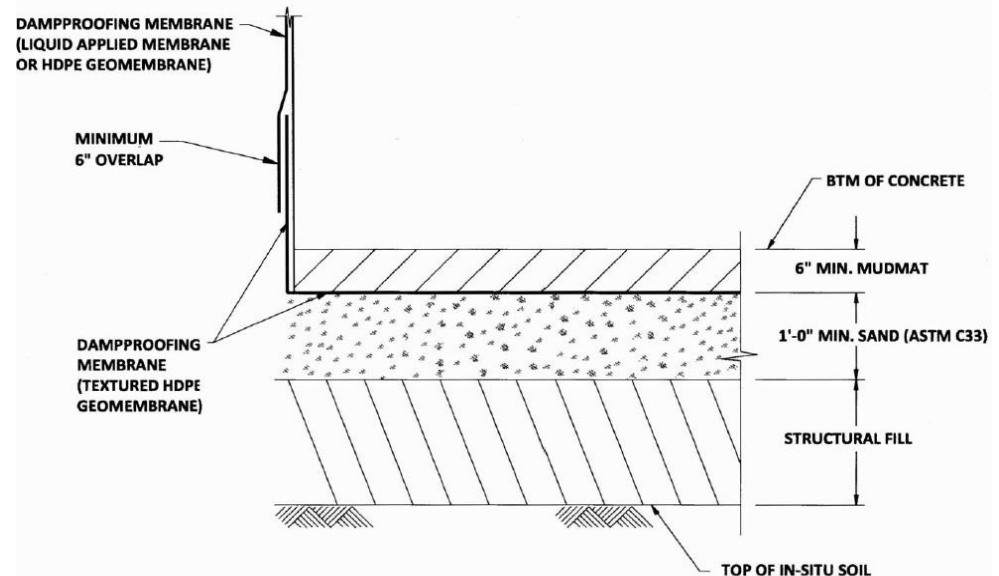
2.4 Hydrologic Engineering

COL Information Item 2.4-13

Dampproofing system will protect the portions of the Emergency Power Generation Buildings (EPGBs) above the groundwater table.

➤ Dampproofing system

- EPGBs are above groundwater
- EPGBs sit on engineered structural fill
- Exposure from pluvial drainage is low
- However, HDPE membrane system implemented for defense in depth



2.4 Hydrologic Engineering

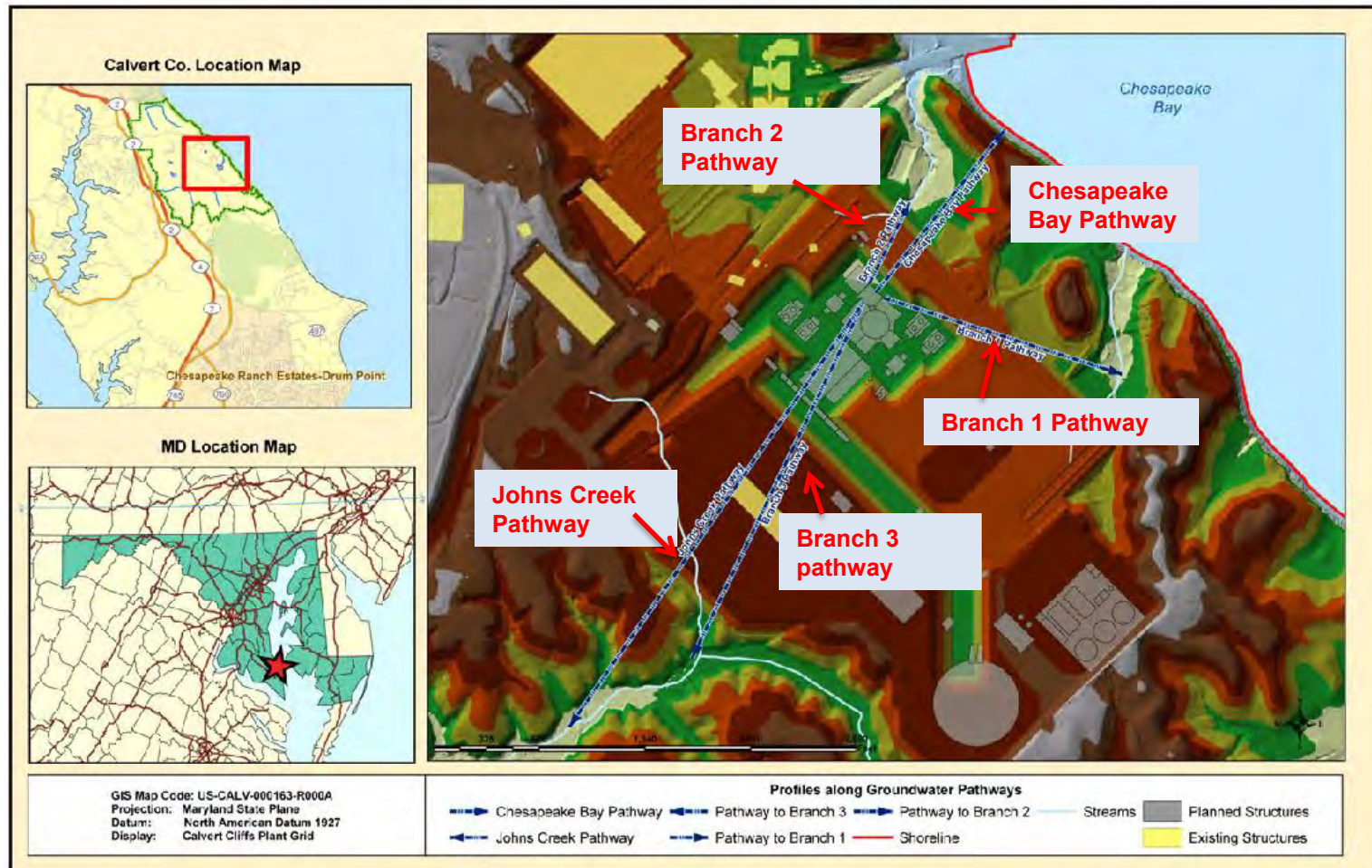
COL Information Item 2.4-14



- A COL applicant will provide site-specific information on the ability of the groundwater and surface water environment to delay, disperse, dilute or concentrate accidental radioactive liquid effluent releases, regarding the effects that such releases might have on existing and known future uses of groundwater and surface water resources.
- Pathways of Liquid Effluents in Groundwater
 - A radionuclide transport analysis has been conducted to estimate the radionuclide concentrations that might impact existing and future water users in the vicinity of CCNPP Unit 3 based on an instantaneous release of the radioactive material contents of a Reactor Coolant Storage Tank (RCST).
 - The results of this evaluation indicate the total ingestion exposure is:
 - ✓ 32.58 millirem per year for the pathway through the Upper Chesapeake unit to Branch 2,
 - ✓ 12.42 millirem per year for transport through the Upper Chesapeake unit to Chesapeake Bay,
 - ✓ 73.98 millirem per year for alternative transport through the fill material to Branch 2.
 - ✓ In all cases, the exposure is below the allowable total exposure level to individual members of the public of 100 millirem/yr required in 10 CFR 20.1301 (primary risk drivers are H-3 and I-131).

2.4 Hydrologic Engineering COL Information Item 2.4-14

Figure 2.4-111— {Plan View of Subsurface Contaminant Pathways}



2.4 Hydrologic Engineering

COL Information Item 2.4-14



- A COL applicant will provide site-specific information on the ability of the groundwater and surface water environment to delay, disperse, dilute or concentrate accidental radioactive liquid effluent releases, (continued)
- Pathways of Liquid Effluents Surface Water
 - Reactor Coolant Storage Tank and/or Liquid Waste Storage Tank ruptures would flood the lowest levels (-45 ft) of the Nuclear Auxiliary and Waste Buildings, respectively.
 - It is unlikely that a release could reach the ground surface and be capable of impacting surface water.
 - The concrete floor supporting the Volume Control Tank in the Fuel Building is at grade level. However, the room containing this tank is centrally located in the interior of the Fuel Building, and the tank is entirely surrounded by concrete walls.
 - There are no doors providing entry to this room and access is only possible via a ladder through the top of the room. Therefore, a postulated release from the Volume Control Tank will not leave the Fuel Building, reach the ground surface, and impact surface water.

2.4 Hydrologic Engineering

COL Information Item 2.4-14



- A COL applicant will provide site-specific information on the ability of the groundwater and surface water environment to delay, disperse, dilute or concentrate accidental radioactive liquid effluent releases, (continued)
- Pathways of Liquid Effluents Surface Water (continued)
 - Two heat exchangers in each of the three Safeguards Buildings are located at grade level.
 - ✓ One Safeguards Building (Building 2/3) houses its grade level heat exchangers within double wall concrete containment, and has no exterior doors leading into the building at grade level.
 - ✓ The remaining Safeguard Buildings (Buildings 1 and 4) do not have double wall containment, and grade level exterior entry doors are present. However, these doorways are designed with six inch concrete thresholds, and the doors are watertight to a flood depth of one meter.
 - ✓ It is unlikely that a release from the grade level heat exchangers in the Safeguard Buildings will reach the ground surface and impact surface water.
 - Because there are no outdoor tanks that could release radioactive effluent, no accident scenario could result in the release of effluent directly to the surface water from outdoor tanks.

2.4 Hydrologic Engineering

COL Information Item 2.4-15



- A COL applicant will describe any emergency measures required to implement flood protection in safety-related facilities and to verify that there is an adequate water supply for shutdown purposes.
- Need for Technical Specifications and Emergency Operations Requirements
 - The information provided concludes that there is no need for emergency protective measures designed to minimize the impact of hydrology-related events on safety-related facilities.
 - Therefore, the requirements of 10 CFR50.36, 10 CFR Part 50, Appendix A, General Design Criteria 2, and 10 CFR Part 100 are met with respect to determining the acceptability of the site.
 - In summary:
 - ✓ The worst case low water event does not pose a potential of interrupting the supply of cooling water.
 - ✓ No emergency protective measures are required to minimize the effect of hydrology-related events on safety-related facilities
 - Confirmation of watertight conditions for the UHS MWIS will be accomplished through routine operator rounds and surveillance of the components comprising the watertight compartments.

2.4 Hydrologic Engineering

CONCLUSIONS

Conclusions



- No Departures and No Exemptions from the U.S. EPR FSAR for Calvert Cliffs Unit 3, Chapter 2.4.
- No ASLB Contentions.
- Fifteen (15) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapters 2.4 FSAR.
- One (1) Confirmatory Item has been identified:
 - ✓ One (1) will be incorporated into revision 10 of the Calvert Cliffs Unit 3 COLA.
- Two (2) SER-Open Items have been identified.

Acronyms

- **ACI – American Concrete Institute**
- **ACRS – Advisory Committee on Reactor Safeguards**
- **ASCE – American Society of Civil Engineers**
- **ASLB – Atomic Safety & Licensing Board**
- **ASME – American Society of Mechanical Engineers**
- **CCNPP – Calvert Cliffs Nuclear Power Plant**
- **COL – Combined License**
- **COLA – COL Application**
- **CWS – Circulating Water System**
- **ECL – Effluent Concentration Limits**
- **EOF – Emergency Operations Facility**
- **ERC – Estuarine Research Center**
- **EPGB – Emergency Power Generating Building**
- **ESWB – Essential Service Water Building**
- **FSAR – Final Safety Analysis Report**
- **HEC-HMS – Hydrologic Engineering Center – Hydrologic Modeling System**
- **HEC-RAS – Hydrologic Engineering Center – River Analysis System**
- **IBR – Incorporate by Reference**
- **LNG – Liquid Natural Gas**
- **MWIS – Makeup Water Intake Structure**
- **NI – Nuclear Island**
- **NWS – National Weather Service**
- **PMF – Probable Maximum Flood**
- **PMH – Probable Maximum Hurricane**
- **PMP – Probable Maximum Precipitation**
- **PMSS – Probable Maximum Storm Surge**
- **PMT – Probable Maximum Tsunami**
- **psi – pounds per square inch**
- **RAI – Request for Additional Information**
- **RCOLA – Reference COL Application**
- **RCST – Reactor Coolant Storage Tank**
- **RG – Regulatory Guide**
- **SB – Safeguards Building**
- **SCC – Stress Corrosion Cracking**
- **SER – Safety Evaluation Report**
- **SLOSH – Sea, Lake, and Overland Surges from Hurricanes**
- **SPH – Standard Project Hurricane**
- **SSCs – Structures, Systems and Components**
- **SSE – Safe Shutdown Earthquake**
- **UFSAR – Updated Final Safety Analysis Report**
- **UHS – Ultimate Heat Sink**
- **USACE – U.S. Army Corps of Engineers**



UNISTAR NUCLEAR ENERGY

**Presentation to ACRS
U.S. EPR™ Subcommittee
Calvert Cliffs Nuclear Power Plant Unit 3
FSAR Chapter 9, Auxiliary Systems
November 6, 2013**



Introduction



- RCOLA authored using 'Incorporate by Reference' (IBR) methodology.
- To simplify document presentation and review, only supplemental information, site-specific information, or Departures/exemptions from the U.S. EPR FSAR are contained in the COLA.
- AREVA U.S. EPR FSAR ACRS Meetings for Chapter 9 – Auxiliary Systems occurred on November 14, 2011 and February 22, 2012.

Introduction



- Three (3) Departures and No Exemptions from the U.S. EPR FSAR for Calvert Cliffs Unit 3, Chapter 9
- No ASLB Contentions
- Thirty Five (35) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 9.

Introduction



- Today Mark Finley, UniStar - President, CEO and CNO, will present the Calvert Cliffs Unit 3 FSAR Chapter 9.
- Today's presentation was prepared by UniStar and is supported by Bechtel, and AREVA.
 - Robert Randall, UniStar – Mechanical Engineering
 - Shankar Rao, Bechtel – Project Engineer
 - Stephen Huddleston, AREVA – Engineering Manager, BOP Systems
- The focus of today's presentation will be on site-specific information that supplements the U.S. EPR FSAR.

Chapter 9 Auxiliary Systems Agenda



- **CHAPTER 9, AUXILIARY SYSTEMS**
 - **9.1 FUEL STORAGE and HANDLING SYSTEMS**
 - **9.2 WATER SYSTEMS**
 - **9.3 PROCESS AUXILIARIES**
 - **9.4 AIR CONDITIONING, HEATING, COOLING
and VENTILATION SYSTEMS**
 - **9.5 OTHER AUXILIARY SYSTEMS**
- **CONCLUSIONS**



Chapter 9

Auxiliary Systems

9.1 FUEL STORAGE and HANDLING SYSTEMS

9.1 FUEL STORAGE and HANDLING SYSTEMS

COL Information Item 9.1-2



- Item 9.2-2: A COL applicant will perform appropriate tests and analyses, which demonstrate that an identified NRC-approved cask can be safely connected to the spent fuel cask transfer facility (SFCTF), and the cask and its adapter meet the criteria specified in U.S. EPR FSAR Table 9.1.4-1, prior to initial fuel loading into the reactor.
- Fuel Handling System (License Condition)
 - Spent fuel cask transfer facility (SFCTF), and the cask and its adapter will be tested before initial fuel loading, the testing will consist of:
 - ✓ Verify the penetration leak tightness with loading pit filled with water, and
 - ✓ Verify the cask loading sequence and the sequential interlocking with the actual cask and a dummy assembly under water.
 - The licensee shall not use the SFCTF for initial cask loading operations until:
 - ✓ The licensee performs the tests, verifies that the results of the tests fall within the acceptance criteria, and
 - ✓ Submits a report to the Director of the Office of New Reactors or the Director's designee.

9.1 FUEL STORAGE and HANDLING SYSTEMS

COL Information Item 9.1-2

U.S. EPR FSAR
Table 9.1.4-1—Spent Fuel Cask Requirements

Type	Requirement
Dimensional Requirements	The dimensions of the cask are less than the following: <ul style="list-style-type: none"> • Height 5820 mm. • Diameter 2500 mm.
Dose Requirements	Dose rates from a loaded cask during cask handling operations do not exceed those identified in Section 12.3.
Cooling Requirements	The cask shall be capable of dissipating the decay heat from fuel assemblies loaded in the cask without supplemental cooling.
Material Requirements	The materials of construction of the cask are compatible with the operating environment including radiation, heat and borated water.
Support System Requirements	The cask shall have provisions for connecting process lines for water filling and draining, and drying of the cask. The mating surface of the cask maintains a leak-tight connection with the penetration assembly when the cask is connected to the penetration. The piping/valves that connect to the cask and serve as a fluid boundary to the cask loading pit up to and including the first valve (if a normally closed valve), or up to and including a second isolation valve (if a normally open valve with auto close or remote close capability) shall be designed in accordance with ASME Boiler and Pressure Vessel Code, Section III, The American Society of Mechanical Engineers, 2004.
Seismic Requirements	The cask shall be designed to withstand a site-specific safe shutdown earthquake (SSE), with seismic response spectra bounded by the generic response spectra shown in FSAR Figures 3.7.2-110, -111, and -112.
Structural Requirements	The loads transferred to the SFCTF components and FB structures under normal operating conditions are within the following: <ul style="list-style-type: none"> • Maximum weight of fully loaded cask, including spent fuel assemblies and water, is 115,000 kg. • Distributed loads on the walls of the loading hall do not exceed 25 psf during normal operation. • Distributed loads on the floor of the loading hall do not exceed 200 psf during normal operation. • Total dead weight load of the SFCTM and fully loaded cask on the floor of the loading hall does not exceed 858 kips during normal operation. The loads transferred to the SFCTF components and FB structures under a site-specific SSE and postulated drop of a fuel assembly from the maximum handling height in the cask loading pit onto a connected cask, are within the load capacity of the components and structures, and meet the leakage, dose and cooling requirements listed above.

9.1 FUEL STORAGE and HANDLING SYSTEMS

COL Information Item 9.1-1



- A COL applicant that references the U.S. EPR design certification will provide site-specific information on the heavy load handling program, including a commitment to procedures for heavy load lifts in the vicinity of irradiated fuel or safe shutdown equipment, and crane operator training and qualification.
- Overhead Heavy Load Handling System Program
 - Procedures address the following:
 - ✓ Identification of any heavy loads and heavy load handling equipment outside the scope of loads described in the U.S. EPR FSAR and the associated heavy load attributes (load weight and typical load path),
 - ✓ Required equipment inspections and acceptance criteria prior to performing lift and movement operations,
 - ✓ Approved safe load paths and exclusion areas, safety precautions and limitations, equipment required for the heavy load lift, and
 - ✓ When heavy loads must be carried directly over the spent fuel pool, reactor vessel or safe shutdown equipment, procedures will limit the height of the load and the time the load is carried.

9.1 FUEL STORAGE and HANDLING SYSTEMS

COL Information Item 9.1-1

- A COL applicant that references the U.S. EPR design certification will provide site-specific information on the heavy load handling program (continued)
- Overhead Heavy Load Handling System Program (continued)
 - ✓ When heavy loads could be carried (i.e., no physical means to prevent) but are not required to be carried directly over the spent fuel pool, reactor vessel or safe shutdown equipment, procedures will define an area over which loads shall not be carried so that if the load is dropped, it will not result in damage to spent fuel or operable safe shutdown equipment or compromise reactor vessel integrity,
 - ✓ Where intervening structures are shown to provide protection, no load travel path is required.
- Inspection and Testing
 - ✓ Cranes addressed in U.S. EPR FSAR Section 9.1.5 are inspected, tested, and maintained in accordance with ASME B30.2. Prior to making a heavy load lift, an inspection of the crane is made in accordance with ASME B30.2.
- Training and Qualification
 - ✓ Training and qualification of operators of cranes addressed in U.S. EPR FSAR Section 9.1.5 meet the requirements of ASME B30.2.



Chapter 9

Auxiliary Systems

9.2 WATER SYSTEMS

9.2 WATER SYSTEMS

COL Information Item 9.2-4



- A COL applicant will provide a description of materials that will be used for the essential service water system (ESWS) at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.
- Essential Service Water (ESW) System Materials
 - The ESWS piping, valves and fittings are made of carbon steel. This is compatible with the normal water chemistry in the UHS tower basin.
 - Carbon Steel buried piping is coated and wrapped and provided with appropriate cathodic protection.
 - The UHS cooling towers are constructed of reinforced concrete, tower fill is constructed of ceramic tile, spray piping and nozzles are fabricated of corrosion resistant materials (e.g., stainless steel, bronze), and the cooling tower basin is made of concrete.
 - Appropriate chemical treatment is used to maintain the quality of water in the basin at an acceptable level to reduce corrosion and scaling, of ESWS components during normal operation.

9.2 WATER SYSTEMS

COL Information Item 9.2-4



- A COL applicant will provide a description of materials that will be used for the essential service water system (ESWS) (continued)
- Essential Service Water (ESW) System Materials (continued)
 - Under normal operation, the ESWS is exposed to desalinated water treated with corrosion inhibitors.
 - During post Design Basis Accident (DBA) scenario, the ESWS may be exposed to brackish water if the nonsafety-related source of desalinated water is unavailable from 72 hours to 30 days after the DBA.
 - An evaluation of corrosion rates during the post 30-day DBA scenario has been performed to demonstrate that the ESWS will continue to perform its functions.
 - Buried piping has appropriate internal lining (e.g. 2-layer fusion-bonded epoxy, or Type II cement) and external coating (e.g. epoxy).
 - Inspection and Testing Requirements
 - ✓ Inservice inspection of the ESW System including piping, valves, pumps and components is performed in accordance with the requirements of ASME Section XI and ASME OM Code.
 - ✓ The ESW System is designed to permit periodic inspection of components necessary to maintain the integrity and capability of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 45.

9.2 WATER SYSTEMS

Potable and Sanitary Water System

COL Information Item 9.2-2



- A COL applicant will provide site-specific details related to the sources and treatment of makeup to the PSWS along with a simplified piping and instrumentation diagram.
- Potable and Sanitary Water System (PSWS)
 - Calvert Cliffs Nuclear power Plant (CCNPP) Unit 3 classifies the system as two systems:
 - ✓ Potable Water System,
 - ✓ Sanitary Water System.
- Potable Water System
 - Delivers drinking quality water to various points throughout the plant, to individual components and for use as process water in other systems inside the Nuclear Island (NI) and the Conventional Island (CI).
 - Provides potable water at a flow rate sufficient to meet demand and keep potable water pressure above connected equipment's or systems' pressures.

9.2 WATER SYSTEMS

Potable Water System

COL Information Item 9.2-2

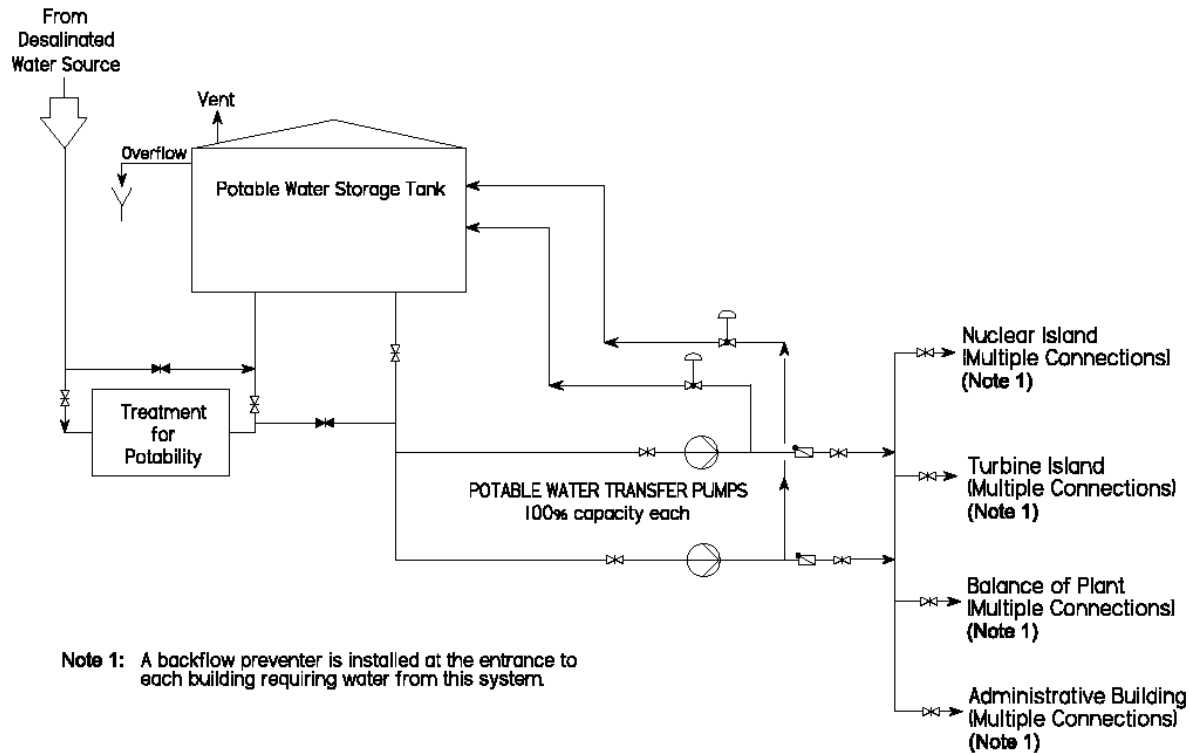


- A COL applicant will provide site-specific details related to the sources and treatment of makeup to the PSWS (continued)
- Potable Water System (continued)
 - Consists of treatment of incoming water from the desalinization plant for potability.
 - The potability treatment can be bypassed for maintenance, provided appropriate condition of the supply/makeup water from the desalinization plant is confirmed.
 - Branch connections to equipment, including hose bibs, or to other systems are individually isolable and are equipped with backflow preventers to prevent backflow and potential contamination of the Potable Water System.
 - In compliance with Criterion 60 of Appendix A to 10 CFR 50, this system is not connected to any components or other systems that have the potential to carry radiological material.

9.2 WATER SYSTEMS

Potable Water System

COL Information Item 9.2-2



9.2 WATER SYSTEMS

Sanitary Water System

COL Information Item 9.2-2



- A COL applicant will provide site-specific details related to the sources and treatment of makeup to the PSWS (continued)
- Sanitary Water System
 - Collects water discharged from water closets, urinals, showers, sinks and other sources of sanitary water, with the exception of that from sources within the radiologically controlled area (RCA).
 - Sources within the RCA are directed to the Liquid Radwaste System by the Nuclear Island (NI) vents and drains system.
 - Some locations within the NI have sanitary waste water streams are directed to the Waste Water Treatment Facility, because they have no connections to systems with the potential to carry radioactive materials.
 - Directs waste water via the domestic waste water collection system through the sewage treatment plant for processing.
 - Compliance with Criterion 60 of Appendix A to 10 CFR 50, sanitary waste piping in the Access Building leads from the non-RCA through the portion of the Sanitary Waste Water System that collects domestic waste water.
 - ✓ This sanitary waste piping is completely separate from the NI vents and drains system.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

Supplemental Information

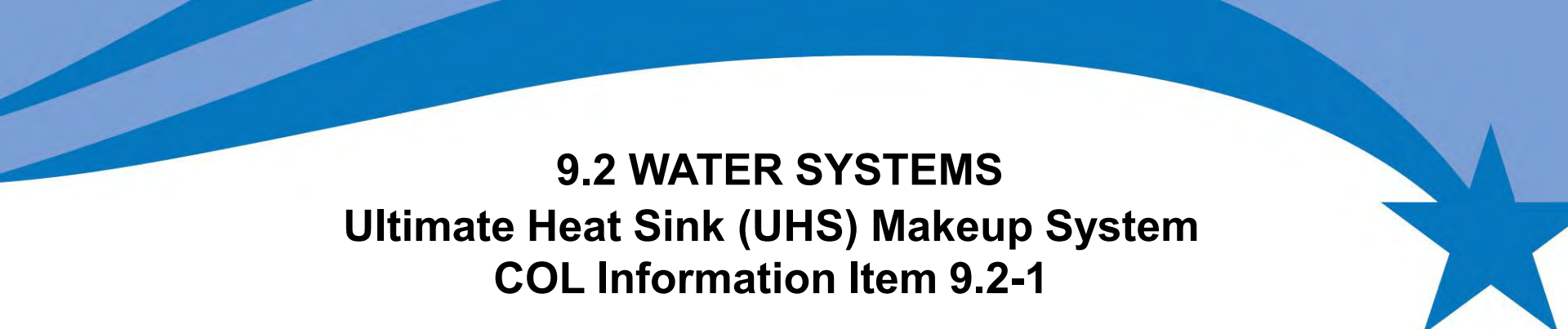
- A COL Applicant will provide site specific design information corresponding to U.S. EPR FSAR Figure 9.2.5-2 [[Conceptual Site Specific UHS Systems]].
- Ultimate Heat Sink (UHS) Makeup System
 - UHS support systems are schematically represented in Figure 9.2-3.
 - For the two operational cooling tower basins, normal essential service water makeup provides a maximum of 660 gpm of desalinated water to replenish UHS inventory losses due to evaporation, blowdown, drift, and provide makeup water to the UHS Makeup Water System to maintain the system full.
 - UHS cooling tower normal blowdown discharges up to 61 gpm of water to the retention basin to maintain ESWS chemistry. This quantity is based on maintaining no more than a ten fold increase in concentration in the cooling tower basin from the concentration in the normal UHS makeup system.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System Supplemental Information



- A COL Applicant will provide site specific design information corresponding to U.S. EPR FSAR Figure 9.2.5-2 [[Conceptual Site Specific UHS Systems]]. (continued)
 - The safety-related UHS Makeup Water pumps provide makeup water to each operating UHS cooling tower basin, starting 72 hours post-accident, at a maximum flow rate of approximately 750 gpm (reduced to approximately 510 gpm when screen wash is operating, 300 gpm required to tower basin).
 - The UHS Makeup Water System is designed to permit periodic inspection of components necessary to maintain the integrity and capability of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 45.
 - The UHS Makeup Water System is designed to permit operational functional testing of safety-related components to ensure operability and performance of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 46.



9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-1

- A COL applicant will provide site-specific information for the UHS support systems such as makeup water, blowdown and chemical treatment (to control biofouling).
- UHS Makeup Water Chemical Treatment
 - There are chemical additives used in the UHS cooling towers to reduce scaling and corrosion, and to treat potential biological contaminants, which are added via the normal ESWS piping.
 - The treatment system consists of multiple skid-mounted arrangements, one for each division's ESWS cooling tower. Each skid contains the equipment, instrumentation and controls to fulfill the system's function of both monitoring and adjusting water chemistry.
 - Chemical additions to the ESWS cooling towers are made as necessary on a periodic or continuing basis.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-1



- A COL applicant will provide site-specific information for the UHS support systems such as makeup water, blowdown and chemical treatment (to control biofouling). (continued)
- The specific chemicals and addition rates are determined by periodic water chemistry analyses. The chemicals are divided into six categories, based on function:
 - ✓ biocide - prevents buildup of potentially damaging aquatic life, such as zebra mussels, and controls bacterial growth in the UHS cooling towers (particularly Legionellae).
 - ✓ algaecide - prevents buildup of potentially damaging algae and plant growth.
 - ✓ pH adjuster - counteracts the acidic effects of the algaecide.
 - ✓ corrosion inhibitor - prevents corrosion of piping and components due to saltwater environment and exposure.
 - ✓ scale inhibitor - prevents buildup of scale and mineral deposits that could inhibit process flow.
 - ✓ silt dispersant - prevents buildup of hard silt deposits.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-9



- A COL applicant will compare site-specific chemistry data for normal and emergency makeup water to the parameters in EPR FSAR Table 9.2.5-5. If the specific data for the site fall within the assumed design parameters in Table 9.2.5-5, then the U.S. EPR standard design is bounding for the site. For site-specific normal and emergency makeup water data or characteristics that are outside the bounds of the assumptions presented in Table 9.2.5-5, the COL applicant will provide an analysis to confirm that the U.S. EPR UHS cooling towers are capable of removing the design basis heat load for a minimum of 30 days without exceeding the maximum specified temperature limit of the ESWS and minimum required basin water level.
- In a comparison of the Calvert Cliffs Unit 3 site-specific water chemistry with the parameters listed in U.S. EPR FSAR Table 9.2.5-5, it was determined that the site-specific data for both UHS normal (desalinated) makeup water and UHS emergency (Chesapeake Bay) makeup water do not fall within the assumed design parameters of U.S. EPR FSAR Table 9.2.5-5.
- For normal operation, the water in the ESW cooling tower basin will be maintained within the specific limits from the U.S. EPR FSAR Table 9.2.5-5 using the chemical addition system.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-9



- A COL applicant will compare site-specific chemistry data for normal and emergency makeup water to the parameters in EPR FSAR Table 9.2.5-5. (continued)
- Regarding Emergency Makeup chemistry outside of the assumed design parameters, an analysis of the UHS Cooling Tower Basin Chemistry indicated that at the end of the thirty (30) days post DBA period :
 - ✓ The Total Dissolved Solids (TDS) concentration of the cooling water in the basin will increase. An analysis of the U.S. EPR UHS Sizing Criteria indicated that the cooling tower heat load decreases significantly after 72 hours post DBA,
 - ✓ An analysis is performed by the prospective cooling tower vendor, which determined that at the end of thirty days, the cooling tower basin water temperature will remain below 95°F with the increased TDS in the basin water and credited reduced cooling tower heat load,
 - ✓ U.S.EPR Tier 1, Table 2.7.11-3, ITAAC 7.9 and 7.10 will confirm the UHS cooling towers are capable of removing the design heat load without exceeding the maximum design temperature and without water level dropping below the minimum design level limit for ESWS.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-5



- A COL applicant will provide a description of materials that will be used for the UHS at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.
- UHS Makeup System Materials
 - Two buried 60" safety-related pipes from Chesapeake Unit 1 &2 intake channels to the Circulating Water System & UHS common forebay:
 - ✓ Carbon steel pipe lined internally with cement, coated externally with a high solids epoxy.
 - ✓ Additionally, the exterior surface of buried piping exposed to the soil is cathodically protected.
 - ✓ Either pipe can be isolated for maintenance as the other pipe is capable of providing 100% flow.
 - The four vertical pumps are designed to ASME Section III, Class 3 requirements:
 - ✓ Constructed of super austenitic stainless steel, which is compatible with the brackish UHS makeup water.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-5



- A COL applicant will provide a description of materials that will be used for the UHS at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.(continued)
- Isolation valves are safety-related motor operated valves (MOVs) & manual valves are:
 - ✓ Constructed of super austenitic stainless steel.
- Self-cleaning strainers, one on the discharge side of each UHS Makeup Water pump are:
 - ✓ Constructed of super austenitic stainless steel,
- The 8" diameter buried and aboveground UHS Makeup Water System piping and fittings that perform safety functions are:
 - ✓ Constructed of super austenitic stainless steel,
 - ✓ Exterior surface of buried piping exposed to the soil is cathodically protected,
 - ✓ Additionally, the piping is flushed quarterly with the brackish Chesapeake Bay water to the retention basin.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-5



- A COL applicant will provide a description of materials that will be used for the UHS at their site location, including the basis for determining that the materials being used are appropriate for the site location and for the fluid properties that apply.(continued)
- ESWS Cooling Tower Emergency Blowdown System Isolation Valves
 - ✓ Constructed of materials compatible with the brackish UHS emergency makeup water.
- ESWS Cooling Tower Normal Blowdown System Piping, Valves and Fittings
 - ✓ Constructed of carbon steel material because the normal blowdown is non-brackish water from the normal ESWS makeup system.
- Screen Wash System Components
 - ✓ Constructed of materials compatible with the brackish UHS emergency makeup water.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-10



- A COL applicant will perform an evaluation of the interference effects of the UHS cooling tower on nearby safety-related air intakes. This evaluation will confirm that potential UHS cooling tower interference effects on the safety related air intakes does not result in air intake inlet conditions that exceed the U.S. EPR Site Design Parameters for Air Temperature as specified in U.S. EPR FSAR Table 2.1-1.
- UHS Cooling Tower Interference on Safety-Related Intakes
 - An evaluation has been performed of the interference effects of the UHS cooling tower plumes on nearby safety-related air intakes.
 - The evaluation concluded that there are no adverse effects on the safety functions of the systems, either due to insensitivity to higher wet bulb temperatures or design features that isolate the fresh air intake of the system.
 - For Main Control Room (MCR) and Safeguard Building (SB) Heating Ventilation & Air Conditioning (HVAC), there is sufficient margin in the system to accommodate the minor effects of a small wet bulb temperature increase – determined to be less than 2.5°F by computational fluid dynamics analysis.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-6



- A COL applicant will confirm by analysis of the highest average site-specific wet bulb and dry bulb temperatures over a 72-hour period from a 30-year hourly regional climatological data set that the site-specific evaporative and drift losses for the UHS are bounded by the values presented in Table 9.2.5-3.
- Maximum Evaporation and Drift in the Ultimate Heat Sink
 - The U.S. EPR and CCNPP Unit 3 utilize the same 72-hour period of temperature data to determine maximum evaporation of water from the UHS.
 - Therefore, the worst CCNPP Unit 3 meteorological conditions resulting in maximum evaporation and drift loss of water for the UHS over a 72 hour period are bounded by U.S. EPR FSAR Table 9.2.5-3.

9.2 WATER SYSTEMS

COL Information Item 9.2-8



- A COL applicant will confirm that the site-specific UHS makeup capacity is sufficient to meet the maximum evaporative and drift water loss after 72 hours through the remainder of the 30-day period consistent with RG 1.27.
- Maximum Evaporation and Drift in the Ultimate Heat Sink
 - The CCNPP Unit 3 UHS Makeup Water System provides ≥ 300 gpm, of makeup water to the each of the four UHS Cooling Tower basin starting 72 hours post DBA, as required by U.S. EPR FSAR Table 9.2.5-2.
 - The CCNPP Unit 3 UHS Makeup Water pumps are sized to provide a maximum of approximately 750 gpm to the UHS Cooling Tower basin.
 - ✓ This flow is sufficient to provide the minimum required flow even when the intermittent traveling screen wash and the intermittent strainer wash systems are operating.
 - ✓ Maintain the water level in the UHS Tower basin above the minimum water level for the ESW pump Net Positive Suction Head (NPSH) and Vortex Suppression, considering the maximum evaporation and drift loss after 72 hours and up to 30 days post DBA.

9.2 WATER SYSTEMS

COL Information Item 9.2-8



- A COL applicant will confirm that the site-specific UHS makeup capacity is sufficient to meet the maximum evaporative and drift water loss after 72 hours through the remainder of the 30-day period consistent with RG 1.27. (continued)
- Maximum Evaporation and Drift in the Ultimate Heat Sink (continued)
 - The U.S. EPR design 72-hour meteorological conditions resulting in maximum evaporation and drift from the UHS Cooling Tower, are depicted in U.S. EPR FSAR Table 9.2.5-3.
 - This data is identical to the CCNPP Unit 3 values for the 72-hour meteorological conditions, resulting in identical maximum evaporation and drift loss.
 - Therefore, the CCNPP Unit 3 UHS Makeup water capacity is bounded by U.S. EPR Makeup Water capacity, to meet the maximum evaporation and drift loss starting 72 hours post DBA through the remainder of the 30 day period.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

COL Information Item 9.2-7



- A COL applicant will confirm that the site characteristic sum of 0% exceedance maximum non-coincident wet bulb temperature and the site-specific wet bulb correction factor does not exceed the value provided in U.S. EPR FSAR Table 9.2.5-2. If the value in Table 9.2.5-2 is exceeded, the maximum UHS cold-water return temperature of 95°F is to be confirmed by analysis.
- The maximum non-coincident wet bulb temperature plus the site-specific wet bulb correction factor for Calvert Cliffs 3 exceeds the value provided in U.S. EPR FSAR Table 9.2.5-2, and, therefore, a site specific analysis was done:
 - The U.S. EPR FSAR Table 9.2.5-2 value is 81°F, and the correction factor is 2.5°F.
 - The site-specific maximum (0% exceedance) non-coincident wet bulb temperature is 85.3°F.
 - The site-specific wet bulb correction factor was determined by computational fluid dynamics analysis, considering the meteorology of the site, to be less than 2.5°F.
 - UHS cooling tower performance was verified by showing that the maximum UHS cold water return temperature was less than 95°F, assuming the worst combination of 24-hour temperature conditions from the perspective of minimum cooling from a 30-year hourly regional climatological data set, and assuming a correction factor of 2.5°F.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

Shifting of Twenty-Four (24) Hour Peak Ambient Temperature Profile

Departure/COL Information Item 9.2-11

- A COL applicant will confirm that the maximum UHS cold-water return temperature of 95°F is met by an analysis that confirms that the worst combination of site-specific wet bulb and dry bulb temperatures over a 24-hour period, from a 30-year hourly regional climatological data set is bounded by the values presented in Table 9.2.5-4.
- Departure
 - The limiting climatological data set is the same for Calvert Cliffs Unit 3 as in US EPR FSAR Table 9.2.5-4, but the data has been conservatively shifted by six hours to align the timing of the peak ambient temperature with the peak heat discharged during a large break LOCA.
 - As stated previously, a site-specific analysis was performed to confirm the maximum UHS cold water return temperature is less than 95°F for the worst conditions at the site during the worst demand scenario – large break LOCA.
 - AREVA intends to update the US EPR FSAR and make a similar shift in the U.S. EPR FSAR Table 9.2.5-4 data in a future revision to the US EPR FSAR, and this departure will be removed when the US EPR FSAR is updated.

9.2 WATER SYSTEMS

UHS Makeup Water Pump Starting Logic Departure



- UHS Makeup Water Pump Starting Logic
 - The UHS Makeup Water System at CCNPP Unit 3 is a manually initiated system.
 - This departure was based on U.S. EPR FSAR, Tier 2 Table 9.2.1-3, Revision 4 wording for the pump start permissive associated with "Cooling tower basin water level Lo-Lo-Lo".
 - The Revision 4 wording incorrectly included a condition that could have precluded starting the Makeup Water Pump.
 - The U.S. EPR FSAR, Tier 2 Table 9.2.1-3, Revision 5, corrected this wording .
 - This departure is no longer needed and will be removed in the next CCNPP Unit 3 Combined License Application (COLA) revision.

9.2 WATER SYSTEMS

Post-DBA UHS Makeup Keep-Fill Piping Departure

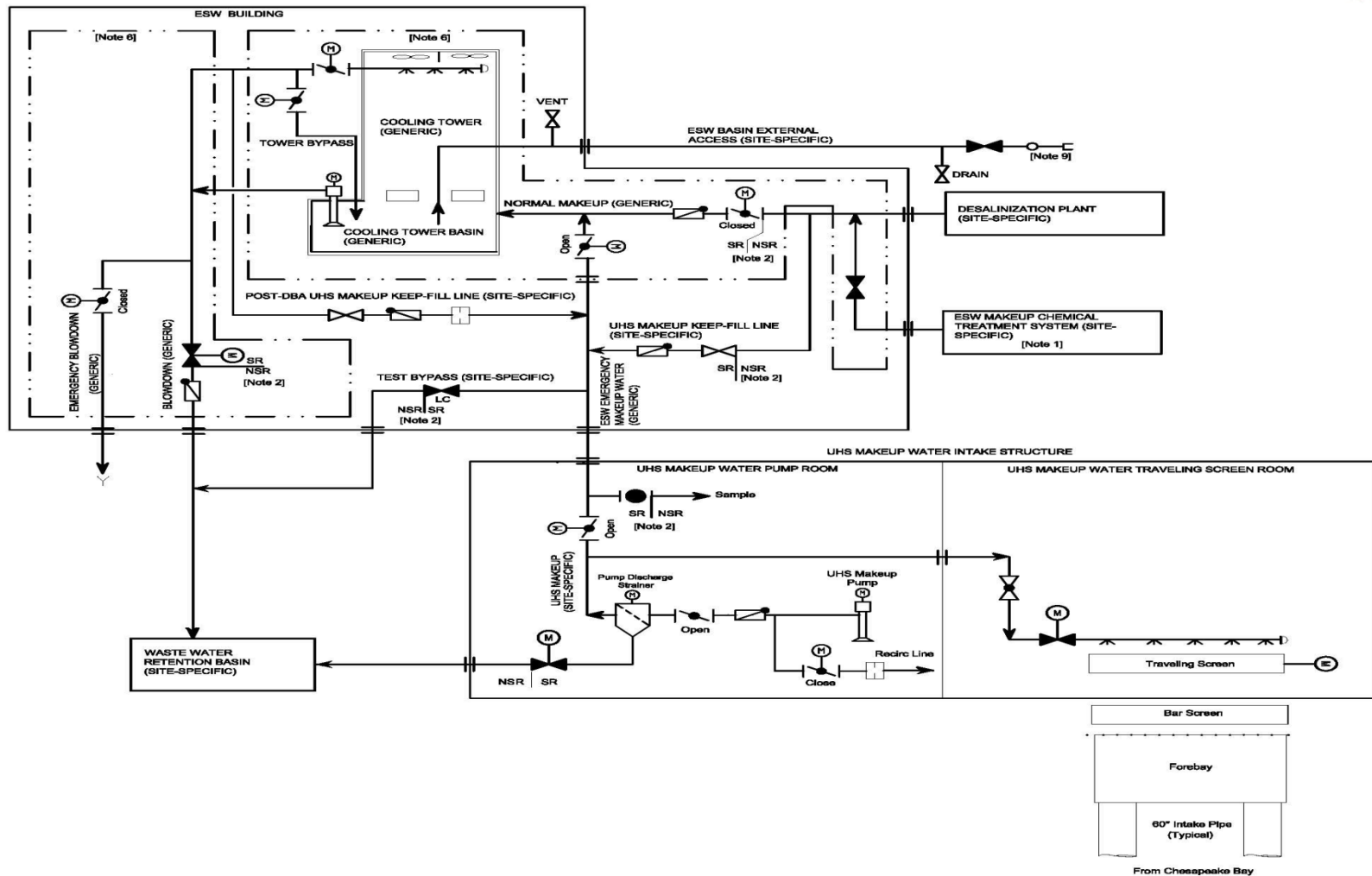


- Post-DBA UHS Makeup Keep-Fill Piping
 - The U.S. EPR Figure 9.2.5-1 does not contain a provision to compensate for the UHS Makeup Water System leakage and maintain the water level in the piping full at all times.
 - The normal UHS makeup keep fill system is designed to provide desalinated water to maintain UHS makeup system full during normal plant operation.
 - The Post-DBA UHS Makeup Keep-Fill line is added to deliver makeup water from the ESWS to the UHS Makeup Water System to compensate for the leakage loss due to pressure boundary isolation valves, and to keep the UHS Makeup Water System piping full of water at all times.
 - Therefore, the ESWS Emergency Makeup Water line piping and the ESW System return line piping are modified.
 - The UHS Makeup Water System pressure boundary is maintained through the safety-related Post-DBA UHS Makeup Keep-Fill line check valve.

9.2 WATER SYSTEMS

Ultimate Heat Sink (UHS) Makeup System

Figure 9.2-3— Normal Makeup, Emergency Makeup, Blowdown & Chemical Treatment



9.2 WATER SYSTEMS

COL Information Item 9.2-3



- The Raw Water Supply System (RWSS) and the design requirements of the RWSS are site-specific and will be addressed by the COL applicant..
- Raw Water Supply System (RWSS)
 - RWSS is Nonsafety-Related.
 - Raw water is supplied from the Circulating Water System Makeup Water System (which draws water from the Chesapeake Bay) and is directed to the desalinization plants.
 - The desalinization plant output is stored in storage tanks and delivered to the demineralized and potable water generation systems, to the fire water storage tanks and to the essential service water cooling tower basins.
 - No cross connections exist between RWSS and any system with the potential to carry radioactive material. This design requirement satisfies Criterion 60 of Appendix A to 10 CFR 50.
 - With respect to potential flooding caused by failures of piping or components, the RWSS piping is designed to preclude adverse interaction with the safety function of the ESWS cooling tower basin.

9.2 WATER SYSTEMS

COL Information Item 9.2-3



- The Raw Water Supply System (RWSS) and the design requirements of the RWSS are site-specific and will be addressed by the COL applicant. (continued)
- Raw Water Supply System (RWSS) (continued)
 - RWSS storage tank failures will not adversely affect safety-related Structures, Systems and Components (SSCs), because intervening topography and the plant storm water controls are designed to divert surface water flow away from these SSCs.



Chapter 9

Auxiliary Systems

9.3 PROCESS AUXILIARIES

9.3 PROCESS AUXILIARIES

➤ Process Auxiliaries

- This section of the U.S. EPR FSAR is completely incorporated by reference, with no COL Items, or site-specific supplemental information.
 - ✓ Systems are:
 - Compressed Air,
 - Process Sampling,
 - Equipment and Floor Drainage,
 - Chemical and Volume Control.



Chapter 9

Auxiliary Systems

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

COL Information Item 9.4-1

- A COL applicant will provide site-specific design information for the turbine building ventilation system (TBVS).
- Turbine Building Ventilation System (TBVS)
 - Does not serve any safety-related functions, has no safety design basis, and is not required to operate during or following a design basis accident. There are no safety-related SSCs in the Turbine Building.
 - The TBVS maintains the bulk average temperature within the Turbine Building during normal plant operation at or above 50°F during winter design conditions and at or below 115°F during summer design conditions.
 - The system is designed to maintain a positive pressure to mitigate intrusion of dust and dirt into the Turbine Building.
 - There are no radiation or safety actuation signals associated with the TBVS. No TBVS realignment or operator action is required in response to plant radiation or safety actuation signals.

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

COL Information Item 9.4-2



- A COL applicant will provide site-specific design information for the switchgear building ventilation system (SWBVS).
- Switchgear Building Ventilation System (SWBVS) Turbine Island
 - Does not serve any safety-related functions, has no safety design basis, and is not required to operate during or following a design basis accident. There are no safety-related SSCs in the Switchgear Building.
 - The station blackout (SBO) diesel generators divisions 1 & 2 and associated electrical equipment are located inside the Switchgear Building. Ventilation is provided to the SBO rooms by an independent ventilation system, not by the SWBVS.
 - The independent station blackout room ventilation system is described in U.S. EPR FSAR Section 9.4.10.
 - There are no radiation or safety actuation signals associated with the SWBVS. No SWBVS realignment or operator action is required in response to plant radiation or safety actuation signals.

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

Supplemental Information



- UHS Makeup Water Intake Structure Ventilation System
 - The UHS Makeup Water Intake Structure Ventilation System maintains a minimum temperature of 41° F and a maximum temperature of 104° F in the UHS Makeup Water Intake Structure,
 - ✓ Based on the 0% exceedance winter design basis outdoor ambient air temperature of 0°F DB, and the 0% exceedance summer design-basis outdoor ambient air temperatures of 102°F DB/ 80°F WB, respectively.
 - The UHS Makeup Water Intake Structure Ventilation System consists of three (3) sub-systems: the UHS makeup pump room and transformer room ventilation system, the Intake Structure personnel access areas ventilation system, and the traveling screen room ventilation system.
 - ✓ Nonsafety-related supply and exhaust fans are provided to heat and ventilate the intake structure personnel access areas corridors. Both supply and exhaust openings are provided with tornado dampers.

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

Supplemental Information



- UHS Makeup Water Intake Structure Ventilation System (continued)
 - ✓ A safety-related split-system air conditioner is provided to cool and ventilate each UHS Makeup Water System pump and transformer room.
 - Each air conditioning system recirculates room air and draws outside air to ventilate the rooms.
 - The supply air flow path includes a missile-protected outside air intake, tornado damper, and an outside air makeup connection to the safety-related air handling unit, ducted from the air-cooled condenser room.
 - The air-cooled condenser room forms the supply air plenum for the air-cooled condenser and the makeup air supply.
 - ✓ Each traveling screen room is ventilated by a safety-related exhaust fan which draws outside air through a missile protected outside air intake, tornado damper and motor operated isolation damper.
 - A safety-related unit heater is provided in each traveling screen room to maintain the minimum required temperature of 41°F in the winter.

9.4 AIR CONDITIONING, HEATING, COOLING AND VENTILATION SYSTEMS

Supplemental Information



- Fire Protection Building Ventilation System
 - Located in the two, 100% capacity diesel engine driven pump rooms, is an augmented quality system designed to be functional post-Safe Shutdown Earthquake (SSE).
 - The ventilation system in the electric motor driven pump room is a non-seismic, augmented quality system.
 - The Fire Protection Building Ventilation System maintains a minimum temperature of 40°F, based on an ambient temperature of -10°F, and a maximum temperature of 120°F, based on an outside ambient temperature of 100°F.
 - Using outside air as the cooling medium.
 - Includes a self-contained Standby Diesel Generator (SDG) to supply AC power to the components of the ventilation system, heating system, and normal and emergency lighting systems, for the two diesel engine driven pump rooms following a SSE and loss of offsite power (LOOP) or Station Blackout (SBO).
 - ✓ The SDG will provide AC power for twenty four hours, and thereafter it can provide AC power continuously by refueling the diesel engine, if the power is not restored within 24 hours.



Chapter 9

Auxiliary Systems

9.5 OTHER AUXILIARY SYSTEMS

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Item 9.5-19



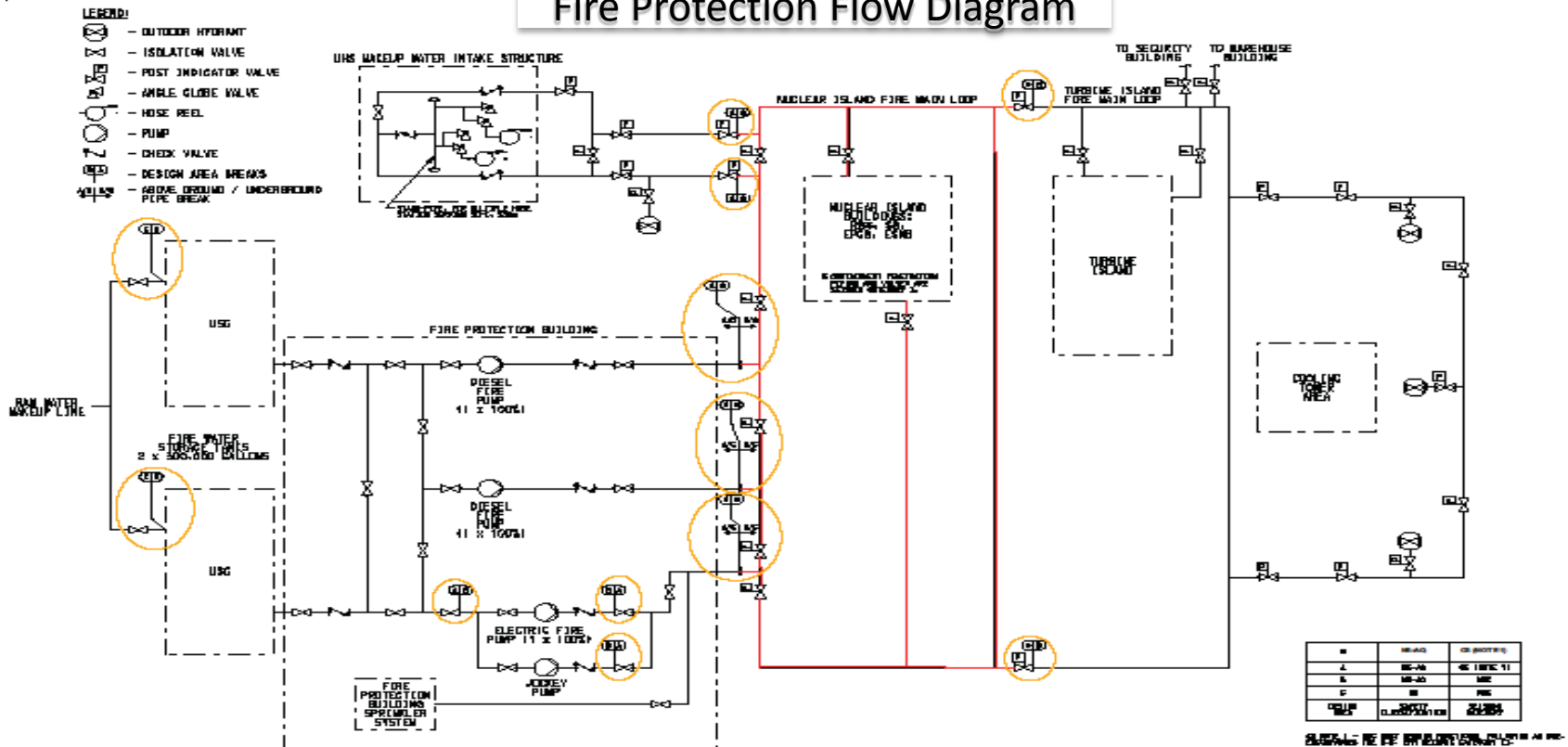
- A COL applicant will provide a description and simplified Fire Protection System piping and instrumentation diagrams for site-specific systems..
- Fire Protection System
 - Figure 9.5-1, Figure 9.5-2 and Figure 9.5-3 each provide a schematic piping and instrumentation diagram of the fire water distribution system specific to CCNPP Unit 3. These figures supplement the generic piping and instrumentation diagram provided in Figure 9.5.1-1 of the U.S. EPR FSAR.
 - Figure 9.5-1 illustrates the site-specific fire main yard loop supplying the Cooling Tower area. This non-seismic loop supplies the sprinkler system protecting the Water Treatment Building as well as the yard fire hydrants.
 - Figure 9.5-2 illustrates the site-specific fire main yard loop supplying the Intake Structure area. The loop remains functional after a SSE and supplies fire water to the above ground manual and automatic suppression systems.
 - Figure 9.5-3 illustrates the standpipe and hose stations, designated as Conventional Seismic-I, specified for the UHS Makeup Water Intake Structure.
 - A consolidated fire protection system loops are depicted in the next figure.

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Item 9.5-19

Fire Protection Flow Diagram



9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Item 9.5-14



- A COL applicant will submit site-specific information to address the Regulatory Guide 1.189, Regulatory Position C.6.2.6, Cooling Towers.
- Fire Protection System
 - The Circulating Water Cooling Tower (CWCT) is remotely located such that a fire will not adversely affect any systems or equipment important to safety.
 - Fire protection features provided to protect the CWCT include a dedicated, underground, fire protection yard loop which surrounds the CWCT, and yard hydrants located in accordance with NFPA 24.
 - The CWCT yard loop is supplied from two independent supply lines from the main fire water distribution system underground yard loop.
 - Other fire protection features provided include automatic fire detection, manual fire alarms and portable fire extinguishers.

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Item 9.5-20



- A COL applicant will describe the program used to monitor and maintain an acceptable level of quality in the fire protection system freshwater storage tanks.
- Fire Protection System
 - The fire protection water supply quality program will ensure the criteria in Regulatory Guide 1.189, Section 3.2.1, are met as follows:
 - ✓ Storage tank makeup is supplied from the desalinization plant which ultimately draws suction from the Chesapeake Bay.
 - ✓ The fire protection water supply is treated to potable quality to help prevent occurrence of biological fouling or corrosion by means of desalination and chemical treatment.
 - ✓ In addition to water treatment, the fire water storage tanks are inspected periodically for biological growth and subsequent corrosion.
 - ✓ Fire service mains, fire hydrants and fire suppression systems are also flow tested and/or drained periodically to verify treatment success and to confirm system functionality.
 - ✓ The rate of makeup flow to the fire water storage tanks is sufficient to refill the minimum fire protection volume in one tank within eight hours.

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Item 9.5-18



- A COL applicant will perform a supplemental Fire Protection Analysis for site-specific areas of the plant not analyzed by the FSAR.
- Fire Protection System
 - Appendix 9B addresses the fire protection analysis for the site-specific structures.
 - In addition, the plant will maintain an integrated fire hazards analysis (FHA) and supporting evaluations that demonstrate that the plant can:
 - ✓ Achieve and maintain post-fire safe shutdown conditions for a fire in any fire area of the plant, including alternative shutdown fire areas,
 - ✓ Maintain safe plant conditions and minimize potential release of radioactive material in the event of a fire during any plant operating mode,
 - ✓ Detail the plant fire prevention, detection, suppression, and containment features, for each fire area containing structures, systems and components (SSCs) important to safety, and
 - ✓ Achieve and maintain these safe conditions with due consideration of plant fire risk.

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Items 9.5-2, 9.5-3 & 9.5-4



- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.7.1, Design and Procurement Document Control.
 - Design and Procurement Document Control shall be in accordance with the Quality Assurance Program Description. Fire protection quality requirements are included in plant configuration control processes.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.7.2, Instructions, Procedures and Drawings.
 - The FPP provides instruction and procedures to control fire prevention and firefighting; design, installation, inspection, test, maintenance and modification of fire protection features/systems; and appropriate administrative controls in accordance with the Quality Assurance Program Description.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.7.3, Control of Purchased Material, Equipment, and Services.
 - The FPP provides procedures to control procurement of fire protection related items to ensure proper evidence of quality in accordance with of the Quality Assurance Program Description.

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Items 9.5-5, 9.5-6, 9.5-7 & 9.5-8

- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.8, Fire Protection Program Changes/Code Deviations.
- Fire Protection Program (FPP) changes or deviations will be assessed in accordance with existing regulatory guidance (i.e., NUREG-0800, SRP 9.5.1 and R.G. 1.189).
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.8.1, Change Evaluations.
- FPP program changes will be evaluated consistent with 10 CFR 50.59 and the applicable change processes in 10 CFR 52.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.8.5, 10 CFR 50.72 Notification and 10 CFR 50.73 Reporting.
- The plant will report fire events and any fire protection program deficiencies consistent with 10 CFR 50.72 and 10 CFR 50.73.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.1.8.7, Fire Modeling.
- If fire models are used to evaluate changes, the plant will apply models consistent with R.G. 1.189 including limitations on their use and adequate verification and validation (as required).

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Items 9.5-9, 9.5-10, 9.5-11 & 9.5-12



- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.5.5, Post-Fire Safe- Shutdown Procedures.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.5.5.1, Safe- Shutdown Procedures.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.5.5.2, Alternative/ Dedicated Shutdown Procedures.
- The plant will have detailed procedures and training to ensure fire-safe shutdown and other fire-safe conditions required to minimize radioactive material release are achieved and maintained.
- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.5.5.3, Repair Procedures.
- Consistent with the U.S. EPR FSAR, the plant does not permit repairs to achieve hot or cold shutdown conditions; procedures are not required.

9.5 OTHER AUXILIARY SYSTEMS

Fire Protection

COL Information Items 9.5-13 & 9.5-15



- A COL applicant will submit site specific information to address the Regulatory Guide 1.189, Regulatory Position C.6.2.4, Independent Spent Fuel Storage Areas.
 - No Independent Spent Fuel Storage Areas are planned for the plant at this time and are not included in this COL application.
- A COL will submit site specific information to address Regulatory Guide 1.189, Regulatory Position C.7.6, Nearby Facilities.
 - Appendix 9A of the U.S. EPR FSAR provides the technical analysis for the nuclear island and related power block structures and demonstrates that the EPR has the ability to achieve and maintain safe-shutdown and to minimize the release of radioactive materials to the environment.
 - FSAR Appendix 9B of this COL application provides an analysis of fire hazards and details fire protection attributes for the remainder of the plant.

9.5 OTHER AUXILIARY SYSTEMS

Communication System

COL Information Item 9.5-21



- A COL applicant will provide a description of the offsite communication system that interfaces with the onsite communication system, including type of connectivity, radio frequency, normal and backup power supplies, and plant security system interface.
- Communication System
 - The emergency off-site communication system provides interface between the on-site and off-site communication systems to allow dedicated communication access to Emergency Operations Facility (EOF), NRC, and federal and state/local agencies.
 - This system is designed to be compatible with on-site communication systems.
 - The emergency off-site communication system is powered from a Class 1E Uninterruptible Power Supply (UPS) system.
 - Interfaces to the plant security system are addressed in the Physical Security Plan.
 - The Emergency Notification System (ENS) is powered locally from either a safety-related or non safety-related power source with a UPS, having either battery or generator backup.

9.5 OTHER AUXILIARY SYSTEMS

Communication System

COL Information Item 9.5-21



- A COL applicant will provide a description of the offsite communication system that interfaces with the onsite communication system, including type of connectivity, radio frequency, normal and backup power supplies, and plant security system interface. (continued)
- Communication System
 - The ENS is routed through the site Private Branch Exchange (PBX) to provide access to multiple outbound call paths.
 - The long distance portion of the system is provided by the NRC using direct access lines (DALs) to the federal long distance service directed through a toll-free (800/888) exchange.

9.5 OTHER AUXILIARY SYSTEMS

Communication System

COL Information Item 9.5-1



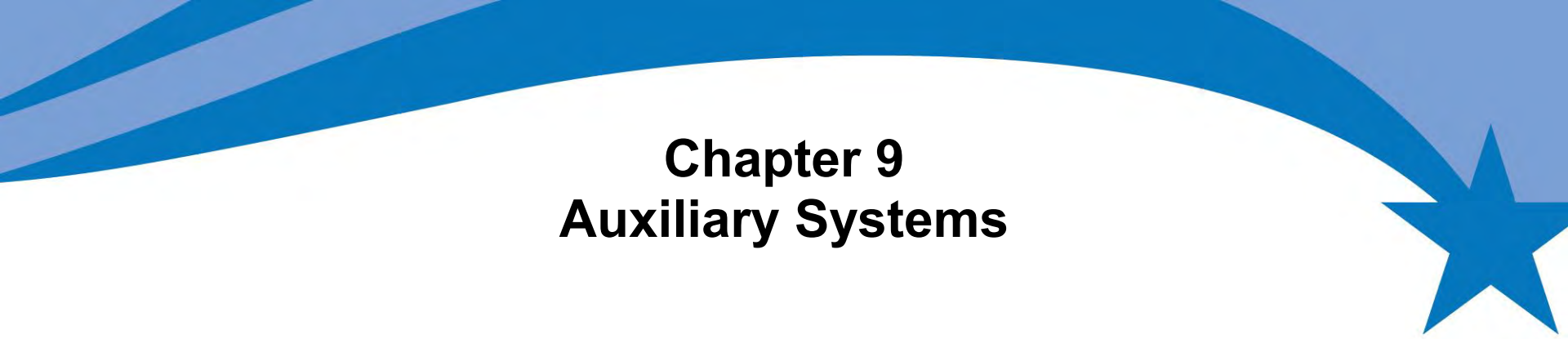
- The COL applicant will identify additional site-specific communication locations necessary to support effective communication between plant personnel in all vital areas of the plant during normal operation, as well as during accident conditions.
- Communication System
 - The UHS Makeup Water Intake Structure contains safety-related equipment and is a site-specific vital area of the plant.
 - Communication equipment will be provided in this area to support effective communication between plant personnel during normal operation, as well as during accident conditions.
 - This location will contain equipment to allow use of the plant digital telephone system, PA and alarm system, and sound powered system.
 - All the communication subsystems are available for use during normal operation of the plant.
 - The communication subsystems are powered from the Class 1E Emergency Uninterruptible Power Supply System (EUPS) or the Class 1E Emergency Power Supply System (EPSS).
 - A portable wireless communication system will also be provided for use by fire brigade and other operations personnel required to achieve safe plant shutdown.

9.5 OTHER AUXILIARY SYSTEMS

Diesel Generator Fuel Oil Storage and Transfer System

COL Information Item 9.5-22

- A COL applicant will describe the site-specific sources of acceptable fuel oil available for refilling the EDG fuel oil storage tanks within seven days, including the means of transporting and refilling the fuel storage tanks, following a design basis event to enable each diesel generator system to supply uninterrupted emergency power.
- Diesel Generator Fuel Oil
 - Calvert Cliffs Unit 3 has multiple sources of fuel oil that may be brought in by truck, barge, or air.
 - Relationships or points of contact with the entities which are the sources of the fuel oil and the means for its transportation are well established.
 - Multiple sources and means of transportation allow for the flexibility necessary in order to best respond to an event, and provides assurance of the ability to deliver fuel oil to the site.



Chapter 9

Auxiliary Systems

CONCLUSIONS

Conclusions

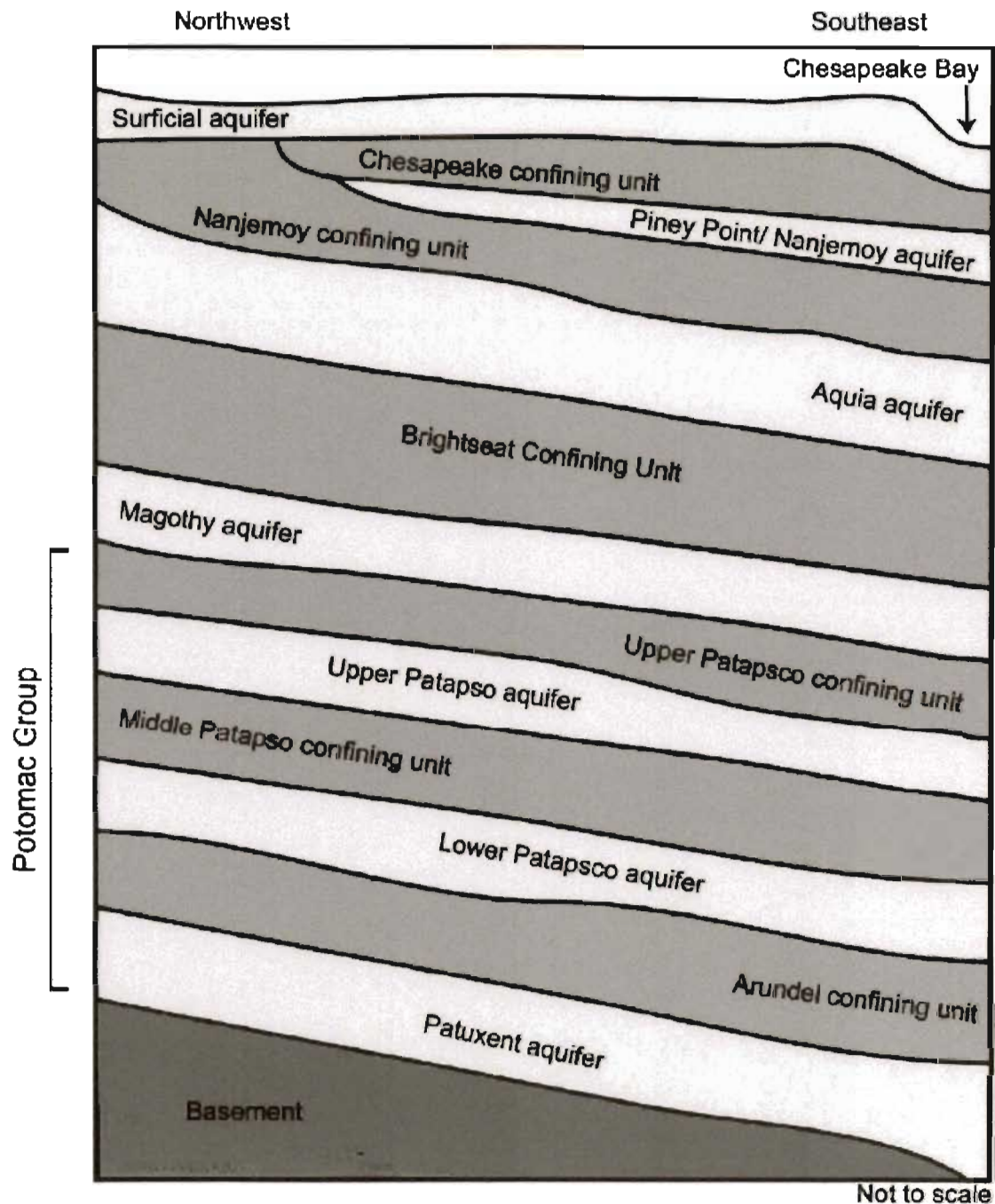


- Three (3) Departures and No Exemptions from the U.S. EPR FSAR for Calvert Cliffs Unit 3, Chapter 9.
- No ASLB Contentions.
- Thirty Five (35) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 9 FSAR.
- Thirteen (13) Confirmatory Items have been identified.
 - ✓ Four (4) have been incorporated into the COLA as of revision 9, and
 - ✓ Nine (9) will be incorporated into revision 10 of the Calvert Cliffs Unit 3 COLA.
- Four (4) SER-Open Items have been identified.

Acronyms

- **ACRS** – Advisory Committee on Reactor Safeguards
- **ASCE** – American Society of Civil Engineers
- **ASLB** – Atomic Safety & Licensing Board
- **ASME** – American Society of Mechanical Engineers
- **CCNPP** – Calvert Cliffs Nuclear Power Plant
- **CI** – Conventional Island
- **COL** – Combined License
- **COLA** – COL Application
- **CWCT** – Circulating Water Cooling Tower
- **DALs** – direct access lines
- **DBA** – Design Basis Accident
- **DOE** – Department of Energy
- **ECL** – Effluent Concentration Limits
- **ENS** – Emergency Notification System
- **EOF** – Emergency Operations Facility
- **EPGB** – Emergency Power Generating Building
- **EPRI** – Electric Power Research Institute
- **LOCA** – Loss of Coolant Accident
- **LOOP** – loss of offsite power
- **EPSS** – Emergency Power Supply System
- **ESWS** – Essential Service Water System
- **ESWB** – Essential Service Water Building
- **EUPS** – Emergency Uninterruptible Power Supply System
- **FHA** – fire hazards analysis
- **FPP** – Fire Protection Program
- **FSAR** – Final Safety Analysis Report
- **HVAC** – Heating Ventilation & Air Conditioning
- **IBR** – Incorporate by Reference
- **ITAAC** – Inspection, Test, Analysis and Acceptance Criteria
- **LOCA** – Loss of Coolant Accident
- **LOOP** – loss of offsite power
- **MOVs** – motor operated valves
- **MCR** – Main Control Room
- **MWIS** – Makeup Water Intake Structure
- **NAB** – Nuclear Auxiliary Building
- **NI** – Nuclear Island
- **NPSH** – Net Positive Suction Head
- **PBX** – Private Branch Exchange
- **PSWS** – Potable and Sanitary Water System
- **RAI** – Request for Additional Information
- **RCA** – Radiologically Controlled Area
- **RCOLA** – Reference COL Application
- **RWSS** – Raw Water Supply System
- **SB** – Safeguards Building
- **SBO** – station blackout
- **SDG** – Standby Diesel Generator
- **SER** – Safety Evaluation Report
- **SFCTF** – Spent fuel cask transfer facility
- **SPH** – Standard Project Hurricane
- **SSC** – Seismic Source Characterization
- **SSCs** – Structures, Systems and Components
- **SSE** – Safe Shutdown Earthquake
- **SSI** – Soil Structure Interaction
- **SWBVS** – Switchgear Building Ventilation System
- **TBVS** – Turbine Building Ventilation System
- **TDS** – Total Dissolved Solids
- **UHS** – Ultimate Heat Sink
- **UPS** – Uninterruptible Power Supply

Attachment 1A: Aquifer Levels Diagram (1 Sheet)



(Source of Information Documented in Ref. 7)



Presentation to the ACRS Subcommittee

**Calvert Cliffs Unit 3 Combined License Application Review
Safety Evaluation with Open Items**

**Chapter 2, Section 2.4:
“Hydrologic Engineering”**

November 6, 2013

Review Team

- **Project Managers**

- ♦ Surinder Arora - Lead PM
- ♦ Mike Takacs - Acting Lead PM
- ♦ Phyllis Clark - Chapter PM

- **Technical Staff**

- ♦ Mike Lee / NRC – DSEA,
- ♦ Henry Jones / NRC – DSEA
- ♦ Ken Erwin / NRC – DSEA
- ♦ Weijun Wang / NRC – DSEA
- ♦ Nebiyu Tiruneh / NRC – DSEA
- ♦ Lyle Hibler / PNNL
- ♦ Philip Meyer/ PNNL
- ♦ Rajiv Prasad / PNNL
- ♦ Lance Vail / PNNL

CCNPP COL CHAPTER 2.4 – HYDROLOGIC ENGINEERING

Reviewers/Presenters

Mike Lee / NRC - DSEA

Henry Jones / NRC-DSEA

Lyle Hibler / PNNL

Philip Meyer/ PNNL

Summary of Review

- **Conclusions and Status of SE Chapter 2.4**
 - ♦ FSAR met regulatory requirements
 - ♦ Currently tracked items: One open item and one confirmatory item related to SE Chapter 2.4
 - ♦ One new open item (RAI 400 with two questions) identified
 - Inconsistent Depiction of CCNPP Unit 3 Site Boundary
 - Estimate of Bounding Value for Subsidence Resulting from Plant Groundwater Use

CURRENTLY TRACKED ITEMS

Existing RAI 222, Question 01-5

U.S. EPR Design Certification



- The staff is reviewing the information in the U.S. EPR FSAR on Docket No. 52-020.
- The results of the staff's technical evaluation of the information related to the characteristics of the site, incorporated by reference in the COL FSAR, will be documented in the staff FSER on the design certification application for the U.S. EPR.
- The staff notes that the FSER on the U.S. EPR is not yet complete.
- The staff will update Section 2.4.1 of the COL to reflect the final disposition of the design certification application.

Existing RAI 389, Question 02.04.03-1

PMF Calculation Typographical Errors

- The COL applicant identified minor typographical errors in the COL FSAR Revision 8.
- The staff reviewed these changes and determined that the staff's independent PMF calculations were similar to the COL applicant's in terms of peak discharges and water-surface elevations.
- Both the COL applicant's and the staff's estimates of peak water-surface elevations were significantly lower than the safety-related plant grade (25.8 m (84.6 ft) NGVD29).
- This item is being tracked as a confirmatory item to ensure the next revision of the COL FSAR is updated to address the minor typographical errors at the site.

NEW OPEN ITEMS

New RAI 400, Question 02.04-1

Inconsistent Depiction of CCNPP Unit 3 Site Boundary



- FSAR Revision 9 Figure 2.4-1 shows the outline of the CCNPP Unit 3 site boundary that appears to be inconsistent with FSAR Figures 2.4-17 and 2.4-25.
- Because the staff uses the CCNPP Unit 3 site boundary in its safety determination related to flooding, it is essential that the staff know which of the applicant's depictions of the site boundary is correct.
- The applicant is requested to provide revised figures in FSAR Section 2.4 that include the site boundary and ensure that the boundary is consistently shown in the figures throughout this section.

New RAI 400, Question 02.04-2

Estimate of Bounding Value for Subsidence Resulting from Plant Groundwater Use

- In the response to RAI 101, Question 02.04.12-3, the COL applicant estimated maximum subsidence from the use of onsite groundwater for construction. This rate of use is estimated to be 288,000 gpd for six years.
- The COL FSAR states that groundwater will be used during plant operation as a back-up supply when the desalination plant is out of service. This rate of use is estimated to be 900 gpm (1,296,000 gpd if pumped continuously) for a period up to 10 weeks.
- Staff want to verify that the estimate of drawdown and subsidence documented in the response to RAI 101 remains bounding given the potential operational use of groundwater identified in the COL FSAR.

New RAI 400, Question 02.04-2

Bounding Value for Subsidence

(continued)

The applicant is requested to provide:

- The anticipated frequency at which the desalination plant will be out of service and thus require a back-up water supply.
- The bounding pumping scenario considering that the water source has not been identified by the COL applicant and could be the Aquia, Upper Patapsco, or Lower Patapsco aquifer.
- Evaluation of the effects of the associated long term site surface deformation on foundation stability and flooding protection measures.

Acronyms

ACRS Advisory Committee on
Reactor Safeguards

CCNPP Calvert Cliffs Nuclear Power
Plant

COL Combined Operating
License

DSEA Division of Site Safety &
Environmental Analysis

FSAR Final Safety Analysis Report

FSER Final Safety Evaluation Report

gpd gallons per day

gpm gallons per minute

mgd million gallons per day

PMF Probable Maximum Flood

PNNL Pacific Northwest National
Laboratory

RAI Request for Additional
Information

RCOL Reference Combined
License

SE Safety Evaluation

UHS Ultimate Heat Sink



Presentation to the ACRS Subcommittee

**UniStar Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3
COL Application Review**

Safety Evaluation Report

CHAPTER 9: Auxiliary Systems

November 6, 2013

Staff Review Team



- **Technical Staff:**
 - ♦ Christopher Van Wert, Reactor Systems Branch
 - ♦ Raul Hernandez, Plant Systems Branch
 - ♦ Gordon Curran, Plant Systems Branch
 - ♦ Larry Wheeler, Plant Systems Branch
 - ♦ Ryan Nolan, Plant Systems Branch
 - ♦ Tarico Sweat, Plant Systems Branch
 - ♦ Raj Goel, Containment and Ventilation Systems Branch
 - ♦ Robert Vettori, Plant Systems Branch

Staff Review Team

- **Technical Staff (Cont.)**
 - ♦ Deanna Zhang, Instrumentation and Electrical Engineering Branch
 - ♦ Amar Pal, Instrumentation and Electrical Engineering Branch
 - ♦ Eduardo Sastre, Component Integrity Branch

- **Project Manager**
 - ♦ Surinder Arora, Lead Project Manager
 - ♦ Michael Takacs, acting Lead Project Manager
 - ♦ Peter Hearn, Chapter 9 Project Manager

Summary of Staff's Review

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Questions
9.1	Fuel Storage and Handling	2	0
9.2	Water Systems	36	2
9.3	Process Auxiliaries	IBR	0
9.4	Air Conditioning, Heating, Cooling, and Ventilation Systems	8	2
9.5	Other Auxiliary Systems	23	0
Totals		69	4

List of Open Items

Chapter 9.0 Auxiliary Systems

1. RAI 393 Question 09.02.05-31- Ensure COL information is incorporated into next COL FSAR Revision
2. RAI 398 Question 09.02.05-32 – Clarification related to the CFD computer model uncertainties, meteorological conditions, and boundary scenarios.
3. RAI 382 Question 09.04.04-4 – Detail Design information for the SWBVS
4. RAI 384 Question 09.04.03-1- ITAAC information for power supplies for the 2 diesel driven pump room vent systems

COL Topic of Interest

Chapter 9.1.4 FUEL STORAGE and HANDLING SYSTEMS COL Information Items

DCD COL item 9.1-2:

“A COL applicant that references the U.S. EPR design certification will perform appropriate tests and analyses, which demonstrate that an identified NRC-approved cask can be safely connected to the spent fuel cask transfer facility (SFCTF), and the cask and its adapter meet the criteria specified in Table 9.1.4-1, prior to initial fuel loading into the reactor.”

Chapter 9.1.4 FUEL STORAGE and HANDLING SYSTEMS

COL Information Items



Calvert Response to COL Item:

Before initial fuel loading into the reactor:

- ♦ Demonstrates that an identified NRC-approved cask can be safely connected to the SFCTF, by test and analysis.

Before initial use of SFCTF:

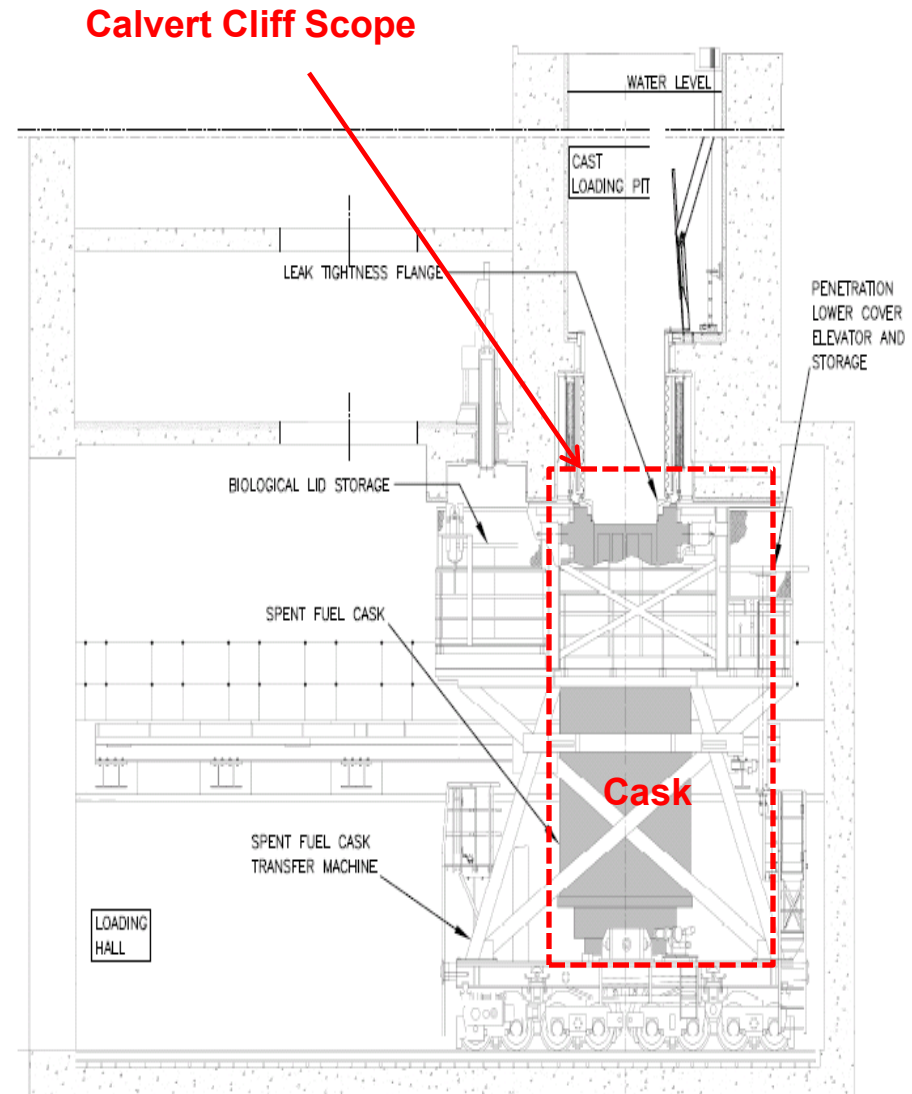
The licensee shall not use the SFCTF for initial cask loading operations until the licensee performs the tests identified below,

- ♦ Verify the penetration leak tightness with loading pit filled with water.
- ♦ Verify the cask loading sequence and the sequential interlocking with the actual cask and a dummy assembly under water.

Spent Fuel Cask Transfer Facility (SFCTF)

DCD COL item 9.1-2:

“A COL applicant that references the U.S. EPR design certification will perform appropriate tests and analyses, which demonstrate that an identified NRC-approved cask can be safely connected to the spent fuel cask transfer facility (SFCTF), and the cask and its adapter meet the criteria specified in Table 9.1.4-1, prior to initial fuel loading into the reactor.”



COLA Topics of Interest

Chapter 9.2– Water Systems

- **Open Items:**
 - RAI 393/7151 Question 09.02.05-31 (ITAAC) – Section 9.2.5
 - RAI 398/7198 Question 09.02.05-32 (analysis uncertainties) – Section 9.2.5

COLA Topics of Interest

Chapter 9.2–Auxiliary Systems



- **FSAR Section 9.2.1 (Essential Service Water System - ESWS)**
 - **COL Information Item 9.2-4** - description of materials that will be used for the ESWS
 - All piping will be plain carbon steel
 - Has adequate 60 year design life against corrosion
 - Buried piping
 - Internal lining in accordance with ANSI/AWWA (qualified installation program)
 - External epoxy coatings
 - Cathodic protection (FSAR 8.3.1.1.15)
- **Staff's Finding** - meets applicable GDCs

COLA Topics of Interest

Chapter 9.2–Water Systems



- **FSAR Section 9.2.5 (Ultimate Heat Sink - UHS)**
 - **COL Information Item 9.2-1 – site specific UHS support systems**
 - Normal UHS makeup (isolated on safety injection signal)
 - Emergency UHS makeup (post accident plus 72 hours – 30 days)
 - UHS makeup water intake structure
 - 27 days water supply from Chesapeake Bay
 - Four safety related pumps with traveling screen and screen wash
 - Keep fill system (reduces water hammer concerns)
 - Safety-related and Class 1E power to key components
 - Pumps are manually started from the main control room
 - Design considerations against freezing
 - **Staff's Finding - meets applicable GDCs**

COLA Topics of Interest

Chapter 9.2–Water Systems



- **FSAR Section 9.2.5 (UHS) – continues**
 - **COL Information Item 9.2-5** – material used for the UHS are appropriate for site location and fluid properties
 - UHS makeup piping material is safety-related and compatible with Chesapeake Bay brackish water
 - Super austenitic stainless steel to be utilized – prevents erosion and corrosion pitting
 - Piping system to be flushed quarterly
- **Staff's Finding** - meets applicable GDCs

COLA Topics of Interest

Chapter 9.2–Water Systems



- **FSAR Section 9.2.5 (UHS) – continues**
 - **COL Information Item 9.2-6** – confirm that the highest average site wet bulb and dry bulb temperatures over a 72-hour period (30-year hourly regional climatological data set) that the site specific evaporative and drift losses for the UHS are bounded by the values presented in U.S.EPR Design Certification
 - The U.S. U.S.EPR and CCNPP Unit 3 use the same 72 hour period of temperature data to determine maximum evaporation of water from the UHS
 - Found in COL FSAR Table 9.2.5-3
 - **Staff's Finding** - meets applicable GDCs

COLA Topics of Interest

Chapter 9.2–Water Systems

- **FSAR Section 9.2.5 (UHS) – continues**
 - **COL Information Item 9.2-7** – confirm that the site-characteristic sum of 0% exceedance maximum non-coincident wet bulb temperature and the-site specific wet bulb correction factors does not exceed the 81 °F (U.S. EPR value in U.S.EPR Table 9.2.5-2); OTHERWISE, confirm that the UHS cold water return temperature is less than 95 °F
 - CCNPP Unit 3 site-specific 0% exceedance maximum non-coincident wet bulb temperature is determined to be 85.3 °F (based on data from Patuxent River Naval Air Station)
 - To determine the wet bulb correction factor for cooling tower recirculation and interference, a computational fluid dynamics (CFD) analysis of the UHS cooling towers was completed using the software CD-adapco Star-CCM+
 - The maximum site-specific wet bulb correction factor due to UHS cooling tower interference and recirculation was determined by analysis to be < 2.5 °F
 - Max. 0% exceedance non-coincident wet bulb with correction factor is 87.8 °F
 - Based on the UHS cooling tower analysis the maximum cold water return temperature was determined to be <95 °F (includes cooling tower recirculation and interference analysis)

COLA Topics of Interest

Chapter 9.2 – Water Systems

COL Information Item 9.2-7 - continues

Staff's Finding - (open item)

RAI 398/7198 Question 09.02.05-32 – CFD model uncertainties, meteorological conditions, and bounding scenarios

NRC audit of CFD on October 1-2, 2013, determined that wind directions and wind speed selected may not be bounding

COLA Topics of Interest

Chapter 9.2–Water Systems

- **FSAR Section 9.2.5 (UHS) – continues**
 - **COL Information Item 9.2-8** – UHS makeup capacity is sufficient to meet the maximum evaporative and drift water loss after 72 hours – 30 days (consistent with RG 1.27)
 - U.S.EPR FSAR Table 9.2.5-2, Ultimate Heat Sink Design Parameters, states the required cooling tower emergency makeup flow, post DBA (72 hours through 30 days) as > 300 gpm
 - Unit 3 UHS Makeup Water pumps are sized to provide a maximum of approximately 750 gpm to the UHS Cooling Tower basin
 - When the intermittent traveling screen wash system is operating the makeup flow rate to the basin is reduced to approximately 510 gpm
- ♦ **Staff's Finding** - meets applicable GDCs

COL Topics of Interest

Chapter 9.2–Water Systems

- **FSAR Section 9.2.5 (UHS) – continues**
- **COL Information Item 9.2-9** – confirm that the U.S.EPR UHS cooling towers are capable of removing the design basis heat load for a minimum of 30 days without exceeding the maximum specified temperature limit for ESWS and minimum required basin water level cooling tower basin is chemically treated to reduce scaling and corrosion, and to treat potential biological contaminants

COL Topics of Interest

Chapter 9.2–Water Systems

- **COL Information Item 9.2-9- continues**
 - Cooling tower is designed for an initial Total Dissolved Solids (TDS) value of 5,000 ppm
 - TDS concentration of the cooling water in the basin may reach up to 72,460 ppm
 - Thermal performance of the cooling tower was performed by the prospective cooling tower vendor
 - Was determined that the cooling tower basin water temperature remains below 95 °F for the 30-day period post-DBA
 - The impact of the reduced cooling tower thermal performance due to the concentrated TDS levels will be off-set by the reduced heat load on the cooling tower

Staff's Finding - (open item)

RAI 393/7151 Question 09.02.05-31 (ITAAC)

COLA Topics of Interest

Chapter 9.2–Water Systems

- **FSAR Section 9.2.5 (UHS) – continues**
 - **COL Information Item 9.2-10** – perform an evaluation of the interference effects of the UHS cooling tower on nearby safety related air intakes
 - Four safety related air intakes have been evaluated for potential adverse effects from the UHS cooling tower plumes:
 - Main Control Room (MCR) Air Conditioning System
 - Safeguards Building Ventilation
 - Emergency Power Generating Ventilation and Combustion Air
 - Essential Service Water Pump Building (ESWPB) Ventilation
 - CFD simulations was performed at various wind speeds and wind directions
 - Adequate temperature margin for MCR and Safeguards ventilation ~13 °F
 - No adverse affects on the Emergency Power Generating Ventilation, ESWPB Ventilation, or Emergency Diesel Generator combustion air intake
- **Staff's Finding - (open item)**
 - RAI 398/7198 Question 09.02.05-32 – CFD model uncertainties, metrological conditions, and bounding scenarios

COLA Topics of Interest

Chapter 9.2–Water Systems



- **FSAR Section 9.2.5 (UHS) – continues**
 - **COL Information Item 9.2-11** – confirm that the maximum UHS cold-water return temperature of 95 °F is met by an analysis (site specific wet bulb and dry bulb temperatures over a 24-hour period, from a 30-year hourly regional climatological data set) is bounded (peak 85.3 °F at DBA plus 9-10 hours)
 - The COL applicant has verified that with the peak heat loads and peak wet bulb temperatures, the ESWS cold water return temperature does not exceed the cooling tower basin design of 95 °F
 - Wet bulb of 85.3 °F occurs at DBA plus 3-4 hours
 - U.S.EPR FSAR Tier 1, Revision 4, Table 2.7.11-3, Item 7.9 ITAAC Acceptance Criteria states that a report concludes that the UHS cooling towers are capable of removing the design heat load without exceeding the maximum design temperature limit for ESWS
- **Staff's Finding** - meets applicable GDCs

COLA Topics of Interest

Section 9.2–Water Systems

- **FSAR Section 9.2.9 Raw Water Supply**
- **COL Information Item 9.2-3 and conceptual information** – The raw water supply system (RWSS) and the design requirements of the RWSS are site-specific and will be addressed by the COL applicant
 - Draws from the Chesapeake Bay via circulating water system makeup system to the desalinization plant
 - Untreated water for makeup to the demineralized water, potable water, fire protection, and UHS normal makeup
 - Non-safety-related functions
 - Two desalinated water transfer pumps at 790 gpm each
 - ESWS basin max flow rate is ~1500 gpm (max. plant shutdown/cooldown)
 - Two 300,000 gallon tanks store desalinated water
 - Corrosion resistant materials
- **Staff' Finding** - meets applicable GDCs

COLA Topics of Interest

Section 9.4 - Air Conditioning, Heating, Cooling, and Ventilation Systems

- **Section 9.4 Total Subsections: 16**
 - **Subsections with IBR Design: 13**
 - **Subsections with Site-Specific Design: 3**
 - **Number of SE open items: 2**
-
- RAI 382 Question 09.04.04-4 (FSAR Section 9.4.4): Detailed design information for the SWBVS (turbine Island). Applicant's response to this RAI question has been reviewed and is found acceptable. The designation of this item will be changed a confirmatory item.

 - RAI 384 Question 09.04.03-1 (FSAR Section 9.4.16): ITAAC information for power supplies for the 2 diesel driven water pump room ventilation systems. Applicant's response to this RAI question has been reviewed and is found acceptable. The designation of this item will be changed a confirmatory item.

COLA Topics of Interest

Chapter 9.0–Auxiliary Systems



Comments or questions?

Acronyms

- ANSI – American National Standards Institute
- AWWA – American Water Works Association
- CFD – computational fluid dynamics
- COL - combined license
- DBA – design basis accident
- ESWS - Essential service water system
- GDC – General Design Criteria
- FSAR - Final Safety Analysis Report
- GL - Generic Letter
- ITAAC - Inspections, tests, analyses, and acceptance criteria
- RAI - request for additional information
- RG - Regulatory Guide
- RWSS – raw water supply system
- TDS - total dissolved solids
- UHS – Ultimate Heat Sink
- U.S. EPR – Evolutionary Power Reactor