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

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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610TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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THURSDAY

DECEMBER 5, 2013

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ROCKVILLE, MARYLAND

+ + + + +

The Advisory Committee met at the  
Nuclear Regulatory Commission, Two White Flint  
North, Room T2B1, 11545 Rockville Pike, at 8:30  
a.m., J. Sam Armijo, Chairman, presiding.

## 1 COMMITTEE MEMBERS:

2 J. SAM ARMIJO, Chairman

3 JOHN W. STETKAR, Vice Chairman

4 HAROLD B. RAY, Member-at-Large

5 RONALD G. BALLINGER, Member

6 SANJOY BANERJEE, Member

7 DENNIS C. BLEY, Member

8 CHARLES H. BROWN, JR. Member

9 MICHAEL L. CORRADINI, Member

10 DANA A. POWERS, Member

11 JOY REMPE, Member

12 PETER RICCARDELLA, Member

13 MICHAEL T. RYAN, Member

14 STEPHEN P. SCHULTZ, Member

15 GORDON R. SKILLMAN, Member

16

## 17 DESIGNATED FEDERAL OFFICIALS:

18 KATHY J. WEAVER

19 GIRIJA S. SHUKLA

20

21

22

23

24

25

1 ALSO PRESENT:

2 EDWIN M. HACKETT, Executive Director, ACRS

3 PERRY BUCKBERG, NRO

4 PHYLLIS CLARK, NRO

5 JOHN CONLY, Luminant

6 TODD EVANS, Luminant

7 ANTONIO FERNANDEZ, UniStar

8 MARK FINLEY, UniStar

9 STEPHEN MONARQUE, NRO

10 DAVID NOLD, NRO

11 SHANKAR RAO, Bechtel

12 RUTH REYES, NRO

13 MUSTAFA SAMAD, Bechtel

14 JOHN SEGALA, NRO

15 RYAN SPRENGEL, MNES

16 REBECCA STEINMAN, MNES

17 MIKE TAKACS, NRO

18 ERIN WISLER, MNES

19

20 \*Present via telephone

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A G E N D A

OPENING REMARKS . . . . . 5

SELECTED CHAPTERS OF THE SAFETY EVALUATION REPORT  
(SER) WITH OPEN ITEMS ASSOCIATION WITH THE CALVERT  
CLIFFS, UNIT 3, COMBINED LICENSE APPLICATION (COLA)  
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TOPICAL REPORT AND SELECTED CHAPTERS OF THE  
SAFETY EVALUATION REPORTS (SERs) WITH OPEN  
ITEMS ASSOCIATED WITH THE U.S. ADVANCED  
PRESSURIZED WATER REACTOR (US-APWR) DESIGN  
CERTIFICATION AND THE COMANCHE PEAK COMBINED  
LICENSE APPLICATION (COLA) . . . . . 56

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

8:30 a.m.

CHAIRMAN ARMIJO: Good morning. The meeting will now come to order. This is the second day of the 610<sup>th</sup> Meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting, the Committee will consider the following. First, selected chapters of the Safety Evaluation Report with open items associated with the Calvert Cliffs, Unit 3, Combined Operating License Application referencing the U.S. Evolutionary Power Reactor. Two, Topical Reports and selected chapters of the Safety Evaluation Reports with open items associated with the U.S. Advanced Pressurized Water Reactor design certification and the Comanche Peak Combined License Application (COLA). Three, future ACRS activities and report of the findings of the Procedures Subcommittee. Fourth, reconciliation of ACRS comments and recommendations. And, fifth, preparation of ACRS reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mrs. Kathy Weaver is the Designed Federal Official for the initial portion of

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1 the meeting.

2 We have received no written comments or  
3 request to make oral statements from members of the  
4 public regarding today's sessions.

5 There will be a phone bridge line. To  
6 preclude interruption of the meeting, the phone will  
7 be placed in a listen-in mode during the  
8 presentations and Committee discussion. We also have  
9 another phone bridge line for the Calvert Cliffs  
10 Combined License presentation with participants from  
11 Pacific Northwest National Laboratory supporting the  
12 NRC Staff, and we ask that this line remain in a  
13 mute status unless these participants are speaking.

14 A transcript of portions of the meeting  
15 is being kept and it is requested that speakers use  
16 one of the microphones, identify themselves and  
17 speak with sufficient clarity and volume so that  
18 they can be readily heard. Another reminder is if  
19 you have cell phone please turn them off. And at  
20 this point, I'd like to turn it over to Dr. Dana  
21 Powers who will lead us through our Calvert Cliffs  
22 discussion.

23 MEMBER POWERS: Well, you've given us an  
24 excellent introduction. We are, indeed, doing the  
25 Reference COLA for the US-EPR design which is

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1 Calvert Cliffs, Unit 3.

2 I remind everyone that the strategy  
3 we've adopted will be as design certifications in  
4 the reference COLA is they're being done in parallel  
5 and the staff brings to us a Safety Evaluation  
6 Report with open items.

7 When they do this, when the staff and  
8 the application feel that despite the open items  
9 there on a pathway to resolution of these issues,  
10 and I have to say that that's the reason this is  
11 successful approach and we can do things piecemeal.  
12 And I compliment both the staff and the application  
13 that they have been scrupulous in following that  
14 criterion that they be on a pathway to resolution.

15 We are going today to discuss a few  
16 chapters. They are the remaining chapters in the  
17 reference COLA, and once we complete these chapters  
18 then we will be able to move from Phase 3 to Phase 4  
19 of the analysis. And at Phase 4 is where the staff  
20 and the applicant try to resolve the issues.

21 The reference COLA will come back to us  
22 and its associated SER in Phase 5 or prior to the  
23 final licensing determination. Today we're going to  
24 look at Section 2.4 of Chapter 2, the site  
25 characteristics. That section deals with hydrologic

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1 engineering. We're also look at Section 2.5,  
2 geology, seismology, and geotechnical engineering.  
3 This will give the applicant a chance to show off  
4 what is truthfully a very beautiful site.

5 We will also look at Chapter 3, design  
6 of structures, components, equipment, and systems.  
7 We will not be looking at Section 3.7, seismic  
8 design. We will look at Chapter 9, auxiliary  
9 systems, Chapter 13, conduct of operations, Chapter  
10 14, verification programs. Needless to say, we're  
11 going to be covering a lot of material here and,  
12 consequently, it's going to be at a fairly high  
13 level. And I have, indeed, asked particularly the  
14 applicant to provide us some background on both the  
15 site and the proposed plant design to remind all  
16 Members of where we are with this particular  
17 application.

18 Our Subcommittee for the US-EPR has  
19 examined these chapters and the open items  
20 identified by the staff and found no additional  
21 items. So, that tells you that we are -- we think  
22 this is in pretty good shape, and welcome comments  
23 from the rest of the Committee.

24 During the US-EPR Subcommittee Members  
25 opening statements, they want to make inquiry on

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1 this. Seeing none, what I have asked is that the  
2 staff begin with kind of an overview of the entire  
3 effort, and then we will turn to the applicant who  
4 will give us some of the nitty gritty here.

5 Mike, are you in position to give that  
6 overview?

7 MR. TAKACS: I am certainly ready for  
8 that. Thank you, Dr. Powers.

9 Good morning, Committee Members. My name  
10 is Mike Takacs. I am the lead Project Manager for  
11 the Bell Bend COLA application. I am also the backup  
12 Project Manager for the Calvert review.  
13 Unfortunately, Surinder Arora is out sick today. I  
14 will --

15 MEMBER POWERS: I love the idea of the  
16 gypsies much better.

17 (Laughter.)

18 MR. TAKACS: I will be providing that  
19 presentation following the UniStar presentation. The  
20 point, and to reiterate what Dr. Powers mentioned  
21 earlier, this is a major milestone. It will complete  
22 the Phase 3 review for the Calvert so that we may  
23 move on to Phase 4.

24 With that, as I mentioned, I'll be  
25 providing some of the open items that remain that

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1 were presented to the Subcommittee over the course  
2 of the year. We've had three Subcommittee meetings  
3 to support this Full Committee meeting for 2013.

4 And with that, I will turn it over to  
5 Mark Finley from UniStar. He is the CEO of UniStar,  
6 and I will relieve myself of this seat to allow --  
7 the laptop operator.

8 MR. FINLEY: Thank you, Mike. As Mike  
9 said, I am Mark Finley, CEO/President, Chief Nuclear  
10 Officer of UniStar. Appreciate the opportunity to be  
11 here this morning and move forward to close Phase 3.  
12 I want to thank Dr. Powers for moving forward with  
13 the Subcommittee and putting us in a good position  
14 for today's meeting. And, as well, thank John  
15 Segala, Mike Takacs, and Surinder Arora, in  
16 particular, as Project Managers for moving the staff  
17 forward in the reviews, again, to get us ready for  
18 today's meeting.

19 A little bit about my background. I've  
20 been with UniStar seven years, before that with  
21 Constellation Energy for about 23 years, mostly at  
22 the Calvert Cliffs 1 and 2 site, which is the same  
23 site, basically, for Calvert 3. Before that, Nuclear  
24 Navy.

25 We can move forward on the slides. I

1 have support for my presentation today, and I'll ask  
2 my team before you speak to introduce yourselves, a  
3 series of individuals who have been key in doing  
4 some of the work on the chapters that we have in our  
5 scope today. I won't go down name by name.

6 I do have quite a few slides today. And  
7 more in the nature of overview, as Dr. Powers said,  
8 in getting some feedback from Dr. Powers we selected  
9 some of the more interesting topics to talk about  
10 for the Calvert Cliffs 3 project. Some of them may  
11 be open items, some are not open items, but they are  
12 significant in terms of the work done for the  
13 Calvert 3 project, so that's why we talk about them  
14 today. Next slide, John.

15 So, a number of open items, and this is  
16 actually based on the draft SERs that we had roughly  
17 a month ago, this number has changed quite a bit,  
18 gone down quite a bit based on what you'll see from  
19 the staff presentation later this morning. That's a  
20 good thing.

21 The point I wanted to make on this slide  
22 is the only one of these 93 open items have we not  
23 responded to. All the others we've responded to, and  
24 as Dr. Powers said, for all those that we've  
25 responded to and for the one that we haven't

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1 responded to we're on a good track to provide a  
2 response.

3 MEMBER POWERS: That really is the key to  
4 this work. I mean it's a piecemeal examination at  
5 this stage, and if we weren't on a pathway to a  
6 resolution this wouldn't work at all. And you guys  
7 really have done -- you and the staff have done a  
8 heroic job of being disciplined in bringing to us  
9 stuff only when you're on a pathway.

10 MR. FINLEY: Thank you. By way of  
11 introduction, Slide 4 just, as I'm sure you know, so  
12 UniStar is responsible for design and operation of  
13 the Calvert Cliffs 3 project, but we do have  
14 contracts with Areva and Bechtel to provide the good  
15 portion of technical support in terms of the work  
16 supporting the FSAR.

17 We use the incorporate by reference  
18 methodology in terms of the US-EPR FSAR. Of course,  
19 the chapters that we're going to talk about today is  
20 the third set of chapters. We've been before you  
21 twice before back in April of 2012, and then back in  
22 April of 2011. It seems like only yesterday. And we  
23 won't discuss any of the generic information in the  
24 US-EPR FSAR. We'll just be talking about site-  
25 specific and supplemental type information.

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1                   Here's just artist rendition of the  
2                   site. It shows the existing units just left of  
3                   center in that picture. The artist rendition there  
4                   is just to the right, and upper right-hand corner.  
5                   You see the site for the Calvert Unit 3 EPR, and  
6                   it's real hard to tell from this angle, but that's  
7                   up on the bluff, and we'll talk more about  
8                   elevations later in the presentation, but that  
9                   plateau, if you will, away from the bay is about 85  
10                  feet above sea level. You can see one area of graded  
11                  land down on the shoreline of the bay, and we'll  
12                  talk more about that. That's where the intake  
13                  structure is that provides makeup to the ultimate  
14                  heat sink after 72 hours. So, we'll talk a little  
15                  bit more about that.

16                 And then just geographically see a  
17                 street map here, more or less, of Southern Maryland,  
18                 site located in Calvert County, and Washington, D.C.  
19                 just inside the 50-mile radius. Okay, John.

20                 Here, again, is the list of 2.4,  
21                 hydrologic engineering, and move quickly to Slide 9.  
22                 I'll give you just a little overview of the  
23                 hydrological characteristics, and as you saw already  
24                 from the map, the site is located on a peninsula  
25                 between the Chesapeake Bay and the Patuxent River.

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1 The main body of water where we receive our intake  
2 makeup which has been our makeup for UHS, and have  
3 concerns about tsunami and hurricane-type flooding  
4 is the Chesapeake Bay. We'll talk some more about  
5 that, obviously.

6 The Patuxent River is to the west of the  
7 site, and there are drainage streams that run from  
8 the site westward toward the Patuxent River. And  
9 these are non-tidal streams, so they don't have a  
10 significant concern in terms of flooding. Slide 10,  
11 again, as I mentioned, the main physical separation,  
12 if you will, for the structures on site is we have  
13 the power block with all the generic structures  
14 described in the US-EPR FSAR up at the 85-foot grade  
15 approximately, and then one site-specific structure,  
16 ultimate heat sink makeup water intake structure  
17 located about 10-foot grade on the shoreline of the  
18 bay. And Slide 11 just shows maybe a closer up  
19 picture of the peninsula. To the right is the  
20 Chesapeake Bay, and then lower left is the Patuxent  
21 River.

22 Slide 12 shows the streams that I  
23 mentioned. You see lower lefthand corner of the main  
24 diagram there, Johns Creeks. That's the main  
25 tributary of the Patuxent River that flows from east

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1 to west, and we've done flooding analysis on these  
2 streams using the maximum assumed precipitation for  
3 one hour. And even assuming that the culvert that  
4 goes under Highway 2-4 there is blocked and floods  
5 the upstream portion of those streams, and the water  
6 still stays well below the power block grade.

7 Slide 13, wanted to talk a little bit  
8 about the maximum storm surge from the hurricane it  
9 is for the Calvert Cliffs site. Some of the main  
10 bullets here in terms of the analysis that was done,  
11 we did use the SLOSH code, Sea Lake Overland Surges  
12 from Hurricanes code, to analyze the surge in the  
13 bay, maximized the storm in accordance with  
14 regulatory guidance, and chose a very conservative  
15 track for the storm through many sensitivity studies  
16 that were done to see what the worst track for the  
17 storm was. Essentially, the storm is nearly Category  
18 5 when it hits the shoreline moving east to west,  
19 and that maximizes the surge when it hits the  
20 shoreline.

21 The location where it hits the shoreline  
22 is just below the mouth of the Chesapeake Bay down  
23 by Norfolk, Virginia. That causes the maximum surge  
24 into the Chesapeake Bay. The storm then moves inland  
25 and makes a right-hand turn, if you will, to move up

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1 the western shore of the Chesapeake Bay, and that  
2 maximizes the surge as it moves north through the  
3 bay. So, all those things we think very conservative  
4 in terms of maximizing the surge level at the bay.  
5 And we see the numbers here, prediction using the  
6 SLOSH code with a 20 percent uncertainty is around  
7 17.6 feet just taking the surge without the waves,  
8 and when you add the wave height plus runup of the  
9 waves on the structure, that's another 15.6 feet  
10 with a total of about 33.2 feet with wave runup on  
11 the structure. And I'll show you Slide 14 actually  
12 is a good pictorial looking from the side. So, with  
13 that 17.6 surge you remember I mentioned that the  
14 grade elevation of the makeup water intake structure  
15 is roughly 10 feet, the 17.6-foot surge gives you a  
16 7.6-foot water depth above that grade, so that  
17 actually cuts down some on the size of the waves  
18 that can propagate in that depth of water. So, we  
19 calculate that new wave height and then the wave  
20 runup on the ultimate heat sink structure.

21 I've got a side view of the ultimate  
22 heat sink structure on Slide 15 which shows that the  
23 upper right-hand corner of this slide you can see  
24 that the elevation of the ventilation intake for the  
25 safety systems in the structure at 36.6 feet, so

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1 roughly 3-foot of margin based on this conservative  
2 analysis with wave runup of the hurricane.

3 That's really what I wanted to say about  
4 that. Let me ask if there are any questions.

5 MEMBER BANERJEE: What wave breaking, if  
6 you get liquid thrown higher, would it affect these  
7 systems?

8 MR. FINLEY: Let me aks Mustafa.

9 DR. SAMAD: The wave sections --

10 MEMBER POWERS: You need to use a  
11 microphone, and give us your name beforehand so that  
12 we can attribute --

13 DR. SAMAD: I'm Mustafa Samad from  
14 Bechtel, and I'm just proxy here for one of our  
15 colleagues, Jemie Dababneh.

16 The wave impact on the structures in  
17 terms of breaking waves hitting the structure, that  
18 force would be accounted for in the design of the  
19 structure itself. So, the maximum forces coming from  
20 the wave breaking, hitting the structure and  
21 breaking would be typically the maximum force that a  
22 wave can attribute to a structure. And when you  
23 design the structure design on this intake system it  
24 would account for that breaking wave impact.

25 MEMBER BANERJEE: My question was really

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1 regarding breaking waves throwing liquid higher than  
2 the level, and getting into some of the intake  
3 structures and things like that. Would that have an  
4 affect?

5 MR. FINLEY: Maybe I'll ask Shankar.

6 MR. RAO: My name is Shankar Rao,  
7 Bechtel. I wanted to point out that the inlet to  
8 these openings have louvers which are provided in  
9 such a way that any water that gets splashed in,  
10 similar to like rain, it protects it from not  
11 draining inside the building but allowing it to  
12 drain outside.

13 MEMBER BANERJEE: But there's a certain  
14 amount of liquid it can handle. Right?

15 MR. RAO: Oh, yes. It's going to be --

16 MEMBER BANERJEE: I mean, this is not  
17 rain. It's going to be breaking waves.

18 MR. RAO: Right. It's more of the amount  
19 of water that's not expected to be like full force  
20 of water coming up and flooding in, and flowing into  
21 it. It's more of splashing the droplets and other  
22 kinds of things that could potentially be coming  
23 onto the --

24 MEMBER BANERJEE: Remember the wind is  
25 pretty high at this point so, I mean, you've got a

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1 curler coming in, and what's going in. But you are  
2 saying that there is protection for this in terms of  
3 being able to handle a certain water capacity.

4 MR. RAO: And, in addition, we do have  
5 tornado dampers which we can -- knowing that this  
6 type of incident could occur can be closed.

7 MEMBER BANERJEE: Okay.

8 MR. RAO: And that will provide  
9 additional isolation, because this particular system  
10 is not --

11 MEMBER BANERJEE: That's an operator  
12 action?

13 MR. RAO: That could be an operator  
14 action.

15 MEMBER BANERJEE: Is it at the moment?

16 MR. FINLEY: It's not a required -- it's  
17 not an operator action that we credit in the  
18 analysis. I was going to mention that if you look at  
19 the configuration, there is a concrete wall that  
20 sits right in front of the intake here so that is  
21 somewhat of a tortuous path. And the wave runup  
22 analysis should address the maximum height of the  
23 solid water.

24 MEMBER BANERJEE: Right.

25 MR. FINLEY: So, it really should only be

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1 splash, as you say, splash that goes above that  
2 height.

3 MEMBER BANERJEE: Okay. I think you've  
4 answered the question. You can, if needed, shut it  
5 off, if needed.

6 MEMBER BLEY: How persistent can these  
7 surges be? How long can the water be there? Can you  
8 get flooding up from the bottom or from any drain  
9 paths?

10 MR. FINLEY: So, I don't know, is Jamie  
11 on from Rizzo. Okay?

12 VICE CHAIRMAN STETKAR: By the way, the  
13 other members who weren't in the Subcommittee  
14 meeting, just use your cursor. It's hard to see, and  
15 if you don't read the material -- show the other  
16 Members with the cursor where grade elevation is,  
17 and where the elevation of -- what level of water  
18 we're actually talking about relative to the  
19 equipment in this building. It'll give you a little  
20 different perspective. That's grade.

21 MR. FINLEY: Right.

22 VICE CHAIRMAN STETKAR: And what's the  
23 maximum wave runup?

24 MR. FINLEY: So, the maximum wave runup  
25 is 33.2, so --

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1                   VICE CHAIRMAN STETKAR: All right. Put  
2 your cursor up there. It's well above any of the  
3 equipment rooms, so the questions about water  
4 getting in are really relevant from the bottom, and  
5 from the top, and from the sides.

6                   MR. FINLEY: Yes. So maybe, Shankar, you  
7 could speak to the design of the internal structure.

8                   MR. RAO: Anything that is -- we have, as  
9 you may notice here, we have the pump room over  
10 there which has the equipment associated with the  
11 operation of the pump, including electrical  
12 equipment which is in the room.

13                   This room is hydraulically sealed from  
14 bottom, any penetrations coming in from the bottom,  
15 and from the sides. And we do have access only at  
16 the top, and the two other accesses that are below  
17 are all provided with the hydraulically sealed  
18 doors.

19                   MEMBER BLEY: Are there pipes that run  
20 through that room, or are they external?

21                   MR. RAO: Yes.

22                   MEMBER BLEY: What if one of those breaks  
23 and it's hydraulically sealed? Would it flood? So,  
24 if you've got a pipe break or a flange leak you can  
25 flood that room, I would think, if it's really

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1 sealed.

2 MR. FINLEY: Right. So, there's -- these  
3 rooms are -- there's actually four divisions.

4 MEMBER BLEY: So you drop one.

5 MR. FINLEY: Right. Each separated from  
6 the other from a flooding perspective.

7 MEMBER BLEY: So, it would flood but it  
8 would be one room.

9 MR. FINLEY: Right, one room.

10 MEMBER BLEY: Okay.

11 MR. FINLEY: Other questions on the  
12 hurricane?

13 MEMBER BANERJEE: Just a question for  
14 interest. Post-Fukushima, did you make any changes  
15 to this design, or was it already taking everything  
16 into account?

17 MR. FINLEY: So, we had some other  
18 actions unrelated to Fukushima running in parallel  
19 that actually drove some changes in design which  
20 helped in terms of responding to Fukushima. With  
21 respect to the hurricane, the analysis wasn't  
22 changed after Fukushima. Our analysis was using the  
23 up-to-date methodology and was acceptable in terms  
24 of a Fukushima response.

25 We did upgrade the design in response to

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1 staff questions that actually came before the  
2 Fukushima requirements, but this upgraded design did  
3 help respond to the hurricane event.

4 MR. FINLEY: And you didn't have to  
5 change anything after Sandy either with regard to  
6 the storm surges?

7 MR. FINLEY: No. In fact, there was  
8 discussion at the Subcommittee meeting about Sandy,  
9 so Sandy is a much smaller storm, in fact, than what  
10 was analyzed for us. And we did look a little bit at  
11 the data for the Chesapeake Bay and Annapolis, in  
12 particular, for Hurricane Sandy. The water level  
13 during Sandy in Annapolis didn't reach the top five  
14 flooding storms that we kind of used as input  
15 previously for Annapolis station. So, of course,  
16 Sandy had a much bigger effect on northern cities,  
17 but I think the main point is our analytical storm  
18 was quite a bit stronger than Sandy, and the path  
19 that we assume that it takes is much worse in terms  
20 of surge and wind.

21 MEMBER BANERJEE: So, you could have  
22 predicted what happened in New York.

23 MR. FINLEY: I'll let the experts speak  
24 to that. I couldn't.

25 Okay, if no other questions, we'll move

1 to tsunami on Slide 16. So, tsunami is really not a  
2 significant concern for the Calvert Cliffs site, but  
3 we wanted to show you that we did do analysis with  
4 respect to an underwater landslide off the  
5 Continental Shelf which could produce the largest  
6 tsunami for the Chesapeake Bay. What the analysis  
7 showed is that with that tsunami and with the worst  
8 case initial water level, we come up to a water  
9 level of around 11-1/2 feet at the site, so that's  
10 much lower, of course, than the 33.2 feet that we  
11 talked about for the hurricane. So, the driver in  
12 terms of the design for this intake structure is,  
13 obviously, the hurricane and not the tsunami.

14 Okay. One other topic for Section 2.4 is  
15 groundwater. This is not an open item, but -- not an  
16 open item with respect to the pH of the groundwater,  
17 I should say. So, we have some acidic groundwater at  
18 the site, about 5.2 pH. This is considered  
19 aggressive in terms of concrete by the regulatory  
20 guidance. So, we have taken measures to waterproof  
21 those foundations which would enter the watertable  
22 where this low pH water is located. We'll be  
23 monitoring behind that waterproof boundary. We'll  
24 have the capability to de-water behind the  
25 waterproof boundary, so we will keep any of this

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1 potentially aggressive groundwater away from the  
2 concrete structure.

3 This groundwater is not acidic at the  
4 Chesapeake Bay, so the ultimate heat sink makeup  
5 water intake structure actually has more of the  
6 concern of the brackish water of the bay to deal  
7 with. And we'll address that through the recipe, if  
8 you will, of the concrete that we use for the makeup  
9 water intake structure.

10 Slide 18 shows a pictorial of the  
11 waterproofing system, so you'll see we'll have some  
12 sand below the foundation, and then this waterproof  
13 membrane that provides the seal, if you will, for  
14 the watertable. And we'll have, like I said, de-  
15 watering capability behind that membrane to make  
16 sure we keep away the acidic water.

17 And let's move to Slide 19. So, that's  
18 it for Section 2.4. I'm not going to repeat the  
19 bullets there. We don't have any departures or  
20 exemptions in this section from the US-EPR FSAR.

21 Moving right on to Section 2.5, geology,  
22 seismology, and geotechnical. I'm going to introduce  
23 Antonio here in just a second, but I do want to  
24 mention before we start that we were one of the  
25 first projects to incorporate the Central and

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1 Eastern U.S. seismic library into our seismic  
2 analysis, so we made that updated seismic library a  
3 part of our seismic analysis for the plant. Section  
4 2.5, obviously, talks about the ground motion that's  
5 the result of that analysis. Section 3.7 is actually  
6 still open. We'll talk about Chapter 3 here in a  
7 minute, but 3.7 is not actually a part of that  
8 discussion, so seismic analysis of all the  
9 structures is still under review as it is in the  
10 design certification.

11 Let me introduce Antonio. He's worked on  
12 the civil structural part of the work for UniStar  
13 for several years now. Antonio.

14 DR. FERNANDEZ: Thank you, Mark. I'm  
15 Antonio Fernandez for UniStar. So, as you are all  
16 well aware, Section 2.5 is quite extensive, so now  
17 we're going to touch on the key elements, and the  
18 key topics that impact the development of these  
19 sections the most, and the most interest.

20 Like Mark was saying, we were, of  
21 course, grouped to incorporate the 2012 Central and  
22 Eastern United States seismic source model, and all  
23 this happened in the middle of the development of  
24 the application, so we have to shift gears back,  
25 incorporate the seismic source model before heading

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1 into structural reconciliation.

2 That's one of the two things that  
3 impacted the development of this work. A second one  
4 was you'll also probably remember the occurrence of  
5 the Mineral, Virginia earthquake in the Central  
6 Virginia seismic zone which happened in August of  
7 2011.

8 This earthquake was also -- well, if  
9 anybody was here, anybody would have felt it. It was  
10 a strong motion, and the question that it brought up  
11 immediately to the table was, well, was this event  
12 properly incorporated into the seismic source model  
13 that came out just before -- that was under  
14 development before this earthquake happened. So,  
15 UniStar has performed the analysis, and has  
16 performed the necessary work to confirm that the  
17 Epri-DOE-NRC seismic source model of 2012 adequately  
18 incorporates this event. And that, therefore, that  
19 source model can be used to develop a reliable  
20 seismic design basis which was the main objective of  
21 our work.

22 I'm here on Slide 22. This is still  
23 being tracked as an open item since the staff is  
24 currently performing a comparatory analysis.

25 Moving to Slide 23, you've also seen the

1 ground motion response spectra of the Calvert Cliffs  
2 Unit 3, which is shown here in the blue curve, and  
3 that blue curve corresponds to the motion that was  
4 developed after the incorporation of the 2012  
5 seismic source model.

6 It's compared here against the red curve  
7 which corresponds to the 1986 EPRI source model, so  
8 you can see that there's an increase, obviously, in  
9 the seismic design basis that resulted from the  
10 update of the seismic source model.

11 CHAIRMAN ARMIJO: You're putting papers  
12 there.

13 DR. FERNANDEZ: Last time it happens.

14 (Simultaneous speech.)

15 CHAIRMAN ARMIJO: As long as we've  
16 interrupted you here --

17 DR. FERNANDEZ: Sure.

18 CHAIRMAN ARMIJO: -- just slide it to  
19 the side if it's bothering you.

20 MEMBER-AT-LARGE RAY: Any vision of  
21 something still under review relative to the  
22 inclusion of this event in the model, say some more  
23 about that, please.

24 DR. FERNANDEZ: Sure. UniStar has  
25 completed the work to confirm that this event is

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1 adequately incorporated into the seismic source  
2 model. UniStar has completed, obviously, the  
3 probabilistic seismic hazard assessment. One of the  
4 RAIs, RAI-385 which is mentioned there in the slide,  
5 it's still tracked by the staff as an open item. As  
6 we understand, the staff is performing a  
7 confirmatory analysis of the seismic -- of the  
8 calculation of the seismic design basis.

9 MEMBER-AT-LARGE RAY: On a PSHA curve,  
10 probabilistic seismic hazard curve where would this  
11 event fall from a recurrence interval?

12 DR. FERNANDEZ: Well, we would have to  
13 get into the details of the recurrence of the  
14 central --

15 MEMBER-AT-LARGE RAY: Yes, I know.

16 DR. FERNANDEZ: We need a seismic zone.

17 MEMBER-AT-LARGE RAY: It's not easy.

18 DR. FERNANDEZ: Which would have to get  
19 into the calculation the seismic source model. But I  
20 can comment --

21 MEMBER-AT-LARGE RAY: Is that a very  
22 rare, extremely rare event or what?

23 DR. FERNANDEZ: Well, I can comment on  
24 that a little bit. Right. The magnitude of the event  
25 which is recorded as 5.8, if we look at the Central

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1 Virginia Seismic Zone, the maximum magnitude  
2 distribution that was used for that zone, the lower  
3 end of that maximum magnitude is higher than the  
4 Mineral earthquake. So, from a magnitude  
5 perspective, from a magnitude point of view, all the  
6 probabilities of an earthquake happening from that  
7 zone indicate that we considered in the analysis to  
8 respond to a higher magnitude. So, the whole  
9 distribution of magnitude is to the -- let's say  
10 it's to the right, the seismic Virginia earthquake  
11 is adequately incorporated.

12 Then the other part of your question  
13 which is occurrence, will come -- did this event  
14 alter the assumptions of recurrence that we have for  
15 the Central Seismic, Virginia Seismic Zone. UniStar  
16 has evaluated and has concluded that the existing  
17 recurrence interval parameters that are in the  
18 seismic source model adequately incorporate this  
19 event. Then there's the tracking of an open item  
20 that the staff still has to complete.

21 MEMBER-AT-LARGE RAY: Okay, but I --  
22 you're looking at it from the standpoint that this  
23 is something that isn't outside of what's  
24 anticipated by the model.

25 DR. FERNANDEZ: Right, right. It's not

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1 outside.

2 MEMBER-AT-LARGE RAY: Okay.

3 DR. FERNANDEZ: So, I'm going to move  
4 along to Slide 24, also a slide that has been shown.  
5 This is not the ground motion response spectra that  
6 we're showing in the blue line for the Calvert  
7 Cliffs project. It's the safe shutdown earthquake  
8 which is higher than the ground motion response  
9 spectra. It has a peak ground acceleration of .15 gs  
10 versus the .12 of the GMRS, so there's margin built  
11 in in the seismic design basis of the project.

12 Peak follows a broadband spectra curve  
13 as it is shown from the 2 hertz on. On the lower  
14 frequency, it is controlled by the new PSHA  
15 calculation with the Central and Eastern United  
16 States source model. And in the low frequency, we  
17 see that there is an exceedance to the generic  
18 certified seismic design response spectra.

19 So, that takes us to one of the --  
20 moving ahead to the next slide, if anybody has any  
21 questions here, takes us to some of the denatures  
22 that we are going to have to consider, and this  
23 seismic design response spectra is one of them.

24 So, one of the departures we're going to  
25 talk about some of them right at this point, in

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1 particular, it's the low strain shear wave velocity.  
2 The US-EPR specifies a minimum shear wave velocity  
3 of 1,000 feet per second for the foundation of  
4 Safety Category 1 buildings. And at Calvert Cliffs,  
5 some of the foundation backfills have lower shear  
6 wave velocity than 1,000 feet per second, so how --  
7 this is reconciled by doing a site-specific soil  
8 structure interaction analysis. The soil has -- the  
9 properties that the soil has sometimes -- we don't  
10 change them, so the analysis incorporates exactly  
11 the shear wave velocity of the backfill at the site.

12 A second departure is the safe shutdown  
13 earthquake that you just saw. It has an exceedance  
14 in the low frequencies approximately below .3 hertz,  
15 and these departures also reconcile by performing a  
16 site-specific structural analysis, soil structure  
17 interaction analysis that uses the site-specific  
18 Calvert Cliffs Unit 3 safe shutdown earthquake.

19 MEMBER RICCARDELLA: Excuse me. Just  
20 going to the previous slide 24.

21 DR. FERNANDEZ: Yes, sure.

22 MEMBER RICCARDELLA: You showed two  
23 response spectra.

24 DR. FERNANDEZ: Yes.

25 MEMBER RICCARDELLA: The safe shutdown

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1 earthquake and then the dashed curve. Which are you  
2 actually designed to, the dashed curve --

3 DR. FERNANDEZ: Okay, the design of the  
4 US-EPR is designed to the dashed curve.

5 MEMBER RICCARDELLA: Okay.

6 DR. FERNANDEZ: To the higher ground  
7 motion.

8 MEMBER RICCARDELLA: Right.

9 DR. FERNANDEZ: And for the site-specific  
10 structural reconciliation, we performed an analysis  
11 with the blue curve to confirm that that design is  
12 also adequate for the blue curve.

13 MEMBER RICCARDELLA: Okay. Thank you.

14 DR. FERNANDEZ: Because we have that  
15 exceedance.

16 Okay. The third departure in Slide 26,  
17 the soil properties. Like I was saying, some soil  
18 properties are beyond the bounds of what was  
19 considered in the certified design analysis. Soil is  
20 very site-specific. It's practically impossible that  
21 a generic design incorporates all the possibilities  
22 and combination of soils that can be there, so  
23 issues such as unit weight of backfill, shear wave  
24 velocity, distribution, some coefficients of  
25 frictions, they're very site-specific and these are

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1 also being reconciled by performing the site-  
2 specific analysis using these properties. So,  
3 there's no cutting corners.

4 Fourth departure has to do with  
5 settlement. There's COL items in the US-EPR that  
6 specify what levels of sediment are acceptable. One  
7 of them has to do with tilt or rotation of the  
8 foundation, and US-EPR specifies a maximum tilt of  
9 half an inch per 50-feet of length in a foundation.  
10 For the ESWB and EPGB, this estimate of tilt is  
11 higher than the one-inch -- than half inch in 50  
12 feet, which is very, very strict, by the way. It's a  
13 very strict limitation. So, it's slightly higher and  
14 further evaluations have been performed to verify  
15 that the structural -- to verify the structural  
16 integrity of the foundation. And analysis indicates  
17 that the design of the foundation adequately deal  
18 with the slight excessive tilt.

19 So, those are departures. One other --  
20 as I said, we're going to touch on the key elements  
21 and key topics of Section 2.5. One of them is  
22 settlement and tilt. This is a soil site so,  
23 therefore, settlement is of particular interest.  
24 Slide 27, this design center has performed extensive  
25 analysis in settlement beyond the -- I would say

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1 beyond the common practice. We have developed  
2 detailed models to estimate settlement, accounting  
3 for construction process, accounting for interaction  
4 between buildings and the -- also the effects of de-  
5 watering, the effects of excavation, and the results  
6 are shown -- of that analysis are shown in the next  
7 slide, Slide 28.

8 This slide shows the evolution, let's  
9 call it, the evolution of settlement through time  
10 through construction. We have concluded that the  
11 settlement's mostly elastic so it will happen on an  
12 immediate basis as the plant is being constructed,  
13 as loads are being incorporated into the soil. And  
14 the important thing about this result and this slide  
15 is that we observed an asymptotic behavior as we  
16 approach the end of construction, and as we get into  
17 the initial stages of operation of the plant. So, we  
18 have concluded that settlement pretty much is over  
19 once construction is finished. So, that pretty  
20 concludes --

21 MR. FINLEY: So, just to summarize. Thank  
22 you --

23 DR. FERNANDEZ: Do you want to summarize?

24 MR. FINLEY: Yes, maybe. Thank you,  
25 Antonio. So, you see the summary here for Section

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1 2.5. I think actually the number of open items will  
2 be updated by the staff here later this morning.  
3 It's down to four, I think, so that's good.

4 Okay. Moving on, for Chapter 3 really we  
5 thought maybe a little bit of discussion on 3.8  
6 would be worthwhile. And just to remind, what I said  
7 earlier, Section 3.7 is not part of the meeting  
8 today. That's a scope that will be moved forward  
9 into Phase 4, but it's not been addressed yet in  
10 terms of the Subcommittee or the staff.

11 MEMBER SKILLMAN: Mark, before you go on,  
12 I'd like to go back to Slide 28, please.

13 MR. FINLEY: 28.

14 MEMBER SKILLMAN: As you explained the  
15 settlement becomes asymptotic, in other words, the  
16 longer you proceed in the construction the more the  
17 entire site settles. It raises in my mind a  
18 question, what about two different buildings that  
19 may be settling at different rates, that have  
20 interconnected conduits or piping, such that one  
21 building sinks three inches and the other eight, and  
22 now you have shear forces or bending moments on  
23 critical piping or conduit. How is that addressed?

24 DR. FERNANDEZ: Correct. It actually  
25 happens -- you're right, there's -- settlement takes

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1 place at different rates for different buildings,  
2 and different buildings have different loads. So,  
3 yes, the -- one building finishes its settlement  
4 while the other is still going, so in the COLA  
5 documentation through RAI responses there's  
6 settlement monitoring programs and settlement  
7 management programs that specify that connection  
8 points between buildings s should be performed, once  
9 this monitoring indicates that it is safe to do so.  
10 And at the end of the -- so, the connection of this  
11 piping and these elements between buildings will be  
12 delayed to later stages when it is safe to do so.

13 MEMBER SKILLMAN: Thank you. How is that  
14 controlled in your construction process? Is that  
15 part of a site-wide battle plan for constructing  
16 such that individuals know you don't make those  
17 connections until the settlement analysis has been -  
18 - or the settlement data has been -- has confirmed  
19 that the buildings are where they're supposed --

20 MR. FINLEY: Yes, I would comment and,  
21 Shankar, you can chime in, too. But this will be  
22 controlled procedurally. And, in fact, we're working  
23 now with the staff on ITAAC related to monitoring of  
24 settlement. And procedurally we'll be required to  
25 monitor settlement, make sure it's within the design

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1 criteria that we've analyzed. And using that design  
2 criteria, that will be what's built into the piping  
3 connection design. So, if the monitoring program  
4 shows we're out of the design criteria we had  
5 previous set, then we would stop and redesign or re-  
6 analyze for those connections.

7 MR. RAO: Any differential movement  
8 between the building that has been predicted over  
9 time will also be incorporated into the design of  
10 the piping system, that is to provide proper  
11 flexibility in piping design and/or flexible joints  
12 in the conduits, what you call it as the concrete  
13 conduits.

14 MEMBER SKILLMAN: Thank you. Thank you.

15 MR. FINLEY: Okay. So, move again to  
16 Section 3.8. We thought it would be worthwhile  
17 talking a little bit about the one significant, I  
18 would say, site-specific safety structure which is  
19 the ultimate heat sink makeup structure. All of the  
20 other safety structures except for the duct banks  
21 and the buried pipe, of course, are described in the  
22 US-EPR FSAR, and I think as we said earlier, we will  
23 be using the design of these structures for the  
24 Calvert -- that are described in the US-EPR FSAR,  
25 that those designs will be used at the Calvert

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1 Cliffs site for those generic structures. But the  
2 one site-specific structure is the ultimate heat  
3 sink makeup water intake structure, and this is the  
4 structure located on the shoreline of the bay.

5 Slide 32 just lists some of the bullets.  
6 It is a combined structure with the makeup -- the  
7 structure for makeup to the main circ water system,  
8 as well as the ultimate heat sink system, so it's a  
9 combined structure. There is a diagram on Slide 33  
10 that shows the structure, both structures with the  
11 forebay in the center. Now, the main circulating  
12 water makeup structure is on the upper lefthand side  
13 of this figure. That is a Category 2 structure, so  
14 we verified that during a seismic event it won't  
15 affect the Category 1 structure which would be the  
16 forebay and the ultimate heat sink makeup structure  
17 which is on the right-hand side of this diagram.

18 And as we said earlier, you can see  
19 looking at the ultimate heat sink makeup intake  
20 structure that's it four divisions there. It's,  
21 obviously, a four safety train plant, so each of  
22 those divisions is independent and would provide  
23 makeup to its assigned UHS basin.

24 That's really all I had for Chapter 3. I  
25 will mention in the summary slide 34 that we are

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1 down to 10 open items when I saw the staff slides  
2 that you'll see here in a moment so that's, again,  
3 good news closing out these open items. No  
4 departures or exemptions in this section.

5 Moving on to Chapter 9, we thought it  
6 worthwhile to talk about Section 9.2, specifically  
7 the ultimate heat sink which is, to some extent,  
8 site-specific at Calvert Cliffs. The makeup system  
9 is site-specific. Normally, we provide freshwater  
10 makeup to the ultimate heat sink basins for normal  
11 operations. However, as we talked about in an  
12 emergency, we provide makeup from the Chesapeake Bay  
13 through the safety-related structure that we just  
14 talked about.

15 We provide each train at least 300  
16 gallons per minute makeup. We have the capability to  
17 provide over 500 gallons per minute makeup with each  
18 of the pumps so there is quite a bit of margin  
19 there. And this makeup is adequate to keep our UHS  
20 basins above minimum levels after 72 hours into an  
21 event.

22 Slide 37, there is one departure related  
23 to our makeup system and that is related to this  
24 keep-fill piping. The keep-fill piping is just a  
25 section of piping that provides flow from the

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1 essential service water pumps back into this makeup  
2 piping to make sure we keep that pipe full of water  
3 to avoid any water hammer type events. But that's  
4 not a section of piping or a function that's  
5 described in the US-EPR FSAR, so it is considered a  
6 departure.

7 Slide 38, talking about evaporation and  
8 drifts, so it turns out that in the US-EPR FSAR  
9 there is an analysis of evaporation and drift. And,  
10 in fact, it uses the same temperature data from the  
11 Calvert Cliffs Unit 3 site, so the temperature data  
12 for Calvert Cliffs Unit 3 site is identical to that  
13 used in the FSAR, so it was an easy problem for us,  
14 if you will, to confirm that we had adequate water  
15 in the basin, and that our makeup flow of 300 gpm  
16 was adequate.

17 Slide 39, we spent some significant  
18 amount of time looking at the issue of interference  
19 of the cooling tower plumes, UHS cooling tower  
20 plumes both recirculation on itself, and also on the  
21 safety-related HVAC air intakes. This was a COL item  
22 from the US-EPR FSAR.

23 Slide 39 shows a high-level summary of  
24 that analysis. Essentially, the peak wet bulb  
25 temperature, zero percent exceedance wet bulb

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1 temperature for the site is 85.3 degrees, and we  
2 calculated a recirculation type interference from  
3 the cooling tower plume of less than 2.5 degrees, so  
4 we combined the 85.3 and the 2.5 and showed through  
5 that process, through the 24-hour transient process  
6 that the 95 degree design temperature for essential  
7 service water is not exceeded even considering that  
8 recirculation effect on the UHS cooling towers.

9 MEMBER SKILLMAN: Has that ever been a  
10 problem at Calvert Cliffs 1 and 2?

11 MR. FINLEY: Calvert Cliffs 1 and 2 are  
12 once-through cooling site. They don't have -- there  
13 is no cooling tower ultimate heat sink.

14 MEMBER SKILLMAN: Okay, thank you.

15 MR. FINLEY: And, similarly, on Slide 40  
16 we summarize the results of the evaluation  
17 associated with interference of these cooling tower  
18 plumes on the safety-related HVAC intakes. And,  
19 again, we did a computational fluid dynamics  
20 analysis of this plume and showed that the  
21 interference at the closest of the safety-related  
22 intakes is less than 2.5 degrees, and we showed that  
23 we have margin in these ventilation systems to  
24 accommodate that kind of an increase due to the  
25 plume.

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1           And that's really all I had for Chapter  
2           9. On Slide 41 is the summary, and I think we're  
3           down to one open item for Chapter 9. It does relate  
4           to this computational fluid dynamic analysis of the  
5           plume.

6           We're left with Chapter 13 and 14, and  
7           not a lot that's unique, I would say, for the  
8           Calvert Cliffs Unit 3 project for these chapters. We  
9           are committed to developing a training program for  
10          the recent industry guidance. On Slide 43 there you  
11          see NEI 06-13A. That will be the guidance used for  
12          our training program. And we're committed to  
13          developing our non-licensed and reactor operator  
14          training programs at least 18 months prior to  
15          delivery of fuel on site.

16          In fact, there's a little time line we  
17          show here that relates to both development of the  
18          training program and the staffing plan on Slide 44.  
19          You can see six years prior to commercial operation  
20          we begin our hiring and training program, and we'll  
21          have our first operator license class, and non-  
22          licensed operator classes conducted well before we  
23          load fuel on site.

24          Emergency planning is the next section,  
25          13.3. We have provided a comprehensive emergency

1 plan. We updated that recently to incorporate  
2 aspects of the revised emergency plan rule to  
3 incorporate the hostile action requirements. We've  
4 also done a staffing analysis to the extent that we  
5 can without having the detailed procedures done at  
6 this point in accordance with NEI 10-05. I think the  
7 emergency plan, the revised emergency plan that we  
8 recently submitted is still under review by the  
9 staff. And on Slide 47 shows the number of open  
10 items, and these open items are, in general, related  
11 to that emergency plan which is still under review.

12           And then the last chapter, Chapter 14,  
13 talk a little bit about Section 14.3, an ITAAC.  
14 Again, nothing really stands out in terms of unique  
15 for Calvert Cliffs. We do have a significant number  
16 of ITAAC right now in the US-EPR FSAR. There are  
17 1,275 ITAAC, and then specifically for the COLA we  
18 have an additional 246, so somewhere north of 1,500  
19 ITAAC will be -- 1,521 ITAAC. You see the number  
20 there, will be conducted for the project, which  
21 actually brings us to the close.

22           On Slide 50, this large number of open  
23 items associated with Chapter 14 has gone down to  
24 two from what I saw on the staff's slide, so most of  
25 the reviews are completed now for Chapter 14 which

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1 is, again, good.

2 Brings us to the end of the content of  
3 our presentation. Slide 52, we talked about the  
4 seven departures and four associated exemptions  
5 which we think are well justified. As I mentioned  
6 earlier, we've responded to all but one of the  
7 remaining open items, and we're on a good path to  
8 provide a response to that last remaining open item.

9 And I think the last bullet there talks  
10 about all the chapters, except for Chapter 1, which  
11 doesn't require ACRS review. And we'll proceed into  
12 Phase 4. Again, Chapter 3.7 has not been covered in  
13 Phase 3, but will be covered in Phase 4. Any other  
14 questions for me or my team?

15 MEMBER POWERS: I think you've got it,  
16 Mark. Very nice, very nice.

17 We'll turn now to the staff.

18 MR. FINLEY: Thank you very much.

19 MEMBER POWERS: Thank you.

20 MR. TAKACS: Okay, good morning,  
21 everybody. My name is Mike Takacs. I will be  
22 presenting the presentation for the staff. Surinder  
23 Arora, as I mentioned, is not in today.

24 A little background on myself. Prior to  
25 --- I've been at NRO for five years. Prior to that,

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1 I started out my career as a Navy nuke operator  
2 aboard the USS Enterprise. I only mention that  
3 because Dr. Bley was aboard that ship before my  
4 time.

5 (Simultaneous speech.)

6 MEMBER BLEY: Coming from this little guy  
7 over here.

8 MR. TAKACS: Following that, I was a  
9 plant operator at the Shoreham Nuclear Plant. We did  
10 low-power testing. Following that, I was a nuclear  
11 reactor operator at Brookhaven National Lab at the  
12 Heavy Water Moderated Reactor, and the Medical  
13 Research Test Reactor. And all of those reactors  
14 I've ever helped operate are permanently shut down,  
15 so --

16 (Laughter.)

17 MR. TAKACS: Now I'm in NRO, so --

18 MEMBER POWERS: And we're --

19 (Simultaneous speech.)

20 MR. TAKACS: We're trying. Okay. Let's go  
21 ahead and go to the next slide. With me is Phyllis  
22 Clark. She's the Project Manager to support the  
23 project she's volunteered to help run these slides  
24 for me.

25 MEMBER POWERS: I'd like to see how that

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1 volunteer --

2 MR. TAKACS: For the first slide, we got  
3 the chronology here. This is a slide that was  
4 presented to previous Full Committee meeting, and  
5 I've updated the slide in red font. Since the last  
6 Full Committee meeting back in April 2012, we've  
7 received Rev 9 of the DCD. And the major milestone  
8 on there, this last red font bullet, on November 6<sup>th</sup>  
9 we had the Subcommittee meeting on the remaining two  
10 sections of Phase 2, 2.4 and Chapter 9. Okay.

11 The next slide is the review schedule.  
12 Now, red font showing, again, just reiterating that  
13 October 9<sup>th</sup> was the milestone for the staff here  
14 completing Phase 2 of the SEs. Phase 3, today is the  
15 major step in completing Phase 3 for us, as is  
16 pointed out in there.

17 The one thing I want to point out on  
18 this slide is that you see Phase 4, 5, and 6. The  
19 schedule is still under review. That has to do with  
20 developing the review schedule for the design cert.  
21 That's still work in progress, so as we get that  
22 schedule for the design cert, we'll have worked out  
23 a schedule for the Calvert review, as well. The next  
24 slide.

25 Okay. The -- what I'm going to do is --

1 MEMBER POWERS: Make sure you haven't run  
2 into scheduling problems with the ACRS meetings.  
3 That's a question.

4 MR. TAKACS: Well, I haven't been  
5 involved in that. I've only been in this group for  
6 two months.

7 MEMBER POWERS: But nothing gets flagged.

8 MR. TAKACS: Not to my knowledge.

9 MEMBER POWERS: As far as I know,  
10 scheduling here is when you guys call us.

11 MR. TAKACS: Yes, that's my  
12 understanding.

13 MR. SEGALA: This is John Segala, the  
14 Chief of the EPR Licensing Branch. We have not had  
15 any problems scheduling ACRS meetings, and there's  
16 been no impacts on our schedule due to that.

17 MEMBER POWERS: Okay, I just wanted to  
18 make sure.

19 MR. SEGALA: Okay.

20 MEMBER POWERS: I didn't want to be on  
21 your critical path.

22 MR. TAKACS: Okay. For the first table  
23 here, what I want to mention before moving on, I've  
24 utilized tables to show both the -- well, the  
25 current status of open items. And I'll highlight

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1 what has changed in red font. What I'm also going to  
2 do is I'm going to show what the Subcommittee was  
3 presented as far as the actual RAIs. There are new  
4 RAIs that are very recent. And I may touch on them  
5 just very briefly, but the Subcommittee has not seen  
6 those, or they're in a preliminary stage where  
7 they're OGC review, the applicant's draft, and what  
8 have you, so that's how we'll proceed forward.

9 For the 2.4 section, that was just  
10 recently presented to the Subcommittee in November.  
11 The level of effort for this was 1,400 hours to get  
12 to this stage. There were, basically, two open items  
13 presented, and you can go ahead to the next slide.  
14 And I'm just pointing out what the Subcommittee was  
15 presented with. These still -- one of them has been  
16 responded to, and I don't recall which one. I know  
17 it was presented, mentioned at the UniStar  
18 presentation.

19 The first one has to do with the  
20 diagram. Different figures are not equivalent. And  
21 the second one had to do with the groundwater  
22 subsidence, where it levels off, is that the  
23 bounding condition. So, I'm just reiterating what  
24 the Subcommittee questions were presented to. Okay,  
25 any questions on that?

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1                   Okay. Moving on 2.5. Now, 2.5 is  
2 geological, seismology, and geotechnical. The level  
3 of effort for this was 7,400 hours, and rightly so,  
4 it seems. This was presented to the Subcommittee  
5 back in May, and you'll see that I have the red font  
6 showing that the first one, 2.5.1 had originally  
7 five open items. Since then, four are now  
8 confirmatory, and one has been resolved closed.

9                   The total -- I should step back. The  
10 total RAIs issued was at the time 133. The new  
11 number is 135. The total of open items back to the  
12 Subcommittee was listed as eight. We're down to  
13 four, but there's a caveat here. For 2.5.2, those  
14 two RAIs are still open, and I'll explain why in the  
15 next slide. And Section 2.5.4, there are new RAIs  
16 being issued to the Calvert -- to UniStar, actually,  
17 one of them dealing with -- it's a follow-up RAI to  
18 Section 2.5.4 dealing with a new ITAAC that needs to  
19 include some settlement control issue. And the  
20 second, which is in the draft form right now to the  
21 applicant is having to do with revised information  
22 in the DCD, value for dynamic bearing capacity. That  
23 information has been revised in the DCD, so this new  
24 RAI questions that applicability to the COLA COL.  
25 The Subcommittee has not seen these two questions

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1 yet. I just bring them up as a point.

2           Okay, the next slide. These two  
3 questions are the ones remaining that the  
4 Subcommittee did see back in May, and the first one  
5 having to do with the hazard seismic contributions,  
6 individual seismic sources, and the second one  
7 having to do with staff requesting information on  
8 sensitivity studies related to the earthquake back  
9 in 2011, the Mineral, Virginia earthquake. Okay, so  
10 those are still under current review.

11           Chapter 3. Chapter 3 is a very busy  
12 slide shot. What I'll do is -- as you can see, the  
13 red font indicates the total changes in RAIs. The  
14 red -- the total 132 previous was 125 RAIs. I know  
15 Mark Finley has mentioned from UniStar that the  
16 current number of open items that he was given was  
17 10. That was a presentation I had to update, and I  
18 apologize. I found out later in the game that we  
19 have four that are in that process of the  
20 preliminary stages of OGC review, draft, that have  
21 not been formally sent to the applicant, so I wanted  
22 to make that clear. What I'm using this table for  
23 is so that we see what actual open items will be, or  
24 are currently in this project.

25           So, looking at Section 3.2, it

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1 originally had one RAI, open RAI. It's down to zero.  
2 3.4 had one, it's down to zero. The Section 3.7, as  
3 you heard, was put into the Phase 4 review. It was  
4 not reviewed under the Phase 2 review.

5 Section 3.8, now here's the big one. 3.8  
6 had originally 23 open items presented back in  
7 January, now January almost a year ago, so it has  
8 dropped down, the number on here as seven, five of  
9 those being previous RAIs, two of those are actually  
10 new RAIs, as well. And you'll see that in the next  
11 slide when I get there.

12 The Section 3.8 has 15 -- excuse me, 3.9  
13 has 15 now. It originally had -- excuse me, I'm  
14 jumping ahead. Section 3.9 had six RAIs, now it  
15 shows 15. We had six original open items in there,  
16 and we're now --- we have closed those and we have  
17 two RAIs now, open items, that have not been  
18 presented to the Subcommittee.

19 Section 3.11 and 3.12 also have new --  
20 where originally 3.11 had one old RAI. That was  
21 closed out, that open item, and a new one is now  
22 being in the process of being issued. And 3.12 had  
23 none, and now it has a new one in process, if you  
24 will.

25 And one thing I failed to mention, the

1 total hours that were needed to do this review were  
2 3,000 hours to complete. Okay. And go ahead and go  
3 to the next slide.

4 So, as I mentioned, what I wanted to do  
5 is just indicate what the RAI questions were to the  
6 Subcommittee. These three questions related to  
7 Section 3.5, missile protection, have to do with the  
8 turbine generator. The reason the three of these are  
9 still open is that we had -- the staff had to  
10 resolve issues related to the DCD, and that was  
11 recently resolved. So, now they're working at  
12 looking at resolving these three questions, so this  
13 is in process right now. They are currently still  
14 open, though.

15 The next slide, and there'll be a  
16 separate one. These will show the five open items  
17 that remain -- that were presented to the  
18 Subcommittee back in January. Obviously, they're  
19 self-explanatory but here the description of sliding  
20 analysis for the SCI-1 structures, the makeup water  
21 intake structure east wall issue, that's still an  
22 open item here.

23 MEMBER BLEY: Mike, do you have responses  
24 on these that you're still reviewing? Is that the  
25 status?

1 MR. TAKACS: From what the staff told me,  
2 they do have -- they are reviewing responses on  
3 these. And the third one on here talks -- the  
4 request on here was the forces -- seismic load  
5 forces as far as are they conservative in the COLA  
6 versus the EPR bounding values.

7 And the second slide is just the  
8 remainder of this 3.9 Category 1 structure RAIs. The  
9 first one, soil pressure considerations for the  
10 common basemat intake structure. And the second one  
11 here, which is actually the fifth one from the  
12 Subcommittee, is the settlement of the essential  
13 service water building. And I just want to verify  
14 with the reviewer that we did get these responses,  
15 and are reviewing them right now. And I think the  
16 reviewer -- is the reviewer here today? Yes, I  
17 apologize. We're reviewing these responses right  
18 now.

19 Okay, so those items were the ones  
20 provided to the Subcommittee. Okay. The next  
21 section, Chapter 9. Chapter 9 was also recently  
22 presented to the Subcommittee this past November. We  
23 originally presented four open items, and at that  
24 presentation two of those were actually mentioned  
25 that they would be confirmatory, Section 9.4.

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1           The one open item that remains in 9.2,  
2           if you go to the next presentation slide, is having  
3           to do with the CFD computer analysis for the  
4           ultimate heat sink essential service water cooling  
5           tower. And that's still being reviewed. We have the  
6           response the staff is reviewing. I believe the staff  
7           has possibly additional questions on that analytical  
8           work.

9           One thing, I apologize, I failed to  
10          mention, for this review for Chapter 9, it was 1,100  
11          hours to get to this stage. Okay, next slide.

12          Okay. Chapter 13. Chapter 13, the level  
13          of effort here to get to this point was 1,200 hours.  
14          This was presented to the Subcommittee back in May.  
15          The total number originally was 178 questions. We  
16          had --the only section that had open items at the  
17          time was the emergency planning. They were  
18          originally six open items. We've closed out five,  
19          and one is unresolved closed.

20          These eight are, essentially -- one is a  
21          follow-up RAI, and seven are RAIs that none of these  
22          have been processed yet. The majority have to do  
23          with the emergency plan, Rev 8, the recent  
24          submittal. There's some information that is missing  
25          or was not included, so these -- most of those

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1 involve getting that accurate information in Rev 8  
2 of the emergency plan. And, again, I need to mention  
3 that they are not formally processed yet. Okay, next  
4 slide.

5 Chapter 14, for the level of effort here  
6 we had 2,300 hours to get to this point. This was  
7 presented in January. You can see on the slide here,  
8 there's been some changes to 14.2, 14.3.1, 14.3.3.  
9 And if you go the last slide, we originally had 146  
10 questions issued. That number remained the same. The  
11 original open items to the Subcommittee was  
12 originally eight, and we're down to two. And what  
13 I'll do is I'll explain. For 14.2 -- back up the  
14 previous, 14.2, those three original open item RAIs,  
15 two are resolved closed now and one is confirmatory.  
16 For 14.3.1, those have been completely closed, the  
17 two that were in there. 14.3.2 and 14.3.3, you can  
18 go ahead and go to the last slide, one more.

19 These are the two open items RAIs that  
20 remain in Chapter 14 having to do with ITAAC,  
21 Seismic Category 1 structures, and the following one  
22 is ITAAC, as well, design, fabrication, and  
23 installation. So, these were presented to the  
24 Committee back in January, a year previous to today.  
25 And the last slide, of course, a good part of the

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1 presentation to be at.

2 MR. SEGALA: This is John Segala, again.  
3 I'm the EPR Licensing Branch Chief. I just want to  
4 add that any -- we issued the SERs with open items.  
5 We presented those open items to the Subcommittee.  
6 Any new RAIs that were issued after we made the  
7 presentation to the Subcommittee will be reviewed,  
8 brought to resolution. We'll issue the SER with no  
9 open items, and then in Phase 5 we'll come back to  
10 the Subcommittee, and we'll go through each one of  
11 those and describe how we got to resolution on  
12 those.

13 MEMBER POWERS: The only requirement is  
14 that you come to the Subcommittee on a path to  
15 resolution. We don't expect that there will be  
16 additional questions. One of the things that we are  
17 always interested in, of course, is when the staff  
18 has done independent analyses, and I know there's a  
19 few of them flagged here and there that I could  
20 identify. And it was useful to get the number of  
21 hours to -- of effort that was taken here.

22 You have a blank screen, so I assume  
23 you're done.

24 MR. TAKACS: Unless there's questions for  
25 staff --

1                   MEMBER POWERS: Do any of the members  
2                   have questions that they would like to pose on this?  
3                   No questions. Okay. Well, I think the upshot is that  
4                   we think we're on a good pathway from our  
5                   perspective to move to Phase 5 once you guys have  
6                   completed your Phase 4, so we'll anticipate that  
7                   when it gets appropriately scheduled. There are  
8                   frictions here because this is being done in  
9                   parallel with the DCD review of the design itself,  
10                  and so there's some interaction back and forth. And  
11                  I think we saw that in the presentation. But other  
12                  than that, Mr. Chairman, I'll turn it over to you. I  
13                  think we're in a position to -- this will, by the  
14                  way, complete Phase 3 for the Calvert Cliffs Unit 3.

15                  CHAIRMAN ARMIJO: Well, thank you, Dana.  
16                  Well ahead of schedule, so first of all I'd like to  
17                  thank the presenters. I was -- attended the  
18                  Subcommittee meeting, and that's why I was so quiet  
19                  through this meeting. It was very well done.

20                  What we're going to do is we're going to  
21                  recess until 10:45 and we'll start with the US-APWR  
22                  briefing.

23                  (Whereupon, the proceedings went off the  
24                  record at 9:49:03 a.m., and went back on the record  
25                  at 10:45:35 a.m.)

1                   CHAIRMAN ARMIJO: We're reconvening for  
2 the next session. The topic will be the Comanche  
3 Peak -- I'm sorry, the US-APR design certification  
4 and Comanche Peak reference combined license  
5 application. And John Stetkar will lead us through  
6 this. John.

7                   VICE CHAIRMAN STETKAR: Thank you, Mr.  
8 Chairman. We have a lot of material to cover here,  
9 and to orient the Committee Members regarding the  
10 scope of what we'll be hearing about from MHI for  
11 the US-APWR design certification, we'll be hearing  
12 presentations on Chapter 6 and Chapter 7 of the  
13 design certification document and related material  
14 on long-term cooling and GSI-191. Those are  
15 basically covered under Chapter 6.

16                   We'll be writing an interim letter on  
17 those chapters. We're in that phase of the review  
18 cycle. We'll also be hearing from them on the  
19 Advanced Accumulator, and we'll be writing a final  
20 letter to finalize our review of that particular  
21 topic. So, there's a separate topical report that  
22 the staff has written their final SER on the  
23 Advanced Accumulator. So, that has an issue of  
24 finality as far as the Committee is concerned, only  
25 the Advanced Accumulator.

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1                   From Luminant we'll be hearing about  
2 Chapter 2, not all of Chapter 2, five sections of  
3 Chapter 2 and Chapter 6 and Chapter 7 from the COL.  
4 That is also an interim status letter on those  
5 chapters. So, if you could follow all of that,  
6 that's what we'll be hearing from. Because there's a  
7 lot of material to cover, I don't want to take up a  
8 lot of time with introductory material. I'll turn to  
9 the staff. Do you have anything? Nothing at all? If  
10 not, Ryan, it's your's.

11                   MR. SPRENGEL: Thank you very much. Good  
12 morning, I'm Ryan Sprengel with MNES representing  
13 MHI for the areas that were mentioned for 6 and 7,  
14 and various associated areas including the  
15 Accumulator Topical Report. Also with me, Rebecca  
16 Steinman for Chapter 6 and associated areas, and  
17 Erin Wisler for Chapter 7. They'll be discussing  
18 those specific areas.

19                   Previous meetings here, this list is  
20 growing which is definitely a positive, and we'll  
21 hopefully expand that even further after today's  
22 meeting. Back in 2011, `12, and `13 many different  
23 areas and topics covered, and we're also looking for  
24 some additional interactions with the Subcommittee  
25 early next year.

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1                   Upcoming submittals, these will be  
2 touched on in the relevant areas, but there's a  
3 couple of key submittals that will be coming in for  
4 the staff's review tied to Chapter 6 and 7 there.  
5 And then also, the LOCA reports, as of today they'll  
6 have both been submitted. And those are actually  
7 supporting some of the items with the accumulator  
8 review, and those will be done today. And the staff  
9 will have those to confirm those minor revisions  
10 associated with some items in the Accumulator  
11 review.

12                   Down at the bottom we also would like to  
13 acknowledge some changes in our activities going  
14 forward. We submitted a letter, and we've had  
15 interactions with the staff since that letter, and  
16 will continue interactions with the staff. We are  
17 undertaking a coordinated slowdown of our activities  
18 starting basically early part of 2014, and carrying  
19 into the future where MHI will be focusing resources  
20 on the Japanese plant restart activities in Japan.

21                   I do want to stress that we will  
22 maintain activities, just at a different pace. That  
23 includes both the NRC review activities, as well as  
24 our ACRS interactions. And now I will turn it over  
25 to Rebecca Steinman for Chapter 6.

1 MS. STEINMAN: All right, hello. For  
2 those of you that are on the Subcommittee, you will  
3 probably maybe finally, maybe not remember that we  
4 spent two days discussing activities associated with  
5 Chapter 6 in September, and then had a third day  
6 discussing long-term core cooling and GSI-191 in the  
7 beginning of October. And I'm going to briefly go  
8 over some of the things that have happened since  
9 those two meetings, and what the remaining items we  
10 have to work on in those areas.

11 The first slide up here is related to  
12 DCD Chapter 6. When the staff wrote the SE, they  
13 identified 12 open items in the SE, three of those  
14 were closed before we even got to the Subcommittee  
15 to talk to you guys, and nine of them were discussed  
16 in detail with the Subcommittee members.

17 Since the time that we had that meeting  
18 back on September 17<sup>th</sup>, we have been working  
19 actively with the staff to close out many of those  
20 open items, and there are three items listed here  
21 which were at the time this presentation was created  
22 a week ago, were all open items that we were working  
23 on with the staff. In the last week, we have managed  
24 to close some of these, as well. Those items are the  
25 sparger associated with the emergency letdown

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1 system, and hydrodynamic loading associated with  
2 that. Design impacts changes on the mass and energy  
3 release analysis, and the secondary piping system  
4 rupture. That was RAI 923 with the area under the  
5 containment analyses in 6.2.1. We discussed several  
6 of those areas when we were with the Subcommittee,  
7 and the mass and energy release is one of the areas  
8 that we're still working on.

9 We just recently in the last week had  
10 some discussions with the staff in relation to some  
11 of the ACRS feedback and activities that we had been  
12 doing with the staff, and have come to a path to  
13 what we believe will close out this item. NMHI will  
14 be revising an RAI response to deal with the  
15 additional information needed to close out the  
16 technical concerns for that. And we anticipate to  
17 submit that design change by the end of this, or not  
18 -- it's not a design change. It's not a design  
19 change, I misspoke. Let me take that back.

20 We will submit that RAI describing the  
21 additional supplemental information to hopefully  
22 close that technical issue here very soon. And then  
23 we also at the time of the meeting back in September  
24 had actions that were required in Chapter 15 in  
25 relation to the Accumulator, and implementing the

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1 scaling biases that were associated with that in the  
2 Chapter 15 LOCA analyses.

3 And as Ryan just mentioned a few minutes  
4 ago, that required changes to both the small break  
5 and large break LOCA Topical Reports, which discuss  
6 how those biases are treated. And those reports were  
7 just recently submitted to the staff yesterday and  
8 today, so the staff will have an opportunity to  
9 review those. You know, we talked with the staff  
10 prior to submitting those, and we believe that what  
11 we did will completely close out the remaining  
12 issues associated with that implementation in  
13 Chapter 15. But, of course, the staff has to have  
14 time to actually review what we have done.

15 VICE CHAIRMAN STETKAR: Did you -- and we  
16 haven't seen that, but did you basically apply the  
17 biases that the staff was recommending in --

18 MS. STEINMAN: Yes, we did.

19 VICE CHAIRMAN STETKAR: Okay, thanks.

20 MS. STEINMAN: The other open items that  
21 we had were primarily related to confirmatory types  
22 of actions associated with DCD Rev 4. At the time of  
23 the meeting, DCD Rev 4 had just been submitted and  
24 the staff hadn't had an opportunity look at that  
25 material. They have been working a lot in the last

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1 several weeks, and more than half of the  
2 confirmatory items and most of the open items have  
3 already been closed out, and they're working  
4 actively to try to continue to close out. So, I  
5 don't expect any additional technical issues to  
6 arise from those closeouts because it really was a  
7 confirmatory type of activity. But, like I said,  
8 that's still an ongoing effort for the staff to  
9 finish up.

10 But from MIH's perspective we believe  
11 that we have addressed all of those hydrodynamic  
12 loading at this point, and there may be additional  
13 work associated with that. And then, of course, we  
14 owe the staff the response that we are working on  
15 for the mass and energy release.

16 We also left the September meeting with  
17 the ACRS with a couple of action items. NMHI is  
18 working to respond to those action items this month,  
19 maybe even as soon as the end of this week, first  
20 part of next week those responses will be submitted.  
21 There are six items of discussion associated with  
22 that.

23 We have no additional RAIs that are  
24 outstanding right now, no new or follow-up RAIs that  
25 were issued between the last meeting with the

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1 Subcommittee and this meeting here. But, as Ryan  
2 mentioned, we are supplying a revision to MUAP-07031  
3 which is our sub-compartment analysis document, and  
4 that will be submitted this month. All right. Next  
5 slide please. Thank you, Ryan.

6 We did have a meeting with the  
7 Subcommittee on October 1<sup>st</sup>, as well. That was this  
8 long-term core cooling. At that time, there were a  
9 couple of different open items that we talked about.  
10 One of the ones that at that time was remaining as  
11 an outstanding issue that we had not determined a  
12 closure path with the staff with the Tier 2\*  
13 designation of the latent debris amounts.

14 Since that meeting, we have talked with  
15 the staff about that. We have submitted a revised  
16 RAI response and DCD markups to designate those  
17 items as Tier 2\* material, and I believe that the  
18 technical aspects of this closed out, as well.

19 From the October meeting, we also had  
20 action items from the Subcommittee. There were 12  
21 items in this case, and we recognize that there was  
22 a possibility of additional need to discuss with the  
23 Subcommittee in this particular topic area, but we  
24 are intending a written response to those 12 action  
25 items. They will be submitted this month, as well,

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1 but not in the next day or two. Chapter 12, or  
2 Chapter 6's items are almost finished and in the  
3 finalization process. We're still working on getting  
4 appropriate answers for all of these. There are  
5 currently no outstanding RAIs for this area, either.  
6 Next slide please.

7 MR. SPRENGEL: Now, we do recognize that  
8 for long-term cooling in GSI-191, as mentioned, is  
9 kind of mid status right now, and this will be an  
10 area that we would --

11 VICE CHAIRMAN STETKAR: That's right. We  
12 will, eventually, write a separate letter to close  
13 out those issues, but not at this time. We'll give  
14 you interim feedback on the issues of long-term core  
15 cooling and related GSI-191, hopefully at this  
16 meeting, if we can get the letter out. But that is  
17 an interim letter, that will not be a final letter  
18 regarding that topic.

19 MS. STEINMAN: And then the final topic  
20 that I want to discuss and associated with Chapter 6  
21 was the Advanced Accumulator Topical Report. That  
22 was the second day of our Chapter 6 meeting back in  
23 September on the 18<sup>th</sup>.

24 The staff has issued the public version  
25 of the Advanced TRSE back in November. That,

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1 basically, just took into consideration proprietary  
2 information and things along those lines. And as we  
3 discussed earlier, one of the actions that NMHI at  
4 that time was to revise the LOCA topical reports to  
5 reflect how we were going to handle the Accumulator  
6 scaling biases. And as Chairman Stetkar had asked  
7 us, we did accept --- you're not the Chair.

8 VICE CHAIRMAN STETKAR: It's okay, it's  
9 fine.

10 MS. STEINMAN: I realize that, sorry. So,  
11 as we've previously discussed, we did accept the  
12 staff's bias values and implement those into the  
13 topical reports.

14 VICE CHAIRMAN STETKAR: Remind me,  
15 Rebecca, I know the small break LOCA is -- they're  
16 both topical reports. Right?

17 MS. STEINMAN: They are both topical  
18 reports.

19 VICE CHAIRMAN STETKAR: So, the staff  
20 will have to redo their SERs, and we'll have to see  
21 those.

22 MS. STEINMAN: Well, I don't want to  
23 speak for the staff, but I believe that they're  
24 going to do a supplemental SER --

25 VICE CHAIRMAN STETKAR: Okay.

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1 MS. STEINMAN: -- to address the  
2 revision. But if that's not correct, the staff  
3 should speak up.

4 VICE CHAIRMAN STETKAR: We'll straighten  
5 that out.

6 MS. STEINMAN: Okay.

7 VICE CHAIRMAN STETKAR: Thanks.

8 MS. STEINMAN: At this point, I'd like to  
9 turn it over to Erin Wisler, who will provide an  
10 overview of Chapter 7 activities.

11 MR. WISLER: Okay. So, this past April,  
12 the Chapter 7 Subcommittee meeting was held  
13 resulting in 14 questions --

14 VICE CHAIRMAN STETKAR: Erin, just make  
15 sure you speak up a little bit so that we pick you  
16 up on the microphone.

17 MR. WISLER: All right. I apologize.

18 VICE CHAIRMAN STETKAR: And don't hit it  
19 with your paper because, otherwise --

20 MR. WISLER: I'll try not to.

21 VICE CHAIRMAN STETKAR: -- we castigate  
22 you.

23 MR. WISLER: So, this past April, the  
24 Chapter 7 Subcommittee meeting was held resulting in  
25 14 questions requiring MIH responses. Subsequent

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1 discussions were held with the staff to insure a  
2 common understanding of the outstanding issues.  
3 Mitsubishi submitted responses to the ACRS questions  
4 this past September, and committed changes have been  
5 made to most documents. Some changes to documents  
6 are still outstanding.

7 RAI responses to SE open items regarding  
8 PCMS failure, D3 coping analysis assumptions, and  
9 selection of PAM variables among others have been  
10 submitted and are under staff review. Currently,  
11 there are no RAIs requiring MHI response.

12 MR. SPRENGEL: That concludes our portion  
13 of the presentation.

14 VICE CHAIRMAN STETKAR: Any questions  
15 from any of the Members from MHI?

16 MEMBER SKILLMAN: Yes, please. I have a  
17 question on your Slide 3, design change impact on  
18 mass and energy release.

19 MS. STEINMAN: Yes?

20 MEMBER SKILLMAN: May I ask you to please  
21 give just a brief description of what the design  
22 change is and how this is being handled in  
23 configuration control space for the unit?

24 MS. STEINMAN: All right. As part of our  
25 GSI-191 process, we made some changes to the flow

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1 paths associated with that, and it was done and  
2 implemented in DCD Rev 4. And there were some  
3 questions from the staff regarding we had made --  
4 submitted an RAI response. It was asking,  
5 basically, whether or not that design change  
6 impacted any of the containment analysis responses.

7 We did sensitivity studies and various  
8 calculations to show that what had been done  
9 previously in DCD Rev 3 with respect to the  
10 containment analyses was bounding, and why we  
11 believe that, and showed some additional graphs and  
12 things like that. And the mass and energy is one  
13 area where the staff still had an outstanding  
14 question, so this is not a new design change. It was  
15 something that was implemented as part of DCD Rev 4  
16 in association with GSI-191 from the perspective of  
17 the flow path of water.

18 MEMBER SKILLMAN: Thank you. Thank you,  
19 John.

20 VICE CHAIRMAN STETKAR: Anything else? If  
21 not, that was efficient. I appreciate your compiling  
22 everything into one place. And if there are no  
23 further questions for MHI -- Charlie?

24 MEMBER BROWN: Well, I just wanted to --  
25 we did receive on the I&C, we received the

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1 responses to the questions, and we have reviewed  
2 some of those. So, we're looking that there will be  
3 some follow-up at some point and we'll try to  
4 address what areas --

5 VICE CHAIRMAN STETKAR: That's part of  
6 where we are in this --

7 MEMBER BROWN: Yes, I just wanted to make  
8 sure we had --

9 (Simultaneous speech.)

10 MEMBER BROWN: -- that you submitted  
11 them, we got them. We've actually read some of them,  
12 gone through them, so expecting follow-up.

13 VICE CHAIRMAN STETKAR: Great. We'll have  
14 the staff come up then on the DCD, change seating  
15 arrangements here.

16 (Off the record comments.)

17 MR. BUCKBERG: Good morning. My name is  
18 Perry Buckberg. I'm the lead Project Manager for the  
19 review of the design certification for the US-APR.  
20 I'll be presenting Chapter 6 and 7 of the Phase 2  
21 Safety Evaluation Reports, the Advanced Accumulator  
22 Topical Report, and dedicating a little time to GSI-  
23 191 and long-term core cooling.

24 VICE CHAIRMAN STETKAR: Be careful about  
25 the microphone up there with your paper.

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1 MR. BUCKBERG: Oh, yes, I've got you.  
2 Just a little review of the status of our project to  
3 date. This is the current public schedule. As Ryan  
4 briefed on, there's going to be some changes coming  
5 through and the public schedule may be updated  
6 within the next few hours, the next couple of days,  
7 if not. And anything with a date on it in the right  
8 column will be TBD at this point, and we'll be  
9 working with MHI at a slower pace waiting to ramp  
10 back up when things are ready to go, but it's  
11 indeterminate at this point when that's going to  
12 happen.

13 At this point, the staff has issued  
14 Safety Evaluation Reports with open items for the  
15 Chapters listed, most of the chapters. And all those  
16 chapters, except for Chapter 3 has been through the  
17 Full Committee, as well. And today we're presenting  
18 6 and 7, so they'll be added to the list.

19 The staff has also issued seven US-APR  
20 topical reports. Is this a typo in here? Chapter 6  
21 of the Safety Evaluation Report was presented on  
22 September 17<sup>th</sup>, 2013. I won't read the slide but the  
23 following open items were discussed in some detail  
24 on this page and the next. And there were no staff  
25 actions resulting from the Chapter 6 meeting. Any

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1 questions on Chapter 6?

2 MEMBER SKILLMAN: What was the open item  
3 on the refrigerant leak, please? What is the  
4 refrigerant, and what is the issue?

5 MR. BUCKBERG: I'll ask the staff to  
6 answer that question.

7 MR. NOLD: David Nold with the  
8 Containment Ventilation Branch.

9 VICE CHAIRMAN STETKAR: A little louder.

10 MR. NOLD: Oh, David Nold with  
11 Containment Ventilation Branch. The issue with the  
12 refrigerant leak on containment chillers in the  
13 plant had to do with the fact that there was concern  
14 on my part that this refrigerant contains a certain  
15 amount of oil, and when it escapes rapidly from the  
16 system it depressurizes, goes into a gas. That's the  
17 driving force.

18 CHAIRMAN ARMIJO: What is the  
19 refrigerant, please?

20 MR. NOLD: It's going to be variable --  
21 it can still vary from plant to plant. It's 134A is  
22 what Comanche Peak was planning on using.

23 CHAIRMAN ARMIJO: Okay. So, your concern  
24 is aerosolization of the oil?

25 MR. NOLD: Of the oil and the freon as it

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1 escapes from the system in a massive system leak.

2 CHAIRMAN ARMIJO: Okay. And that's the  
3 question that's being addressed now?

4 MR. NOLD: Yes.

5 CHAIRMAN ARMIJO: Thank you. Okay.

6 MEMBER CORRADINI: The concern, just so I  
7 understand, the concern is just effect on the  
8 operating -- I don't -- it's a health issue, I  
9 assume.

10 MR. NOLD: It's a health issue for those  
11 workers in the area. It's a containment issue, well,  
12 not containment per se, but containment, the fact  
13 that you can try to control it escaping from the  
14 refrigerating rooms to other areas of the plant, and  
15 ventilate as quickly as possible and get it out of  
16 the plant.

17 MR. BUCKBERG: Any more questions? Well,  
18 after the Subcommittee brief on Chapter 6, we  
19 followed with a brief on the Advanced Accumulator  
20 Topical Report, MUAP-07001. The staff went into  
21 detail following MHI's presentation, and there were  
22 no staff action items resulting from that meeting.

23 VICE CHAIRMAN STETKAR: Could you, Perry,  
24 because the Advanced Accumulator -- I hate to put  
25 you on the spot, but I'm sure you have someone here

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1 that can answer. The Advanced Accumulator on this  
2 design is one of the probably more interesting  
3 pieces of hardware in the entire plant, and we heard  
4 from MHI that they are redoing their LOCA analyses  
5 as a result of scaling biases that the staff has  
6 requested that they include. Could you give the rest  
7 of the Committee a little bit of background about  
8 why that exercise is being done? We have quite a bit  
9 of time here, so the notion about what is the  
10 genesis of this scaling bias, and why is there a  
11 concern that the analyses need to be redone?

12 MR. BUCKBERG: The staff will reply.

13 MR. SCHMIDT: This is Jeff Schmidt from  
14 Reactor Systems, just a brief overview. We used a --  
15 most of the change in the scaling bias is due kind  
16 of to the tool that we used. We used CFD to  
17 determine the -- the Japanese had done a half-scale,  
18 full-height half-radius test, so there was some  
19 question of how to handle the scaling to a full-size  
20 accumulator. And we addressed that, what we call the  
21 scaling bias, by using CFD. And we used CFD to come  
22 up with what we thought the bias was and the  
23 uncertainty associated with that is. So, the staff  
24 felt that something should be applied for that,  
25 where originally there was nothing applied for the

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1 fact that it was somewhat of a half-scale test.

2 MEMBER CORRADINI: I don't understand,  
3 I'm sorry. So, the bias, essentially -- so what are  
4 you trying to hold constant in the design -- let me  
5 -- I don't want to get into too much detail, but  
6 what is staff concerned about relative to the  
7 scaling? Is it that the time scale -- you want to  
8 preserve the time scale, or consciously reduce the  
9 time scale by the distortion?

10 MR. SCHMIDT: Well, there was some  
11 concern in the design there's this vortex chamber  
12 that you go from large flow to small flow, and there  
13 could be issues say with cavitation that flow regime  
14 change. And the cavitation could change the effect  
15 of flow rate that the accumulator would provide. So,  
16 since the -- in this case, the radius is half-scale,  
17 you know, we wanted to make sure that there wasn't  
18 something that could occur in the full-scale model  
19 that wasn't occurring in the half-scale model, so we  
20 used CFD to try to determine if we could see any  
21 type of phenomenon and what -- if there was any bias  
22 that may be due to that. For example, if we saw  
23 cavitation, should we be reducing the flow rate from  
24 the accumulator to account for that.

25 MEMBER CORRADINI: Okay, thank you.

1 MR. SCHMIDT: Any other questions?

2 MEMBER CORRADINI: Thanks, Jeff.

3 MR. BUCKBERG: Thanks, Jeff. Following  
4 the Chapter 6 in Advanced Accumulator meetings in  
5 September we had an October 1<sup>st</sup> meeting to discuss  
6 long-term core cooling between GSI-191, and I listed  
7 some of the topics covered in the staff presentation  
8 on this slide and the following slide, number 8.

9 Three open items specific to Chapter 6  
10 were discussed, excuse me, from Chapter 6 that were  
11 specific to long-term core cooling were discussed in  
12 detail during the presentation, and there were no  
13 resulting staff actions.

14 MEMBER CORRADINI: But these remain open.

15 MR. BUCKBERG: The current status I don't  
16 know right off. It's very dynamic right now.

17 MEMBER CORRADINI: Okay, all right. I'm  
18 just looking at a colleague that supposedly is  
19 following you.

20 MR. BUCKBERG: There's no technical  
21 impasses. They just could be in process right now.

22 MEMBER CORRADINI: Okay, thank you.

23 MR. BUCKBERG: Do you want to address?

24 MS. REYES: I believe that all of the  
25 open items --

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1                   VICE CHAIRMAN STETKAR: Give your name so  
2 we know who you are.

3                   MS. REYES: Oh, I'm sorry. This is Ruth  
4 Reyes. I'm the Chapter PM for Chapter 6. I believe  
5 that all the open items associated with GSI-191 are  
6 right now closed.

7                   MEMBER CORRADINI: Okay, thank you.

8                   MS. REYES: We only have probably some  
9 confirmatory items and maybe those are also closed.

10                  MEMBER CORRADINI: Thank you.

11                  MR. BUCKBERG: Thanks, Ruth. Any more  
12 questions on Chapter 6 related to issues? If not,  
13 I'll move on to Chapter 7.

14                  Prior to my tenure as lead PM back in  
15 April, the staff and MHI presented Chapter 7 Safety  
16 Evaluation. There were several open items discussed  
17 in detail, as well, during this presentation.  
18 They're listed on Slides 9 and 10. And there were  
19 several action items, I believe the count was 14 to  
20 MHI, and the staff had two additional items that  
21 required updates of the Safety Evaluations. And MHI  
22 sent a response in in September, and the staff is  
23 currently working to polish up for the updates  
24 needed to be made in response to these staff  
25 actions. And that's all I have for Chapter 7. Any

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1 questions for the staff?

2 VICE CHAIRMAN STETKAR: Any members have  
3 any questions for the staff, 6 and 7, accumulator,  
4 anything? If not, thanks a lot, Perry. Appreciate  
5 it.

6 MR. BUCKBERG: That's my presentation.

7 VICE CHAIRMAN STETKAR: We'll have  
8 Luminant come up and give us a presentation on  
9 Chapters 2, 6, and 7 for the site-specific issues in  
10 those chapters.

11 MR. MONARQUE: Bear with me. While  
12 Luminant is getting set up, Stephen, do you have any  
13 introductory statement you'd like to make?

14 MR. MONARQUE: Thank you, Mr. Stetkar. My  
15 name is Stephen Monarque. I'm the lead PM for the  
16 review of the Comanche Peak COL. And I want to thank  
17 the Full Committee for giving us the opportunity to  
18 present Chapter 2 without hydrology and geology,  
19 Chapters 6 and 7 for today's Full-Committee. And  
20 this is our third Full Committee presentation, and  
21 we've made substantial review progress over the last  
22 several years, so thank you.

23 (Off the record comments.)

24 VICE CHAIRMAN STETKAR: We're ready.

25 MR. EVANS: Good morning. I'm Todd Evans,

1 Engineering and Projects Manager for Luminant for  
2 Comanche Peak Unit 3 and 4 COL application. I'm here  
3 today with John Conly from licensing to present  
4 Sections 2.0 to 2.3, and Chapters 6 and 7 to the  
5 ACRS Full Committee. Don is available on the phone  
6 so if we have any questions or anything, he'll be  
7 available to chime in if we need it.

8 We appreciate this opportunity to  
9 discuss the Comanche Peak 3 and 4 COLA which  
10 references the Mitsubishi US-APWR. Today's  
11 presentation will be brief and will include an  
12 introduction, and then a list of topics that we  
13 noted that were discussed with the ACRS  
14 Subcommittee.

15 The Comanche Peak 3 and 4 COLA uses an  
16 incorporated by reference methodology. FSAR Chapters  
17 2, 6, and 7 take no departures from the DCD for the  
18 US-APWR. There are no contentions pending before the  
19 ASLB. All confirmatory items have been incorporated  
20 into FSAR Rev 4 which we did get submitted just this  
21 past week, and that should be available soon, as I  
22 assume it'll still be in process, so that will be  
23 available for you soon.

24 Luminant has responded to all open  
25 items, and no outstanding issues are identified in

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1 the Safety Evaluation Report.

2           Going into the chapters a little bit,  
3 the topics that were discussed at the ACRS  
4 Subcommittee meetings for these chapters included  
5 information on population data, some discussion  
6 about the airways around the Comanche Peak site,  
7 some discussions about the abilities to detect and  
8 respond to leaks in pipelines in the vicinity of the  
9 plant, chlorine detection for the main control  
10 rooms, some discussion about wind speeds, and then  
11 also about probable maximum precipitation. If you  
12 have any questions or follow-up on any of these,  
13 that's fine. Otherwise, we'll move to the next  
14 slide.

15           In Chapter 6, we also covered chlorine  
16 detectors, so the same subject that was discussed  
17 also in Chapter 2 for the main control room. And  
18 then there was a little bit of discussion about  
19 fiber and aluminum inside containment for Comanche  
20 Peak 3 and 4. And then for Chapter 7, one topic that  
21 was discussed was concerning the displays in the  
22 EOF, and being able to display information for all  
23 units simultaneously.

24           MEMBER SKILLMAN: All units, Todd, means  
25 all four units when you fully build both units, or

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1 just the new ones?

2 MR. EVANS: All four units.

3 MEMBER SKILLMAN: All four.

4 MR. EVANS: So, each unit in the EOF will  
5 have its own separate display.

6 MEMBER SKILLMAN: Thank you.

7 MR. EVANS: And that is all that we had  
8 prepared to cover.

9 VICE CHAIRMAN STETKAR: Any of the  
10 members have any questions for Luminant? Most of  
11 this, by the way, is -- Chapters 6 and 7 is IBR.

12 MR. EVANS: That's correct.

13 VICE CHAIRMAN STETKAR: As you gathered  
14 the site-specific issues were primarily  
15 meteorological issues that we discussed for Chapter  
16 2.

17 MR. EVANS: Correct.

18 VICE CHAIRMAN STETKAR: If nothing,  
19 that's pretty straightforward. Thank you very much.

20 MR. EVANS: Thank you very much.

21 VICE CHAIRMAN STETKAR: We'll have the  
22 staff come up.

23 MR. MONARQUE: I'll go ahead and email  
24 the slides right after my presentation. So, what  
25 I'll do is for the purpose of my presentation I'll

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1 read from the slide. It's a short slide.

2 VICE CHAIRMAN STETKAR: Yes, just make  
3 sure when you do that, Stephen, just give us the  
4 slide number so in case there are any questions when  
5 you read from it so that we have it on the  
6 transcript.

7 MR. MONARQUE: Okay, Slide 2, please.  
8 Today's presentation is a summary of Chapters 2  
9 partial, 6 and 7, Safety Evaluations with open  
10 items. The staff has issued Safety Evaluations with  
11 open items for Chapters 2, 6, and 7, and these  
12 Chapters were presented to the ACRS Subcommittee  
13 earlier this year. I should point out that Chapter 2  
14 does not include hydrology and geology. That will be  
15 a separate corresponding separate meeting. Today's -  
16 - I won't go further about Chapter 2. And we didn't  
17 identify any significant issues for these chapters.

18 Slide 3, please. Chapter 2 partial  
19 includes geography, site safety, mill trade  
20 facilities, and transportation. Oh, thank you. Slide  
21 3, please. Okay.

22 We presented this to the ACRS  
23 Subcommittee in April of 2013. There were no issues  
24 we identified. Slide 4, please. Thank you.

25 Chapter 6, engineered safety features.

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1 Chapter 6 discusses the engineered safety features  
2 designed to reduce consequences of postulated  
3 accidents. We presented this to the Subcommittee in  
4 September of this year. There were no issues  
5 identification.

6 Slide 5, please. Chapter 7,  
7 instrumentation and controls. This is mostly IBR. We  
8 presented this to the Subcommittee in April of this  
9 year, and we did not identify any issues to present  
10 to the Full Committee. This concludes my  
11 presentation.

12 VICE CHAIRMAN STETKAR: Again, any  
13 members have any questions for the staff? If not,  
14 Stephen, thank you.

15 Well, what I'd like to do is ask if  
16 there are any public comments from anyone in the  
17 room? I don't know, Girija, do we have anyone on the  
18 bridge line?

19 MR. SHUKLA: No public, no.

20 VICE CHAIRMAN STETKAR: Are we sure

21 MR. SHUKLA: Yes.

22 VICE CHAIRMAN STETKAR: Okay. I need to  
23 ask for that. I'd like to thank MHI, and Luminant,  
24 and the staff for their presentations, and we will  
25 try to get the letters out during this meeting.

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1 That's all I can -- I can't promise because we have  
2 a very difficult schedule for our meeting, but we'll  
3 work on it.

4 With that, Mr. Chairman, I turn it back  
5 to you a little early.

6 CHAIRMAN ARMIJO: Thanks, John. We're  
7 well ahead of schedule. What I'd like to do is take  
8 advantage of the time we have and we will have to  
9 move all of our materials to the next meeting room  
10 because this room is going to be prepared for  
11 tomorrow's meeting.

12 MEMBER CORRADINI: So, we've got to --

13 VICE CHAIRMAN STETKAR: We have to move.

14 CHAIRMAN ARMIJO: Shift to the next room,  
15 and come back at 12:30 and we'll start P&P Closed  
16 Session

17 MEMBER CORRADINI: At 12:30.

18 CHAIRMAN ARMIJO: 12:30.

19 MEMBER CORRADINI: Okay, so we take our  
20 lunch now.

21 CHAIRMAN ARMIJO: Yes, if you don't mind.

22 MEMBER CORRADINI: Whatever you tell us.

23 CHAIRMAN ARMIJO: 12:30 return next door.

24 (Whereupon, the proceedings went off the  
25 record at 11:28 a.m.)

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# **Presentation to the ACRS Full Committee – 610<sup>th</sup> Meeting**

**Briefing on Calvert Cliffs Unit 3 COL Application Safety Evaluation  
with Open Items for FSAR Chapters/sections 2.4, 2.5, 3 (except 3.7) 9,  
13, and 14**

**Mike Takacs - Presenter  
Surinder Arora – Lead Project Manager**

**December 5, 2013**

# Major Milestones - Chronology

07/13/2007	Part 1 of the COL Application (Partial) submitted
12/14/2007	Part 1, Rev. 1, submitted
03/14/2008	Part 1, Rev. 2, & Part 2 of the Application submitted
08/01/2008	Revision 3 submitted
03/09/2009	Revision 4 submitted
06/30/2009	Revision 5 submitted
09/30/2009	Revision 6 submitted
12/20/2010	Revision 7 submitted
03/27/2012	Revision 8 submitted
03/28/13	Revision 9 submitted
11/6/13	ACRS subcommittee review complete for the remaining Phase 2 Chapters.

# Review Schedule

<b>Phase - Activity</b>	<b>Target Date</b>
<b>Phase 1</b> - Preliminary Safety Evaluation Report (SER) and Request for Additional Information (RAI)	April 2010 (Actual)
<b>Phase 2</b> - SER with Open Items	October 9, 2013
<b>Phase 3</b> – Advisory Committee on Reactor Safeguards (ACRS) Review of SER with Open Items	December 2013
<b>Phase 4</b> - Advanced SER with No Open Items	Schedule under Review
<b>Phase 5</b> - ACRS Review of Advanced SER with No Open Items	Schedule under Review
<b>Phase 6</b> – Final SER with No Open Items	Schedule under Review

# Summary of SE with OI: Section 2.4 Hydrologic Engineering



<b>SRP Section/Application Section</b>		<b>Number of RAI Questions</b>	<b>Number of SE Open Items</b>
2.4	Hydrologic Engineering	3	2
Totals		3	2

# Summary of SE with OI: Section 2.4 Hydrologic Engineering



- **RAI 400, Question 2.4-1:** 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.
- **RAI 400, Question 2.4-2:** Estimate of Bounding Value for Subsidence Resulting from Plant Groundwater Use - verify that the estimate of drawdown and subsidence remains bounding given the potential operational use of groundwater identified in the COL FSAR.

# Summary of SE with OI: Section 2.5 - Geological, Seismology, and Geotechnical Engineering



SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
2.5.1	Basic Geologic and Seismic Information	74	<b>0</b>
2.5.2	Vibratory Ground Motion	26	2
2.5.3	Surface Faulting	1	0
2.5.4	Stability of Subsurface Materials and Foundations	<b>33</b>	<b>2</b>
2.5.5	Stability of Slopes	1	0
Totals		<b>135</b>	<b>4</b>

# Summary of SE with OI: Section 2.5.2 - Vibratory Ground Motion



- **RAI 381, Question 02.05.02-25:** the staff requested hazard contributions of individual seismic sources to conduct an independent confirmatory study. The staff has not finalized its confirmatory study.
- **RAI 386, Question 02.05.02-26:** the staff requested further information on the sensitivity study conducted to analyze the impact of the Mineral, VA earthquake on the seismicity rate increases.

# Summary of SE with OI: Chapter 3 - Design of Structures, Components Equipment and Systems

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
3.2	Classification of Structures, Systems, and Components	13	0
3.3	Wind and Tornado Loadings	4	0
3.4	Water Level (Flood) Design	1	0
3.5	Missile Protection	33	3
3.6	Protection Against Dynamic Effects Associated with Postulated Rupture of Piping	2	0
3.7	Seismic Design	n/a	n/a
3.8	Design of Category I Structures	51	7
3.9	Mechanical Systems and Components	15	2
3.10	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment	1	0
3.11	Environmental Qualification of Mechanical and Electrical Equipment	11	1
3.12	ASME Code Class 1, 2, and 3 Piping Systems, Piping Components, and their Associated Supports	1	1
3.13	Threaded Fasteners (ASME Code Class 1, 2, and 3)	0	0
<b>Totals</b>		<b>132</b>	<b>14</b>

# Summary of SE with OI: Section 3.5 – Missile Protection



- **RAI 376, Question 03.05.01.03-23:** requests the applicant to provide justification on how the Jaquet electronic turbine overspeed protection system reliability data would be equivalent to that provided by a different supplier, and to evaluate how the associated ITAAC commitment is impacted by a different supplier's reliability data.
- **RAI 376, Question 03.05.01.03-24:** requests that applicant to explain how Alstom Document 75C10001 includes all the relevant information such as valve types, valve control, and overspeed protection systems etc. that is included in the U.S. EPR FSAR standard steam turbine.
- **RAI 376, Question 03.05.01.03-25:** requests that the applicant reference all of the reports associated with the turbine missile probability analysis, probability of fatigue, and probability of destructive overspeed in the COL FSAR.

# Summary of SE with OI: Section 3.8 – Design of Category I Structures



- **RAI 301, Question 03.08.04-21:** requests a detailed description of the sliding analysis for each SC-I structure. The description should include the values of itemized lateral forces applied and values of itemized shear resistance.
- **RAI 333, Question 03.08.04-32:** requests additional information to justify the assumption that only the East Wall of the UHS MWIS is subject to breaking wave pressure. Requests information on the consideration of the run-up water elevation in the design of the exterior walls of the UHS MWIS.
- **RAI 339, Question 03.08.04-33:** requests the technical basis that the CCNPP method to determine the design member forces due to seismic loads is at least as conservative as the U.S. EPR method or more detailed methods.

# Summary of SE with OI: Section 3.8 – Design of Category I Structures

- **RAI 339, Question 03.08.04-34:** requests the values of the maximum soil pressures considering all locations of the CBIS basemat design, explanation on how these pressures are obtained, and explanation whether the CCNPP Unit 3 bearing capacities provided in the FSAR are the bearing capacities for localized pressure.
- **RAI 308, Question 03.08.05-9:** requests to explain how the new and updated COL Items regarding settlement of the ESWBs will be addressed and what site-specific conditions will be considered. Also requests to provide additional information on the methodology and procedures used for the settlement evaluation of the CBIS foundation.

# Summary of SE with OI: Chapter 9 Auxiliary Systems

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
9.1	Fuel Storage and Handling	2	0
9.2	Water Systems	36	<b>1</b>
9.3	Process Auxiliaries	IBR	0
9.4	Air Conditioning, Heating, Cooling, and Ventilation Systems	8	<b>0</b>
9.5	Other Auxiliary Systems	23	0
Totals		69	<b>1</b>

## Summary of SE with OI: Section 9.2 Water Systems



- **RAI 398, Question 09.02.05-32:** Clarification related to the CFD computer model uncertainties, meteorological conditions, and boundary scenarios regarding UHS cooling towers.

# Summary of SE with OI: Chapter 13 Conduct of Operations

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
13.1	Organizational Structure of Applicant	1	0
13.2	Training	1	0
13.3	Emergency Planning	<b>66</b>	<b>8</b>
13.4	Operational Program Implementation	1	0
13.5	Plant Procedures	0	0
13.6	Security	109	0
13.7	Fitness for Duty	4	0
13.8	Cyber Security	4	0
<b>Totals</b>		<b>186</b>	<b>8</b>

# Summary of SE with OI: Chapter 14 Verification Programs

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
14.1	Specific Information for the Initial Plant Test Program	0	0
14.2	Initial Plant Test Program	60	<b>0</b>
14.3	Inspections, Tests, Analyses, and Acceptance Criteria	0	0
14.3.1	Selection Criteria and Methodology	45	<b>0</b>
14.3.2	Structural and Systems Engineering	20	1
14.3.3	Piping Systems and Components	5	<b>1</b>
14.3.4	Reactor Systems	0	0
14.3.5	Instrumentation and Controls	0	0

# Summary of SE with OI: Chapter 14 Verification Programs (cont.)

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
14.3.6	Electrical Systems	2	0
14.3.7	Plant Systems	1	0
14.3.8	Radiation Protection	0	0
14.3.9	Human Factors Engineering	0	0
14.3.10	Emergency Planning	3	0
14.3.11	Containment Systems	0	0
14.3.12	Physical Security Hardware	8	0
Totals		146	<b>2</b>

# Summary of SE with OI: Sections 14.3.2, Structural and Systems Engineering and 14.3.3, Piping Systems and Components



- **RAI 367, Question 14.03.02-20:** Request to provide design information for seismic Category-II structures to meet ITAAC requirements for ensuring that failure of non-Seismic Category I structures will not impair the safety capability of adjacent safety-related SSCs.
- **RAI 161, Question 14.03.03-02:** For clarity and inspectability, the staff determined that three ITAAC covering 1) design, 2) fabrication and installation, and 3) as-built reconciliation are necessary and sufficient to ensure the piping systems and components are properly designed and constructed in accordance with the ASME Code Section III requirements.

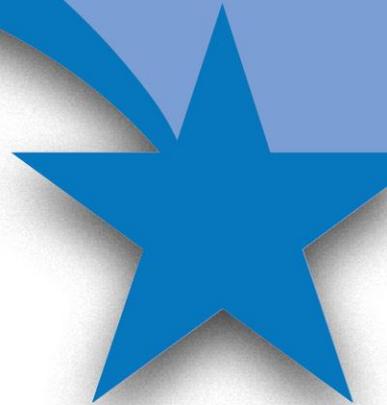
# ACRONYMS

- ASME - American Society of Mechanical Engineers
- EAL - Emergency Action Level
- EPGB - Emergency Power Generating Buildings
- ESWB - Essential Service Water Buildings
- CBIS - Common Basemat Intake Structure
- UHS MWIS - Ultimate Heat Sink Makeup Water Intake Structure
- CWS MWIS - Circulating Water System Makeup Water Intake Structure
- PMH - Probable Maximum Hurricane
- SPH - Standard Project Hurricane
- CS - Conventional Seismic
- CCNPP - Calvert Cliff Nuclear Power Plant
- CFD - Computational Fluid Dynamics
- NI - Nuclear Island

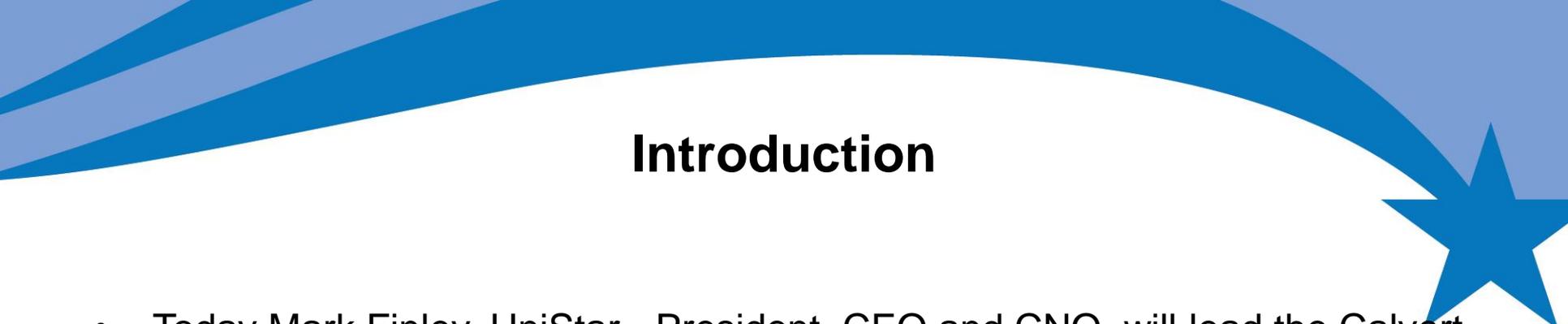


# UNISTAR NUCLEAR ENERGY

**Presentation to ACRS Full Committee  
U.S. EPR™  
Calvert Cliffs Nuclear Power Plant Unit 3  
FSAR Chapters 2.4, 2.5, 3, 9, 13 and 14  
December 5, 2013**



# Introduction

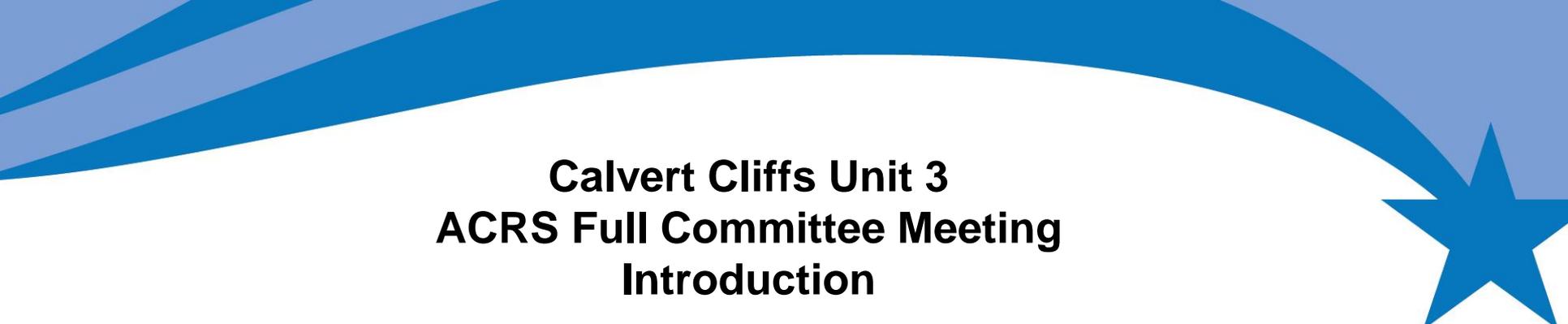


- Today Mark Finley, UniStar - President, CEO and CNO, will lead the Calvert Cliffs Unit 3 presentation.
- Presentation was prepared by UniStar and is supported by:
  - Robert Randall, UniStar –Engineering Manager
  - Antonio Fernandez, PhD, PE, UniStar – Structural/Seismic Engineering
  - Mark Hunter, UniStar – Director Operations and Maintenance
  - Onur Tastan, Rizzo Associates – Structural/Seismic Engineering
  - Todd Oswald, AREVA — U.S. EPR Technical Consultant Civil Structural
  - Ahmed “Jemie” Dababneh, PhD, Rizzo Associates –Technical Director
  - Shankar Rao, Bechtel – Project Engineer
  - Mustafa Samad, PhD, Bechtel – Sr. Engineering Specialist-Hydrology
  - Stephen Huddleston, AREVA – Engineering Manager, BOP Systems
  - Kelly Knight, PhD, Bechtel - Engineering Manager

**Calvert Cliffs Unit 3**  
**Chapters 2.4, 2.5, 3, 9, 13 and 14**  
**Overview**



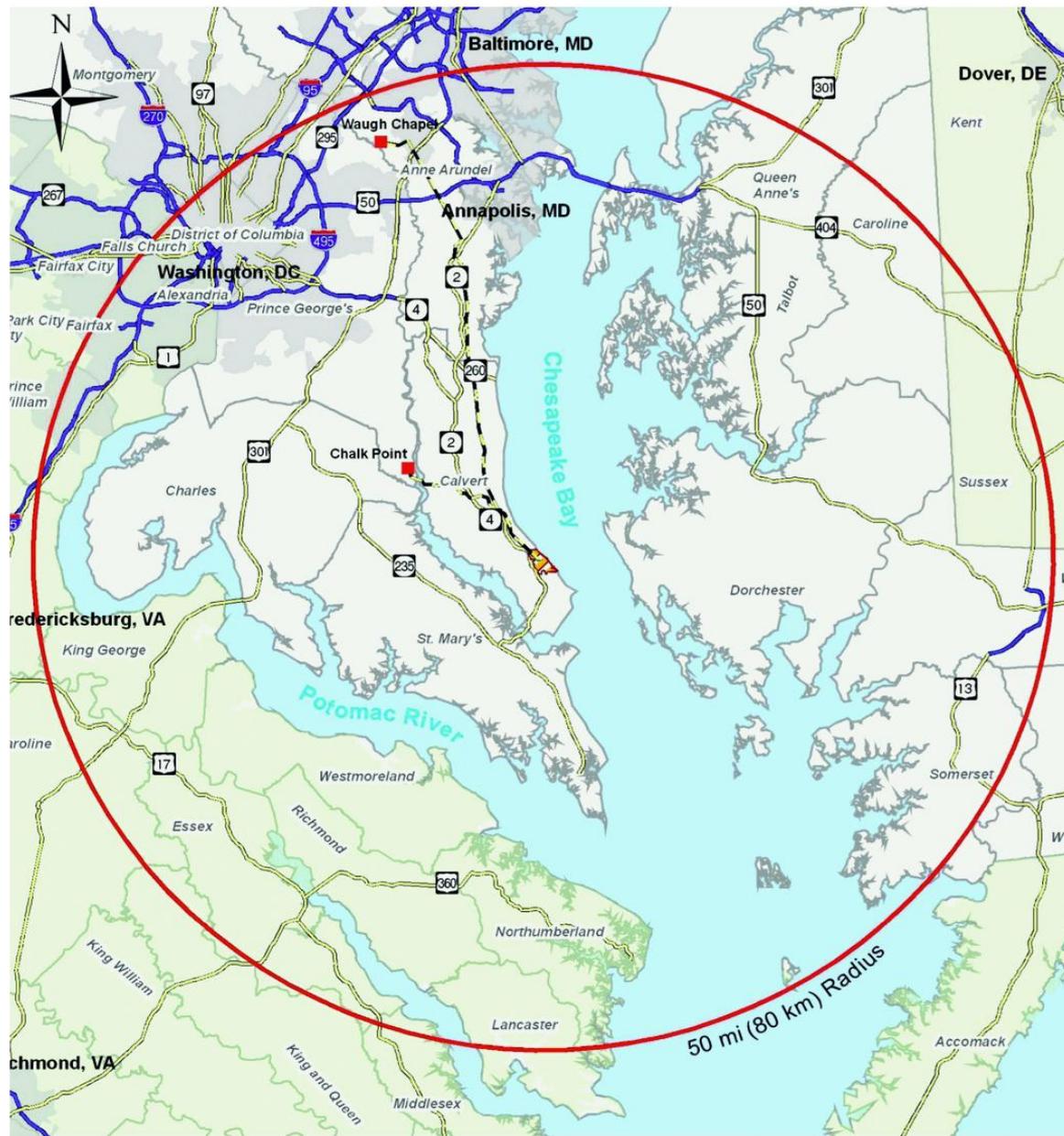
<u>Calvert Cliffs Unit 3 Summary</u>				
<u>Chapter</u>	<u># Departures</u>	<u>#Exemptions</u>	<u># SER Open Items</u>	<u># SER Open Items Responses Submitted</u>
2.4	0	0	2	1
2.5	4	4	8	8
3	0	0	36	36
9	3	0	4	4
13	0	0	6	6
14	0	0	37	37
<b>Totals</b>	7	4	93	92



## Calvert Cliffs Unit 3 ACRS Full Committee Meeting Introduction

- UNE is responsible for the design of Calvert Cliffs Unit 3 and develops the design primarily through contracts with Bechtel and AREVA.
- Reference Combined License Application (RCOLA) authored using 'Incorporate by Reference' (IBR) methodology.
- The focus of today's presentation will be a summary of the third set (4½) of FSAR Chapters that have been presented to the U.S. EPR ACRS Subcommittee.
- The first Calvert Cliffs Unit 3 ACRS Full Committee meeting, addressing the first set (9½) of FSAR Chapters, was conducted on April 7, 2011.
- The second Calvert Cliffs Unit 3 ACRS Full Committee meeting, addressing the second set (4) of FSAR Chapters, was conducted on April 12, 2012.
- For today's presentation only supplemental information, or site-specific information, departures or exemptions from the U.S. EPR FSAR are discussed.

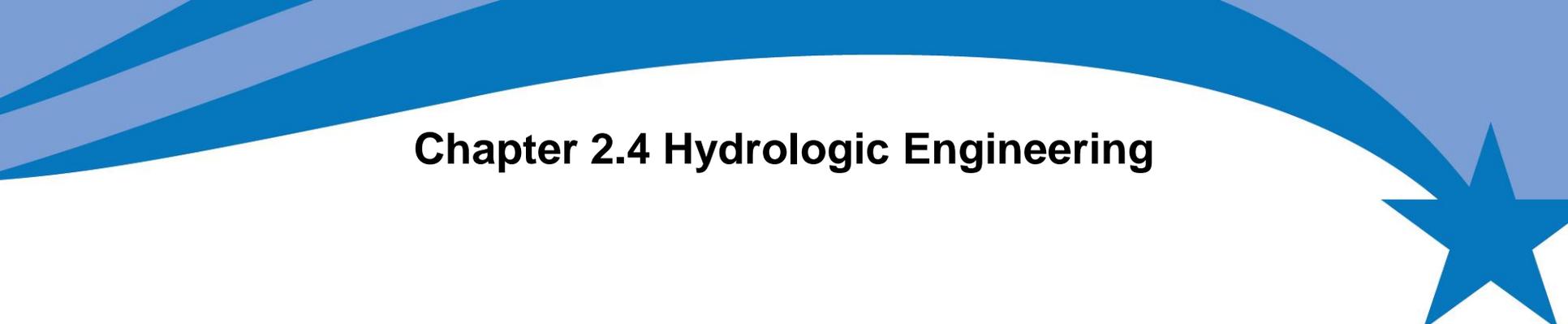




## List of Chapters



- Chapter 2.4, Hydrologic Engineering
- Chapter 2.5, Geology, Seismology, and Geotechnical Engineering
- Chapter 3, Design of Structures, Components, Equipment, and Systems, (except Section 3.7, Seismic Design)
- Chapter 9, Auxiliary Systems
- Chapter 13, Conduct of Operations
- Chapter 14, Verification Programs



## **Chapter 2.4 Hydrologic Engineering**

# **2.4 HYDROLOGIC ENGINEERING**

## 2.4 Hydrologic Engineering

### Hydrologic Description

#### ➤ 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

### Hydrologic Description



#### ➤ 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 Hydrologic Description

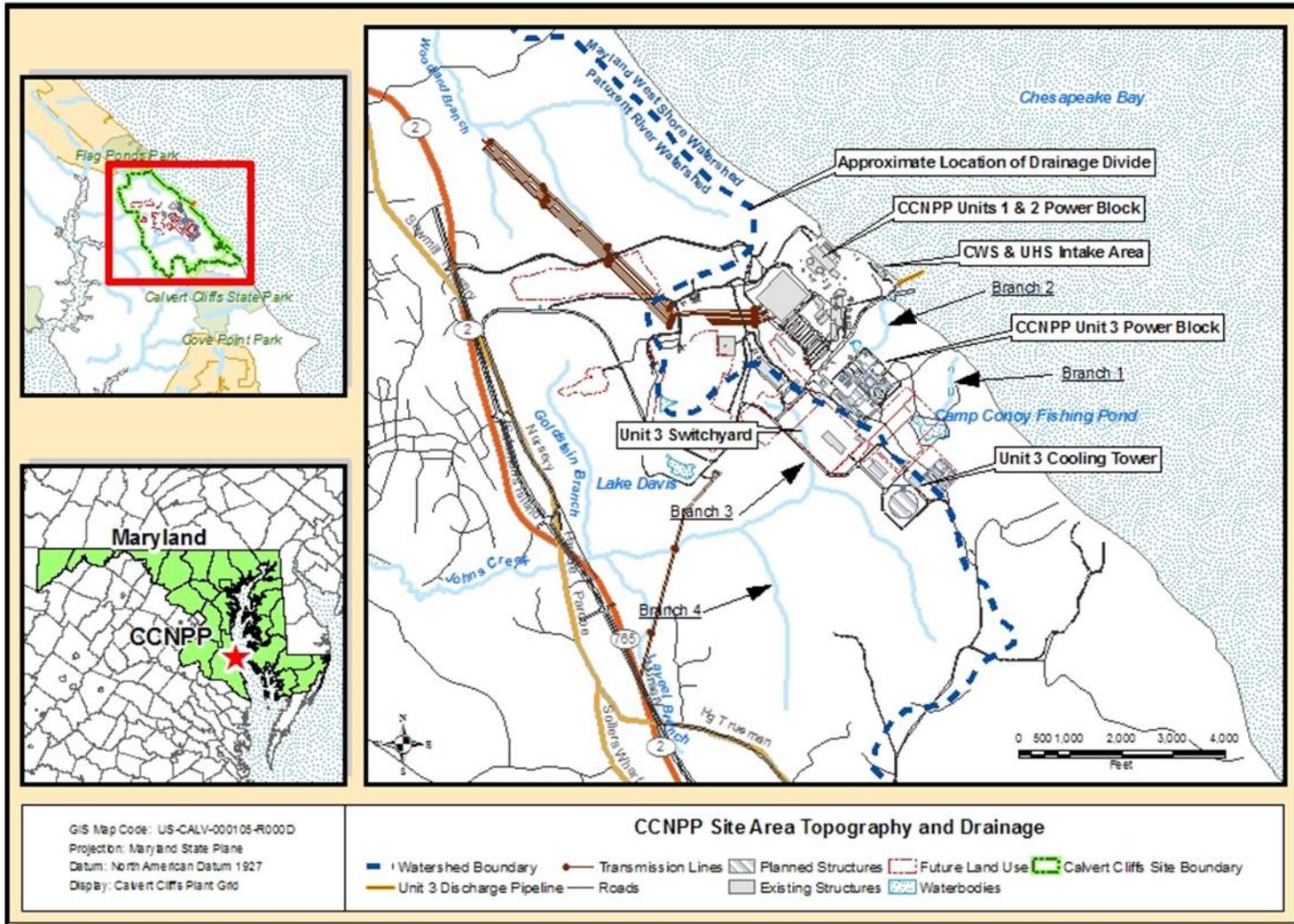
### Aerial View of CCNPP Unit 3 Site on the Calvert Peninsula



# 2.4 Hydrologic Engineering

## Hydrologic Description

### CCNPP Unit 3 Site Area



## 2.4 Hydrologic Engineering

### Probable Maximum Surge and Seiche Flooding

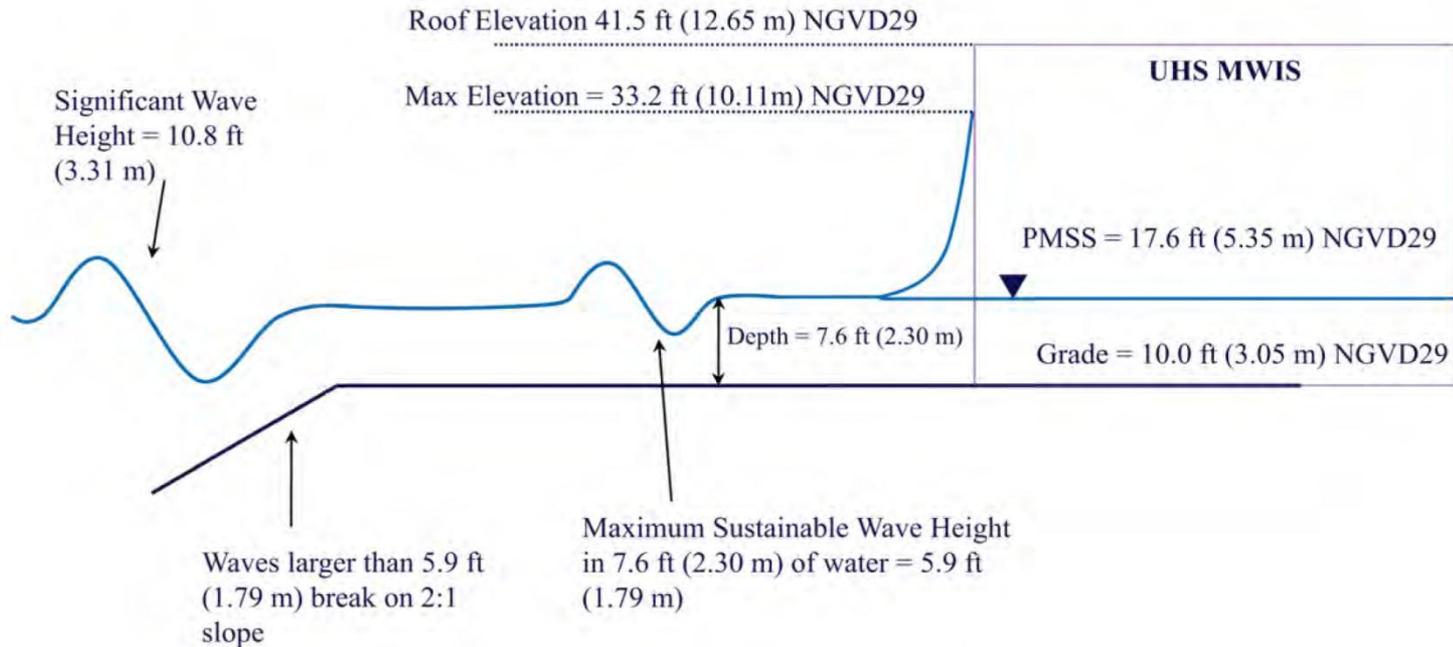


- Probable Maximum Storm Surge (PMSS) and Seiche Flooding
  - The Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model predicted a maximum surge elevation at the site of 11.0 ft from a water level of 0.0 NGVD 29. The simulated surge height was then adjusted to take into account the 20% margin (SLOSH model uncertainties) suggested in Technical Report National Weather Service (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

### Probable Maximum Surge and Seiche Flooding

Figure 2.4-33— {Schematic Diagram Wave Runup on the UHS Makeup Water Intake Structure (MWIS)}

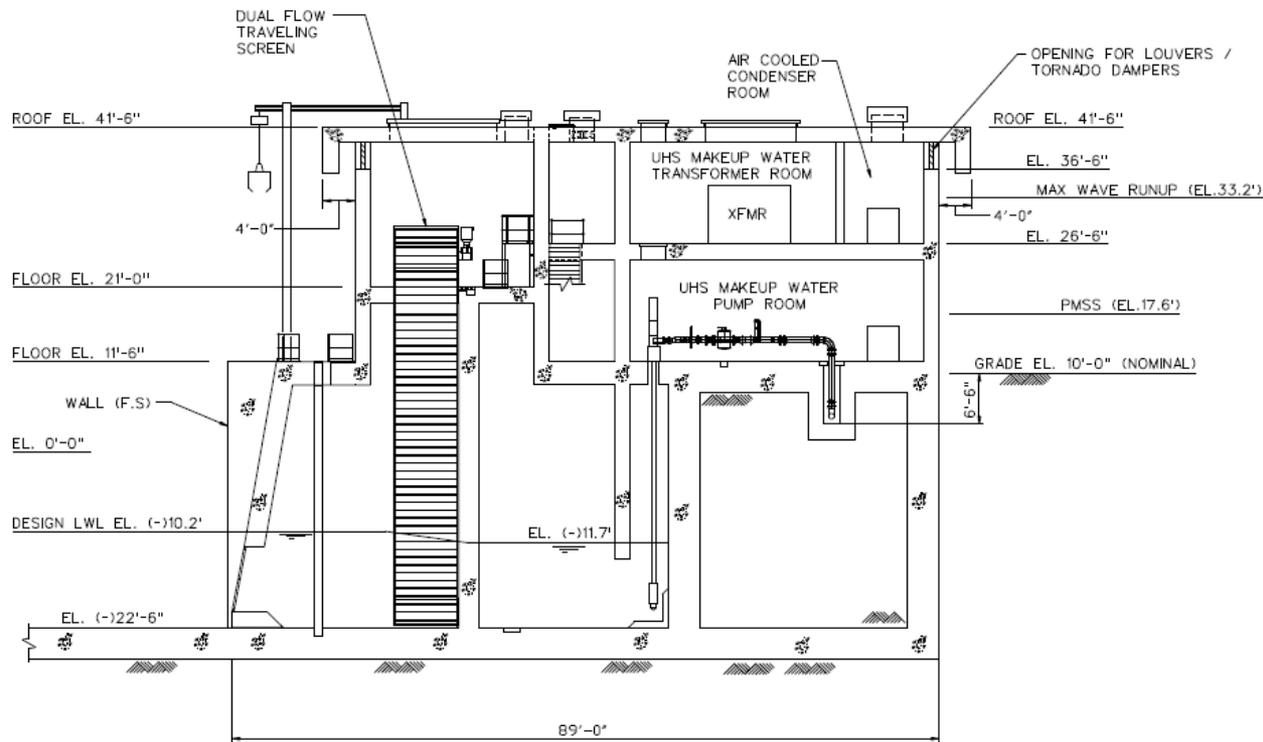


Drawing not to scale

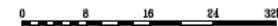
# 2.4 Hydrologic Engineering

## Probable Maximum Surge and Seiche Flooding

### UHS MWIS Cross Section



UHS MAKEUP WATER INTAKE STRUCTURE  
ELEVATION LOOKING EAST



## 2.4 Hydrologic Engineering

### 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 Groundwater

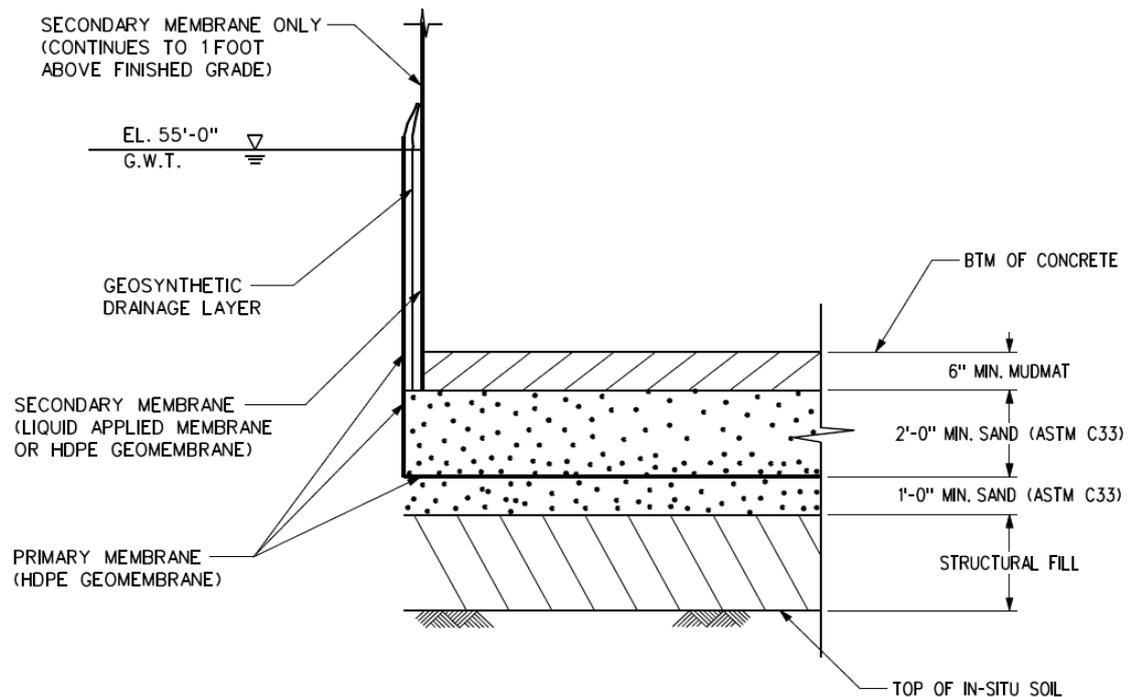


- Groundwater in the surficial aquifer at the Calvert Cliffs Unit 3 site is aggressive (pH ~5.2).
  - This affects the portions of structures that are below the water table (at least 30' below power block grade) but not at MWIS.
  - Waterproofing system will protect the portions of the Nuclear Island (NI) and Essential Service Water Buildings (ESWBs) that are below the groundwater water table.
  - Water level will be monitored behind waterproofing system with the capability to dewater if necessary.
  - Dampproofing system will protect the Emergency Power Generating Buildings (EPGBs) that are above groundwater table.
- 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 Groundwater

Waterproofing system will protect the portions of the NI and Essential Service Water Buildings (ESWBs) below the groundwater table.

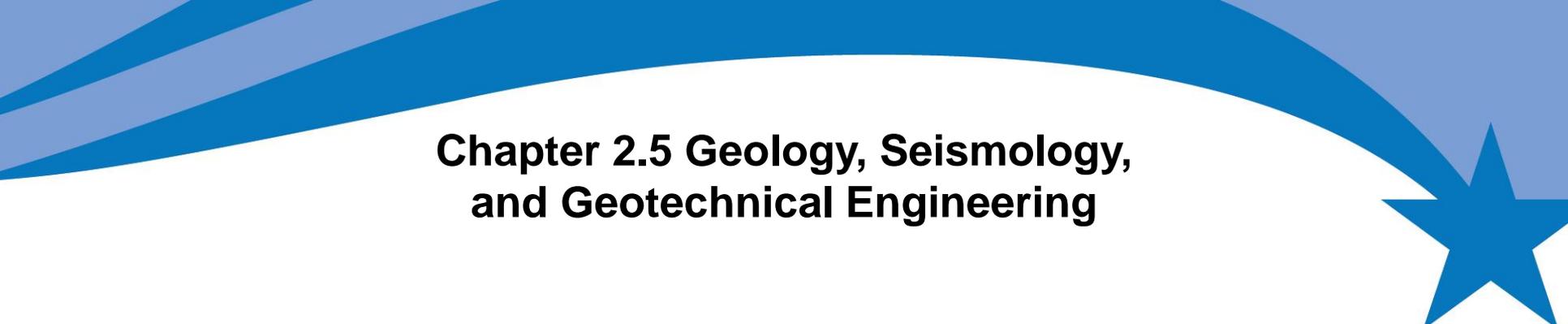
- Waterproofing system
  - Primary and secondary membranes
  - Groundwater monitor system
  - Vertical drainage system placed between primary and secondary systems to facilitate flow of leaked groundwater down to sump pumps



## Chapter 2.4 Hydrologic Engineering Summary



- Fifteen (15) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 2.4
- No ASLB Contentions
- No Departures or exemptions from the U.S. EPR
- Two (2) SER Open Items
- One SER Open Item Request for Additional Information (RAI) has been responded to, and the other is scheduled for early 2014.



**Chapter 2.5 Geology, Seismology,  
and Geotechnical Engineering**

**2.5 GEOLOGY, SEISMOLOGY, AND  
GEOTECHNICAL ENGINEERING**

## 2.5 Geology, Seismology, and Geotechnical Engineering

### Vibratory Ground Motion



- Vibratory Ground Motion
  - A detailed review of the vibratory ground motion assessment was carried out for the CCNPP Unit 3 site, resulting in the development of the CCNPP Unit 3 Ground Motion Response Spectra.
  - As the first step in this process, a Probabilistic Seismic Hazard Assessment (PSHA) for a hard rock condition was performed taking into account guidance in NRC Regulatory Guide 1.208.
    - ✓ The recently developed seismic source characterization (SSC) for the Central and Eastern United States (CEUS SSC) (EPRI/DOE/NRC, 2012)
    - ✓ The EPRI (2004, 2006) ground motion characterization (GMC) model.

## 2.5 Geology, Seismology, and Geotechnical Engineering Vibratory Ground Motion



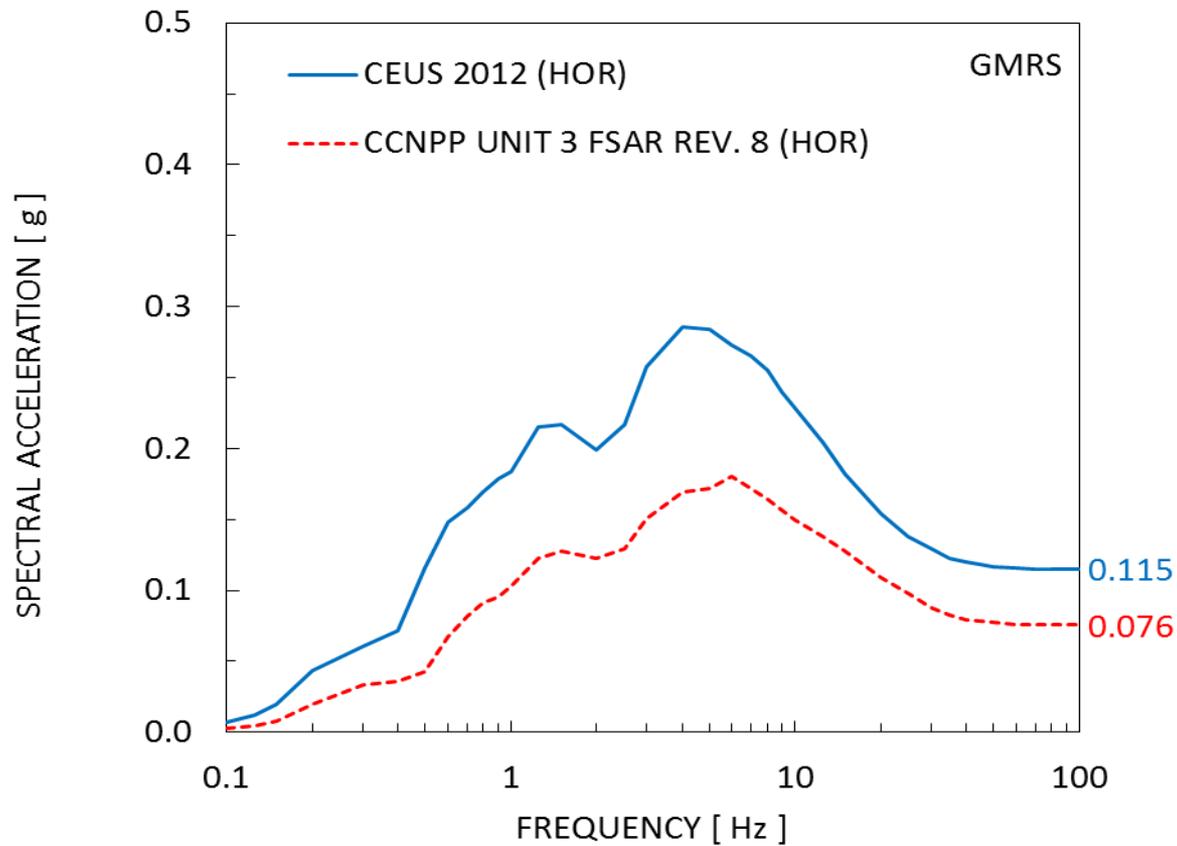
### ➤ Mineral Virginia Earthquake

- August 23, 2011, M 5.8 from the Central Virginia Seismic Zone (CVSZ)
- CEUS SSC catalog predates the Mineral Virginia Earthquake (MVE).
- UniStar has performed the necessary evaluations to verify that the CEUS 2012 SSC catalog adequately accounts for events such as the MVE.
- Mineral Virginia Earthquake and Aftershocks (SER-Open Item RAI 385)

## 2.5 Geology, Seismology, and Geotechnical Engineering Vibratory Ground Motion



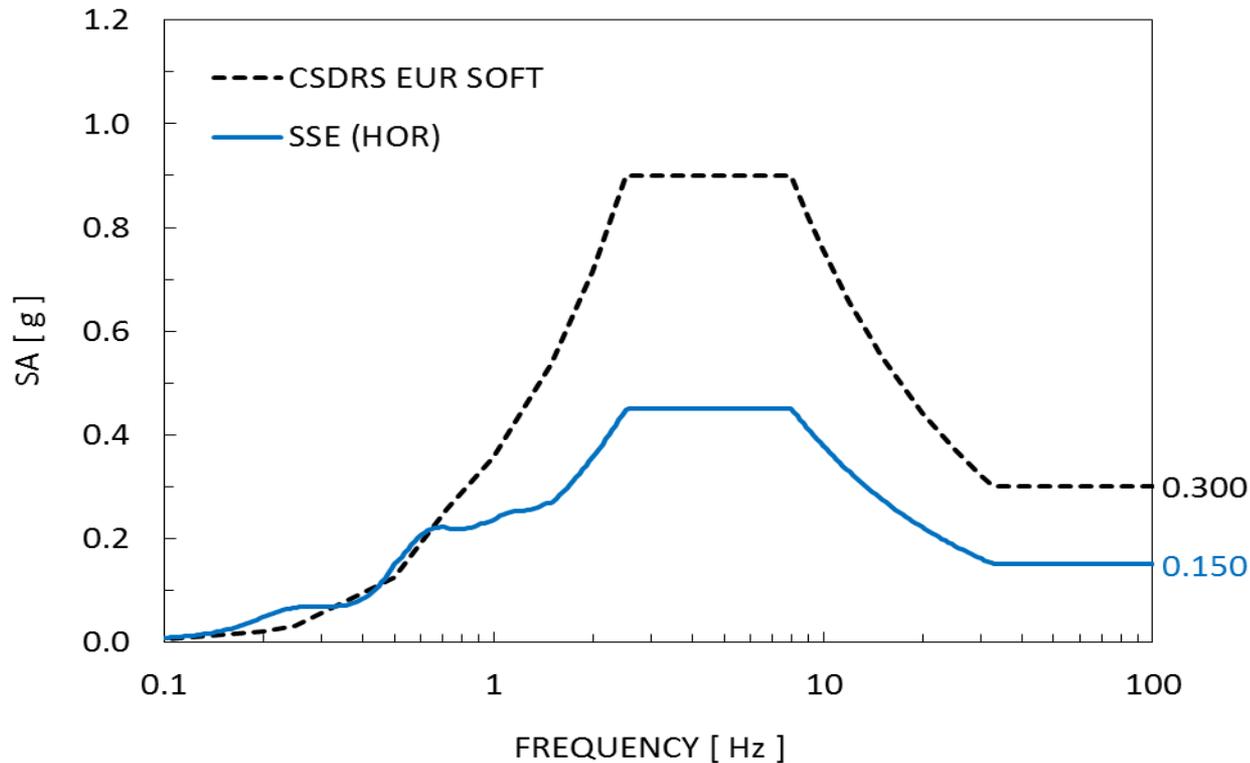
### IMPACT OF 2012 CEUS SSC



## 2.5 Geology, Seismology, and Geotechnical Engineering Vibratory Ground Motion



### Safe Shutdown Earthquake (SSE) & Certified Seismic Design Response Spectra (CSDRS)



The site specific soil structure interaction (SSI) analysis is performed with the use of the CCNPP Unit 3 SSE, therefore, the exceedance will be directly accounted for in the design of structures, systems, and components.

## 2.5 Geology, Seismology, and Geotechnical Engineering Departure/Exemption

### Departure/Exemption from Minimum Shear Wave Velocity

- Departure/Exemption: Low Strain Shear Wave Velocity
  - The shear wave velocity (LOW STRAIN), at the foundation elevation of the Emergency Power Generation Buildings (EPGBs), is lower than 1000 fps, which is the minimum requirement defined by the U.S. EPR.
  - This departure/exemption is reconciled in FSAR Section 3.7 with a site-specific soil structure (SSI) interaction analysis.

### Departure/Exemption from Safe Shutdown Earthquake

- Departure/Exemption: Safe Shutdown Earthquake (SSE) exceeds the US EPR Certified Design Response Spectra (CSDRS) at low frequencies ( $< 0.3$  Hz)
  - This departure/exemption is reconciled in FSAR Section 3.7 with a site-specific soil structure (SSI) interaction analysis that uses the SSE as the seismic input

## 2.5 Geology, Seismology, and Geotechnical Engineering Departure/Exemption

### Departure/Exemption from Soil Properties

- Departure/Exemption: soil properties that fall beyond the analysis bounds of the U.S. EPR (Minimum dynamic bearing capacity, Maximum angle of internal friction, Soil Density, Minimum Coefficient of Static Friction: 0.47, NAB Coefficients of Friction ( $\mu$ ): 0.47)
  - This departure/exemption is reconciled in FSAR Section 3.7 with soil structure interaction and stability analyses that use the site-specific soil properties

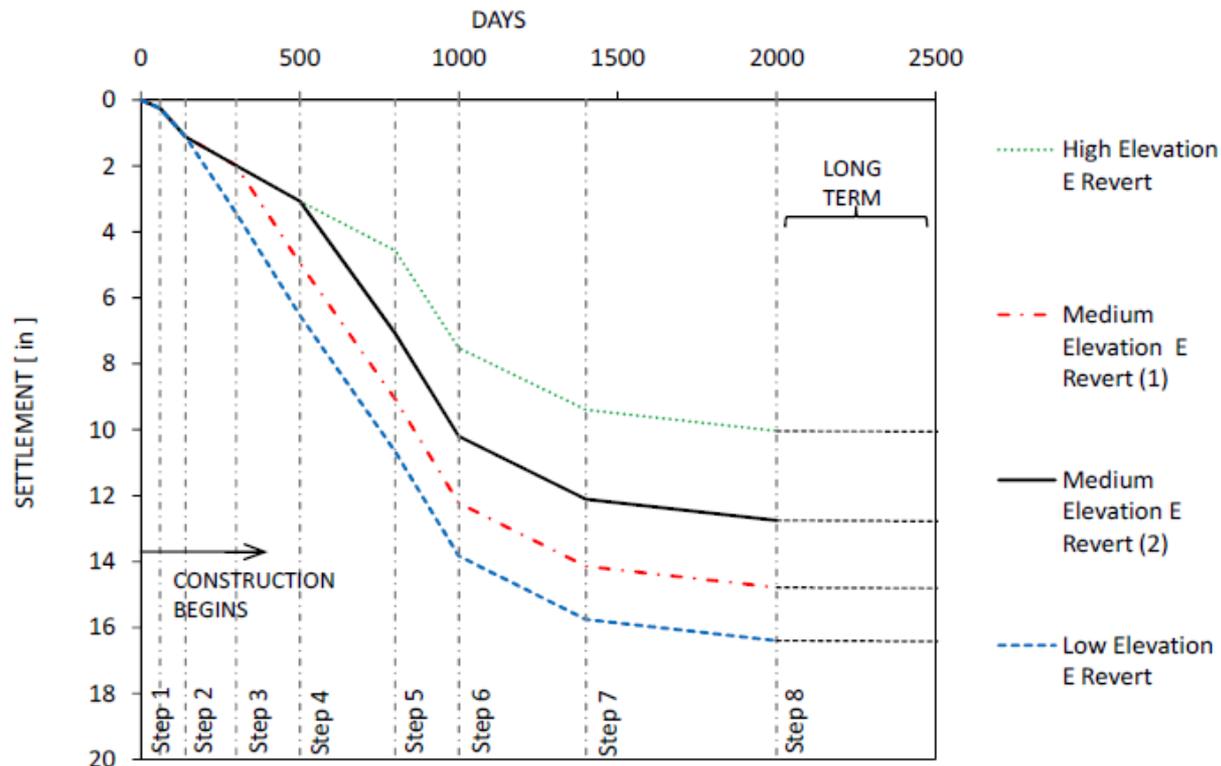
### Departure/Exemption from Maximum Differential Settlement of 1/2 inch/50 ft (1/1200) Any Direction Across the Basemat

- Emergency Power Generating Buildings (EPGBs) & Essential Service Water Buildings (ESWBs) estimated site-specific tilt is higher than the allowable value.
  - Evaluation of the effects of the higher tilt, a finite element analysis of the EPGB & ESWB
    - ✓ Results show that increase in design moment based on the additional tilt is less than the U.S. EPR FSAR maximum design moment.
- Therefore, EPGB & ESWB basemats are structurally adequate to resist the increased moments.

## 2.5 Geology, Seismology, and Geotechnical Engineering Settlement

- The settlement (total settlement and tilt) and excavation related heave of the CCNPP Powerblock Area was carried out under the following premises:
  - Develop a 3D finite element model capable of capturing irregular subsurface conditions, realistic foundation footprint shapes, and asymmetric building loads.
  - Perform a time-dependent simulation, that provides settlement and tilt estimates as a function of time through and after construction.
  - Incorporate a construction sequence and examine the behavior of settlement and tilt as buildings are erected.
  - Account for asymmetric topography, by recognizing that reloading time to original consolidation pressure after excavation, will be variable throughout the foundation footprint.
  - Perform the settlement analysis simultaneously for the NI and adjacent facilities, including the detached safety related structures (EPGB and ESWB).
- The settlement model in the Intake Area is developed in a similar form. The model is much simpler and the influence of neighboring structures is negligible.

## 2.5 Geology, Seismology, and Geotechnical Engineering Settlement



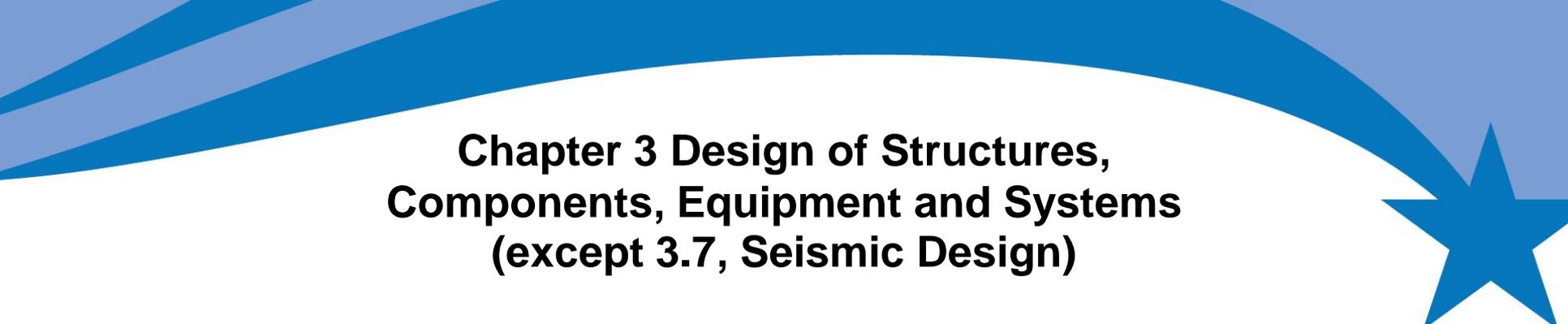
**Notes:**

- Low Elevation: revert to loading modulus at the end of the 2nd load step (140 days)
- Medium Elevation (1): revert to loading modulus at the end of the 3rd load step (300 days)
- Medium Elevation (2): revert to loading modulus at the end of the 4th load step (500 days)
- High Elevation: revert to loading modulus at the end of the 5th load step (800 days)
- Long term settlement estimate due to creep and rewatering offset each other and are not significant

## **Chapter 2.5 Geology, Seismology, and Geotechnical Engineering Summary**



- Eleven (11) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 2.5
- No ASLB Contentions
- Four (4) Departures and four (4) Exemptions from the U.S. EPR FSAR for Calvert Cliffs Unit 3, Chapter 2.5
- Eight (8) SER Open Items
- All RAI responses have been submitted

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**Chapter 3 Design of Structures,  
Components, Equipment and Systems  
(except 3.7, Seismic Design)**

**3.8 Design of Category I Structures**

# Design of Structures, Components, Equipment and Systems Other Seismic Category I Structures



## Description of the Structures

- The standard plant layout and design of other Seismic Category I Structures is as described in the U.S. EPR FSAR without departures.
- The site-specific Seismic Category I structures are:
  - Forebay and UHS Makeup Water Intake Structure (MWIS)
  - Buried Conduit Duct banks
  - Buried Pipe

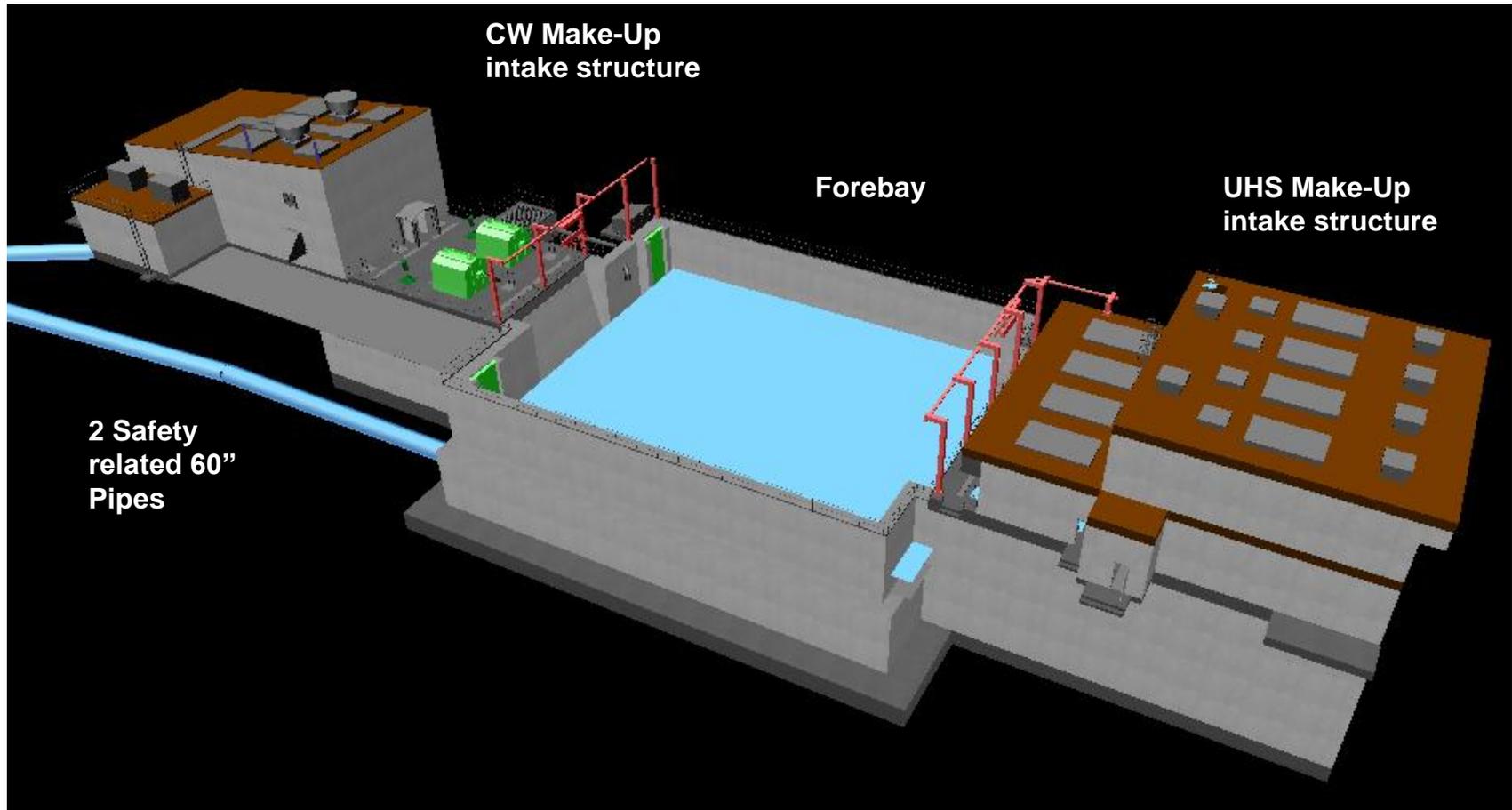
# Design of Structures, Components, Equipment and Systems Foundations

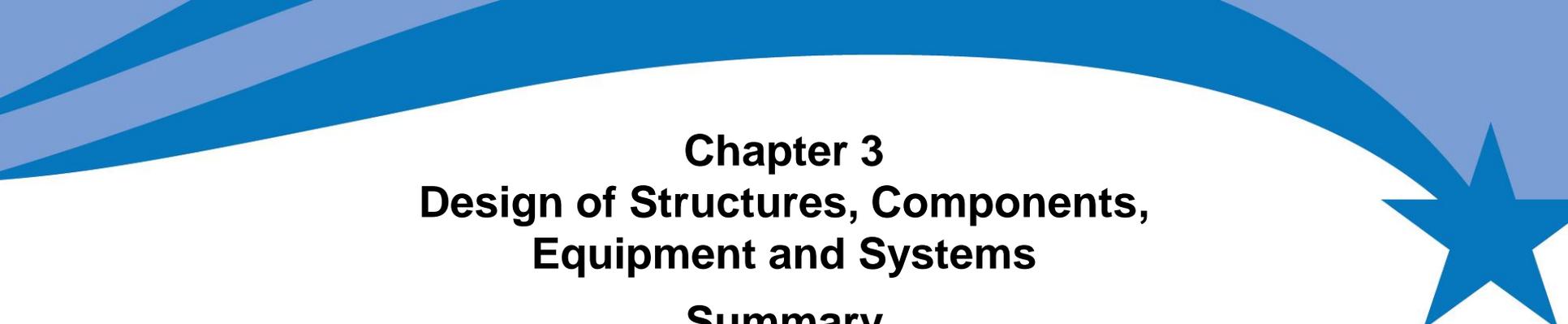


## Forebay and UHS Makeup Water Intake Structure

- The Seismic Category I Forebay and UHS MWIS are reinforced concrete structures situated along Chesapeake Bay.
- The UHS MWIS is integrally connected with the Forebay basemat.
- Seismic Category II Circulating Water System (CWS) Makeup Water Intake Structure and Seismic Category I Forebay and UHS Makeup Water Intake Structure share a 5 ft thick common basemat.
- Forebay and UHS Makeup Water Intake Structure
  - Reinforced concrete shear wall and slabs are designed for seismic (including hydrodynamic loads) and non-seismic load combinations.
  - Exterior walls are designed to withstand
    - ✓ Tornado missile impact and
    - ✓ Wave pressures of the Probable Maximum Hurricane (PMH)
    - ✓ Standard Project Hurricane (SPH) severe environmental event
  - Checked for sliding, overturning, and flotation using the stability load combination.

# Design of Structures, Components, Equipment and Systems Foundations



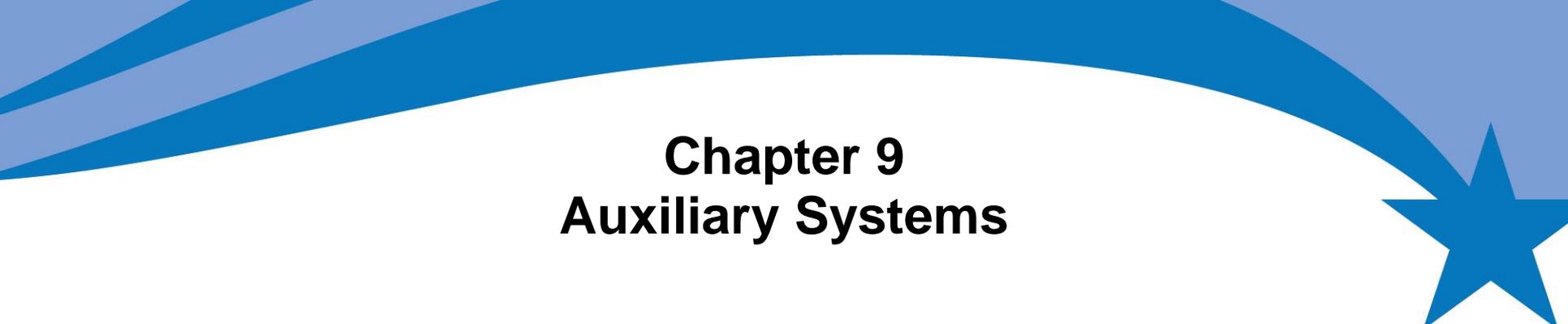


# **Chapter 3**

## **Design of Structures, Components, Equipment and Systems**

### **Summary**

- Seventy-six (76) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 3
- No ASLB Contentions
- No Departures or exemptions from the U.S. EPR FSAR for Calvert Cliffs Unit 3, Chapter 3
- Thirty-six (36) SER Open Items
- All RAI responses have been submitted

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# **Chapter 9**

## **Auxiliary Systems**

### **9.2 WATER SYSTEMS**

## 9.2 WATER SYSTEMS

### Ultimate Heat Sink (UHS) Makeup System Supplemental Information



- Ultimate Heat Sink (UHS) Makeup System
  - Normal nonsafety-related Essential Service Water makeup provides desalinated water to replenish UHS inventory losses.
  - UHS cooling tower normal blowdown discharges water to the retention basin.
  - Emergency safety-related UHS Makeup Water system provides Chesapeake Bay makeup water to each operating UHS cooling tower basin, starting 72 hours post-accident, at a maximum flow rate of 750 gpm and approximately 510 gpm of makeup when the screen wash is operating (300 gpm is required to the basin).
  - Emergency safety-related blowdown is provided, if the normal path is unavailable.
  - 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 (GDC) 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, GDC 46.

## 9.2 WATER SYSTEMS

### Post-DBA UHS Makeup Keep-Fill Piping Departure



- Departure: Post-Design Basis Accident (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 Essential Service Water System (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 from the configuration in the design certification.
  - 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 Cooling Tower Basin



- 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.
  - The Technical Specification required UHS Cooling Tower basin minimum inventory is sufficient to provide 72 hours of cooling following a DBA without makeup.
  - The CCNPP Unit 3 UHS Makeup Water System provides  $\geq 300$  gpm (required by USEPR FSAR), of makeup water to the each of the four UHS Cooling Tower basin starting 72 hours post DBA.
  - The CCNPP Unit 3 UHS Makeup Water pumps are sized to provide a maximum of approximately 750 gpm to the UHS Cooling Tower basin to maintain adequate Net Positive Suction Head (NPSH) for the ESWS pump for up to 30 days after the DBA and providing for intermittent operation of the screen wash system.

## 9.2 WATER SYSTEMS

### Ultimate Heat Sink (UHS) Makeup System Cooling Tower Basin

- 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 Mechanical Draft Cooling Towers

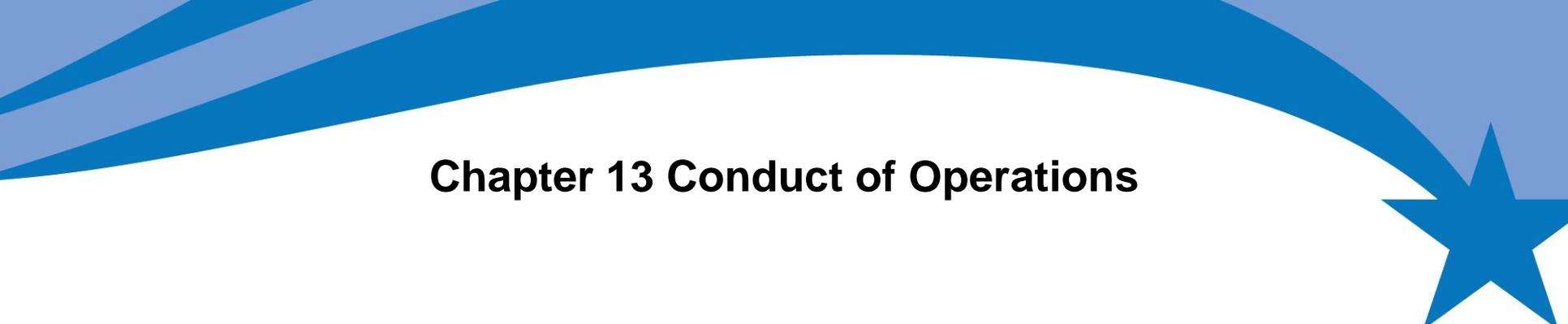


- UHS Cooling Tower Interference on Safety-Related Intakes
  - An evaluation has been performed of the interference effects of the UHS cooling tower plumes on nearby safety-related air intakes.
  - The evaluation concluded that there are no adverse effects on the safety functions of the systems, either 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.

# Chapter 9 Auxiliary Systems Summary



- Thirty Five (35) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 9
- No ASLB Contentions
- Three (3) Departures and No Exemptions from the U.S. EPR FSAR Chapter 9
- Four (4) SER Open Items
- All RAI responses have been submitted



## **Chapter 13 Conduct of Operations**

### **13.2 TRAINING**

## 13.2 Training Training Programs

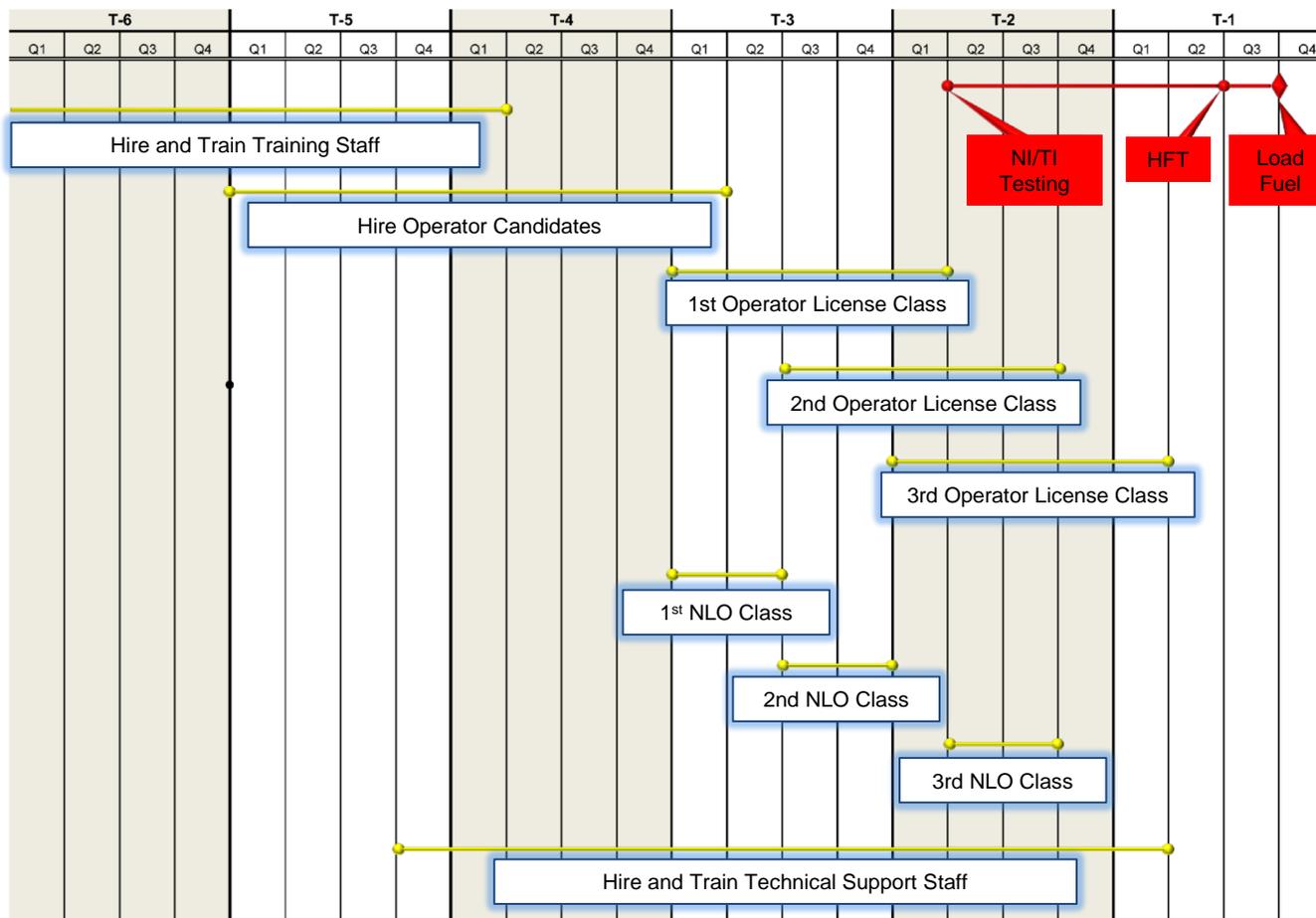


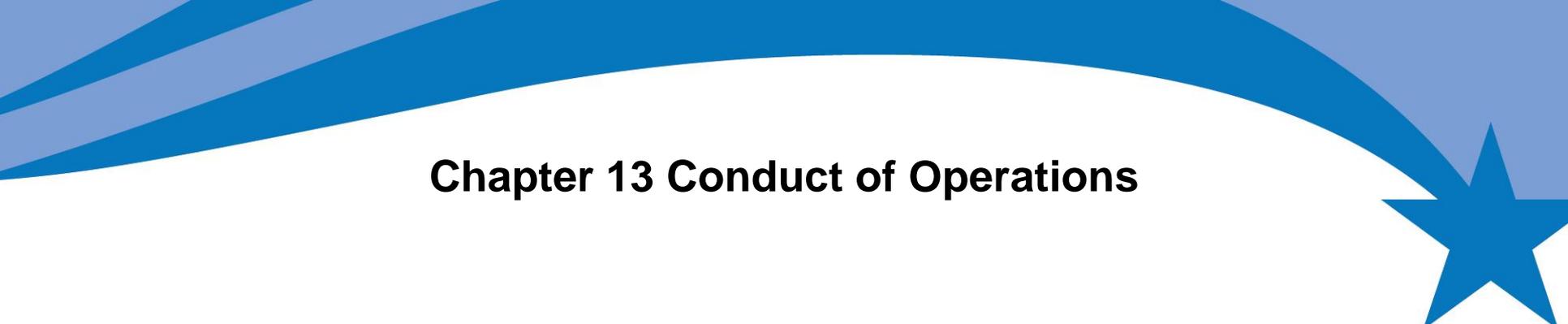
- Training
  - Follows NEI 06-13A “Template for an Industry Training Program Description” including Appendix A (Cold License Training plan) of NEI 06-13A
  - Non-licensed Plant Staff Training Program
    - ✓ 18 months prior to scheduled date of initial fuel load
  - Reactor Operator Training Program
    - ✓ 18 months prior to scheduled date of initial fuel load

# 13.2 Training

## Training Programs

### Hiring and Training Schedule of Plant Staff





## **Chapter 13 Conduct of Operations**

### **13.3 EMERGENCY PLANNING**

## 13.3 Emergency Planning Emergency Planning



- Emergency Planning
  - A comprehensive Emergency Plan is provided in COLA Part 5, Emergency Plan.
  - Emergency Plan, Revision 8, for CC3 was issued April 30, 2013.
  - Emergency Plan incorporates new EP Rule Hostile action requirements.
  - NEI 10-05 for staffing analysis has been addressed.
  - NUREG 0654\FEMA Rep-1 requirements have been incorporated.

# Chapter 13

## Conduct of Operations

### Summary

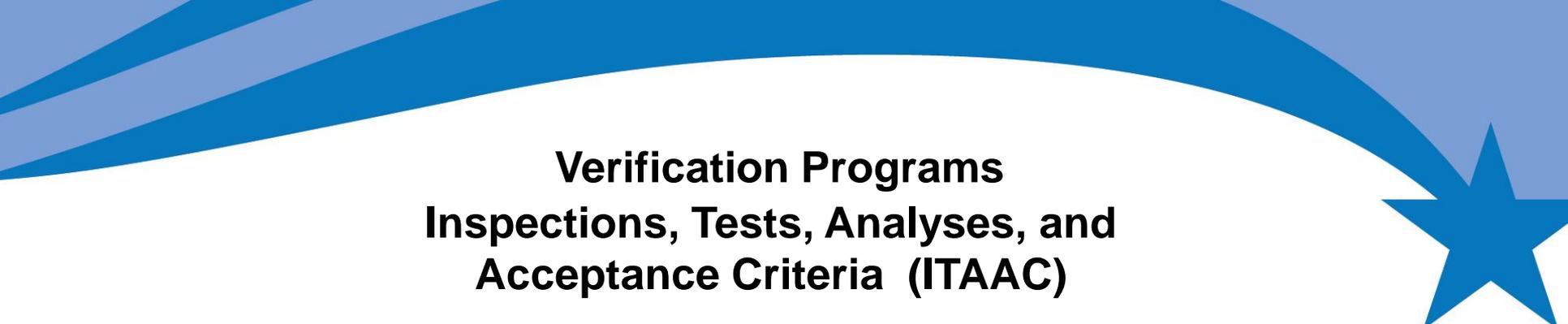


- Twelve (12) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 13
- No ASLB Contentions
- No Departures/Exemptions from the U.S. EPR FSAR Chapter 13
- Six (6) SER Open Items
- All RAI responses have been submitted

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## Chapter 14, Verification Programs

# **14.3 INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA (ITAAC)**



# Verification Programs Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

- ITAAC sets (Total: 1521) consist of:
  - Design Certification ITAAC (DC-ITAAC) (1275)
  - COLA ITAAC (246)
    - Site Specific system ITAAC (SS-ITAAC)
    - Emergency Planning ITAAC (EP-ITAAC)
    - Physical Security ITAAC (PS-ITAAC)

# Chapter 14

## Verification Programs

### Summary



- Sixteen (16) COL Information Items, as specified by U.S. EPR FSAR, are addressed in Calvert Cliffs Unit 3 FSAR Chapter 14
- No ASLB Contentions
- No Departures and no Exemptions from the U.S. EPR FSAR
- Thirty-seven (37) SER Open Items
- All RAI responses have been submitted



# **CONCLUSIONS**

## Chapters 2.4, 2.5, 3, 9, 13 and 14 Conclusions



- No ASLB Contentions
- There are seven (7) departures and four (4) exemptions.
- Responses have been submitted to 92 of the 93 SER Open Items.
- As of December 05, 2013, eighteen (18) of the nineteen (19) Chapters of the Calvert Cliffs Unit 3 FSAR have completed Phase 3 (all but Chapter 1, which does not require ACRS review).

# Acronyms

- **ACRS – Advisory Committee on Reactor Safeguards**
- **ASLB – Atomic Safety & Licensing Board**
- **CCNPP – Calvert Cliffs Nuclear Power Plant**
- **CSDRS – Certified Seismic Design Response Spectra**
- **CEUS – Central and Eastern United States**
- **COL – Combined License**
- **COLA – COL Application**
- **CVSZ – Central Virginia Seismic Zone**
- **CWS – Circulating Water System**
- **DBA – Design Basis Accident**
- **EPGB – Emergency Power Generating Building**
- **ESWB – Essential Service Water Building**
- **ESWS – Essential Service Water System**
- **FSAR – Final Safety Analysis Report**
- **GDC – General Design Criterion**
- **GMC – ground motion characterization**
- **HVAC – Heating Ventilation & Air Conditioning**
- **IBR – Incorporate by Reference**
- **ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria**
- **MCR – Main Control Room**
- **MVE– Mineral Virginia Earthquake**
- **MWIS – Makeup Water Intake Structure**
- **NI – Nuclear Island**
- **NPSH – Net Positive Suction Head**
- **NWS – National Weather Service**
- **PMH – Probable Maximum Hurricane**
- **PMSS – Probable Maximum Storm Surge**
- **PMT – Probable Maximum Tsunami**
- **PSHA – Probabilistic Seismic Hazard Assessment**
- **RAI – Request for Additional Information**
- **RCOLA – Reference COL Application**
- **SB – Safeguards Building**
- **SER – Safety Evaluation Report**
- **SLOSH – Sea, Lake, and Overland Surges from Hurricanes**
- **SPH – Standard Project Hurricane**
- **SSC – seismic source characterization**
- **SSCs – Structures, Systems and Components**
- **SSE – Safe Shutdown Earthquake**
- **SSI – soil structure interaction**
- **UHS – Ultimate Heat Sink**



# **US-APWR**

## **Design Certification Application**

**Chapters 6 and 7**  
**Topical Report supporting Chapter 6**  
**LTCC / GSI-191**

**ACRS Full Committee Presentation**

**December 5, 2013**

**Mitsubishi Heavy Industries, Ltd.**

# Presenters



- **Ryan Sprengel**
  - ✓ DCD Licensing Manager
- **Rebecca Steinman**
  - ✓ DCD Licensing Engineer, Ch 6
- **Erin Wisler**
  - ✓ DCD Licensing Engineer, Ch 7

## ➤ Previous ACRS Full Committee meetings

- ✓ September 9, 2011 – Chapters covered: 2, 5, 8, 10, 11, 12, 13, 16
- ✓ September 6, 2012 – Chapter 9 covered
- ✓ April 11, 2013 – Chapters 4, 15, 17, 19; Topical Reports supporting Chapters 4 and 15, respectively

## ➤ Significant upcoming submittals

- ✓ Ch 6 MUAP-07031 Rev. 2 to be submitted, Dec 2013
- ✓ Ch 7 MUAP-07005 Rev. 9 to be submitted, Dec 2013
- ✓ Ch 15 LB and SB LOCA topical reports revisions submitted, Dec 2013

## ➤ Adjustment of ongoing US-APWR DC Activities

- ✓ Letter (UAP-HF-13256) submitted to NRC 11/5/2013
- ✓ Coordinated slowdown of DCD Licensing Activities, while maintaining a commitment to US-APWR

- **ACRS Subcommittee meeting held September 17, 2013**
- **Remaining SE Open Items**
  - ✓ Items in which MHI submitted response that is awaiting staff review / confirmation of closure
    - Sparger hydrodynamic loading
    - Design change impact on M&E release analysis under secondary system piping rupture
    - Ch 15 RAIs tied to debris impacts on boron precipitation / LTCC
  - ✓ Other open items have alignment with NRC Staff and closure path is confirmation of changes in DCD Rev. 4
- **Written responses to ACRS SC questions to be submitted, December 2013**
- **No current RAIs**

- **ACRS Subcommittee meeting held October 1, 2013**
- **Remaining SE Open Item**
  - ✓ Tier 2\* designation of debris amounts
- **Written responses to 12 ACRS questions to be submitted, December 2013**
- **No current RAIs**

### ➤ **MUAP-07001, The Advanced Accumulator**

- ✓ ACRS Subcommittee meeting held September 18, 2013
- ✓ Staff issued public version of advance TRSE on 11/14/13
- ✓ MHI submitted ACC scaling revisions to the LB LOCA (MUAP-07011) 12/4/13 and SB LOCA (MUAP-07013) topical reports on 12/5/13

- **ACRS Subcommittee meeting held April 2013**
  - ✓ 14 questions requiring follow-up
  - ✓ Subsequent discussions held with Staff
- **Written responses to 14 ACRS questions submitted September 2013**
- **RAI responses corresponding to SE Open Items submitted and under Staff review**
  - ✓ Common cause failure, D3 coping analysis, post accident monitoring variables, and others
- **No current RAIs requiring MHI response**



United States Nuclear Regulatory Commission

*Protecting People and the Environment*

# **Presentation to the ACRS Full Committee – 610<sup>th</sup> Meeting**

**United States – Advanced Pressurized Water Reactor (US-APWR)  
Design Certification**

**Safety Evaluation Report with Open Items  
for  
Chapters 6 & 7**

**Safety Evaluation Report  
for  
Advanced Accumulator Topical Report**

**Perry Buckberg  
US-APWR Design Certification Lead Project Manager**

**December 5, 2013**

# US-APWR Design Certification Review Schedule

	<b>COMPLETION DATE</b>
Phase 1 – Preliminary Safety Evaluation Report (SER)	Completed
Phase 2 – SER with Open Items	May 2014
Phase 3 – ACRS Review of SER with Open Items	August 2014
Phase 4 – Advanced SER with No Open Items	February 2015
Phase 5 – ACRS Review of Advanced SER with No Open Items	April 2015
Phase 6 – Final SER with No Open Items	September 2015
Rulemaking	February 2016

# Summary of the US-APWR Safety Evaluation Reports

- The staff has issued Safety Evaluation Reports (SERs) with Open Items for Chapters 2, 3 (partial), 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17 and 19 (partial).
- Of the issued chapters, all but Chapter 3 (partial) have been presented to the ACRS Full Committee.
- The staff has also issued SERs for five US-APWR Topical Reports.

# **US-APWR Chapter 6**

## **Engineered Safety Systems**

- The SE for Chapter 6 addresses the engineered safety systems, engineered safety feature material, containment systems, emergency core cooling systems, habitability systems, fission product removal control systems, inservice inspection (ISI) of Class 2 and Class 3 components
- The following Chapter 6 Open Items were discussed during the September SC Meeting
  - ♦ **Open Item RAI 923-6420, Question 06.02.01-21:** Containment Internal Design Changes in the DCD
  - ♦ **Open Item RAI 1036-7079, Question 06.02.02-94:** Tube-side and Shell-side Fouling Factors Used for the CS/RHR HX Design
  - ♦ **Open Item RAI 597-4590, Question 06.03-85:** SI and RHR/CS Pump Testing
  - ♦ **Open Item RAI 881-6203, Question 06.03-104:** ITAAC for SI and RHR/CS Pump Testing

# **US-APWR Chapter 6**

## **Engineered Safety Systems**

- Open Items continued:
  - ♦ **Open Item RAI 391-2974, Question 06.03-35:** Lack of an Advance Accumulator Small Injection Flow Rate ITAAC
  - ♦ **Open Item RAI 982-6036, Question 06.03-111:** Emergency Letdown Sparger Design
  - ♦ **Open Item RAI 559-4387, Question 06.04-11:** Flood Barriers
  - ♦ **Open Item RAI 927-6460, Question 06.04-16:** Condensate equipment drain lines
  - ♦ **Open Item RAI 955-6585, Question 06.04-17:** Refrigerant Leak
- There were no staff action items from the September Subcommittee meeting related to Chapter 6.

# US-APWR Advanced Accumulator Topical Report

- The following ACC Subjects were discussed during the September SC Meeting
  - ♦ Overview of Advanced Accumulator Design
    - Principle of Advanced Accumulator
    - ACC role in ECCS performance during LOCAs
  - ♦ ACC Scaled Testing/ Test Results Summary
  - ♦ ACC Characteristic Equations
  - ♦ Applicability of ACC Characteristic Equations
  - ♦ Uncertainty Evaluation and Treatment
  - ♦ CFD Scaling Analysis of the Advanced Accumulator
    - Scaling Bias
- There were no staff action items from the September Subcommittee meeting related to the AAC.

# US-APWR Long Term Core Cooling

- The following LTCC Subjects were discussed during the October SC Meeting
  - ◆ GSI-191 Evaluation for Sump Performance
    - Break Selection
    - Debris Generation/Zone of Influence (ZOI)
    - Latent Debris
    - Debris Transport
    - Chemical Effects
    - Debris Source Term Control
  - ◆ Strainer Head Loss Evaluation
  - ◆ Ex-Vessel Downstream Effects

# US-APWR Long Term Core Cooling

- ♦ In-Vessel Downstream Effects
  - Debris Bypass
  - Core Blockage Acceptance Criteria
  - Fuel Bundle Head Loss Testing
  - Debris Deposition Analysis
- ♦ Structural Design of Strainer/Debris Interceptors
- ♦ Net Positive Suction Head (NPSH)
- The following Chapter 6 Open Items related to LTCC were discussed during the October SC Meeting
  - ♦ **Open Item RAI 840-6096**
  - ♦ **Open Item RAI 997-7033**
  - ♦ **Open Item RAI 719-5352**
- There were no staff action items from the October Subcommittee meeting related to the LTCC.

# US-APWR Chapter 7

## Instrumentation and Controls

- Chapter 7 addresses the reactor trip system, engineered safety feature systems, analyses of the plant's responses to postulated disturbances and postulated equipment failures or malfunctions.
- The open items discussed during the April Subcommittee meeting are as follows:
  - ♦ **Open Item RAI 568-4588** - Selection criteria for PAM variables should be refined (7.5)
  - ♦ **Open Item RAI 753-5742 & Follow-up RAI 988-7021** - Basis for the inputs and assumptions used in D3 Coping Analysis (7.8)
  - ♦ **Open Item RAI 992-6999** - Sufficient evidence to demonstrate that the use of O-VDUs enhance the performance of the safety system ITAAC that adequately verifies testing for normal and abnormal data transmission conditions for all non-safety to safety interfaces (7.9)

# **US-APWR Chapter 7**

## **Instrumentation and Controls**

- Open Items continued:
  - ♦ **Open Item RAI 995-7024** - Process to flow down the requirements for MELTAC platform hardware/software components (7.1)
  - ♦ **Open Item RAI 993-7027** - Process to ensure vendor's safety software development process (7.1)
  - ♦ **Open Item RAI 996-7040** - How the plant would be adequately protected from each PCMS failure, including single failures and design defects. (7.7)
- ACRS SC Meeting Actions
  - ♦ MHI submitted written responses in September to 14 Subcommittee questions after discussions with the NRC Staff.
  - ♦ Two additional items will require NRC staff to update the SE.