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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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MEETING OF THE ESBWR SUBCOMMITTEE ON THE NORTH ANNA

COMBINED LICENSING APPLICATION (COLA)

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FRIDAY, AUGUST 21, 2009

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ROCKVILLE, MARYLAND

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The Subcommittee met in the Commissioners' Hearing Room at the Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, at 8:30 a.m., Michael L. Corradini, Chairman, presiding.

SUBCOMMITTEE MEMBERS:

MICHAEL L. CORRADINI, Chairman

JOHN W. STETKAR, Member

CONSULTANTS PRESENT:

THOMAS S. KRESS

GRAHAM B. WALLIS

DESIGNATED FEDERAL OFFICIAL:

CHRISTOPHER L. BROWN

I N D E X

P R O C E E D I N G S

(8:31 a.m.)

CHAIRMAN CORRADINI: Okay. The meeting will come to order.

This is a meeting of the Advisory Committee on Reactor Safeguards, the ESBWR Subcommittee on the North Anna COLA.

My name is Mark Corradini, Chairman of the Subcommittee. The Subcommittee members in attendance are to be Said Abdel-Khalik, John Stetkar and Tom Kress and Graham Wallis, consultants to the Committee.

The purpose of the meeting is to discuss Chapters 2, 3 and 14 of the Safety Evaluation Report with open items associated with the North Anna COLA. The Subcommittee will hear presentations by and hold discussions with representatives from the NRC staff; Dominion, the applicant; and General Electric-Hitachi, GE-H, regarding these matters.

The Subcommittee will also gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full Committee, which will occur in October.

Christopher Brown is the designated

federal official for this meeting.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on July 21st, 2009.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register notice.

It's requested that speakers first identify themselves and speak with sufficient clarity and volume so they can be readily heard.

I'll note for everybody that we're in a different room, which means to be heard you've got to punch a button. It has got to turn red on your button, and then turn it off so we don't hear your other conversations.

We've not received any requests from members of the public to make oral statements or written comments. I assume that we have the bridge line open. Okay. Is anyone currently on the bridge line?

PARTICIPANT: Yes.

CHAIRMAN CORRADINI: Okay. So you have your lifeline open. If so please state your name and affiliation when called upon.

I'll note for everybody that this is our third in a series of Subcommittee meetings on the North Anna COLA. We anticipate to finish today on all three chapters, two, three and 14, and then we'll come back and hear a presentation to the full Committee and prepare a letter, contingent upon, of course, the settling of issues for the DCD.

So we'll proceed with the meeting, and I'll call upon Tom Kevern to lead us through this from NRO.

Tom.

MR. KEVERN: Thanks. Good morning.

I'm Tom Kevern. I'm the lead project manager for -- review, and I'd like to start with just a brief overview on behalf of the staff.

Monitors are throughout. So if you're not used to the room here, find the one that's closest to you -- that's why we have hard copy handouts for everyone.

I'd like to note at this point in time the staff has completed our Safety Evaluation Report with open items for the North Anna seawall (phonetic) application. It consists of 19 chapters and the associated appendices.

That SER with open items was formally

transmitted to the Executive Director of the ACRS on August 7th, by the Director of the Division of Reactor Licensing. That document is available, a large document, is available in the public domain at the ADAMS ascension number identified there on the slide.

This is, as Dr. Corradini mentioned, this is the third month we've had Subcommittee meetings, or actually four different dates. We've reviewed or presented, rather, chapters in June and July that you see, and today in accordance with following the agenda, we'll have Chapters 2, 3 and 14.

I note that the staff Safety Evaluation Report with open items is based upon the North Anna seawall application, Revision 1 that was provided to the staff back in December of '08. It also incorporates by reference two other licensing actions, one of which was ongoing and one of which was completed.

The ESBWR design certification, currently undergoing review by the staff, and the most recent revision, Revision 5, that was provided to the staff approximately a year ago, and then documentation associated with the yearly site permit, completed licensing action, the ESP was issued by the Commission back in November of 2007.

And the sequence today will be similar to what we've done. It will be the same as what we have done before. We'll start out with a presentation by Dominion summarizing the content of the FSAR, and then by the staff summarizing the content of our SER.

I'd like to make one more note, please. Back in the June presentation, the staff came out of that meeting with a lesson learned, and the item was that staff understood that we had done a less than a stellar job in fully explaining and clarifying the details of our review related to the seawall application, specifically related to that information the COLA that incorporated by reference material from the DCD.

And as before, I'd like to reiterate that in the safety evaluation report, we note in the excerpt there in that first slide or the first bullet, rather, that we did do a complete review of the FSAR material and checked the applicable material in the DCD.

Now, that action verb "checked" clearly is open to interpretation by all the stakeholders reading the SER. That was a term that was chosen, consensus by the staff, to indicate that we did do a review of the applicable parts of the DCD.

However, we did not use the word "review" to avoid any confusion that we were redoing the staff's review of the DCD. It is a parallel but separate licensing activity that is the review of the design certification application, and that will also be applicable today for the documentation associated with the early site permit especially in Chapter 2 where there are a number of locations where the applicant incorporates by reference material primarily from the site safety analysis report associated with the early site permit.

And then as before, the second bullet on the slide here, wherever possible we're going to provide specific examples to hopefully clearly indicate and demonstrate to members of the ACRS that we have appropriately reviewed the material in the related documents that were incorporated by reference.

With that said, we're ready to start the presentations, and we're ready to move on to Chapter 3 and turn it over to Dominion, Gina Borsh.

(Pause in proceedings.)

MS. BORSH: Good morning. I'm Gina Borsh from Dominion, and we're going to talk about Chapter 3 first. We'll jump right in.

As Tom said, we're following the same

format that we used previously. The first slide of Slide 2 in our handouts is a beginning list of the chapter topics that are presented in Chapter 3.

Chapter 3 is about the design of structures, components, equipment and systems, and in this chapter we added information to supplement the DCD in the sections of classification of structures, systems and components, missile protection, seismic design, mechanical systems and components, seismic and dynamic qualification of mechanical and electric equipment, EQ of mechanical and electrical equipment, and then the appendix that covers seismic soil structure interaction analysis.

And then the two middle bullets that are in blue, piping design review and threaded fasteners, are two sections in the FSAR that don't appear in the DCD, and the reason that we added them to the FSAR is because Reg. Guide 1.26 in the NRC guidance has these two sections for COLA, COL applicants, and so we followed the format of the NRC guidance for this chapter.

So we jump right to Section 3.2, which is the first section where we added information, and here in the FSAR we confirm that we are not using the hydrogen water -- or I'm sorry -- that we are using the hydrogen water chemistry system for our Unit 3 design at North Anna. We are not using the zinc injection system, and we do not have a cold machine shop, a separate cold machine shop at North Anna, which is shown in the DCD standard design figures.

The first two bullets are what we talked about when we met the last time in July.

Next slide, please.

In Section 3.5, Missile Protection, we point to our FSAR Section 2.2 for a discussion on the site specific missile information that we provide, and the aircraft hazard analysis.

Just to note, this is not the aircraft hazard analysis, the aircraft impact rule that GE is addressing in their DCD. This is specific to this site and flights, and we'll talk a little bit about that when we get to Chapter 2.

Section 3.7 is about seismic design. Here in the first bullet we provided cross-references to the site specific GMRS, FIRS, and comparison information that we put in Chapter 2, and we also state that the CSDRS, certified seismic design response spectra, are compared to the FIRS in a table in Chapter 2 of the FSAR.

And then for the next supplemental

information item in 3.7, we cross-reference FSAR Section 2.5.4, where we provided the site specific earthquake ground motion item history information.

And finally, we provided a cross-reference to Chapter 2 again for specific information North Anna's -- the site specific properties of subsurface materials for North Anna.

DR. KRESS: Are you going to discuss the changes in the ground motion under Chapter 2 then?

MS. BORSH: Well, it depends on how you define "discussed." I'm not going to. We certainly can if you'd like to talk. That would be the time to talk about that, yeah.

CHAIRMAN CORRADINI: And then for the missile protection, this does not include -- we had just gotten from you all the missile hazard report. Is that part of this discussion, or does that refer back to the previous chapter that we had already brought up?

MS. BORSH: That's the Chapter 10 turbine missile analysis.

CHAIRMAN CORRADINI: That's not specific to North Anna.

MS. BORSH: That's correct. That's a GE-H document.

MEMBER STETKAR: I thought isn't that an open item in the COL?

MS. BORSH: Yes. Yes, we have to provide -- what we have to do we submitted the document or GE-H submitted it for us. So that open item is closed, and then we have to update the FSAR to include information about the turbine missile, the maintenance and inspection frequencies.

MEMBER STETKAR: Where do we have an opportunity to comment on that turbine missile analysis? Is that now part of the DCD?

MR. HICKS: No, that's part of a COLA. That's part of our COLA.

MS. BORSH: It's to support our COLA, yeah.

MR. HICKS: And one other point. We have an ITAAC to update that with the plant specific turbine properties. So that analysis will get updated before we load fuel later.

CHAIRMAN CORRADINI: I think that John is asking is if it's time to ask the question, should we ask it now; should we ask it later. I think he has looked at it. I have not had a chance.

MEMBER STETKAR: A couple of weeks ago. We had it for --

MR. HICKS: It was talked about in Chapter 10, but I mean --

MS. BORSH: Well, yeah, we covered the topic, but as you said, there are open items in Chapter 10 on it, and we can certainly talk about it if you have questions about the report.

MEMBER STETKAR: I don't know if now is the time to do it or should we continue with Chapter 3?

CHAIRMAN CORRADINI: I mean, are you going to talk any more about 3.5 initial protection? Can we just -- log it down?

MS. BORSH: It would probably be good if -- oh, I'm sorry.

CHAIRMAN CORRADINI: No, it's me. Great.

MS. BORSH: It would probably be good for us to hear the information or your questions now because we don't have our turbine expert here, and so we can let him know.

MR. HICKS: We can get him, but he's not here now.

CHAIRMAN CORRADINI: John, go ahead.

MEMBER STETKAR: The main questions that I had, I went through the analysis, and I don't know anything about probabilistic fracture mechanics. So I was impressed with the probabilistic fracture mechanics part of it.

The questions that I had were on the modeling and analysis of the turbine control and protection systems because in the current analysis, the evaluation is apparently based on an analysis that was done by General Electric back in the 1980s for a completely different turbine protection system, and the details of that analysis aren't provided. I don't know what type of model they used. It's been only excerpted.

And the argument is made. There is some attempt to say, well, the current protection and control system is much, much different, but it's much, much better. There are a lot of reasons to believe that it's a lot better, but we're going to use the result of the old analysis.

So essentially you have an analysis of today's turbine based on an evaluation of some old protection and control system, and there's not really good documentation even of that analysis. So that's my basic comment.

You said you need to update the analysis anyway with the properties of the actual turbine that you're going to install.

MR. HICKS: Right. There's an ITAAC for us.

MEMBER STETKAR: Then it will be different than the one that is included in --

MR. HICKS: Yeah, the one that's in there is a bounding set of material properties.

MEMBER STETKAR: Okay, okay.

MS. BORSH: Well, material properties, but not necessarily about the protection and control system.

MEMBER STETKAR: The protection and control system, part of the problem is in the qualitative discussion, it bounces back and forth between I don't know what they're called, but it's a Mark 4e and a Mark 6e, but no specific analysis is really done on either one of those.

MS. BORSH: Okay. Well, how about if we --

MEMBER STETKAR: The new one, you know, is going to be a digital control system. The old one was an analog with solenoid valves. It's a completely different system.

CHAIRMAN CORRADINI: So can I just say it differently? So you're trying to get enough information to decide that what is new is bounded by what was old.

MEMBER STETKAR: I'd rather see an analysis of what's really going to be installed.

MS. BORSH: Okay. So we understand the question. Rick, are you good with that? Do you need to ask anything further of John?

I mean, because what we could do, depending on your schedule and how Tom wants to do this, we could get somebody maybe after the break, get Gary Anthony our subject matter expert on the line.

MR. WACHOWIAK: Right. This is Rick Wachowiak from General Electric-Hitachi.

I'll see if I can get a hold of our expert on this for the ESBWR project. Once again, the analysis came from our steam turbine group, and so the availability of that group is a little more remote, but the question that you're looking for is is there a specific analysis of the current generation and control system on the turbine.

MEMBER STETKAR: That's part of this, but even -- I didn't have enough information. For example, if you talk about typical things that we worry about and risk assessment like common cause failures of -- I'm not going to talk about software because that's a separate issue.

MR. WACHOWIAK: Thank you.

MEMBER STETKAR: Common cause failures, for example, of the stop valves, the control valves, the intercept valves. I didn't see any evidence that that type of failure mode was even treated in this analysis that's in there.

So there are sort of basic fundamental questions about what type of model was built and is that model relevant on the protection and control side input analysis.

MR. WACHOWIAK: So it goes beyond the control --

MEMBER STETKAR: Is that relevant and were all of the failure modes accounted for even for the things that are conceptually common, like the stop and intercept valves and control valves and so forth?

MR. WACHOWIAK: All right. I'll see if we can find some of those answers after the break.

CHAIRMAN CORRADINI: But just from a question of scheduling standpoint, if we don't get to it today, we can bring it up, I think, relative -- since it is a generic issue -- we can bring it back up. We've got six other days coming up of Subcommittee meetings with the ESBWR. So we will have it for a while and can chat with you.

So I think we can bring it back up there if need be.

MR. WACHOWIAK: Right, and I think we probably can find something in those six days, a slot for that.

CHAIRMAN CORRADINI: Yeah, okay. Good.

DR. KRESS: Well, while we're on the subject, I haven't had a chance to read that particular document yet, but when I think of qualitative probabilistic analysis, I think of crack initiation and growth, and I have never seen this done for missiles. I've seen it done for pipes and other things that fail due to stresses on them.

Does the document go into how you arrive at those probabilistic analyses?

MEMBER STETKAR: Yes, there actually is -- I'm not familiar enough with either the probabilistic or the fracture mechanics to be able to comment on --

DR. KRESS: Well, I was wondering if there was a database for these materials under the stress conditions and temperature conditions, and this at the turbine is --

MR. WACHOWIAK: Yeah, I think the methodology for that portion of the analysis was provided to us rather than something that is --

DR. KRESS: Well, I'll reserve my questions until I actually read the document.

DR. WALLIS: Well, if we're going to talk about this, I'd like --

CHAIRMAN CORRADINI: We're not going to talk about it anymore.

DR. WALLIS: Anymore today at all?

CHAIRMAN CORRADINI: No, not unless they get an answer for us.

DR. WALLIS: Well, if the question comes up, I'd like to see the document because I don't --

CHAIRMAN CORRADINI: It was sent to us.

DR. WALLIS: It was sent to somebody, but I don't think it came to me.

CHAIRMAN CORRADINI: I will get you a copy.

DR. WALLIS: Thank you.

CHAIRMAN CORRADINI: Chris will get you a copy.

MS. BORSH: Okay. We are going to the next slide. That's it.

Okay. Still on 3.7. We provided a cross-reference to a figure in Chapter 2 that has the site specific locations of our structures. We provided a commitment to implement a site specific seismic monitoring program prior to receipt of fuel on site. We added this because Reg. Guide 1.206 specifically had a line item on it, and so we addressed it in 3.7.

Now, we're in 3.9, Mechanical Systems and Components. We addressed a DCD COL item by providing the schedule information for our vibration assessment program. The schedule is based on the guidance in Reg. Guide 1.20, which is comprehensive vibration assessment program for reactor internals during pre-op and start-up testing.

Then we addressed another DCD COL item by providing our milestone for completing the ASME stress reports for the equipment segments that are subject to loadings that could result in thermal or dynamic fatigue. The reports will be completed within six months of completing the associated ITAAC.

And we also state in the SER that we'll update it as necessary to reflect the results of the analysis.

In 3.9, we provided a full description or our snubber pre-service and in-service examination and testing programs, and we also established a milestone for implementing the programs for snubbers.

MEMBER STETKAR: Gina.

MS. BORSH: Yes, John.

MEMBER STETKAR: In 3.9, I was looking at the AOV testing program, and there's a statement in there that says valves are categorized according to the safety significance and risk ranking. Periodic static testing is performed at a minimum on high risk, high safety significant valves, et cetera, et cetera.

And then in Section 3.9.7 -- that was in 3.9.6-8 reference -- in 3.9.7 the COLA says, "Risk informed in-service testing is not being utilized." What process are you using to determine the risk ranking or the high risk categorization of valves for your in-service program if it's not a risk informed in-service testing program?

MS. BORSH: Sorry. John, I think you're mixing two different programs, but I also think -- Al Schneider, are you on the call?

MR. SCHNEIDER: Yes, I am.

MS. BORSH: Hey, Al.

Al Schneider is our subject matter expert in this area, and he helped write the FSAR sections on this.

Al, would you like to answer John's question?

MR. SCHNEIDER: I can't say specifically, but there is guidance in the regulatory information summary, RIS 2000-03, I think, that was referenced in the FSAR, and we basically indicated that we would follow the guidance in that RIS to develop an AOV program, AOV testing program for valves that are not necessarily ASME Class 1, 2 and 3 valves, but they're power operated valves for which additional testing is recommended, I guess, by the staff.

MEMBER STETKAR: Yes, I understand that, and all I'm doing is reading the statement that said there's apparently some type of risk significance that determines which of those valves are included in that program and which are not, and I was curious about how that risk significance determination was made or will be made.

MR. SCHNEIDER: There is guidance out there in NUREGs, I think, and in the RIS that tells you how to go about that, but the risk informed IST is relevant for the entire IST program, and that's what in Section 3.9.7, I think, of the FSAR --

MEMBER STETKAR: Yes, yeah.

MR. SCHNEIDER: -- where it is indicated that that would not be used at this point.

MEMBER STETKAR: Yeah, and I understand that. Given the fact that you're not doing that, my question is how are you determining the risk significance of these other portions of the testing program. What's in that portion and what's not?

I understand that your entire -- you're not invoking at this time a risk informed in-service testing program for the basic elements of the plant.

MR. WACHOWIAK: This is Rick Wachowiak from GE-H.

The initial way that we would address risk significance emanates from the D-RAP, and there are a list of risk significant components or risk significant candidates in the D-RAP, and that can be used as the initial cut at the set of risk significant components for, if you will, nontraditional risk informed -- if you can call them nontraditional risk informed -- but, you know, not following the full blown risk informed evaluation.

So that list of potentially risk significant components from the design PRA is included in the D-RAP, and that's where that would likely come from.

Now, there's a COL item in Chapter I believe it's in 17, which says when you do the required construction PRA update that has to happen as part of Part 52, that you can go back and revisit what is your list of risk significant components, given the as-built status of the plant, but absent that, you would use the list that's in the D-RAP.

MEMBER STETKAR: But it's basically going to come out of the D-RAP which falls out of the existent PRA.

MR. WACHOWIAK: That's right.

MEMBER STETKAR: Thanks. That helps.

MS. BORSH: Thanks, Al and Rick.

Okay. Next slide, please, Mike.

This is the slide that talks about the IST program for valves. We provided a full description of the ASME OM code pre-service and in-service inspection and testing program for our valves, along with a milestone for implementing the programs, and we just note that in the ESBWR design we don't have any pumps that are in the ASME program because the design doesn't require it.

And then also, which is what John was just asking about, we do note that we provided a description of the additional testing of power operated valves that will be performing as discussed in the risk that Al mentioned, 2000-03.

Next slide, please.

Moving on to Section 3.10, this is about seismic and dynamic qualification of mechanical and electrical equipment. We established a milestone for submitting the implementation schedule for the seismic and dynamic qualification of mechanical and electrical equipment. The schedule will be submitted within 12 months of issuance of our license, and then we'll update it every six months until 12 months before scheduled fuel loading, and then it will be updated even more frequently.

We also committed to completing the dynamic qualification report prior to fuel load and to updating the SER to reflect the results as necessary.

And then finally for 3.10, we stated that the QA program requirements that are contained in FSAR Section 17.5 will be applied to the equipment qualification files.

We added that statement to address a particular SRP acceptance criterion.

That's it. Next slide, please.

Three, point, 11, Environmental Qualification of Mechanical and Electrical Equipment. Here we added a milestone for implementing the EQ program, which includes completion of the plant specific EQ documentation, and the milestone for completing this work is prior to fuel load.

Next slide, please.

Section 3.12 is one of the sections that we added in the FSAR that doesn't appear in the DCD. It's about the piping design review, and basically the information that covers the guidance that the NRC has issued on the subject is provided in different sections of the DCD, and so we referenced the difference DCD sections for the seismic and non-seismic piping and support information.

And then we also state that the location and distance between the piping systems will be established as part of completion of the ITAAC.

Section 3.13 is about threaded fasteners. This was also added to follow the Reg. Guide 1.206 format for COLAs, and here we also reference the DCD for the criteria that will apply to the selection of the materials, the design, the inspection and testing of threaded fasteners that are within the scope of the ASME code.

Appendix 3A of the DCD presents the seismic soil-structure interaction analysis or SSI analysis. The DCD appendix includes the analysis that was performed for two site conditions: the generic site and the site specific conditions that are provided in the North Anna ESP or the RESP application.

So we incorporated the DCD by reference, and we provided a cross-reference to our FSAR Chapter 2 for the site specific geotechnical data.

The data in Chapter 2 is compatible with the site enveloping parameters that are considered in the standard design.

We also state that our site plan is provided in Chapter 2 of the FSAR, and all of this information was provided to replace conceptual design information that's in the DCD.

This is the slide that shows the summary of open items that are in the SER. There's seven open items that have Chapter 3 numbers, and there is one open item that's discussed in the Chapter 3 SER that is related to a Chapter 2 -- that is really a Chapter 2 open item

The first open item is tracking an RAI that asks us to provide a list of the SSCs that are necessary for continued operation after an operating basis earthquake.

The second open item involves the latest editions of codes and standards for specific structure systems and components.

The third open item is tracking an RAI that requests that we identify the site specific SSE and OBE as they relate to plant shutdown criteria.

Fourth open item on the list is the Chapter 2 open item about the SSI for the fire water storage complex. We'll talk about that later on in Chapter 2.

The next open item is about the process for design and qualification of mechanical equipment, including design and procurement specs.

Next open item is about the implementation plan that we'll have for the equipment qualification -- I'm sorry -- yeah, for the equipment qualification program.

And then there's a specific RAI that's tracking an item about our plant specific EQ document.

And finally there's an RAI that's asking us about our implementation plans for our EQ program.

And then there are three confirmatory items, and with that if there are no more questions, I'll turn it --

CHAIRMAN CORRADINI: So I did have one thing, but I think I want to bring it up later in Chapter 14. There's a confirmatory item that relates to the DACs. So I think I'd like to bring it up there, but somehow it's linked relative to one of the things that you brought up that kind of jogged my memory, was the piping and the timing of all of this. So we can observe that when we get to 14.

MS. BORSH: Sure. Anything else before the NRC presentation?

Okay. Thank you.

CHAIRMAN CORRADINI: You have your folks coming up?

MR. EUDY: My folks are here.

CHAIRMAN CORRADINI: Your folks are here. Okay.

MR. EUDY: Hi. I'm Mike Eudy, Project Manager for North Anna.

We appreciate Dominion's presentation. I agree it was an accurate representation of the information in their FSAR, and we're going to go ahead and start with our technical evaluation. Yuken Wong is first, and we're going to jump around a little bit on some of the slides. I'll indicate when we do that.

These are the staff members at the table. All of the ones in bold and asterisked are the ones that we're going to specifically address.

CHAIRMAN CORRADINI: Which will probably involve the open items, I assume.

MR. EUDY: Some of the open items actually have been resolved in communications sine the SER came out.

DR. WALLIS: What are these acronyms on the second page about EMBs and SEBs and DIBs?

MR. EUDY: That is the branch. Engineering and Mechanics Branch, Structural Engineering --

DR. WALLIS: Usually they just wrote out the whole thing. Thank you.

CHAIRMAN CORRADINI: They're reorganize and change them. It's easier to change this.

MR. EUDY: Point taken.

I'm just going through all of the different topic areas we're going to discuss.

I'll turn it over now to Yuken Wong to discuss Section 3.2.

MEMBER STETKAR: Tom, are you going to discuss each of these sections at all or are you just going to focus on the ones that you have the open items?

MR. EUDY: The ones with the open items will be discussed. We decided some were moot. Like 3.74 was just an editorial. The only reason why there was anything in there was it was an editorial supplement.

MEMBER STETKAR: I happen to have a

question, and this may be a process thing just because I'm not familiar with the COL process. It happened to be 3.74.

MR. EUDY: That you want to talk about? We can have our subject matter expert here.

MEMBER STETKAR: You have a slide that gets to 3.7. So if you want to wait.

MR. EUDY: Sure. Okay. We have a back-up slide for 3.74, and our subject matter expert is here.

MEMBER STETKAR: I don't want to put you out of sequence.

CHAIRMAN CORRADINI: So when you come to 3.7.

MR. EUDY: Sure. No problem. We'll start off with Yuken Wong. He's going to go over Section 3.2.

MR. WONG: Yuken Wong from the Engineering/Mechanics Branch.

Section 3.1 addresses the seismic classification of -- and 3.22 --

CHAIRMAN CORRADINI: I don't think you're on or you've got to get closer. I don't think he can hear you.

MR. WONG: Sorry. Okay. Again, I'm Yuken Wong from the Engineering/Mechanics Branch.

Section 3.2.1 address the seismic classification of systems, structures and components, and 3.2.2 address the quality group classification of SSCs.

As I mentioned earlier, the supplementary information confirmed that there is a hydrogen water chemistry system and eliminate the injection system and also eliminate the cold machine shop.

These supplementary information do not change the seismic classification and quality group classification in the DCD.

There is one open item. We recently issued an IAI on the list of SSCs necessary for continue safe operation that must remain functional after an OBE, and Dominion has verbally committed to provide this list.

That's all I have for Section 3.2.

DR. KRESS: I'm sorry. I missed on the zinc injections. You no longer have that?

MR. WONG: Correct.

DR. KRESS: The change would just eliminate that part from the --

MR. WONG: Correct.

MR. EUDY: Manas Chakravorty for Structural Engineering will go over Section 3.5

through 3.7.

CHAIRMAN CORRADINI: It should be red.

MR. CHAKRAVORTY: My name is Manas Chakravorty, and I work at Structural Engineering Branch of Nuclear Regulatory Commission in NRO.

I reviewed Section 3.7.1. and 3.7.2. These sections describe seismic design parameters, such as ground motion response spectra.

Two, point, three was -- 2.7.3 was basically -- well, I reviewed that, too.

DR. WALLIS: Section 3.3.

MR. WONG: Section 3.3?

MR. EUDY: Probably completely full IBR. I can check.

MR. CHAKRAVORTY: Wind and tornado?

DR. WALLIS: Well, there was something about someone estimated the probability of exploding underground gas tank, and I just wondered how that probability was obtained.

CHAIRMAN CORRADINI: We'll take it up on 3.5, I think. I was going to actually ask about their explosion hazards, too. So that's under 3.5, right?

DR. WALLIS: I got the wrong section, did I?

CHAIRMAN CORRADINI: Yes.

DR. WALLIS: Okay. thank you.

CHAIRMAN CORRADINI: We'll come up to it.

MR. CHAKRAVORTY: The seismic portion covers the ground motion response spectra, time history, supporting media for Category 1 structures, SSI analysis, and interaction of Category 1 and Category 1 structures.

I reviewed the application as well as the DCD. Section 3.7 appears ESBWR DCD was incorporated by reference with five supplements. They are listed on this slide.

Three, seven, one provides site specific ground motion response spectra. They are generally described in Section 2.

Supplement 3.7-2 provides site specific ground motion time histories. That is also specified in Section 2.

Three, seven, three and three, seven, dash, four, that provided the site specific properties of subsurface materials, and then 3.7-5 provided the location of these structures.

MEMBER STETKAR: There was another one, 3.7.6. That happened to be the one I had the question on. That's on seismic instrumentation.

MR. CHAKRAVORTY: That's 2.7.4.

MEMBER STETKAR: Section 3.7.4, it's the supplement 3.7-6.

MR. CHAKRAVORTY: Six, and that is on seismic instrumentation. I'm talking about here 3.7.1, 3.7.2.

MEMBER STETKAR: Okay.

MR. CHAKRAVORTY: And 3.7.3.

MEMBER STETKAR: I'll wait.

MR. CHAKRAVORTY: My conclusion was that ESBRW SSC spectra, which is generally termed as CSDRS, which means 35 seismic design response spectra, they're developed by enveloping Reg. Guide 160 spectra incurred at .3 G level and also at three site specific response spectra. So these things both.

And the result was that site specific design parameters for reactor building and fuel building and control building that fall within the range of parameters considered in the DCD and the corresponding foundation input response spectra are bounded by the CSDRS site certified design spectra.

Now, we do have two open items which Gina probably talked. We have one open item where we requested the applicant to include in Section 3.7.1 site specific SSE and corresponding OBE for operating the plants, and then another issue was that the backfill for the fire water storage complex that did not meet the DCD site parameter for a minimum -- velocity. So the applicant will perform site specific SSI analysis for the fire water storage tank, storage complex to demonstrate its seismic adequacy.

Now, this analysis at the time was not complete when I reviewed it, and the issue will be addressed by an open item in Section 2.

That basically completes my presentation. The bottom line is we have two open items for reactor building, fuel building, and control building. The foundation input response spectra is enveloped by the certified design spectra as specified in DCD.

MR. EUDY: Would you like us to go to 3.5 or 3.7.4 next?

MEMBER STETKAR: Why don't we clear out 3.7.4? This is more of a programmatic question, I think, than anything else.

MR. EUDY: Thank you.

MEMBER STETKAR: Go to the back-up slide for 3.7.4 and get Vladimir, our subject matter expert here.

I have a programmatic question that's answered quite easily. In 3.7.4, there was a supplemental information that said that basically

North Anna will install the seismic monitoring instrumentation before the receipt of fuel on site so that with respect to this COL it's basically a postponed activity.

In that section, however, there's always a section that says post COL activities, and the staff concluded that there were no post COL activities related to seismic monitoring instrumentation.

So I was curious. If it's not evaluated as part of the COL and it will be installed before receipt of new fuel on site, why there are no post COL activities related to that subject matter.

MR. EUDY: That's our definition of --

MEMBER STETKAR: And that's why I think it's a programmatic thing. I just want to make sure that, indeed, the design and the instrumentation and locations, et cetera, will be, in fact, reviewed before it's installed.

MR. EUDY: I would ask Tom Kevern to explain how we're using that particular field in the SER.

MEMBER STETKAR: It's the only one when I was scanning it that --

MR. EUDY: Had lots of talks about what we should put in there. So I'll ask Tom to clarify.

MR. KEVERN: Tom Kevern for the staff.

I'll start out with a caveat. There's always a possibility we missed something there, but the point is what we attempted to do in the way we wrote our Safety Evaluation Report, in that section at the point in time this revision of the COLA was provided. There were a number of holder items with Hs after them, and so that section specifically was to address all of those H items that both the staff and applicant agreed could not be done.

Well, in the process now, to make a long story short, we are no longer going to have holder items. They're going to be dispositioned another way, either information that's going to be actually contained in the next revision of the seawall application or will be identified as a commitment to do something in the future.

For example, this one you see on site as being instrumentation or it will be an actual condition of the license that's issued, and we're still in the throes of a little bit of deciding. We know those are going to be the three options, but as far as which one of those options applies to a specific seawall item, we're still reviewing. Put it that way.

So it's not going to be omitted. It's a question of which of those bins, if you will, this seismic instrumentation will fall into.

MEMBER STETKAR: But you said that's in the context of the next update of the COL.

MR. KEVERN: Yes, sir.

MEMBER STETKAR: Of the COLA itself.

MR. KEVERN: Yes. So right now you'll see -- I hate to use the word "messy" -- but you'll see there's a little bit of inconsistency as far as how we're addressing each of those specific items, and that's why we have a statement in most sections that says the staff is still reviewing, and by the time we get to the advanced SER, you'll clearly identify whether there are specific commitments in FSER that staff finds acceptable or whether the staff believes it necessary to elevate those issues to a license condition.

MEMBER STETKAR: I just thought this was the only one. I didn't read every single word, but this was the one that jumped out at me that seemed to be possibly prone to falling in a crack. So we're on the record now.

MR. KEVERN: Okay. Thank you.

MR. EUDY: We want to go over to 3.5.

Rao.

Sorry for jumping around so much, but we didn't have much choice.

You can sit right here. We'll go back to Section 3.5 to discuss.

MR. TAMMARA: Three, five, one, five. My name is Rao Tammara. I do -- external hazards.

Three, five, one, five deals with the -- generated by external facility accidents.

Five, one, six deals with -- accidents.

In the 3.5.1.5, we looked at the sites which mostly the applicants has by reference ESP. We considered all the facilities except there was a ESP COL action item to consider the chemicals, on-site chemicals near by the site.

So under that one there were -- we identified the two gasoline tanks under the -- I mean beneath the efface (phonetic), 10,000 gallon tanks, and that was not analyzed since they considered they are underground. It has no potential for the explosion. Therefore, we thought we should reconsider what would be the potential for the delivery truck that explodes. What happens because -- proximity to the plant?

So that was the RAI generated and asked

the applicant to evaluate that potential. So they analyzed that situation. Usually if there were above ground tanks that would have been evaluated considering the Reg. Guide 1.9.1, taking into account the equivalent entity to calculate what it would be at a safe distance, and if the safe distance is permissible, I mean, the plant is away from that safe distance, then it would have been all right, but since they are underground, we thought we should ask a question: what would be the potential?

And they came and calculated the probability considering what would be the typical delivery. I mean, they have taken the state accident rates, and they have taken into account the spill, once the accident has happened, and a fraction that is spilled will be potential for explosion, and they have considered those fractions.

And also they have calibrated the distance, what would be the travel distance, what you can determine from the amount of the material in the tank, the truck tank. You can calibrate the safe distance.

In spite of that one, they have constructed the total travel distance nearby the route, and they have calculated the probability to be actually 7.8 ten to the power minus seven.

DR. WALLIS: It would seem to me that there are all kinds of possible events due to human error which could lead to a problem. Is that evaluated or is it all based on distances?

MR. TAMMARA: The frequency of the deliveries they have considered. They have considered the frequency of the accidents.

DR. WALLIS: Database.

MR. TAMMARA: Yeah, right. They have taken into account. Actually they have considered what will be the average accident rate based upon 2006 Commonwealth of Virginia accident rate. Have considered about 20 percent is spill rate once the accident has happened, and out of that one 20 percent is available for the ignition, and based upon that one, they use the equation, probably these exposure rate, accident rate, spill rate, and the frequency, also number of shipments and the distance.

DR. WALLIS: This is all about ground, and they simply said nothing can ever happen in the tanks themselves, underground tanks?

MR. TAMMARA: Underground tank, but even if it happens, since it is underground, the explosion will be contained. That's the -- if it was above ground tank, then we would have considered there are two scenarios. The whole amount is available for potential ignition, and what would happen. We apply 1.9.1.

DR. WALLIS: If it's underground, you just assume that it's --

MR. TAMMARA: Yes. It's a puddle and then it is evaporated.

DR. WALLIS: It's not big enough to erupt and do anything?

MR. TAMMARA: But that is the -- I mean, that's what they have considered, and then we said there might be another scenario they have overlook rate, and we looked at that particular aspect. And staff feels that they have done an adequate job to, you know, describe the scenario.

DR. WALLIS: All this is documented somewhere, is it?

MR. TAMMARA: Pardon?

DR. WALLIS: All of this is documented somewhere?

MR. TAMMARA: Yeah, this is the response to the RAI.

DR. WALLIS: Given the technical details?

MR. TAMMARA: Yes.

DR. WALLIS: Thank you.

It would be nice to see, yes. We probably have it somewhere hidden in the -- we don't?

MR. EUDY: I can identify the ML number. Would that be adequate?

CHAIRMAN CORRADINI: I'm sure the staff has it. I'm not sure we've gotten it.

DR. WALLIS: Give it to me some time today.

MEMBER STETKAR: We don't necessarily get all of the RAIs.

MR. EUDY: We're going to call up P.Y. Chen to discuss 3.10, and we're going to jump to slide 18.

CHAIRMAN CORRADINI: Going to 18?

MR. EUDY: Going to Slide 18, Section 3.10.

CHAIRMAN CORRADINI: Got it.

MR. EUDY: Sorry for all of the jumping around.

MR. CHEN: My name is P.Y. Chen. I'm from Engineering and Mechanics Branch.

I will be covering two sections, Section 3.10, Seismic and Dynamic Qualification of Mechanical and Electrical Equipment, and Section 12, 3.12, which is the piping design for components and support.

For Section 3.10, the application includes basically scheduling the availability of dynamic qualification report. In the application it says that you will be provided within 12 months after the issuance of COL, and then the report will be available to the staff prior to the fuel load.

We in the early preparation, we already know at the time of COL application, we know that we won't be able to see the test result or analysis result. Therefore, we specifically put a guidance saying that at the time of application if those information are not available, we'd like to see the implementation program and approximate date of completion.

And so at this point, it's an open item, and at least the staff expects the applicant to submit two things. One, I think they should be able to at this point provide the equipment list and identify what kind of method of qualification is going to be used, you know, by analysis, by testing or combination of analysis and testing. That's the list that I would like to see so that we can make certain judgment.

The second thing is we'd like to know the implementation program and lay out basically when the different aspects of their qualification will be complete, sort of estimate date of condition such that the staff will be able to conduct audit, the test result or analysis result prior to the installation of equipment.

So basically that's the open item for 3.10.

MR. EUDY: Go on to 3.12.

MR. CHEN: Three, 12.

MR. EUDY: That's Slide 21.

MR. CHEN: Right. Three, 12 is the ASME Code Class 1, 2, 3 piping systems and components and their support. There are two items, as I think Gina already mentioned.

The piping, the first item is the piping design methodology is addressed in different sections, basically 3.7, 3.9, 5.2, and 5.4 and some appendices.

And then the second item is the location and distance of piping system will be established as part of the completion of the ITAAC.

DR. WALLIS: By distance, you mean distance between or something?

MR. CHEN: I think it's, yeah, basically in the model.

DR. WALLIS: The piping system doesn't

mean anything then?

MR. CHEN: Well, the model, you know, how kind of distance they're going to cover in the analysis.

DR. WALLIS: Location would cover that. Wouldn't the word "location" cover that? I just don't understand what the word "distance" is doing in here.

MS. BORSH: Graham, you're right. It is distance between.

DR. WALLIS: Distance between.

MS. BORSH: Between the model, the systems.

DR. WALLIS: There are certain rules about distance between or distance from control gear or something, a distance from inhabited places and things like that.

MS. BORSH: Yes, between, from.

DR. WALLIS: That's what you mean. Distance from places for which there are specifications or guidance or codes or something.

MS. BORSH: Right, right.

MR. CHEN: Okay, and actually right now there's not much information to be reviewed, but the design has the back for the piping. So the actual design will be completed and reviewed as part of the

ITAAC program after the CRL.

CHAIRMAN CORRADINI: We'll get into 14, but I just use this as an example. So this is no later than when? That is, you guys have got to see this no later than or so long before fuel load. What was the time window there?

MR. CHEN: Okay. For this stack, I guess the decorated review, but the result has not been reviewed.

CHAIRMAN CORRADINI: We're clear with that. I'm trying to understand when you need this information to complete your design review.

MR. CHEN: Well, I guess the detail will be given by Tom in Chapter 14.

CHAIRMAN CORRADINI: Okay. That's fine.

MR. CHEN: Right?

CHAIRMAN CORRADINI: Okay, and let me ask you a different question relative to this so I get it clear. I could have this wrong. So you can correct me. In the old system, Part 50, there was a size of piping, a physical size of piping that was field run. There is still below a certain size still field run piping even in this situation. So even though the DAC, the design review will know for the detail piping no later than X time where things are, distances, locations, blah, blah, blah. Still there will be field run piping that you will not have in this review, that will just occur and then the inspectors will inspect per --

MR. CHEN: I think it's like two inch and below.

CHAIRMAN CORRADINI: Two inch and below still. That's still the break point.

MR. CHEN: Yeah. Well, first of all, I'm not a reviewer.

CHAIRMAN CORRADINI: That's fine.

MR. CHEN: The reviewer i snot available here, but --

CHAIRMAN CORRADINI: That's fine. I understand.

MR. CHEN: Yeah.

CHAIRMAN CORRADINI: Okay. Okay. Thank you.

MR. CHEN: Okay?

CHAIRMAN CORRADINI: Yes, sir.

MR. CHEN: Anything else?

Thank you.

CHAIRMAN CORRADINI: Thank you.

MR. EUDY: I'll call our next reviewer to finish the presentation, Tom Scarbrough. This covers

Section 3.9 and 3.11, and we're going to go back to Slide 9.

MR. SCARBROUGH: Good morning. I'm Tom Scarbrough, and I'm going to walk you through some sections of 3.9 that we looked at and then get to my specific area of technical review.

The first section that Mike mentioned is 3.9.2, and this is dynamic testing and analysis of systems, structures and components. This section describes criteria, testing procedures, dynamic analyses employed to insure the structural and functional integrity of reactor internal systems, components and their supports.

And there was additional information placed in the FSAR in this area in addition to the DCD. One had to do with the COL Item 3.9.9.1, which talked about the initial start-up, flow induced vibration testing of reactor internals. The FSAR was revised, revised the text in the DCD to reference the topical reports which related to things like steam dryers and other reactor internals and provided a schedule for the information on the vibration assessment program as called for in Reg. Guide 1.20, which is the vibration assessment program for start-up testing.

DR. KRESS: Well, let me ask you about that. Does the internal instrumentation on this power separators or vibration --

MR. SCARBROUGH: On the steam dryers themselves? I do not believe they're going to, but that's part of the DCD.

DR. KRESS: They're going to use that system where you measure the outside in the piping and --

MR. SCARBROUGH: Right. That's part of all the DCD review. They're definitely going to be instrumentation on the steamlines and looking for acoustic resonance and that sort of thing that we had with all the power up rates.

I'm not performing the review. Patrick Herrick (phonetic), and he's not here, but that is part of the review. I know we had instrumentation put on the initial dryers for Quad Cities and such, and I know that's part of the discussion ongoing, but exactly where they are with that I don't know.

DR. BIRKMEYER: Could you please repeat your concern?

DR. KRESS: Well, it wasn't so much a concern. It's just that to determine the vibration modes from the steam dryers and separators, and they're going to use instrumentation in the steamlines to get resonances and back-calculate what the effect was coming from the steam dryer, and I wasn't sure how we assured ourselves that that system has ever been calibrated, and it had to do with Quad Cities.

I was wondering what the status of that was. It wasn't so much a concern as it was a question.

MR. SCARBROUGH: I know that review is still ongoing, but the technical experts are not here, but I know that's still ongoing, and that's part of the topical reports that are under review right now with the staff.

DR. WALLIS: Well, if this were possibly the first ESBWR steam dryer that's going to be installed --

MR. SCARBROUGH: Yes.

DR. WALLIS: -- it would make sense to instrument the dryer if you possibly could before all the questions start to come up.

MR. SCARBROUGH: I agree.

DR. WALLIS: It's much easier to do before it gets radioactive and various things.

MR. SCARBROUGH: That would be my anticipation, yes, sir.

So we did have questions. We had RAIs on the potential adverse flow effects where we asked about how they were going to monitor for acoustic resonance and things, and they responded back to us and pointed out provisions in the DCD which calls for that evaluation as part of start-up testing and as part of the initial valve specifications. That's part of the review that's done for that.

We also asked questions on the Reg. Guide 1.2.0 assessment program, and those were provided, and that's what's part of the revision that was done to the FSAR.

So with that, the staff closed those RAIs and there are no open items in this section.

Now, 3.9.3 is the ASME Code Class 1, 2, and 3 components and their supports and the core support structures, and this section relates to the structure integrity, pressure retaining components or supports and the core support structures.

There were a couple of response items here, 3.9.2-H, regarding the piping design report schedule, and that was provided. The stress reports will be completed within six months of completion of the ITAAC.

And also, there was an additional section place, and this had to do with the operational program aspects because, as you know, and I understand there was a presentation to you all back in July on this, the operational programs are reviewed as part of the COL. They're not part of the DCD review, and the snubber operational program was included. A description of it was included in the FSAR for North Anna under the COL information item, and it describes the pre-service and examination and testing program; provides information on codes and such; and I'm going to mention a little bit about that when we get to 3.9.6 because this is part of the in-service testing program.

But also it adds that there will be a table of specific snubber information once the ITAAC are complete, and that includes the types of snubbers, their conditions, their qualifications and that sort of thing, and that has to wait until the end of the ITAAC to make sure they have all of the supports indicated.

So that was an addition, and then there was a confirmatory item which has to do with a table, the corrected table in the DCD, and that item is going to be completed as well. So that's what that is.

Okay. So that's 3.9.3.

CHAIRMAN CORRADINI: Did you have a comment from GE?

MR. WACHOWIAK: Rick Wachowiak from GE-H.

If you look in the DCD in Tier 1, Section 2.1.1.1, it describes the instrumentation on the steam -- on the dryers that are associated with the start-up test measurements. There's ITAAC 12, 13 and 14 addressed; the placement of pressure sensors, strain gauges, and accelerometers in order to do these tests.

CHAIRMAN CORRADINI: On the dryer directly.

MR. WACHOWIAK: Yes.

MR. SCARBROUGH: Thank you.

The next section is Section 3.9.6, and this is the functional design, qualification and in-service testing programs for pumps and valves and dynamic restraints. And as I mentioned, this is an operational program. So it's under the Commission paper SECY 05-0197. They have the fully described program for us to complete our COL SER.

And how this works is the North Anna COL application relies on information in the DCD combined with information in the FSAR to fully describe the functional design and qualification and IST program for pumps, valves and dynamic restraints.

And we asked several RAIs to both Dominion and GE-H regarding the IST program and functional design, and the DCD and the FSAR are both revised to provide information in those areas to fully describe those programs.

We also performed an audit of the GE-H design and procurement specifications in July to look at how those DCD provisions were -- and I have a few slides which kind of describes this review process. So that's kind of an overview.

Slide 12, the FSAR incorporates by reference the DCD, but since this is an operational program we go back and look at the DCD and review it and make sure the combination of what's in the FSAR and the DCD fully describes the problem.

Now, the DCD in response to our RAI was revised to require the use of ASME Standard QME-1-2007, which reflects the lessons learned from the operating experience of the motor-operated valve programs over several years for the functional design and qualification for new valve designs. There's a Reg. Guide 1.100 which is being updated to address the generic use of that standard, but this QME-1000-7 for functional design qualifications deals with things such as flow testing, internal clearances and edges and pressure locking, a lot of the lessons learned that we had from the motor-operated valve programs.

And now for valves that were previously qualified, the DCD requires that the key aspects of QME-1 be reviewed to make sure that those previously qualified valves are fully capable performing their safety functions, and there's a comparative analysis, what they call gap analysis, where they compare item by item how the previous qualification was conducted and how the QME-1 requires that qualification.

So that's how the DCD applies. On the next slide, the DCD also provides design process for dynamic restraints, and it references back to the boiler and pressure vessel code, Subsection NF for those. That's a reference there.

There's also in the DCD, as I mentioned, the flow induced vibration qualification, and in the confirmation as part of the start-up testing where that's done.

So overall the staff considers that the combination of DCD, and incorporated by reference of the FSAR, that the lessons learned from the previously plant experience for valves and component restraints has been incorporated, and pending our open items, you know, we did have an audit, which we're working on the report right now, which we may have some open items from that.

Other than that, this review is nearing completion except for those portions.

Now, this is the IST operational program itself. Now we move from the qualification into the in-service testing operational program, and once again, the FSAR incorporates by reference the DCD to help support that program description, and the DCD describes the valve program based on the 2001 edition, the 2003 addenda to the OM code which is incorporated by reference in 50.55(a).

And as part of that, the DCD includes a table 3.9.8 which lists the valves within the IST program scope, includes the valve actuated pipes and code class category. It's a summary table that you see in a lot of IST programs, and it's used as a part of the description for the North Anna program.

As is mentioned earlier, there are no safety related pumps as part of the IST program, and actually there are no motor-operated valves. They use air-operated valves or solenoid valves. That's what's in the DCD.

Now, on the next slide FICR supplements that information to help fully describe the program for the valve in-service testing provision by including information on pre-service testing, valve exercising, reference values, solenoid valves, prohibition of pre-conditioning, check valve testing, acceptance criteria.

And the staff reviewed those for their consistency with Section ISTC of the ASME OM code.

DR. WALLIS: All this stuff about these various valves, what do you do about squib valves?

MR. SCARBROUGH: Squib valves is an area that is under initial qualification right now. When we were down at the audit back in July, we asked about that. GE-H is still working with several potential valve suppliers. Because of the size change, the large size, there's a significant amount of review and design has to take place.

We've actually been working. We've been participating with Westinghouse, and they invited us to a design meeting, and we observed their design process for their squib valves. So we're taking that lessons learned, and we'll be using that as part of the review for the squib valve designs for the ESBWR.

And we have asked as one of the follow-up items from the audit is that GE-H notify us when they're going to be doing more detailed review, testing and qualification for squib valves.

The other area with which to talk about briefly earlier was the provisions for a periodic verification of design based capability of safety related power operated valves, and the FSAR does provide a summary of lessons learned to be applied to those valves for their periodic verification and lists some key program attributes of the regulatory issue summary, 2000-03, and some of those items are diagnostic testing, periodic static testing, but with the potential for the need for dynamic testing based on the operating experience or qualification and evaluation of trends, post maintenance procedures.

A lot of the lessons learned that we gleaned from the motor operated valve programs we put into this regulatory issue summary, and they're going to apply that to the program, and there is a provision in there for risk ranking of the valves themselves. There are various methodologies. GE came up with a risk ranking methodology for motor operated valves. They can use lessons learned from that. There's an O&M code case, O&M-3, which talks about risk ranking of IST type components. So there is guidance out there to help them apply risk ranking for the valve program itself.

The next slide, Slide 16.

So also in the FSAR, as I mentioned, there is the description in 3.9.3.7.1(3)e, which describes the snubber program, and that talks about the examination intervals, the identification of potential damage to the snubbers, the sample sizes, service live, and reviewed that against the OM code Section ISTD.

And there's also a license condition which requires Dominion to notify us of the schedule for program development so that we can plan inspections down the road as a plant is constructed.

So overall, the staff considers the FSAR combined with the DCD by the full description of the IST program, consistent with the SECY paper 05-0197, pending the resolution of open and confirmatory items, and those really relate to the audit that we're going to have, that we have had right --

DR. WALLIS: Presumably when you test the valves, it's not just the valve itself that's in situ. The valve interacts with the piping in which characteristic of a valve can excite resonance behavior of a pipe that's somehow connected. Valve testing isn't just looking at the valve, but the characteristics of the system provided by the valve.

MR. SCARBROUGH: Well, there has to be as part of the initial start-up testing program, you know, there is instrumentation accelerometers and such placed on the piping instrumentation. They have to monitor how the system reacts to operating conditions. So that will be part of their start-up testing program.

And so the next Slide 17 talks about the implementation of those DCD provisions, and this is where through RAIs that we ask both GE-H and dominion to make available documentation to demonstrate the implementation of those DCD provisions, qualifications and service testing. As part of that, they notified us that we could review this with the GE-H Wilmington office, and so we did in July, and we are preparing a report on the audit findings.

There are some areas where some findings we had were updating some of the valve specs and some of the IST tables. Some of the things like that came out of that audit, and also we're talking to them about the transition from one program to another. So those are some things we're talking about as we finalize that.

That's the IST program, provisions for functional design, qualification. So the next area I was going to talk about is 3.11, which is environmental qualification of mechanical and electrical equipment, and once again, the FSAR incorporates by reference the DCD for the description of the operational program for EQ for mechanical and electrical equipment, and they reference the milestone schedule under FSAR 13.4, which is part of the fuel load that this be completed.

There's also an information item which states that the COL applicant will provide a full description, and that's accommodated by the back-reference to the DCD milestone per FSAR Section 13.4.

So our review of 3.11 was we looked back at what was conducted for the ABWR, and the NRC accepted the NEDE 24.326 document, which was the GE EQ program in NUREG 1503 as part of the ABWR SER.

So that was part of our review, and then the DCD description is acceptable based on that previous methodology, and then there's ITAAC. There's actually ITAAC for this section where even though it's an operational program, GE-H has established ITAAC to confirm that the EQ of electrical mechanical equipment is performed prior to plant start-up, and there's a number of requirements as part of this ITAAVC that are done.

There's also going to be a licensing condition which requires schedule to be provided 12 months after COL issuance and then updated every six months so that we can track and determine when we perform inspections.

And as I mentioned, we performed an audit at the GE-H Wilmington office, and we're preparing any follow-up items. In this case one of our follow-up items is that transition from the initial EQ program to the operational activities, which is surveillance, the process of working that out.

So that is my 3.11. So that concludes my sections. If I can answer any questions I'll be glad to.

MR. EUDY: We did a re-tallying about the open items. We actually currently have six open items based on things that have taken place sine the SER was sent to you, if you want us to go back and list those, if that would be helpful for you.

CHAIRMAN CORRADINI: That would be helpful for me. Can you bring up your --

MR. EUDY: We could probably bring up Dominion's, her slide.

CHAIRMAN CORRADINI: Right.

MR. EUDY: That actually lists them all in one place.

CHAIRMAN CORRADINI: I assume you're done with the other presentations, right?

MR. EUDY: Yes, that was all we had.

CHAIRMAN CORRADINI: Okay. Can we bring that up just so we understand where you guys are relative to the old ones?

MR. EUDY: Sure.

CHAIRMAN CORRADINI: Last slide, right? Seventeen.

MR. EUDY: The second one is no long applicable, if you include the Chapter 2 open item. We just list it in our SER to reference it. So that's where we are.

CHAIRMAN CORRADINI: I'm sorry. I'm sorry. The one that we had briefly discussed is actually at Chapter 14.

MR. EUDY: Right, and I don't believe we listed that in this as an open item.

CHAIRMAN CORRADINI: I just wanted to make sure, yeah. I'm sorry. It's not an open item. Excuse me. It's a confirmatory item.

MR. EUDY: Thank you.

CHAIRMAN CORRADINI: Other questions by the Committee?

So are we don with Chapter 3 then?

Let's take an early break so you can reconstitute. I have a feeling that some of Chapter 2 after lunch may be moved up before lunch, given where we are, Tom. So can we take a break and get back here at ten after, 15 minutes?

Thank you.

(Whereupon, the foregoing matter went off the record at 9:57 a.m. and went back on the record at 10:17 a.m.)

CHAIRMAN CORRADINI: Okay. Let's come back into session.

And we'll be talking about the first part of Chapter 2. Gina, you're going to start us off.

MS. BORSH: Sure. All right. Let's talk about Chapter 2, Site Characteristics.

All right. Chapter 2 is a little different in the SER than the other chapters that we have covered and will cover, and one of the reasons it's different is because we, North Anna, have an early site permit, as you all know.

So we requested our early site permit to obtain NRC's early acceptance of the site for a new reactor. You all know this. The permit states that a reactor having the design characteristics that fall within the site characteristics in controlling parameters of the North Anna ESP site can be constructed and operated without undue risk to the health and safety of the public.

All right. So we have that, the ESP. then we turn to look at the DCD, Chapter 2, and the DCD for Chapter 2, we have the envelope of site related parameters defined for the ESBWR design. The parameters that are in the DCD are the parameters that GE-H used for developing their design, and based on that information each COL applicant has to consider that information and compare our site characteristics, our specific site characteristics to the DCD characteristics.

So when the site characteristics --

DR. KRESS: Let me ask you just a simple question. You have two other plants on the site.

MS. BORSH: Yes.

DR. KRESS: Did you have to do all of this to get those approved? Did you have to characterize the site and the population?

MS. BORSH: Sure, yes, we did, but we did it through the Part 50 process, not the Part 52 process obviously. It wasn't in place.

DR. KRESS: Is that much difference?

MS. BORSH: Than the actual characteristics?

DR. KRESS: Yes.

MS. BORSH: Oh, I would have to defer to the subject matter experts on that. Generally, I think we could say no.

Dan? Okay. Dan Patton from Bechtel.

MR. PATTON: From Bechtel.

Generally, of course, the starting point was the characterization for the existing plants. It has been updated, of course. Those plants have been in operation for some time. So all of the time dependent parameters would be updated. risks would be updated to current standard, but you're right.

DR. KRESS: The population may have changed.

MR. PATTON: Yes, un-huh.

DR. KRESS: Do anything about the old plants to see if they still fall within the right characteristics?

MR. PATTON: No.

MR. TAMMARA: My name is Rao Tammara.

With respect to the population, this seawall application is referencing the approved ESP, and the part of ESP they have evaluated latest population and projected out to 2065, and that is based upon the rather -- you know, it is not Part 50 or Part 52. In between we have RS-002 developed for the ESP's regulatory requirements.

So most of the site specific information in the COL the applicant is by reference whatever it is presented and approved under ESP.

Therefore, to answer you precisely, that is not the population for the existing operating unit, but they have considered the population for 2000 and then projected, assuming the plant, whatever the plant at that time, whatever; they don't have specifics, but the plant is going to be in 2025, the projected 40 years of operation since then and projected up to 2065.

DR. KRESS: Wouldn't they have projected this population when they approved this site for the other plants, Units 1 and 2?

MR. TAMMARA: No, no, no, no, no. As a part of ESP. That is the proposed new plant, Unit 3, but they have not chosen the technology or they haven't applied for seawall at that time. They have chosen the site. They have chosen site specific information, but they have not chosen at that time the technology, not the specific site parameters of whatever it is, characteristics.

But the other site information like the exact location, they did not choose, but they have located this will be the potential location. For the EAB they are considering the existing EAB as EAB, not the population. They have protected into 40 years from 2025.

So that information has been referenced or taken as reference to the seawall, to answer that question.

DR. KRESS: Is there some sort of NRC approved methodology for projecting populations around?

MR. TAMMARA: In a given situation you have the history of previous data. To set --

CHAIRMAN CORRADINI: An approved methodology?

MR. TAMMARA: No, approved methodology, no. I see, okay. A reasoned methodology, but it is not approved, means it is not a period.

DR. KRESS: But by accepting what's done here, that's almost an approval, is it, precedent?

MR. TAMMARA: Well, you will project based upon whatever the current data is available because the U.S. Census data sometimes puts out into future few years. Okay? And also the state --

DR. KRESS: Draws a line through that?

MR. TAMMARA: No. They conduct some kind of a -- I don't know how precise it is, but they publish into future few years. Like if you go in such on a Website, you will have a few years ahead what would be the projected population.

Also the state will have their own projections. So taking into account that one and also whatever the information and relaying on what has been the past, say, you have 1990 data, 2000 data. You know what is the trend and what is the trend into future, which is published data --

CHAIRMAN CORRADINI: So is that a long way of saying it's an extrapolation of history --

MR. TAMMARA: Yes.

CHAIRMAN CORRADINI: -- in the region?

MR. TAMMARA: That's correct.

DR. KRESS: How far out do you go with this? Do you include Richmond?

MR. TAMMARA: How far do you go?

DR. KRESS: Charlottesville?

MR. TAMMARA: No, within 50 miles.

DR. KRESS: Fifty miles?

MR. TAMMARA: Yes, 50 miles. That is a

requirement.

I'm sorry to, but that is the answer.

MS. BORSH: Thank you, Rao.

And, Tom, this is all about North Anna Unit 3. We did not go back and revisit the site characteristics.

Okay, okay, all right. So going on back to DCD Chapter 2, so when the site characteristics for North Anna fall within the DCD's site parameter values, the facility built on the site is in conformance with the design certification. Okay?

So to create our Chapter 2 of our FSAR, we incorporated the DCD Chapter 2 by reference, and then we incorporated our Chapter 2 from our ESP application's site safety analysis report which describes site characteristics.

And then in addition to that information, we added information to demonstrate that the site parameters for the ESBWR design bound the site characteristics for our North Anna Unit 3. We also added some information to address DCD COL items, ESP permit conditions, and ESP COL items.

DR. WALLIS: So you're on the next slide.

MS. BORSH: Well, I was just giving you a little background. Let's go to the next slide because, you know, basically that shows what we just did. We incorporated the DCD and the SSAR.

Okay. This slide, Chapter 2.0, is an introduction from the DCD. So here we are incorporating DCD 2.0, and in 2.0 we added a summary of the comparisons that we made related to the site parameters and characteristics. We compare the Unit 3 FSAR site characteristics and facility design values with the corresponding DCD ESP or ESP application SSAR values to determine if, one, the Unit 3 site characteristics fall within the DCD's site parameters; two, the facility design falls within the ESP site characteristics and design parameters; and, three, the Unit 3 site characteristics and design values fall within the SSAR site characteristic and design parameter values. Okay?

All right. In 2.0 we also address the DCD COL item on site characteristics by stating that the information on the Unit 3 site characteristics is provided in detail in Sections 2.1 through 2.5 of the FSAR, which I said earlier incorporates the ESP SSAR sections 2.1 through 2.5.

All right. This is a slide that shows the variances that we identified in FSAR Table 2.0-201, which provides that summary of comparisons that I told you about. So we'll spend a few minutes on this because this is about our variances.

The first variance is about the long-term dispersion estimates, and here we're asking for a variance because our Unit 3 long-term dispersion estimates don't fall within the ESP and SSAR values. We requested approval to use the Unit 3 maximum long-term dispersion estimates provided in the FSAR for locations other than the exclusion area boundary. The variance results from the fact that the distances to several of the closest receptors have changed, and this variance is acceptable because all the estimated annual doses from normal gaseous effluent releases remain within the applicable NRC limits.

This variance, just to note is associated with the variance that we talked about when we presented Chapter 12. That was a variance on the doses from the gaseous effluents being higher than the corresponding ESP value.

Okay. The next variance is about hydraulic conductivity. Here we're requesting to use the Unit 3 maximum hydraulic conductivity value, which is higher than the corresponding ESP and SSAR value, and it's higher because we found higher values when we tested at the additional observation wells that we installed for the site specific Unit 3 subsurface investigation.

This variance is acceptable because even with the higher value and other conservative assumptions that we made in the analysis, we still comply with the 10 CFR 20 limits for a postulated liquid release in the groundwater pathways.

Also, we used the more conservative hydraulic conductivity value when we were comparing the maximum groundwater elevation for Unit 3 to the DCD site parameter value and the Unit 3 value fell well within the DCD value.

The next variance is ESP variance 2.0-3. This is about -- sorry, Graham. Go ahead.

DR. WALLIS: It's too early, but hydraulic conductivity is in meters per day. That's a strange kind of a unit. Maybe we'll get to it when we get to that point. Someone who understands can explain it.

MS. BORSH: Yes, we will leave that to our subject matter expert, our lifeline it appears. Okay.

All right. In variance 2.0-3 we're requesting approval to use a larger hydraulic gradient than what we specified in the ESP and SSAR, and this difference results from additional groundwater data that we collected from the subsurface investigation for Unit 3.

And this variance is also acceptable because we still comply with the 10 CFR 20 limits for postulated accidental release.

Variance 2.0-4 is about vibratory ground motion. Here we're requesting approval to use the United 3 horizontal and vertical spectral acceleration values, the G values for the site specific safe shutdown earthquake at the top of competent rock rather than the corresponding ESP value.

This variance is acceptable because the ESBWR certified seismic design response spectra, CSDRS, is used for design of the Unit 3 seismic category structures. We're not using the Unit 3 site specific SSE spectra.

FSAR demonstrates that the Unit 3 foundation input response spectra, the FIRS, fall within the ESBWR CSDRS. So we're okay.

Variance 2.0-5 -- oh, could we go back? Two, zero, five, this is about distribution coefficients. The values in the FSAR, we want to use those values for Unit 3 rather than the corresponding SSAR values. These values are different because we used a more conservative approach to selecting the

Unit 3 values.

The variance is acceptable because we still comply with Part 20 using these lower values to evaluate a postulated liquid effluent release. Also the measured values at the site that the values that we used are conservative.

Variance 2.0-6, here we're requesting to use the Unit 3 source terms and resulting doses from the DCD Chapter 15 design basis accident analyses. We talked about this when we presented Chapter 15. The SSAR Chapter 15 analyses were based on accidents and source terms for a range of possible designs, including the ESBWR values that we had at that time. The variance is acceptable because the doses in Chapter 15 are within the NRC limits, and the DCD analyses are based on assumed site parameters for chi over Q, and we've demonstrated in the FSAR that our chi over Q values fall within the DCD values.

Therefore, the DCD dose consequences are bounding for our Unit 3.

The last variance on this slide is 2.0-7, which is a simple one. This is about the coordinates for the FSAR at the North Anna site. We want to use the ones that are in our FSAR rather than what are in the early site permit because basically the early site permit has a typo in it, and so it's in correction.

Then also the variance requested another change where we have abandoned mat foundations from the originally planned Units 3 and 4 at North Anna, and they're there. They're in place, and we want to request approval to leave those mat foundations there. The ESP has a figure in it that says they're going to be removed. We want to leave them there because we don't have any kind of seismic Category 1 or 2 structure that will be placed above the abandoned foundations. So leaving the foundations there isn't going to impact any of our ne Unit 3 structures.

Okay. Those are our variances. Any other questions on that?

The next slide is another introduction. This is our 2.1 introduction from the SSAR. Here we're incorporating it by reference, and then we added a site plan that shows the Unit 3 on the North Anna site, the ESBWR. We have provided the coordinates for the Unit 3 reactor building, and then we updated information about ownership and control of Unit 3.

As I think most of you know, we're the applicant. Dominion is the -- John, do you have a question?

MEMBER STETKAR: Yeah, a couple. Finish.

Finish the discussion.

MS. BORSH: Dominion is the applicant for Unit 3 and Dominion and ODEC, Old Dominion Electric Cooperative, are going to jointly own the site.

MEMBER STETKAR: Two questions, and I have to apologize. I haven't been in either of the previous Subcommittee meetings.

Where are the plant service water pump? In your handout here you don't have a site plan. I'm looking at a site plan here from the FSAR. Are they out near the Unit 3 intake? Are they up -- I couldn't figure out where they were. It's relevant to a later question that I have.

The plant surface water system, not the ESWS.

MR. QUINN: Right. My name is Geoff Quinn. I'm with Bechtel.

The plant service water system, the pumps are in a basin which is shown just a little bit south of the turbine building cooling towers, and there's a basin and the pumps are in the basic.

Can I point it out for you?

MEMBER STETKAR: I'm not sure. Yeah, if you can show me on this drawing it will help.

MR. QUINN: Yeah, those are the service --

MEMBER STETKAR: Okay. Thanks. Got it. Thank you.

CHAIRMAN CORRADINI: Are you fine for now?

MEMBER STETKAR: I'm find for now. I just didn't know where they were.

MS. BORSH: Sure.

MEMBER STETKAR: The other question I had was I understand that Dominion is the applicant, but the facility is jointly owned by Dominion and Old Dominion Electric. Who owns which yard and who controls the operation of the -- operations and maintenance of the switchyard? Is it Dominion from inside the plant or is it -- I'll stop asking you follow-up questions.

MS. BORSH: Are you asking --

MEMBER STETKAR: Who operates the circuit breakers in the switchyard and maintains the equipment in the switchyard?

MS. BORSH: Dominion.

MEMBER STETKAR: Dominion. Okay.

MS. BORSH: Do you want to add anything to that?

This is Gene Grecheck, our Vice President.

MR. GRECHECK: Yeah, Gene Grecheck from Dominion.

Dominion is a holding company that owns several different legal entities. The legal entity that is the applicant here is Virginia Electric and Power Company, which is the regulated utility in Virginia.

The transmission system is controlled by a separate section of the overall corporation, but it is the same corporation.

Now, in Virginia the transmission system is part of a larger regional transmission organization, which is PJM. So PJM controls the operation, the policy operation of the system, but it is actually physically operated by a segment of Dominion.

So this is different from some other situations you may be familiar with where you have a generating company and then there's a separate transmission company. That is not the case here. These are just separate legal entities under the overall Dominion umbrella.

MEMBER STETKAR: Well, okay. I used to work for a utility, and in our utility in our control room, we could actually operate some of the switchyard circuit breakers, but not all of them.

MR. GRECHECK: That's no different.

MEMBER STETKAR: Okay. Do you have operation of all of the switchyard circuit breakers that can connect the off-site power transmission lines into the -- taking credit for in your license? Can those circuit breakers be operated from inside the control room on Unit 3, switchyard circuit breakers?

MR. GRECHECK: Anything that is being taken credit for as part of the safety analysis is going to be controllable by the plant, just like in the existing units, in Units 1 and 2.

MEMBER STETKAR: Thank you.

MS. BORSH: Thanks, Gene.

The last bullet on this slide just describes the arrangements that we've made with the Commonwealth for warning and assisting people in boats on the lake when there's an emergency.

Two, point, one, the SER with open items has no open items or confirmatory items for this section.

Two, point, two covers nearby industrial transportation at military facilities. Once again, we're incorporating the SSAR. We added a statement that confirms that no hazardous industrial facilities have been added near the exclusionary boundary since the SSAR was submitted, and we added a statement that there continues to be no hazard to Unit 3.

This statement was added to addressing ESP COL item.

We noted in the FSAR that there has been a small airport added within ten miles of the site. It's a very small airport. It's private. It has basically three aircraft on the field. One of them is a glider.

We also identified an additional military training flight that passes near Unit 3, and we note that our assumptions on the flight paths for the two addresses, COL item, were very conservative.

CHAIRMAN CORRADINI: Do you have a question, Mr. Stetkar?

MEMBER STETKAR: I do. I looked at the --

CHAIRMAN CORRADINI: Is your red light on?

MEMBER STETKAR: Yeah. I'm projecting. Can I continue?

CHAIRMAN CORRADINI: Yes.

MEMBER STETKAR: Okay. I looked at the aircraft crash frequency analyses, and I understand what you did. I was curious about the course of the military aircraft crash frequency, 2e to the minus nine crash per aircraft light mile number.

The only reason that raised the flag with me is this site is a bit unusual because of the proximity to those military air traffic control corridors.

I recognize that you've taken a very conservative estimate of the number of over-flights per year compared to at least the value that you cited for whatever it was, 2006 or seven or something, but I was curious what the source of the crash frequency per aircraft flight mile data was.

MR. PATTON: This is Dan Patton from Bechtel.

That came from a DOE standard. There's a paucity of data in the NRC guidance on crash frequency, and so we went to a DOE standard for calculating that probability.

MEMBER STETKAR: Do you have the number of the standard handy? Because I'm kind of familiar with the DOE standards, and they typically use an aircraft crash frequency per square mile rather than a per aircraft flight mile, at least in the ones I'm familiar with.

MR. PATTON: I'll have to get back to you on that.

MEMBER STETKAR: I'd appreciate that.

MR. PATTON: Okay.

MS. BORSH: All right. In 2.2 we evaluated potential accidents, including gasoline tanker truck explosion hazards due to local deliveries on site. Rao talked about that earlier.

We evaluated chemical materials stored on site, the ones that have the potential to be toxic, flammable or explosive.

And we evaluated the aircraft hazards for effect on Unit 3.

And finally, we identified -- oh, I'm sorry. We evaluated the potential for wildfires. That's that.

There are two open items for FSAR Section 2.2. The first open item is tracking the rationale that we used for screening out certain chemicals as hazards to control room habitability, and the second open item is tracking our RAI response concerning the modeling details for calculating the toxic chemical concentrations in the control room.

And there are no confirmatory items for 2.2.

We'll go on to 2.3, meteorology.

We supplemented the SSAR information to address the DCD COL item. We provided the coincident wet bulb temperature, which is 76 degrees Fahrenheit, which corresponds to the 100-year return period value for the maximum dry bulb temperature.

We also provided the basic wind speed for non-safety related structures which is 90 miles per hour, and to address any ESP COL item we added information on the evaluations of the potential impacts of cooling tower operations, including local ambient air temperature, moisture, salt content, and we concluded they have minimal impact on Unit 3.

We addressed another DCD COL item. We determined that since the primary tower is located more than ten building heights away from the Unit 3 turbine building, which is the tallest building on the site, the turbine building doesn't influence the meteorological measurements that we're making.

Also, the closest point on the EAB is more than ten building heights away from the Unit 3 power block buildings, and that could have a postulated fission product release. So as a result, the entire EAB is located beyond the wake influence zone that can be induced by tall buildings, for example, the turbine building or the reactor building.

And as we'll see when we address DCD Appendix 2A in a couple of slides, we determined that the onsite chi over Q values for use in evaluating potential doses from -- you'll see the values that we used for evaluating the potential doses from accidents.

In addition to determining the on-site chi over Q values for postulated accidents, we determined this off-site chi over Q and D over Q values for evaluating doses from normal operations. For these values some are larger than the ESP and SSAR values due to changes in the distances to the receptors. We talked about this experience a few slides ago, and we talked about that in Chapter 12 at our July meeting.

Do you all have a question? Okay. Next slide.

This is Appendix 2A where the DCD provides the ARCON96 source/receptor inputs, and here we incorporated the DCD appendix and then we provided our North Anna specific instrumentation heights and meteorological data as required by DCD COL item.

We also identified the Unit 3 receptor to source directions. The DCD directions are adjusted by an angle of approximately 24 degrees counterclockwise between the ESBWR plant north and the Unit 3 plant north.

DR. WALLIS: Tom asked about projecting population.

MS. BORSH: Yes.

DR. WALLIS: And this Section 2.3 you talk about residents, meat animals, vegetable gardens and milk cows. Did you project those populations, too?

MS. BORSH: Dan, do you want to go?

MR. PATTON: Have we projected -- I'm sorry -- which populations?

CHAIRMAN CORRADINI: Ancillary populations.

DR. WALLIS: How would you know how many milk cows are going to be there when the plant is in operation 15 years from now?

CHAIRMAN CORRADINI: They're not happy in Virginia. They'll come to Wisconsin.

(Laughter.)

DR. WALLIS: I think it's more likely the other way around, isn't it?

MR. PATTON: This is Dan Patton from Bechtel.

Actually the analysis is based on the most recent land use survey that's done for the existing units.

DR. WALLIS: Changed considerably.

MR. PATTON: It could. The analysis is pretty conservative in that we looked at the closest anything, residence, garden, meat animal. There are no milk animals within five miles currently, and we based the analysis on one of everything at the closest of anything in all directions. So it turned out that the closest of any of the sensitive receptors was a residence and in a certain direction we located for the purpose of this calculation the residence, the garden, the meat animal at that distance, and we swung it in all compass directions. So we've been pretty conservative in that treatment.

MS. BORSH: Thanks, Dan.

So as I said before, in Appendix 2A, we provide the North Anna specific on-site chi over Q values from the site specific analysis that we performed. We also state that we'll establish admin controls prior to and during movement of irradiated fuel bundles to insure that doors and personnel airlocks on the east sides of the reactor building or fuel building are promptly closed under conditions that are indicative of a fuel handling accident.

Two, point, three, we have no open items and no confirmatory items in the SER with open items, and I think at this point we'll turn it over to the NRC for presentation.

MS. BERRIOS: Good morning. My name is

Ilka Berrios.

Since this is a big chapter, what we're going to do we're going to have three presentations. This one is go from Section 2.0 to 2.3. This afternoon we're having one for 2.4 and then another one for Section 2.5.

The content of Section 2.0, this section incorporates by reference ESBWR DCD Section 2.0. We have 33 items in this chapter that they're evaluated through the sections 2.1 through 2.5, and we have supplement information that we're explaining in the next slide.

For this section, the staff looked for completeness in the following tables, and the first table that we have is an evaluation of the Unit 3 site, 36. However, what we're looking for here is to be sure that the Unit 3 site characteristic values, what we've seen, the DCD site parameter's value and the ESP site characteristics.

As everyone know, we have no departures for this application, but, yes, we have some variances which are a deviation from the ESP, and we have seven, as Gina already explained, issues and establishing these variances in their respective sections.

The second table identifies all the zero items for this chapter and the FSAR section where each item is addressed, and the staff will be reporting that during the first --.

As I said the application will be providing Sections 2.1 through 2.5.

Now I'm going to review with Rao Tammara, which is the reviewer for Sections 2.1 and 2.2.

MR. TAMMARA: My name is Rao Tammara.

I reviewed the Sections 2.1 and 2.2. Two, point, one is mostly geography and demography, and 2.2 is nearby facilities and external hazards.

Two, point, one, most of the information has been included in COL by reference with the early site permit. The early site permit has been identified with two ESP seawall items. One is the precise site location of the Unit 3 and the second one is any -- that is, in 2.1, and 2.2 is who has the authority or the control activities. Those have been clarified in Section 2.1.1 and 2.1.2.

And also there is a permit condition to have the ownership and controls, and the applicant has come up with the understanding of the previous Old Dominion Electric Cooperative. Dominion has the overall control of the whole facility and control area.

Adn those permit conditions as well as the seawall conditions have been satisfied.

Most of the staff, 2.1.1 is the location. The 2.1.2 is the EAB and the site identification, and 2.1.3 is the population distribution as I explained earlier. Most of this stuff has been included by reference from the ESP, the population, how they have done.

We also independently -- confirmatory checks have been made, and staff has done independent analysis and confirmed the applicant's values reasonable.

Section 2.2 is dealing with the facilities in nearby. That would include industrial facilities, routes, any barges with respect to any explosions or any releases and delayed ignition due to the chemical releases, and if there is any explosion and there is a potential for any missiles, and also there is a potential for any chemical leak that would impair the control room habitability. These are the external events potential to the safe operation of the plant and also safe shutdown of the plant have been looked at, and we have independently analyzed and also checked so that they are not posing any threat to the safe operation of the plant.

And one of the C royal (phonetic) conditions was from the ESP their having to look at the on-site chemical storage at that time, and that was the -- one of the C royal conditions or C royal action items, and they have addressed that one, and they analyze the chemicals. Part of that one, they were identified to underground storage tanks for gasoline and that would be assessed for the probability that has been discussed and explained.

And also we had a concern with any of the Unit 1-2 turbine missiles have a potential to have any threat to the Unit 3. That was the RAI we have asked and that has been resolved and satisfied. Right, the orientation is.

And there is only one open item still with respect to the chemicals because they identified eight chemicals which have been screened out, but they ask for the methodology how they have been screened out, and that is one of the open items still being carried on.

CHAIRMAN CORRADINI: Somebody on the bridge line better put themselves on mute. We can hear you fumbling around with something.

Sorry. Keep on going.

MR. TAMMARA: And they identified as they mentioned, there was one airport and also one military airway. They reanalyzed and presented in the C royal, and we looked at the -- that probability is reasonable because we have a DOE reference which has some numbers.

(Laughter.)

MR. TAMMARA: I will show you that reference, I mean.

So I think --

MEMBER STETKAR: I'm sorry. I have many, many --

MR. TAMMARA: But remember they have chosen using the reasonable range.

MEMBER STETKAR: I have many references that have many numbers that range over two or three orders of magnitude. So selecting one particular reference with one particular number doesn't necessarily mean --

MR. TAMMARA: But I don't think if you take a look at the civil (phonetic), they have actually four, ten to the power of minus ten which is much lower --

MEMBER STETKAR: I'm glad you brought that up because I actually traced that number back, and it's published in NUREG 0800, and it's derived from a paper that was published by a researcher in 1972.

CHAIRMAN CORRADINI: Former ACRS member.

MEMBER STETKAR: It has very little to do with actual current civilian aircraft crash statistics that are published yearly by NTSB. So I was curious. Simply because a number is published in a reference that's traceable, one can, indeed, trade that reference and find that number. It doesn't necessarily mean that it's relevant to what happens in the real world.

So I guess I have that -- since you brought it up, I didn't want to bring up the civilian, but you brought it up so I will. I have equal -- in fact, I have a greater question about the frequency of the civilian aircraft crash frequency.

MR. TAMMARA: And we obtained independently the fair data, actual data for --

MEMBER STETKAR: Number of flights.

MR. TAMMARA: -- number of flights.

MEMBER STETKAR: That's true.

MR. TAMMARA: From 2004 to 2008, and by looking at that data, they use the data depending upon what type of aircraft it is, commercial or military. We didn't go in with -- and based upon that data, the number is really much lower than 6,000. That's what I compared.

MEMBER STETKAR: The military aircraft crash or the military aircraft overflight frequency is less than 6,000. That's true.

MR. TAMMARA: That's right. I think about 1,600, to be precise. That's what I got from all those 40 years.

MEMBER STETKAR: There's still a question about the sources for the crash rate data, that the crash is per aircraft flight mile.

The reason I was curious about this is because of the proximity to the flight corridors and the fact that the current calculations in the FSAR show a cumulative -- a total frequency, military plus commercial that is slightly higher than 1e to the minus seven.

Now, I'm not going to, you know, draw hard lines at 1.000 E to the minus seven, but it's on slightly above that number now so that if there is a concern about that being some type of de facto acceptance criteria, some changes in those craft frequencies could make a difference there.

MR. TAMMARA: Actual acceptance criteria is one tenth to the minus six.

MEMBER STETKAR: I know, yeah.

MR. TAMMARA: If the actual data is available. So I'm not contradicting your point, but it is --

MEMBER STETKAR: I was just curious about, you know, the depth to which the review went back to look at the source information for those analyses.

CHAIRMAN CORRADINI: I think where John is coming from --

MEMBER STETKAR: We can talk about it. That's enough.

MR. TAMMARA: But I have one more point to make. There are certain instances, you know, there are applications where the aircraft probability has about a ten to the minus six. So the fall-back position at that time, that situation is to go and look at the PRA and look at the coded image frequency aspect because this is initially even probability, and essentially if you can prove that your dose criteria is met with the probability, that is --

MEMBER STETKAR: How to do that though.

MR. TAMMARA: I agree, but what I'm saying, it is a concern. It should not be ten to the power minus six, but there are certain options which we can precisely take a look at it. That's all I'm saying.

MS. BERRIOS: We're going to -- during this review we have all this week, we have Kevin Quinlan representing for him.

MR. QUINLAN: Thank you.

My name is Kevin Quinlan with NRO, and I'm the presenter.

Brad Harvey was the lead reviewer for Section 2.3 of this application.

I'd like to just --

CHAIRMAN CORRADINI: You assisted, I assume.

MR. QUINLAN: I actually did not assist in this. He asked me to present for him.

CHAIRMAN CORRADINI: So we can ask you the in depth questions?

MR. QUINLAN: You sure can.

CHAIRMAN CORRADINI: Okay. Keep on going.

MR. QUINLAN: Much of Chapter 2, Chapter 2.3 incorporated by reference, Revision 9 to the North Anna early site permit SR. Below is a list of the COL items, and the only variance in our section is down at the bottom, and it's variance 2.0-1, which is related to the long-term dispersion estimates.

This is a list of the regulations and review guidance that were used for Section 2.3.

That's all I need to say about that.

Okay. This is the technical topics of interest for Section 2.3. Section 2.3.1 is the regional climatology, and this is a comparison of the climatic set parameters and the site characteristics, mainly the 50-year and the 100-year wind speed, three second gusts, the maximum tornado wind speeds, the maximum roof load for winter precipitation, and the zero percent exceedance and 100-year return period temperatures.

The staff was able to confirm all of the applicants' site characteristics, and we were able to state that all of the site characteristics were within the bounds of the DCD.

Section 2.3.2, local meteorology, addresses COL Item 2.3-1, which is the cooling tower-induced effects on temperature, moisture and salt deposition. The staff and the applicant both used the seasonal and annual cooling tower impact code, or SACTI code, and the staff agreed with the applicant that there's no adverse effects due to air temperature, moisture increases at the HVAC intakes, and salt deposition on any of the electrical equipment.

Section 2.3.4 is the short-term diffusion estimates for accidents, and this was a comparison of the atmospheric dispersion site parameters and the site characteristics. This is for the control room chi over Qs and the EAB and LPZ chi over Q values. This was done using the Arcon-96 computer model and the PAVAN computer model and used three years of meteorological data.

the staff was able to confirm all of the applicant's results and state that they were within the DCD parameters.

And Section 2.3.5 was, again, a comparison of the atmospheric dispersion site parameters and the site characteristics. We verified the release points and the receptor locations per COL Item 2.3-3, and this is the only variance in the section, was variance 2.0-1, which Dominion discussed a little bit earlier, but it recalculated the North Anna 3 maximum long-term chi over Q and D over Q values at specific receptors.

Just to restate, this was done because the applicant reviewed the updated land use census and determined that a number of the distances had changed since the SSAR had been approved, and again, the staff was able to confirm all of the applicant's results to be within DCD values or DCD parameters.

For 2.3, all of the regulatory

requirements were satisfied and we have no open items in this section.

CHAIRMAN CORRADINI: Then on to 2.4, at least for the Dominion part.

(Pause in proceedings.)

MS. BORSH: SSAR -- sorry -- SFAR. Thank you, Dan.

CHAIRMAN CORRADINI: All alone.

MS. BORSH: No, I am not alone.

FSAR, hydrology. We incorporate SSAR, Section 2.4 by reference, and we supplemented that SSAR by explaining that the layout of Unit 3 will affect a few small wetlands and the upstream portions of two intermittent streams that flow into Lake Anna. No other natural drainage features require changes to accommodate Unit 3.

We also specify that the design plant grade elevation, Grade 4 safety related structure systems and components, which is at elevation 290 feet. This provides more than 20 feet of free board above the design bassi flooding level.

Next slide, please.

Okay. We go on in Section 2.4. The local intense precipitation is discharged to Lake Anna, and we've located the safety related structure system and components at elevations that are above the maximum water surface elevation that would be produced by local intense precipitation.

CHAIRMAN CORRADINI: I have a question about that. I just happen to have stumbled through Dominion at the site right when you had a ice storm. So tell me intense precipitation includes cold intense precipitation, but what is the limit relative to that sort of low temperature ice storm or snow loads?

MS. BORSH: Minus 40. Are you asking about temperature or are you asking about precipitation and the measurement?

CHAIRMAN CORRADINI: Well, the day I happened to walk through every branch on every tree was cracking and falling. The they were offline because of sagging transmission lines, not the plant; all the stuff getting things to and from the plant.

So my question is what's the design base in that area for that sort of event. I'm just curious.

MS. BORSH: Well, we have freeze projection for our systems that are out in the yard. Okay? So that they can still function in the cold weather. We have roofs that have been designed to accommodate now loads. I'm not exactly sure --

CHAIRMAN CORRADINI: Well, I'm trying to understand for low temperature events what is your design base. Is it essentially a snow load at a certain temperature? That's what I'm asking.

MS. BORSH: Oh, Geoff, do you want to answer it?

MR. QUINN: Geoff Quinn, Bechtel.

We look at a normal -- the maximum ground snow load, and then we take a look into account the maximum winter precipitation, and we look at these on roof loads.

CHAIRMAN CORRADINI: So ice storms would be encapsulated by a snow load?

MR. QUINN: Craig.

MR. TALBOT: Yes. This is Craig Talbot with Bechtel.

And in accordance with the parameters set forth in the United States guidance that we look at a 100-year snow pack on the ground and combine that with a winter probable maximum precipitation to determine the maximum loading.

CHAIRMAN CORRADINI: Okay. So the answer to my question is yes, based on your 100-year snow load. Is that what you're saying?

MR. TALBOT: Yes.

CHAIRMAN CORRADINI: Okay.

DR. WALLIS: But isn't this a different event? Ice on wires is not snow.

MR. TALBOT: That is correct. It's ice and water, not just snow.

CHAIRMAN CORRADINI: I guess what we're asking, and if you want to think about it some more that's fine; I'm just trying to understand that at least in this region of the country I'm not so much worried about snow, but every time I hear about an event it has to do with some sort of ice storm whizzing through the area.

So what I'm kind of asking is is the snow load event limiting in this region of the country. I guess that's what I'm trying to get at or is an ice storm the limiting event.

MS. BORSH: Limiting from keeping the plant on line or from safe shutdown or --

CHAIRMAN CORRADINI: Shutdown.

MS. BORSH: Okay. All right.

CHAIRMAN CORRADINI: You can think about that and get back to us.

MS. BORSH: Craig.

MR. TALBOT: Yeah. We would need to do that. It's not a question we were actually anticipating as far as the probable maximum precipitation.

CHAIRMAN CORRADINI: Our job is to give you unanticipated questions.

DR. WALLIS: Snow load on the roof is one thing, but ice which coats things and prevents you from operating switches and opening doors and all kinds of things is quite a different event.

MEMBER STETKAR: They don't have to do that analysis. All they do is a structural analysis based on loading.

DR. WALLIS: But the reality is an ice storm is different. It is not covered by the normal snow load analysis.

CHAIRMAN CORRADINI: Well, give that some thought and we will talk again out there somewhere.

MR. TALBOT: Okay.

CHAIRMAN CORRADINI: Keep on going.

MS. BORSH: Let's go on. All right. The second item on this slide, the water supply to the ultimate heat sink is above the design plant grade elevation also, and therefore, it's capable of withstanding the probable maximum flood on streams or rivers without loss of the ultimate heat sink safety functions.

Next slide, please.

To address two ESP COL items we explain that the ultimate heat sink for the passive ESBWR design does not use safety related engineering underground reservoirs or storage basins. The ultimate heat sink is in the reactor building. So even if Lake Anna were to be drained due to a dam failure, no safety related structures or systems for Unit 3 would be adversely affected.

DR. WALLIS: No, you're going fast through all of this. This maximum water surface elevation and intense precipitation, this is where there's all this analysis about flow in the ditches and flow over roads and stuff like that. The margins seem to be fairly low. Isn't it like 1.8 feet or something like that? A lot margin, isn't there?

MS. BORSH: Yeah, and, well, we've gotten some questions, RAIs on that, too. Do you have a specific question or would you like us to just address the fact that there's a question about the margin, Graham?

MR. TALBOT: Okay. On the margin if you're referring to the Unit 3 structures, the margin is a little less than two feet. That is considering a significant amount of conservatism in the analysis.

The analysis --

DR. WALLIS: The conservatism is you assume that all the culverts are blocked; is that right?

MR. TALBOT: That is one measure of the conservatism, yes.

DR. WALLIS: And what about debris on the roads? That's assumed to be washed over? Is it there or what about it?

The road act as dams in this situation.

MR. TALBOT: That is correct, and where we have flow crossing roads we assume them to act as dams.

DR. WALLIS: So there's no debris on the road then.

MR. TALBOT: The debris on the road is considered in looking at the coefficients that are used.

DR. WALLIS: What's in the coefficient, okay.

MR. TALBOT: And we assumed high coefficients. We also assumed complete runoff from all areas as though it was all impervious even though the area is not.

We also in the analysis take into

consideration reducing flow times, which also is a conservative assumption that accounts for no detention of any kind of flows along the way. So, in other words, the peak discharges compound one on top of each other by everybody increasing these discharges.

And all of these things together then give us what we estimate to be conservative results, and so we feel confident that the numbers that we have come up with are on the conservative side, and the 1.8 feet is a reasonable margin for that area.

CHAIRMAN CORRADINI: So if I could just say back, you're saying that given all of the analyses that maximize the level, the 1.8 feet you still feel is adequate margin.

MR. TALBOT: Yes.

DR. WALLIS: I guess that when we get to the staff the staff themselves did some calculations which we can talk about.

CHAIRMAN CORRADINI: Which we have to talk about, correct.

MR. TALBOT: That's correct, and this is a different margin that is down in the unit, in the boundary between Unit 3 and Unit 2, and that margin down there is less, and that's where the questions are coming from.

CHAIRMAN CORRADINI: All right. Thank you.

Go ahead.

MS. BORSH: The next item on this slide is about the emergency cooling water for Unit 3. It's provided from the ultimate heat sink, which is not affected by ice conditions because it's inside the reactor building.

Yes.

MEMBER STETKAR: Can I ask about have Unit 1 and 2 had any icing problems with their cooling water intakes, needle ice, that type of thing? I'm not talking about, you know, major blocks of ice, but needle ice clogging up intake screens and so forth.

MS. BORSH: Craig, I know we talk about ice in the FSAR. Can you talk about that from Units 1 and 2 or is that beyond what you looked at?

MR. TALBOT: No, no. We did look into that, and we investigated that and asked questions about that, and to the best of our knowledge and the knowledge that we have received from Dominion, there has been no issues of icing in the Unit 1 and 2 intake area.

MEMBER STETKAR: Okay. Great. Thanks.

MS. BORSH: To address two ESP COL items, we explain that the UHS for the passive ESBWR design doesn't use safety related engineered underground reservoirs or storage basins. As I said, UHS in the reactor building. So -- oh, did we just talk about this? I'm on a different slide. Never mine. You're good. Excuse me.

CHAIRMAN CORRADINI: That's okay.

MS. BORSH: To address an ESP COL item regarding whether Lake Anna is used for safety related water withdrawals, we've included an explanation in the FSAR that the ultimate heat sink for Unit 3 has water in place during Unit 3 operation for safety related cooling in the event that use of the UHS is required. That's what we talked about earlier, the water being in the reactor building.

Lake Anna is not used for safety related water withdrawals for Unit 3.

Another ESP COL item requires us to address slope embankment protection for the Unit 3 intake structure. We describe the location of the intake structure, including the fact that the embankment for the structure is protected by rip-rap to prevent local runoff from eroding the structure.

We also note that for the ESBWR design, the intake structure is not safety related.

Any questions on that?

Okay. Two, point, four, next slide. The maximum PMP. Okay. We're addressing another DCD COL item, and we performed a local PMP flood analysis, probable maximum precipitation flood analysis.

The maximum PMP water level in the power block area is 2.8 feet below the design plant grade elevation for safety related facilities. Therefore, no --

DR. WALLIS: This PIP is the sort of deluge from a cloud or something? This stands for probable maximum precipitation?

MS. BORSH: Correct. So no safety related structure is subject to static or --

DR. WALLIS: So your 2.8 is the same as the 1.8 that we heard before?

MR. TALBOT: I misspoke. The 2.8 is the correct value.

DR. WALLIS: Oh, so the 1.8 is not correct?

MR. TALBOT: That's correct.

DR. WALLIS: I read 1.8 though when I read a document.

MR. TALBOT: Let me quickly look. I've got the document right here in front of me.

DR. WALLIS: It's a minor point, but I suppose if you changed it to 0.8 then we'd worry the other way.

MS. BORSH: Yeah.

DR. WALLIS: It's not very much, is it, really? Two, point, eight is better.

MS. BORSH: Two, point, eight?

MR. TALBOT: Looking.

DR. WALLIS: Is there really a level when you've got all of these surges and hydraulic jumps and waves and stuff? I mean, what is the level?

MR. TALBOT: Well, that is the maximum level, and this is due to the local, like you said, the local cloud burst over the site, and so the level in the ditches is not constant. It moves as it moves down the ditches, and so what we give you when we tell you that water level, it is the maximum that we have computed in those ditches.

And I'm reading that right now from the FSAR, and that value is 2.8 feet.

CHAIRMAN CORRADINI: Thank you.

MS. BORSH: All right. So what we're saying here is that no safety related structure is subject to static or dynamic loading due to flooding as a result of a design basis flood event or local

PMP event. No flood protection measures are required for Unit 3, and no tech specs or emergency procedures are required to implement flood protection activities.

To address an ESP COL item that deals with low water conditions in Lake Anna, we added information to the FSAR to describe the two operating modes of the circulating water system. We talked a little bit about this when we talked about Chapter 10. We'll either have energy conservation mode without the dry cooling tower or we'll use the maximum water concentration mode with the dry cooling tower and hybrid cooling tower operating in series.

Next.

In Section 2.4 we also provided supplemental information based on additional borings, groundwater level measurements, and hydraulic conductivity testing that we performed specifically for Unit 3. As a result, we identified a variance from the SSAR. We have a variance 2.4-1 that requests approval to use the void ratio, porosity, and seepage velocity of saprolite rather than the SSAR values.

The Unit 3 values that we'd like to use resulted from the additional data that we collected during the subsurface investigation. This variance is acceptable because we'll still comply with the 10 CFR

20 amendments for radionuclide concentrations as a result of a postulated release of liquid effluents in the groundwater pathways.

Section 2.4, we also provided supplemental information about groundwater supply wells, groundwater use, and the groundwater level monitoring program. We identified a variance involving the North Anna water supply well information. We found that the variance is acceptable because the corrected and new information continues to support the conclusions in the SSAR that we incorporated by reference.

Okay. The estimated maximum groundwater level that could occur in the power block area is seven feet below the design plant grade elevation of 290 feet.

DR. WALLIS: I have a question. Why is it conservative to assume 80 percent of the tank contents come out instead of 100 percent?

MS. BORSH: Craig, would you like to -- oh, this is really Stu.

Stu, are you on the line yet?

MR. TAYLOR: Yes. This is Stewart Taylor with Bechtel.

And there is guidance provided in --

DR. WALLIS: This is NRC; is that right?

MR. TAYLOR: BTT 11-6 that recommends the use of 80 percent of the tank capacity for that analysis.

DR. WALLIS: But suppose the hole is at the bottom.

MR. TAYLOR: I'm sorry. I didn't hear that.

DR. WALLIS: It seems very peculiar to pick 80 percent when 100 percent would have been a simple thing to do. It wouldn't have raised any questions. If you go back, this is a GE-H assumption or is it a staff assumption?

MR. TAYLOR: No, this is an NRC guidance document.

DR. WALLIS: I don't see it. It's one of these?

MS. BORSH: In the branch technical position I think is what Stu said, Graham. Okay?

DR. WALLIS: Okay.

MS. BORSH: So can I talk about the fact that we don't need a permanent de-watering system for Unit 3?

CHAIRMAN CORRADINI: Please do.

MS. BORSH: Okay. We don't need one.

MEMBER STETKAR: Okay. Why?

MS. BORSH: Because what we found was that the maximum groundwater level elevation is seven feet below the design.

MEMBER STETKAR: I'm not a hydrologist. So I'm going to need some help here. I notice that you have groundwater elevations from several wells, borings that you put in at the site, and they vary right around the immediate area of the power block anywhere from about 266 to about 298 feet currently.

I understand that the planned nominal grade level will be 290 feet, and I understand you did a bunch of analyses to estimate where the groundwater elevation would be after you get everything in place, and that came out to be 283 feet, seven feet below the 290.

If I look at the elevations of the buildings, I notice that the basement elevations for the vast majority of the buildings are substantially below 283 feet, substantially below groundwater level. Why don't you need to do watering system? Are you just going to let the stuff float in the basement?

MS. BORSH: Craig, it's Gina. Are you there?

MR. TALBOT: I'm here, but this is really a question for Loren or Angela.

MS. BORSH: Yeah, Loren, are you on yet?

MR. MATTHEWS: Yeah, I'm here.

MS. BORSH: Oh, okay. This is Loren Matthews from Bechtel.

MR. MATTHEWS: Well, it's probably more of a design issue than it is anything else, but the idea is that there would be waterproofing around the foundations below the ground surface or below two feet. The two foot is coming from the reactor vendor, and that's what they say they can -- that's how high they can stand the groundwater level to be.

MEMBER STETKAR: Is that below the base mat of any structure or is that below grade level?

MR. MATTHEWS: It's two feet below -- well, it's two feet below the final floor grade elevation, I believe.

MEMBER STETKAR: Floor grade elevation or plant grade? Because plant grade is 290 feet. That as best as I can tell is if I'm standing on the ground looking up at the sky. My feet would be standing at 290 feet elevation; is that correct?

MR. MATTHEWS: Yes. That's right.

MEMBER STETKAR: Basement elevations, for example, of the reactor and fuel building are 224 feet, which is not unusual. That's about 65 feet below grade. Two, twenty-four feet is about 60 feet below 283 feet or about 60 feet below the estimated groundwater elevation.

Why don't I need a de-watering system?

DR. WALLIS: It's just standing in a pool.

MEMBER STETKAR: A large fraction of most of the bottoms of the buildings are below estimated groundwater level, as I understand it, but I don't know why the conclusion I don't need a ground de-watering system. I perhaps could understand it if I simply look at only safety related equipment, which is passive and shielded by and large internal in the buildings, but I'm not convinced that this site doesn't need a groundwater de-watering system, especially to protect RTNSS equipment.

The follow-up question was are you going to have any underground cable ducts that supply power to RTNSS equipment, in particular, that could be below groundwater level.

CHAIRMAN CORRADINI: Do you have an answer now or do you want to cogitate over that at lunch?

MR. TAYLOR: This is Stewart Taylor with Bechtel.

I maybe could add something to that. The DCD, their design basis for the ESBWR is provided groundwater is no more than two feet below ground surface, that their design -- that's the design basis for the ESBWR. So at least our assumption is that provided, you know, we have -- the water table is deeper than two feet below ground surface and it turns out to be about seven feet based on our predictions, then their design is adequate.

MS. BORSH: So, Stu, you're saying it's really -- sorry, Graham. Go ahead.

Well, Stu, you're saying it's really a DCD question, but what we'll do is we'll go back and talk with Rick and the GE-H people about it and see if we can get an answer for you today.

MEMBER STETKAR: Okay. Thank you.

DR. WALLIS: Now, John mentioned the observation wells. I notice -- you probably said it already -- one observation well was 314 feet. Did you get that, John?

MEMBER STETKAR: Yeah, I did, but that was not -- I just looked at four or five right immediately around --

DR. WALLIS: This goes away when you grade the site and everything? Somehow or other you change the groundwater level so that we should ignore those high levels?

MR. TAYLOR: This is Stu Taylor again.

You know, all of those measurements reflect the North Anna site in its current condition, and when Unit 3 is constructed, there is going to be, you know, changes in grading. There's going to be changes in recharge the groundwater, and what's been done in the FSAR is to develop what we call a post construction groundwater model that reflects those changes to the site characteristics.

So it's with that model that we're making these predictions of what the post construction groundwater level is.

So the answer to your question is those pre-construction groundwater levels that have been observed aren't necessarily relevant for the site in its post construction state.

DR. WALLIS: Well, there's another thing. You said there's negligible seepage from the lake because it's 1,000 feet away? Over years presumably there is seepage. It doesn't matter to water over a long period of time.

MEMBER STETKAR: I look at it as saturated groundwater. So it doesn't make too much difference where it's coming from.

DR. WALLIS: It's going towards the lake.

MEMBER STETKAR: It's there from the lake already.

DR. WALLIS: It's going towards the lake presumably. So I didn't understand that business about seepage from the lake.

MS. BORSH: Bechtel, do you want to -- oh, Geoff, do you want to?

MR. QUINN: Loren, isn't that related to the construction?

MR. MATTHEWS: Well, it was. I mean, I'm not quite sure where the exact quote is or where it's referenced.

DR. WALLIS: It says de-watering during construction. So you say that because it's not going to take five years to build; therefore, we don't have to worry about seepage from the lake. Okay. Later on it reaches some sort of equilibrium, which is fine.

CHAIRMAN CORRADINI: Right, but I think it's two different -- unless I misunderstand.

DR. WALLIS: It's two different issues.

CHAIRMAN CORRADINI: Yeah. Okay.

MS. BORSH: So, Graham, your question is answered? Okay.

DR. WALLIS: So are you going to talk about the absorption coefficients, Kd's, that are going to be so variable by orders of magnitude?

We know that radionuclides don't follow the water, that they get absorbed and so on. Their rate of progression through the ground is different from the water. You seem to have a huge order of magnitude variation in these absorption coefficients. I wondered wasn't this -- how are you going to sort that out? You have to make some calculation and prediction.

MS. BORSH: Stu, would you like to talk, answer Graham's question?

MR. TAYLOR: Sure. When you look at -- again, this is Stu Taylor from Bechtel -- when you look at literature data for distribution coefficients for any particular element or substance, it's very common to see order of magnitude variation in the data even from samples taken from the same site and they typically are log normally distributed. So that kind of variation is expected.

Now, what was done in the analysis for the North Anna was that -- well, two things were done. One is there were samples taken from the site and analyzed to determine the Kd values. And then that information was sued to make conservative estimates of radionuclide transport, and what has been done in an

RAI response that has been submitted, and I'm not quite sure exactly where it stands in the licensing process, but the latest analysis uses the minimum site specific Kd values for the radionuclide transport analysis.

DR. WALLIS: Okay. So you've eventually done what the staff asked you to do, which was use the minimum value.

MR. TAYLOR: Correct.

DR. WALLIS: Okay. Thank you.

MS. BORSH: The last bullet on this slide that we have up, Slide 23, is talking about the design features that have been incorporated into the ESBWR design to preclude this accidental release of liquid effluence that you're asking about, and we noted that the tanks are located -- for a groundwater release, the tanks are located in the rad waste building, which has design features that include a seismically designed rad waste building, steel lined compartments for the tanks, and a building -- some system -- maybe somebody could mute, silence their phone or mute their line -- to contain any releases that may result from a release from a tank.

For a surface water release, the condensate storage tank is the only above-ground tank that we have outside of containment. Its design features include a basin surrounding the tank to prevent uncontrolled runoff in the event of a tank failure, and the basin volume is sized to contain the total tank capacity.

Also, a sump located inside the retention basin has provisions for sampling the collected liquids prior to routing them to the liquid waste management system or the storm drain.

Here we're talking about the accidental release, again, of the radioactive liquid effluent to either groundwater or surface water, and we found in our analysis that we comply with the 10 CFR 20 limits for release to the unrestricted areas.

Based on the locations of the safety related structure assistance in components, we've determined that no technical specifications or emergency procedures are required to prevent hydrological phenomena from degrading them.

And then finally we note in our FSAR that we'll shut down Unit 3 when the water level in Lake Anna drops below 242 feet.

There are four open items in this SER with open items. The first open item is tracking an RAI that requests that we include more information in the

SER regarding the locally intense precipitation flood event.

The next item is tracking an RAI response that is with the NRC for review. This is the RAI that's asking about information about the PMP flows at the Units 1 and 2 plant access road.

And the third item is the transport -- I'm sorry. No, it isn't. The third item is modeling the groundwater elevations in the power block area, and the fourth item is asking for some revisions to our transport analysis, and that's what Stu was referring to earlier where we revised it and submitted it, and it's within NRC for review.

There are no confirmatory items in this section. Oh, wait. Rick, did you want to add something, Rick?

MR. WACHOWIAK: Yes, this is Rick Wachowiak from GE-H.

CHAIRMAN CORRADINI: This is about our water?

MR. WACHOWIAK: This is about your groundwater question, and we can give you what we have right now and see how much further we need to investigate this over lunch.

So in the DCD, the design section is

3.4.1.2. What I have here is from the RTNSS section in 19 alpha. The reactor building, control building, fuel building, fire pump enclosure, and ancillary diesel generator buildings are all designed such that to withstand the flood level and groundwater level specified as Gina mentioned, and all exterior openings are above flood level and exterior penetrations below the design, flood and groundwater levels are appropriately sealed as described in 3.4.1.1.

For the electric building, service water building, and turbine building which have the RTNSS components, basically we've said all exterior openings are above the flood level or exterior penetrations, below the flood and groundwater levels are appropriately sealed.

And so that's the description in the DCD. We have Sujit on the line to bring us the building if you want to look into that further, if you have more detailed questions about that.

CHAIRMAN CORRADINI: Can I summarize what I'm hearing you say? You're saying that the way the plant is going to be built, the basement areas, is that nothing, no opening is below 283.

MR. WACHOWIAK: Yes.

CHAIRMAN CORRADINI: And by how you're

going to design it, there will be no cracks. It will be sealed. Nothing will leak in. There's no need to have a de-watering system.

MR. WACHOWIAK: Right, and what Tom just mentioned to me was in 3.4.1.2 it says that the walls are sealed below the groundwater level, waterproof.

DR. WALLIS: So this is really a DCD question anyway. It's not a North Anna question.

CHAIRMAN CORRADINI: Okay. Good. We have a chance to come back to you as we cogitate over your answer. Thank you.

MEMBER STETKAR: Rick, do -- and I don't know whether it's part of the DCD or whether it's the site as far as routing of cables. Is that part of the DCD design?

You know, underground routing of cables, for example, to the --

MR. WACHOWIAK: There are specifications for how you would route underground cables, yes.

MEMBER STETKAR: With actual --

MR. WACHOWIAK: There are tunnels provided in the standard design for those cables.

MEMBER STETKAR: So they would be subjected to the same discussion.

MR. WACHOWIAK: Yes.

MEMBER STETKAR: So it's really a DCD issue then.

MR. WACHOWIAK: Yes.

MEMBER STETKAR: Okay. Thank you.

CHAIRMAN CORRADINI: So it's a DCD issue. We'll make note of it. That's fine.

MR. WACHOWIAK: Okay. So nothing further for this meeting.

CHAIRMAN CORRADINI: Nothing further for this meeting, right.

MS. BORSH: Thank you, Sujit.

CHAIRMAN CORRADINI: Questions for Dominion?

Okay. We're at an interesting point. A number of us have to be at a meeting in a bit on DAC and ITAAC, which we're all excited about. So my proposal is that we take the staff's part of 2.4 after lunch and we adjourn for at least an hour. Probably we would get back together at 12:45 or 12:50.

So if you guys want to take extra time, as long as we fit everything in by 4:30 as planned, because I think we're going to start -- Committee members have got issues. So let's just recess now and come back at one o'clock and we'll take up 2.4.

Okay. Thank you.

(Whereupon, at 11:43 a.m., the meeting was recessed for lunch, to reconvene at 1:00 p.m., the same day.)

MS. BERRIOS: Now we are going to present Section 2.4. For this one, we have Mark McBride, which he is from the staff, and then we have two contractors from PNNL, and it is Steve Breithaupt and Philip Meyer. They are going to be giving some support to Mark.

I'm going to leave you with Mark now.

MR. McBRIDE: Thank you.

First of all, to avoid repetition, I am going to note right now that the regulatory basis for most of the sections was simply incorporated by reference from the ESP. Also, no section includes any post-COL activities, and we are going to discuss only certain selected technical topics. I will go through, basically, section by section.

Section 2.4.1, the Hydrologic Description, had one permit condition that applied to hydrologic engineering in general. This required use of dry cooling for the second new unit, but since only one new unit is going to actually be built, this condition no longer applies.

Section 2.4.2 identifies and summarizes

the causes of flooding. It addresses two different kinds of flooding. First, is large-scale flooding, resulting from a watershed-scale event, and second, localized flooding from locally-intense precipitation. I am going to talk about these separately. In brief, however, I will say that only local flooding was found to be of any significance.

Extreme watershed-scale flooding could occur because of precipitation over the watershed, combined with upstream dam breaks and wind action. However, when looked at, even in combination, these conditions would not flood the site.

The key elevations to note here are summarized at the bottom. They are the plant grade, 290 feet; maximum flood elevation prescribed by the DCD, 289 feet, but only 270 feet was the maximum predicted flood elevation. So that maximum predicted flooding is 19 feet below the DCD maximum flood elevation.

There is a good deal more to say about locally-intense precipitation flooding. Two ESP/COL information items addressed flooding from locally-intense precipitation. First, that is very site-specific.

The applicant conducted modeling using

HEC-RAS to address these items, and the results were reviewed by the staff.

Now next I'm going to point out features of interest on maps of the site. The site drainage features of the site are planned to be constructed to protect critical plant components from locally-intense precipitation flooding.

The nuclear island, which is outlined by a heavy orange square, is near the high point of the site. Flood drainage is shown by blue arrows and runs generally toward large ditches on the north side and the south side of the site.

These drain northeastward toward the storm water management building, which on this map is outlined by heavy blue dashes. From the storm water management basin, it flows into Lake Anna.

No significant issues were identified with the north ditch. However, the south ditch, which is shown by a heavy orange line, had ditches of significantly greater importance.

These issues were associated with two particular features of the south ditch, which are, again, highlighted in heavy orange rectangles. First, the south ditch makes an abrupt bend to the northwest just before it enters the storm water management basin.

Second, an access road parallels the ditch, and this road also acts as a dike. It separates the south ditch from the existing Unit 2 area, which is to the northeast of the ditch.

During the technical evaluation, the staff reviewed the applicant's HEC-RAS modeling of runoff and conducted its own sensitivity analysis of the HEC-RAS model. For conservatism, all the culverts along the ditches were assumed blocked. The staff evaluated the potential for debris blockage of the ditches and also the effect of channel overflow on flow at the abrupt bend where the ditch goes to the northwest.

NEC-RAS modeling indicated that water levels near the nuclear island will not be high enough to be of concern. However, several other issues were identified in the south ditch. High velocities and hydraulic jumps could damage the ditch, but they were found not to affect safety-related areas.

At the abrupt bend, however, modeled water level is very close to the elevation of the top of the access road. Overtopping of the road could affect safety-related areas.

Two open items addressed refinements to the HEC-RAS modeling. The first concerns updating the modeling to show the effects of a newly-added diesel building and also ensuring that the south ditch will, in fact, function as described. The second open item addresses uncertainty that flooding will overtop the access road protecting the existing units.

Now I am going to move on to several sections that we can talk about very briefly. A number of specific causes of flooding are not of concern for safety of this site. As already noted, flooding on streams and rivers, in this case Lake Anna, is not of concern for safety-related facilities. Potential failures of upstream dams do not present a significant risk, and neither do surge and seiche effects. Tsunamis are, obviously, not an important safety risk at this site.

As with some of the other less important safety issues at North Anna, when preparing the FSAR, the applicant incorporated by reference the corresponding sections of the ESP SSAR with no additional information. The staff confirmed that there's no outstanding information on tsunamis and did not perform any additional technical reviews of this topic.

CHAIRMAN CORRADINI: What's an S-E -- what's that? Maybe everybody else knows in the room;

I don't.

MR. McBRIDE: It's an effect that takes place in lakes. Think of the water in a bathtub, how it can slop back and forth.

CHAIRMAN CORRADINI: Oh, sloshing?

MR. McBRIDE: Sloshing, yes. This can be driven by wind.

CHAIRMAN CORRADINI: We don't call this sloshing because it's not scientific enough?

(Laughter.)

Okay, fine. That's all. I've got it. Keep on going.

MR. McBRIDE: That's all it is. The importance of it is that --

CHAIRMAN CORRADINI: I'm with you.

MR. McBRIDE: Okay. 2.4.7, ice effects. Ice effects and also the capabilities of cooling water --

CONSULTANT KRESS: Before you get to that, this open item of the possible flooding of the road at the bend, how do you expect that to be closed? I mean the numbers were really close together.

MR. McBRIDE: I'll refer that to Stephen, who has actually been working on the details.

MR. BREITHAUPT: Yes, we are reviewing

that currently. Of course, these open items are referred to as corresponding RAIs. We have gotten some response for most of those. The last one is 2.4.2-3; we're still under discussion. So we are in the process of trying to close these items out.

CONSULTANT KRESS: Are they trying to show that the analysis was conservative or what?

CHAIRMAN CORRADINI: Other than making the road taller.

MR. BREITHAUPT: Other than making the road tall?

Well, okay, in our analysis of HEC-RAS, we tried to look at various conservatisms. When we did that, of course, it doesn't improve the situation.

We also did some additional analysis, two-dimensional modeling, that shows also some problems. That is what we are still under discussion with Dominion.

CONSULTANT KRESS: Okay, thank you.

MR. BREITHAUPT: Sure.

MR. McBRIDE: The ice effects and also the capabilities of cooling water canals and reservoirs and the risk of channel diversions are also not significant safety issues.

The principal underlying reason here is

that the ESBWR design, in that design, I should say, the ultimate heat sink for emergency cooling is an integral part of the plant and does not depend on an outside source of water that could be affected by these factors.

Flooding protection requirements, Section 2.4.10, depend on what the flooding conditions are at the site. Flooding protection requirements cannot be fully specified until the flooding conditions, as we were just discussing, are actually defined. Defining the flooding conditions depends on having results from Section 2.4.2, flooding, and in particular, on resolving the two open items associated with that section. Therefore, this section remains unresolved pending final decisions on Section 2.4.2.

Low water levels, Section 2.4.11, are also not a safety issue at this site. The ultimate heat sink incorporated into the plant design provides emergency cooling for Unit 3, so safety would not be impacted by low water conditions in Lake Anna.

Now we move on to Section 2.4.12, groundwater. I am going to ask Phil Meyer to take a place at the table here.

Now regarding groundwater, the applicant requested four variances, all of which have been accepted. All amounted mainly to requesting use of more conservative site-specific parameter values than those used in the ESP application. This was based on new measurements made after the submission of the ESP application.

One open item pertains to groundwater. The underlying concern is that the DCD requires that groundwater must be more than two feet below plant grade. The drainage ditches that I described previously are also expected to help maintain groundwater levels by acting as groundwater drains, and the open item concerns evaluating their effectiveness as drains.

Regarding Section 2.4.13, accidental releases of radioactive liquid effluents, the ESP contained one permit condition. This condition was that the design must include features that will preclude accidental releases into potential liquid pathways.

That includes steel-lined compartments surrounding below-grade tanks and a basin surrounding the above-grade tank. The staff concluded that these features satisfy the permit condition.

The applicant requested one variance for the use of smaller distribution coefficients, or Kd values, than those used in the ESP. The resolution of this variance will depend on open item 2.4.13-4, which also concerns Kd values and is represented on the next slide.

Open item 2.4.13-4 concerns the staff's need to verify that the transport analysis is, in fact, a bounding analysis. In particular, staff has requested that a transport analysis be made using minimum observed Kd values and maximum observed hydraulic conductivities to verify that the analysis based on site-specific values is, in fact, bounding.

CONSULTANT WALLIS: Now I had a question about that. These Kd values vary quite a bit. When you ask for the minimum value, then you have to think about whether the sample is big enough for the minimum to be reasonable. If you have two values, taking the lower one is not very sensible. If you have 100 values, taking the minimum is probably excessive. So do they have enough samples in order for taking the minimum to be a meaningful thing to do?

MR. MEYER: That's an excellent question. You hit the money with that one.

There's a balance, of course, particularly when you're sampling a variable like Kd that has such a large variability at a site. You have to balance the need for that kind of a conservative estimate with the cost to do those analyses, collect the samples, and then run the lab analyses.

There's some statistical methods that can be used. We have looked at those. I would say that the sample size that they have, which I think was 20 samples, is pretty reasonable based upon that.

CONSULTANT WALLIS: Now Kd tells you how much the -- lags behind the water? Water moves and this other material reacts, right? So, if Kd is zero, does that mean that the pollutant follows the water?

MR. MEYER: Yes.

CONSULTANT WALLIS: And if Kd is very small, does it make any difference? How big does it have to be before it starts to make a difference?

MR. MEYER: Well, it depends upon a number of issues.

CONSULTANT WALLIS: If you are taking the minimum and it is small enough, it doesn't really make much difference whether it is zero or the minimum perhaps?

MR. MEYER: If the minimum is very small, it might not. It depends upon --

CONSULTANT WALLIS: It would be close to that limit or –

MR. MEYER: It depends upon the half-life --

CONSULTANT WALLIS: Right.

MR. MEYER: -- and the distance over which it has to travel. So, even if you have a small Kd value, you could still have an impact.

CONSULTANT WALLIS: Yes. Yes. Is this minimum close to being small enough that, if it was zero, it wouldn't make any difference?

MR. MEYER: Well, if you wanted to be ultimately conservative, you could assume that all radionuclides travel at the rate of groundwater flow. That would be --

CONSULTANT WALLIS: Just I was wondering if it really matters anyway because, if the minimum is small enough, it doesn't matter that you're too accurate about what it is?

MR. MEYER: You're talking about the accuracy of the measurement of Kd?

CONSULTANT WALLIS: No. I'm saying Kd, it varies by orders of magnitude in your measurements, but the limit is zero. If you get a value, if your minimum, let's say, is .01 or something, it might as well be zero, or it doesn't matter if you're sure about taking the minimum? If how you select the minimum makes a big difference, then you would be more careful about how you selected it? Do you see what I mean?

MR. MEYER: I think I see what you mean, yes. Right.

One approach to this would be to do an analysis where all the radionuclides moved at the speed of groundwater.

CONSULTANT WALLIS: Maybe that is okay, too.

MR. MEYER: It could be okay.

CONSULTANT WALLIS: But didn't you do a sensitivity analysis or not?

MR. MEYER: Yes. We looked at that, yes, and the applicant looked at that, if you look at the FSAR.

The initial analysis, assuming that all Kd values are zero does not satisfy --

CONSULTANT WALLIS: Does not satisfy?

MR. MEYER: No.

CONSULTANT WALLIS: So you need a minimum value?

MR. MEYER: For all the radionuclides.

CONSULTANT WALLIS: Okay.

MR. MEYER: The ultimately conservative

value, yes, but --

CONSULTANT WALLIS: Then you had better be careful about whether you have really got enough of the tail when you get the minimum value then?

MR. MEYER: Potentially, yes. Like I said, it depends upon other factors. It depends on the radionuclide and the distance/time of travel.

CONSULTANT WALLIS: When you got readings of this Kd, which vary orders of magnitude, you might have to be careful about how well you are bottling the tail? So I'm wondering how you know when you've done a good enough job.

MR. MEYER: How you know whether your estimate is accurate enough? Do you want me to answer that question.

CONSULTANT WALLIS: I'm wondering how you know that. I don't know what you did. But somehow you are satisfied that taking the minimum is good enough?

MR. MEYER: Well, do you want me to describe a technical analysis?

CONSULTANT WALLIS: Well, no, maybe you need to reassure me that taking the minimum is good enough by some overall argument.

CHAIRMAN CORRADINI: So you have to

reassure him or explain it. You pick.

MR. MEYER: If you have a sufficient number of samples --

CONSULTANT WALLIS: Yes.

MR. MEYER: -- you can do a couple of things. One is you can fit a distribution to the sample values.

CONSULTANT WALLIS: You can do all these things. What did you do?

MR. MEYER: I did both a fitting to the distribution, and then I also did a Bayesian analysis where we used an initial prior distribution that was equal to the literature distribution that the applicant used, and then we updated that, based upon the actual measured values. From that, you get a post-area distribution by Kd value. Then you're left with the choice of, well, what percentile do we choose as a conservative value? We looked at several different values. In fact, the minimum site-measured value is pretty conservative.

CONSULTANT WALLIS: How much was it?

MR. MEYER: How much? How conservative was it?

CONSULTANT WALLIS: Well, give me a number or something.

MR. MEYER: Well, let's see, I can't remember exactly. I would have to look at my results, but it is down in the small 1 percentile of the distribution, something like that.

CONSULTANT WALLIS: That's good. That's very nice. Thank you. Yes.

CHAIRMAN CORRADINI: Keep on.

MR. McBRIDE: Finally, no emergency procedures or technical specifications are necessary to prevent hydrological phenomena from degrading the ultimate heat sink for the plant. This conclusion is, again, based on the ultimate heat sink being an integral part of the plant rather than the plant depending on outside water sources for short-term emergency cooling.

Finally, I would like to open it up to further questions.

CHAIRMAN CORRADINI: Fine. Thank you very much.

On to 2.5. Right? Isn't that where we are at?

MS. BORSH: For the people that are on the bridge line, this is Gina Borsh.

Dr. Farhang, are you on the line?

DR. FARHANG: Yes, I am here, Gina.

MS. BORSH: Oh, wonderful. Thank you.

Joe, how about you?

(No response.)

Not yet? Okay.

Joe, is that you?

Okay. All right.

Ai-shen, are you on the line?

MR. LIU: Yes.

MS. BORSH: Oh, well, thanks for joining us, Ai-shen.

Okay. So we are going to talk about Chapter 5 now. We are going to do the North Anna presentation for 2.5.

We have John Davey here with us from Bechtel. He is one of our subject matter experts. Then, obviously, we have people on the line that will help, when I need help.

Okay. So, with that, let's talk about 2.5.

This is about geology, seismology, and geotechnical engineering. We incorporated SSAR Section 2.5.1 into our FSAR, and then we provided additional supplemental information, which in 2.5.1 covers, it provides a summary of the geological data that we collected from the additional borings that we performed for Unit 3.

This information describes the site stratigraphy that John can explain to you, if you would like him to.

Okay. Next slide, please.

For the first item on this slide, we will be addressing the types of materials beneath Unit 3. As we described in the SSAR, there's several zones of materials ranging from bedrock to saprolite.

To address the ESP permit condition, we state that the Zone II saprolite will not be used as structural fill to support Seismic Category I or II structures.

This statement creates a variance from the ESP permit condition because the permit condition states, permit-holder and then applicant for a construction permit or COL, referencing the ESP, shall not use an engineered fill with high compressibility and low maximum density, such as saprolite. That is how it is written.

Based on this wording, the condition would imply that all saprolites consist of material with high compressibility and low maximum density, and that there is no type of saprolite which can be used to support the Unit 3 structures.

However, saprolite has a wide range of physical properties, and Zone IIB saprolite materials are acceptable as structural fill for our Unit 3 structures, including the Seismic Category I and II structures. So we have requested a variance.

The next item we would like to highlight on this slide is that the results of the subsurface investigations that were conducted indicate that Zones III-IV and IV are suitable bearing surfaces on which to found the Category I structures.

To address an ESP permit condition, we commit to excavating the weather-defractured rock at the foundation level for safety-related structures and replacing it with lean concrete before constructing the foundation.

To address another ESP permit condition, we commit to geologically mapping future excavations for safety-related structures and evaluating any unforeseen geological features that we may encounter. We also commit to notifying the NRC no later than 30 days before any excavations, so that the NRC can examine and evaluate the excavation.

In Section 2.5.2, which covers vibratory ground motion, we describe the seismic wave transmission characteristics, including the shear wave velocity profiles of rock and soil under our Unit 3 structures.

In this section, we have a variance because for the specific locations of the reactor building, fuel building, control building, and fire water storage complex, the control point elevation for seismic analysis changed from that in the SSAR. This results in a variance from the SSAR for control point safe shutdown earthquake response spectra.

We described the variance when we presented Section 2.0, and the variance is acceptable because, as we said, the ESBWR CSDRS is what we used for the design of the Seismic Category I structures, not the site-specific Unit 3 numbers. So the FSAR demonstrates that the Unit 3 foundation input response spectrum, or FIRS, for Seismic Category I structures falls within the ESBWR CSDRS.

We provided the horizontal and vertical seismic response spectra for the control point elevation and for the foundation elevations for the reactor building, fuel building, control building, and the fire water storage complex.

For example, on the next slide, we will show you the comparison of the horizontal CSDRS with the Unit 3 FIRS for the reactor building, fuel building.

The next item on this slide is that the Unit 3 operating basis earthquake ground motion is one-third of the FIRS and is bounded by the DCD's operating basis earthquake.

As you saw in the review of Chapter 3, the Unit 3 operating basis earthquake ground motion is an open item in the SER, and we are developing a response to address the associated RAI.

Then here's a lovely picture of our FIRS versus the CSDRS. So you can see CSDRS. This is the horizontal version. What you can see, the blue is the CSDRS curve from the DCD, and the FIRS is the dotted red line, and we fall within the CSDRS. So we are good to go. This is just an example of what we found for all the curves that we had to do. That was 2.5.2.

Now we are in 2.5.3, which is surface faulting. Here we added a statement that the borehole data from the supplemental surface investigation that we did for Unit 3 showed no evidence of Quaternary fault movement. That means it hasn't happened in 1.8 million years, Quaternary.

Section 2.5.4 integrates the SSAR information with results from the additional Unit 3 borings. We describe the properties of the subsurface materials. We provided an overall of the subsurface materials, giving the soil and rock constituents and their range of thicknesses encountered at the Unit 3 site. The information that we provided was taken from the 55 borings that we made at the site.

We describe the field investigations that we performed, including a summary of the borings, observation wells, in-cone penetrometer tests from the site exploration program, the locations of the exploration points, the standards that we used to perform the work. There's all kinds of information in there.

Then we also performed numerous lab tests on the soil and rock samples that we obtained from the field investigation. In the SER, we provide a summary of the types, numbers, and the results of the tests that we performed, along with the guidance and admin controls that we used to perform the work.

Then, finally, on this slide, the engineering properties for the soil and bedrock zones that were derived from the Unit 3 field investigation and laboratory testing programs are provided.

We provide the engineering properties for each of the materials on the site.

Still in Section 2.5.4, in Section 2.5.4.3

we cover the foundation interfaces. To address any ESP COL item, we provide the locations of the site exploration points for the Unit 3 subsurface investigation, including borings, observation wells, CPTs, electrical resistivity tests, and test pits that we made inside and outside the power block area. The borings from the previous exploration programs are also shown here.

To address another COL item, we present the excavation plan for the safety-related structures and other major facilities, including the plan outline of these structures. We give the plan dimensions and the bottom-of-foundation elevations for the major structures. Also, we show the locations of the six subsurface profiles.

In the next subsection of the FSAR 2.5.4.4, we describe the geological testing that we performed for Unit 3, which consisted of field electrical resistivity testing, geophysical down-hole testing, and seismic cone penetrometer testing.

We covered the locations of the testing, the methods that we used to perform the tests, and the results of the tests. We describe in detail the results of the shear and compressive wave velocity tests that we performed.

CONSULTANT KRESS: What do you with the resistivity numbers? Where are they on that?

MS. BORSH: May I call a friend?

CONSULTANT KRESS: Yes.

MS. BORSH: John?

CONSULTANT KRESS: Certainly.

MR. DAVEY: I'm John Davey from Bechtel.

Basically, the electrical resistivity results are used more for plant design than basically a licensing operation. They are used in a power plant to measure the resistivity of the soil, which gives the corrosion potential for various --

CONSULTANT KRESS: It is a corrosion-related issue?

MR. DAVEY: It is a corrosion-related issue; plus, the inverse of resistivity of conductivity, and you need that for your grounding system on your plant. So it covers --

CONSULTANT KRESS: Lightning or just other shorts?

MR. DAVEY: Huh?

CONSULTANT KRESS: Lightning protection?

MR. DAVEY: Not -- well, indirectly, indirectly. Interestingly enough, you can never satisfy both the electrical engineers, who are looking at it for conductivity, and the civil engineers, who are looking for resistivity.

CONSULTANT KRESS: Thank you. That is helpful.

CONSULTANT WALLIS: You measured soil cohesion in these tests?

MR. DAVEY: Yes, we do lab tests for the soil cohesion.

CONSULTANT WALLIS: What are these blows per foot?

MR. DAVEY: The blows per foot is the standard penetration test. Basically, in this country it is the standard test really used for exploration of soils.

CONSULTANT WALLIS: What do you blow with?

MR. DAVEY: It's a 2.5-inch diameter, thick-walled, steel tube that you basically hammer into the ground.

CONSULTANT WALLIS: Hammered how?

MR. DAVEY: In a standard way, with a hammer having a standard drop and a standard weight.

CONSULTANT WALLIS: Go along, doing it so many times --

MR. DAVEY: Yes. As you go down the bore hole, basically, every five feet you do one of these tests, and you measure the blow count.

CONSULTANT WALLIS: What do you actually measure?

MR. DAVEY: You actually measure the number of blows for the sample to go a foot.

CONSULTANT WALLIS: Oh, to move a foot?

MR. DAVEY: Yes, to move a foot.

CONSULTANT WALLIS: Oh, that's what it means?

MR. DAVEY: Yes.

CONSULTANT WALLIS: I thought you meant you went along like this so many per foot.

MR. DAVEY: Oh, no, no.

CONSULTANT WALLIS: Oh, how many blows it takes to move it --

MR. DAVEY: Right, it's foot vertical.

CONSULTANT WALLIS: That makes more sense. Okay.

MR. DAVEY: Right, right. Obviously, the higher the number of blows, the higher the resistance.

CHAIRMAN CORRADINI: It's not an SI unit that is the problem.

MS. BORSH: All right. In the excavation and backfill subsection of 2.5.4, we describe the extent, both horizontally and vertically, of the

Seismic Category I excavations, fills, and slopes. We discuss the excavation methods in relation to the stability of the excavation, and we identify the sources and quantities of the backfill that we plan to use. We provide the compaction specifications and we describe the QC requirements that will be applied to the backfill.

We state again that the excavations for the safety-related structures will be geologically mapped and that we will evaluate any unforeseen geological features, and that will give NRC advance notice so they can examine the excavation.

Section 2.5.4.6 covers groundwater conditions. So, as for control of groundwater during excavation, the groundwater levels at North Anna require us to provide temporary dewatering of the foundation excavations that are below the water table during construction.

The maximum groundwater level in the power block area of Unit 3 is at elevation 283 feet, which is below the DCD's maximum allowable value of 288 feet. We talked a little bit about this. Therefore, no permanent dewatering system is required.

CHAIRMAN CORRADINI: From Dominion's standpoint, given that everything will be designed fine, you will start off not needing one. Do you have contingency plans if you happen to start leaking later in life, that you will need one?

John's point, which I think was you are 60 feet below grade, below the water table. So my basement leaks three feet below the water.

MEMBER STETKAR: We have several plants in the current fleet that were originally designed not to have wet basements that have wet basements now, and may not be that far below groundwater level.

We are curious whether you are concerned about this.

CHAIRMAN CORRADINI: I mean it may be of no safety significance. I guess my question is, is it prudent?

MS. BORSH: I understand your question. If you are asking if right now, as we are doing detail design, are we designing for that contingency?

CHAIRMAN CORRADINI: That is a good way to put it.

MS. BORSH: Okay. Let me turn to my designers and ask.

Can we take an action to get back with you on that?

CHAIRMAN CORRADINI: That will be fine.

MEMBER STETKAR: But a bigger concern also is be careful about strictly safety-related equipment versus non-safety equipment because the term RTNSS comes up. There may be several RTNSS systems that are vulnerable that perhaps the pure safety-related equipment may not --

MS. BORSH: Yes.

MEMBER STETKAR: -- because of elevations in the buildings, and so forth.

MS. BORSH: Okay. Yes, I understand your concern. We will get back with you on that.

All right. So, going on to the next slide, in Section 2.5.4.7, we provide the information on the response of soil and rock to dynamic loading. The SHAKE2000 computer program was used to compute the site dynamic responses. The data required to perform the analysis included shear wave velocity profiles of the rock and soil overlying the hard rock, variation with strain of the shear modulus and --

CONSULTANT WALLIS: Excuse me. Is there where you put in this one and one-third of the static to do the dynamic analysis? The dynamic-bearing capacity was one and one-third of the static?

MR. DAVEY: I think that is a little later on in 2.5.4.10.

CONSULTANT WALLIS: An acceptable thing to do?

MR. DAVEY: Yes. Well, that is one of the open items, I believe.

CONSULTANT WALLIS: It is a standard thing? It just seems a little strange to me.

MR. DAVEY: It is a standard in IBC, basically, the International Building Code. It is really a probability thing. It is not so much that you are raising the load, that you are basically lowering the factor of safety from three for static long-term conditions to two and a quarter for unusual or rare conditions.

MS. BORSH: We also needed the data from the site-specific seismic acceleration time histories.

Graham, you were asking about that earlier. Do you have any questions on that right now?

CONSULTANT WALLIS: What is that?

MS. BORSH: The time histories that we used, the site-specific seismic acceleration time histories. Were you asking about that earlier? No?

CHAIRMAN CORRADINI: I don't think he was.

CONSULTANT WALLIS: Well, I do have a question though.

CHAIRMAN CORRADINI: All right.

CONSULTANT WALLIS: We haven't quite got to it yet. Have you used a pseudostatic approach for seismic? You have argued that the event only lasted a short time, but in that time doesn't it have several oscillations? So it has several cycles? So it might excite some dynamic thing in that several cycles of oscillation. Just because it is over in a few seconds, when you are worried about quite a few hertz in terms of response, I would think you would have to do a dynamic --

MR. DAVEY: Well, in Section 2.5.5, we used a pseudostatic approach to slope stability analysis. That is the only one I am familiar with. I am not sure as far as --

CONSULTANT WALLIS: Liquefaction or the stability of the slopes, right?

MR. DAVEY: Yes, the stability of the slopes, which is coming up --

CONSULTANT WALLIS: So you are arguing it won't have time to move very far or something? Or what's the argument?

MR. DAVEY: Well, basically, the pseudostatic approach is very conservative, yes, because, basically, what you're saying --

CONSULTANT WALLIS: But if you jiggle

something, it is much more likely to subside, you know.

MR. DAVEY: Well, from a liquefaction point of view, we don't use a pseudostatic approach. We use a --

CONSULTANT WALLIS: I thought you did.

MR. DAVEY: No. It was from the --

CONSULTANT WALLIS: Maybe I misunderstood because I thought it was --

CHAIRMAN CORRADINI: It was only in the slope analysis, is what he was saying.

CONSULTANT WALLIS: But it gets mixed up with the liquefaction. Okay. So it is a different --

MR. DAVEY: Yes.

CONSULTANT WALLIS: Won't the slopes liquefy, too?

MR. DAVEY: We do an analysis to see if they liquefy, and if they don't liquefy, then we do an analysis to see if they --

CONSULTANT WALLIS: They're full of water. They are full of water. I mean the groundwater level is up there.

MR. DAVEY: Yes. Yes, liquefaction mainly occurs under the groundwater, right. So we only look at that.

CONSULTANT WALLIS: You're arguing that the soil has a certain nature that doesn't allow it to liquefy?

MR. DAVEY: Yes, these saprolites, it is highly unlikely that they will liquefy.

CONSULTANT WALLIS: The ground structure is such that it --

MR. DAVEY: Yes, yes.

CONSULTANT WALLIS: -- blocks or something?

MR. DAVEY: Exactly. In fact, that is what a saprolite is. It is basically a rock that has weathered in place, and it has become a soil, but it still has a lot of structure whereas --

CONSULTANT WALLIS: Okay. So it will never become a quicksand?

MR. DAVEY: If you think of a beach sand, it has no structure.

CONSULTANT WALLIS: This is the Bishop approach, is it?

MR. DAVEY: The Bishop approach is the slope stability analysis approach.

CONSULTANT WALLIS: This is the R.E.D. Bishop?

MR. DAVEY: This is --

CONSULTANT WALLIS: R.E.D. Bishop, isn't it?

MR. DAVEY: English gentleman, yes. He's, unfortunately --

CONSULTANT WALLIS: He told me at one time --

MR. DAVEY: Oh, okay.

CONSULTANT WALLIS: -- it was his approach.

MR. DAVEY: It has been a while.

(Laughter.)

CONSULTANT WALLIS: Well, you are going back to Tetsagi, and Tetsagi never taught me because I think he died before I was even born.

MR. DAVEY: Well, he is long gone.

(Laughter.)

MS. BORSH: I'm afraid to go on.

This data was required because the seismic acceleration at the sound bedrock level is amplified or attenuated up through the weathered rock and soil column. The data was used to estimate this amplification or attenuation.

So we've got the data in FSAR, along with the resulting response spectrum for the analyzed rock and the soil profiles. Okay?

CONSULTANT WALLIS: What does "extremely low" mean?

Now your slide numbers are not the same as mine, which makes it a little awkward.

MS. BORSH: I'm sorry.

CHAIRMAN CORRADINI: They are. She's just moved a slide on you.

CONSULTANT WALLIS: They're offset by two or something, yes. They are; they're offset. They're offset. That's why I'm having a little trouble. Two slides too early or too slides to late?

CHAIRMAN CORRADINI: Too early.

CONSULTANT WALLIS: Okay, I'm sorry. I'm trying to follow your slides and the numbers are not the same as mine. Okay. Sorry.

MS. BORSH: Yes, because you did seem like you were ahead of us.

CONSULTANT WALLIS: It is much easier to read than it is to look up --

CHAIRMAN CORRADINI: Your question is on 38.

CONSULTANT WALLIS: On my 38?

CHAIRMAN CORRADINI: Yes, not their 38.

CONSULTANT WALLIS: I'll tell you. Okay.

CHAIRMAN CORRADINI: You've got to pay

attention to the slides.

CONSULTANT WALLIS: But we were told to read them because it was better. Okay.

(Laughter.)

MS. BORSH: Okay, so next slide. Okay.

So we created these shear wave velocity profiles, and we used them for the slope stability analysis, the liquefaction analysis, and for the backfill that we did for the fire water storage complex.

As it turns out, the only Seismic Category I structure that will be founded on compacted structural fill is the fire water storage complex. So we plan to remove the saprolite and replace it with sound, well-graded, angular gravel-sized material.

CONSULTANT WALLIS: But we just heard that saprolite was good.

MS. BORSH: Some saprolite -- well, I'm sorry. John, go ahead.

MR. DAVEY: Yes, the very bottom stuff is what is called the Zone IIB saprolite, is a very dense sand. But, to be honest, on the site there's not a whole lot of it. It comes and it goes, and so from a design point of view, just as far as getting a sound design, we decided to take it out below all the

Category II structures, both the Zone A and the Zone IIB.

CONSULTANT WALLIS: Well, but granular material is more likely to liquefy, isn't it?

MR. DAVEY: Not if it's very dense.

CONSULTANT WALLIS: Dense enough?

MR. DAVEY: The Zone IIB --

CONSULTANT WALLIS: If it is well-graded enough for the ground --

MR. DAVEY: Right, yes. No, actually, the one most likely to liquefy is a very clean sand if it's got no fines, no silt at all. It's much more likely to do it. It is the opposite, basically, of the IIA saprolite that we were talking about that has lots of structure and lots of silt.

MS. BORSH: The primary source of the fill that we are going to use is the bedrock that we are going to be excavating to construct the Unit 3 power block. Because this fill will be obtained from the new plant excavation, we are not able to measure shear wave velocities for the fill. So we used estimates to obtain the shear wave velocity profile range for the analyses that we performed.

Now let's talk about liquefaction.

CONSULTANT WALLIS: Estimates had some

basis?

MS. BORSH: I'm sorry, Graham. Pardon me?

CONSULTANT WALLIS: The estimates, they have some basis? I mean they're not just some sort of judgment thing?

MR. DAVEY: Yes, they have some basis, though we don't have a test fill, but --

CONSULTANT WALLIS: You have real measurements with similar materials?

MR. DAVEY: Yes, we have a gradation, a planned gradation, that we will use, and we have a compaction criterion, and we know the mineralogy. So it is going to be a very tough fill.

MS. BORSH: Now we are here for liquefaction potential. This is the only slide on it.

What we are saying is that we included discussion of the potential for liquefaction in the SSAR. We looked at the material at North Anna and we determined that the only material that requires analysis is the Zone IIA sapolitic soil that John has been talking about.

The analysis determined that the chances of liquefaction occurring in the Zone IIA saprolite are extremely low.

CONSULTANT WALLIS: The chance of my

believing that statement is pretty low.

(Laughter.)

So what do you mean by "extremely low"?

MR. DAVEY: We actually have never quantified. We basically looked at a whole lot of samples and we found, based on the analysis, that there are a few of them that are capable of liquefaction.

CONSULTANT WALLIS: You actually have a number, didn't you? I'm trying to find it here.

MR. DAVEY: We have, in the FSAR, I believe we do have some actual numbers of how --

CONSULTANT WALLIS: Two of 18 results?

MR. DAVEY: Right. Right.

CONSULTANT WALLIS: Well, two of 18 doesn't look very low.

MR. DAVEY: Yes, but those would only be the materials within that were potentially liquefiable within the Zone IIA saprolite, though perhaps the more important point is that it's almost an academic study. It is almost for a completeness that we are studying liquidity --

CONSULTANT WALLIS: Well, it isn't academic because you need to know what the chance of liquefaction is. That is a real design problem.

MR. DAVEY: But I guess the point is that all of this material will be removed.

CHAIRMAN CORRADINI: That is what I thought you had said earlier.

MR. DAVEY: Right. Right. So it is more for --

CONSULTANT WALLIS: But put it in something else which you know is not going to liquefy or are you --

MR. DAVEY: Right, right. The structural fill will not liquefy.

CONSULTANT WALLIS: Yes, but then this extremely low means there is some probability?

CHAIRMAN CORRADINI: But the material won't --

MR. DAVEY: This is originally based just on the Reg Guides require that we characterize the sites and do a liquefaction analysis.

CHAIRMAN CORRADINI: Let me say it back, so I get it clear.

They are required to characterize the site. This material was removed before they prepared the site for the seismic structures. So it isn't going to be there.

CONSULTANT WALLIS: But Zone IIA

saprolite, that's something else. That's still there, isn't it?

MR. DAVEY: But not within the power block.

MS. BORSH: It is there today, but once we --

CONSULTANT WALLIS: So why do you even put it on the slide then if it has been taken away?

CHAIRMAN CORRADINI: They are required to characterize it.

CONSULTANT WALLIS: Oh, I see. Then it says, "Any liquefaction that does occur will not impact".

MR. DAVEY: Right.

CONSULTANT WALLIS: Well, what sort of analysis did you do of what might occur? That is a categorical statement. Now that means you made a quantitative analysis of --

CHAIRMAN CORRADINI: Stuff that won't be there.

MR. DAVEY: I mean, on the whole site itself, there will still be saprolite. So, if there is a design earthquake, we can expect that within the whole site there will be small zones of liquefaction and you might see some slight settlement.

CONSULTANT WALLIS: Well, this statement that it will not affect the stability, that is because of what?

MR. DAVEY: It's not there. Sorry.

CHAIRMAN CORRADINI: The power block, just to say it again, the power block where they are going to have the plant will not be there.

CONSULTANT WALLIS: But if it were there, it would still have a very small effect? Is that what you are saying?

MR. DAVEY: Sorry?

CONSULTANT WALLIS: You're saying, if it were there --

MR. DAVEY: If it were there, under the design earthquake, ignoring age and mineralogy effects, then the analysis shows that there could be some samples that would liquefy.

CONSULTANT WALLIS: So what is the basis of the second sentence here? I don't understand. The liquefaction that does occur -- how much liquefaction do you need to have an impact on stability, and how do you assure yourselves that it is not going to occur? This is a statement that has to have some back --

CHAIRMAN CORRADINI: Let me try one more time. What I'm looking at is they are saying, where the power block is, there will be no Zone IIA material. Somewhere in the site there will be Zone IIA material, but that won't affect the --

CONSULTANT WALLIS: Oh, then that's more specific. If you say liquefaction which occurs somewhere else on the site than the places that support key equipment doesn't have any safety influence, is that what you mean to say? That is not what that says, though.

CHAIRMAN CORRADINI: But I think that is what they meant to say.

CONSULTANT WALLIS: What you meant?

MR. DAVEY: Yes, and I think in the SSAR --

CONSULTANT WALLIS: Making sure that there is no liquefaction where it could do any harm?

MR. DAVEY: Right, right. I think probably, for the sake of brevity in the slide, we have --

CONSULTANT WALLIS: But it might happen. It might make some truck sink a little bit in the sand somewhere, but it is not going to hurt any structures, right?

MR. DAVEY: Exactly. Exactly.

MEMBER STETKAR: I need just a little bit of help. I understand that no Seismic Category I structures are going to be grounded on the saprolite. Are there any Category II structures that will be?

MR. DAVEY: No, no, no. None of the power block or any other major structure will be on the --

MEMBER STETKAR: No Seismic Category I or II?

MR. DAVEY: Right.

MEMBER STETKAR: Okay, thanks.

MS. BORSH: In 2.5.4-10 of the FSAR, we discuss static stability, including an analysis of the bearing capacity. We determined that the allowable bearing capacity values are adequate for Seismic Category I and II structures and for the radwaste building.

We also performed a settlement analysis and determined that the total and differential settlement values are well within the DCD limits for Seismic Category I structures.

Finally, in Section 2.5.4-10, we provide information about the static and seismic lateral earth pressures.

Oh, 2.5.5, stability to slopes. This section of the FSAR addressed the stability of slopes at the North Anna ESP --

CONSULTANT WALLIS: Now wait a minute. I'm sorry now.

MS. BORSH: That's okay.

CONSULTANT WALLIS: I'm not on the right slide again, but I'm somewhere in 2.5.5, something about FS. FS is a factor of safety? It seems to be close to one.

MR. DAVEY: Yes. Basically, for the seismic event, the design seismic event, the accepted factor of safety is a range, but for a well-characterized site it is 1.1.

CONSULTANT WALLIS: Is it always above 1.1 in your analysis or sometimes it is not?

MR. DAVEY: I believe it is always -- it wasn't in the ESP, but I think it is in the COLA.

MEMBER STETKAR: No, no. There's a statement that says, for the seismic margin assessment, resulting FS values ranged from about 1.05 to 2.95, with an overall average value of about 1.6. So, apparently, under some analysis parameters, the FS value is below 1.1.

Not being a structural or seismic analyst, this is all under the liquefaction area. Is that strictly for the Zone IIA saprolite, I mean all these values that are quoted in here?

Again, I'm not a geotechnical engineer.

MR. DAVEY: Right, right. Well, there's basically only two slopes on the site that would cause any problems potentially if they failed during the seismic design event. One is an existing slope on the site that, if you go to the sites, you can see it. It leads down from the service water pond down to Units 1 and 2.

The second one will be up to the southwest of the fire water service complex. It is an existing slope, but it will be cut back for our construction. It's got a three-to-one slope.

From a static point of view, they are very safe. There is no chance of failure. From a seismic point of view, this is where the pseudostatic analysis comes in.

When we say a pseudostatic analysis, it means that we take the seismic force and we treat it just like a hydrostatic force. It is a constant force that lasts forever. So it is a very conservative approach to looking at how a slope will react, ignoring liquefaction.

It is really limited analyses. If you can achieve your required factor of safety using the pseudostatic method, then it is very conservative. If you don't, then I think those are the numbers you are referring to, and you have to --

MEMBER STETKAR: No, this is under liquefaction actually. This is in, if you have it, it is 2.5.4.8.1 --

MR. DAVEY: Oh, okay. Sorry. Sorry.

MEMBER STETKAR: -- of the SSAR. It says, "Liquefaction analyses performed for Unit 3, subpart B, updated seismic margin assessment." So it is an analysis --

MR. DAVEY: Right.

MEMBER STETKAR: -- for liquefaction.

MR. DAVEY: Okay, I'm sorry. Sorry. I thought you were talking about --

MEMBER STETKAR: It is not the static --

MR. DAVEY: Okay, I thought you were --

MEMBER STETKAR: It is not the part that you were talking about.

MR. DAVEY: Yes. There will be numerous liquefaction analyses performed for the site. I think this is getting back to the extremely low chances. Basically, what we were saying there is the factor of safety that you were quoting went from 1.6 to 2.5, I think. So those very low ones would come under the extremely low, but possible chances of liquefaction.

MEMBER STETKAR: But I guess my question was going back to, is that liquefaction analysis performed presuming that the Zone IIA saprolite is the base material? Or is this a liquefaction analysis performed under the plant as-built conditions?

MR. DAVEY: No, this is just a liquefaction analysis based on all of the samples that were taken during the investigation. So it is not necessarily --

MEMBER STETKAR: This factor of safety, this 1.05, doesn't necessarily pertain to the as-constructed plant?

MR. DAVEY: No, no.

MEMBER STETKAR: Okay.

CONSULTANT WALLIS: So what is it for the as-constructed plant?

MR. DAVEY: Well, we're getting back to what we were talking about before with the saprolite. Within the power block, it is removed and replaced.

MEMBER STETKAR: It is effectively infinite, is what they are saying, because --

CONSULTANT WALLIS: A factor of safety is infinite? No, that's never -- you never have a factor of safety that is infinite.

MR. DAVEY: I didn't say that.

MEMBER STETKAR: What was that 1.1?

CONSULTANT WALLIS: You mean it is 1.1.1?

MEMBER STETKAR: They claim the fill won't liquefy.

CONSULTANT WALLIS: It will never liquefy?

MEMBER STETKAR: It's effectively infinite.

MR. DAVEY: Yes.

MEMBER STETKAR: For liquefaction anyway.

MR. DAVEY: Right.

CONSULTANT WALLIS: These figures that show these low or tables that show these low values, why are they there? They give us a misleading impression that you have a low safety factor.

MR. DAVEY: Now are we talking about liquefaction or are we back on slopes for the --

CONSULTANT WALLIS: Well, I don't know. I just know there were factors of safety listed in 1.1, whatever the table was. I don't have enough -- well, you are in figure -- I've got a figure 5.5-3, but you've got something else. You had something else.

MR. DAVEY: I was reading the text from the FSAR. I didn't find a table.

CHAIRMAN CORRADINI: Why don't we take this offline?

CONSULTANT WALLIS: Yes, we can. I don't know if it is a big issue. It is just I was a bit concerned to see these low factors of safety; that's all. I wanted to know what was going on. I don't know if it is a big issue. It is just I was a bit concerned to see these low factors of safety; that's all. I wanted to know what was going on.

CHAIRMAN CORRADINI: We'll clarify.

MS. BORSH: All right. So, here in 2.5.5, we talk about stability of slopes. SSAR 2.5.5 addressed stability of slopes at the North Anna site.

CONSULTANT WALLIS: The staff will clarify it all when they get up.

CHAIRMAN CORRADINI: Good.

MS. BORSH: Yes.

However, the information that we presented in the FSAR replaces the analyses that we had in the SSAR because the slopes that we are considering are different than what were in the SSAR.

Also, for the seismic slope stability analysis, the peak ground acceleration being applied is different, but we used, essentially, the same method of analysis.

The changes result in a variance to the SSAR. The new Unit 3 specific slopes are lower, less steep, and have a smaller applied seismic acceleration than the slopes analyzed in SSAR Section 2.5.5.

So, as a result, the slopes addressed in this section have a higher computed factor of safety against failure and are stable both under long-term static and short-term seismic conditions. Therefore, we believe this is an acceptable variance.

So, in this section, we describe the Unit 3 slopes, discuss the impact of slope instability, provide slope characteristics, summarize the design criteria and analyses, and provide the boring logs. We also addressed two ESP COL items by evaluating the existing service water reservoir slope and the new slope southeast of the fire water storage complex that John talked about.

The evaluation determined that these slopes remain stable under long-term static and seismic design conditions.

Our last slide for the 2.5, there are eight open items in this SER. The first item is tracking our response to an RAI that asked us to provide the engineering properties of concrete fill.

The second open item involves the methods that we will use to confirm that the backfill design criteria and DCD site parameter values are met during and after construction.

The third open item deals with the method for determining shear wave velocity below the fire water storage complex.

The next item is tracking an RAI that asks us about the differences between the estimated dynamic settlements presented in the SSAR and the FSAR.

The fifth open item involves the properties of the concrete fill and how they were determined and used in the allowable bearing-capacity calculation.

The sixth open item tracks an RAI that requests us to address the possibility of local failure within the backfill layer beneath the concrete mat in the foundation stability analysis of the fire water storage complex.

The next open item is tracking a question about the load combinations that were used in the dynamic bearing-capacity estimate for the site.

And the last open item is tracking an RAI that requests justification and clarification for the site-specific coefficient of friction that we used to calculate the site-specific factor of safety against sliding between the base mat and the underlying material.

And there are no confirmatory items in this section.

Any questions before we turn it over to NRC?

(No response.)

Okay, thank you.

MS. BERRIOS: Well, now we are going to be presenting Section 2.5, and for 2.5, we have Dr. Weijun Wang and Dr. Vladimir Graizer. Now I am going to leave you for the technical presentation.

DR. WANG: My name is Weijun Wang. I am a geotechnical engineer in NRC.

We will present the summary of the staff review of the North Anna COL application, Section 2.5. I will present all the sections related to that area, and my colleague, Dr. Graizer, will present the section related to the seismic and the ground motion analysis part.

The content of the COL application, we already saw the presentation from Dominion, and we have the overall idea about the COL application in Section 2.5, and clear it was that most of the portion of the COL application was incorporated by reference from the ESP application. So the only things new in the COL application are based on the ESP application and address all the COL items and the ESP permit conditions and some variance.

The following presentation of the folks on the scope of the COL application, just as I mentioned, is incorporated by reference from the ESP, and there are four COL items defined by the standard design. The COL application addressed the four COL items.

Also, there are items, really, to the ESP applications. They total 11 ESP COL items, and the four ESP permit conditions and the four ESP variances. I am not going to repeat all the items here because Dominion already presented that. I will just give you a summary of the staff reviews.

Section 2.5.1 is basic geological and seismic information, and 2.5.3 is the surface faulting. For those two sections, there are no outstanding issues because it is all incorporated by reference from the ESP, and the applicant provided additional information to address the COL items. So there are no outstanding issues regarding Sections 2.5.1 and 2.5.3.

DR. GRAIZER: Now the section vibratory ground motion. Again, similarly, most items are incorporated by reference from the ESP. This is why we will not talk about them, but there are some differences which are addressed in the COL.

Specifically, the most important difference is that the control point elevation was changed from 250-foot elevation to 273-foot elevation. As a result, ground motion response spectra was revised, based on this new elevation, and also foundation input response spectra were calculated at the elevation 241 foot, 224, and 282 foot for the control building, reactor building, and others.

Okay, next slide, please.

Now what we did at NRC, we decided, of course, to check what the applicant did. Here you can see three curves. One is gray; another is red, and blue.

The blue one is the old curve from ESP, and the red one is ground motion response spectra that the applicant presented. We didn't take their word for granted, and we did independent calculations using different ground motion time series.

Basically, our analysis showed that our results are even a little bit lower at higher frequencies, but basically it is at least bounded by what the applicant did.

Now what we did, we did kind of a classical seismic analysis. We took different ground motions from similar size earthquakes and we ran it through the SHAKE program. That is what we got.

Basically, our confirmatory analysis showed that what the applicant presented makes sense and is more conservative, actually, a little bit more conservative, than what we got.

CONSULTANT KRESS: Looking at these curves, what would you have done if your particular calculation actually crossed over the line?

DR. GRAIZER: Okay. I'm sorry, maybe I didn't understand. Can you --

CONSULTANT KRESS: Your calculation showed or your analysis was not quite as conservative as the ESP one, for example.

DR. GRAIZER: Of course, the first thing I would do, I would check my calculations. That is No. 1. I will probably run more time series because the results depend upon what kind of time series you use.

In this specific case, there are two controlling earthquakes. One is 5.4 magnitude at the distance of 12 miles, and the second one is 7.2 at 190 miles.

Basically, if hypothetically it happened what you asked, you are asking, I would review my calculations, try a different time series. That is the No. 1 point.

But I would confirm that my calculations are right and, unfortunately or fortunately, different from the applicant; we will raise this question. It should be in the hypothetical case, if we got higher results, we will ask for a supplemental RAI.

CONSULTANT KRESS: I presume you are using the same methodology.

DR. GRAIZER: It is partially true. The methodology that we are using is developed by Professor Seed at UC Berkeley and Professor Ebers, also from UC Berkeley, at this time in 1969. It is called SHAKE analysis. It is very well-known. And actually, as far as I know, it is the best-tested program in this area in the world.

Now the difference between our analysis and the applicant's analysis, we use --

CONSULTANT KRESS: That is really what I was asking.

DR. GRAIZER: Oh, okay. Sorry.

We have big experience with ground motion. Specifically, the difference is that we are using a different time series. Basically, I am picking up the time series from a much broader database, and believe me, I have many years of experience working in

California with ground motion. Basically, I am picking up different time series and I am trying to push a little bit farther than maybe they are doing. But, in this case, I have to say it worked very well.

CONSULTANT KRESS: But you do understand why these curves differ?

DR. GRAIZER: These curves are different, yes, I understand. It is kind of because of different time series that were used. In this specific case, they were more conservative than I was.

CONSULTANT KRESS: Good. Thank you. I appreciate it.

DR. WANG: Okay, let's continue for Section 2.5.4. That is the main sections where we have more RAIs, and all the open items are from these sections, because these sections deal with all the subsurface material property and the stabilities. It affects the stability and the safety of the structures.

So the applicant responded to our 11 RAIs, and then after we reviewed the applicant's response, we issued additional supplemental RAIs with regard to the eight open items.

This figure, actually, I copied it from the COL application. It is not a high-definition one.

Probably you can get a better view from the application files.

But, anyway, this figure showed all the boring locations which is during the COL, the site investigation in the power block area. You can see there are quite a few new borings added during the COL application.

Next slide.

This slide gives you the overall idea for the comparison of what the site investigation program performed during the ESP and the COL. Just to point out, for example, during the COL, the site investigation, an additional 55 borings were conducted. Why we needed more boring during the COL, probably everybody knows that. But I just repeat it again to point out that is because based on the 10 CFR 1.23, and also following the Reg Guide 1.132, all the borings that you assess, you have to choose the design, the borings, to cover all the safety-related structure for the plant, and the detailed guidelines about how far away the borings should have been, how thick the borings should go. Also, we can see the addition of the field tests performed during the COL.

Now let's talk about the open items. So here I gave the summary of the open items again.

For the open item 2.5.4-3 and -6, those two items are related to the concrete fill underneath the safety-related structure foundations. Because, in a site, before they put down the foundations, they will remove all the weathered rock because you can image the surface won't be perfect, smooth. So they need to put down the concrete fill to level it out.

So we need the detailed information, the property of the concrete fill, in order for us to evaluate if the concrete fill is suitable for the safety-related strata foundations. So that is why we raised the question about that. Actually, those two items are related to the concrete fill properties.

Open item 2.5 --

CONSULTANT WALLIS: How thick is this concrete fill? I understand you have sort of a non-level rock surface and you put some concrete fill on it. Then you build your foundation on that, is that it?

DR. WANG: Yes.

CONSULTANT WALLIS: So how thick does this fill have to be?

DR. WANG: The thickness is varying.

CONSULTANT WALLIS: Yes, but what sort of range is it?

CHAIRMAN CORRADINI: From zero to what?

CONSULTANT WALLIS: Well, it is never zero, is it? Oh, is it at zero?

DR. WANG: Oh, yes, in some places it will be zero, yes.

CONSULTANT WALLIS: Okay.

DR. WANG: It is from zero to -- I think probably Dominion can answer that question.

MR. DAVEY: I think 22 feet is the maximum thickness.

CONSULTANT WALLIS: Feet of fill?

MR. FITZGERALD: Based on the borings, yes. Of course, the size of the foundation is 250 feet by --

CONSULTANT WALLIS: From top to bottom? Because of the rock structure, is it?

MR. DAVEY: Right. There was rock extending under the building; it goes down 22 feet. So it will be removed and replaced with the concrete fill.

CONSULTANT WALLIS: Do you do it in layers or something?

MR. DAVEY: It is quite a task. What you are trying to prevent is excess heat hydration. So you want it relatively low-strength, low-cement content, and thin layers.

DR. WANG: Okay. Open item 2.5.4-4 and -5, it is all related to backfill soils. Actually, this is an ITAAC issue there. I probably should add at least a couple of words about why we raised the ITAAC issue for the backfill soil, because there is no ITAAC items in the standard design for the backfill.

According to our Regulatory Guide 1.206, the guidelines indicate that we should know the property, including the materials property and the mechanics property of the backfill soil if the backfill soil is going to be placed under the safety-related strata foundations. And because of that, for any application, if the applicant does not know the source of the backfill soil, and therefore, they don't know the property of the backfill soil, then we would like to get some kind of insurance, if you will, ensuring that the backfill soil has the properties which will meet the standard design.

For example, in the ESPWR design, there are the site parameters for the site soils, like the minimum shear wave velocity requirement, which is 1 feet per second, and also the internal friction angles also have a requirement in this standard design.

Because for North Anna the COL application does really not know exactly the source, and therefore, all the parameters for the backfill soil will assume, like the starting property and dynamic property all will be assumed in the calculation, such as the bearing capacity, the settlement, and SSI analysis.

So, because of that, we raised the question we would like to have the ITAAC to ensure the property fits the standard design and meets or exceeds the parameters that are used in the analysis. So, because of that, though, those are the questions, and we do have open items regarding them.

Okay, the open item 2.5.4-7 and -11 is related to the foundation stability. So one is about the possibility of the local failure of the backfill soil underneath the foundation. Another one is the justification of the dynamic bearing-capacity determination. That is regarding those two open items.

Open item 2.5.4-8 is regarding the coefficient of friction at the foundation interface, which is one set parameter required by the standard design.

The last one is open item -- this open item is not really related to the safety-related structures, but is one item that we would like to get it a clear explanation, which is we found out that in this there is a big difference about the seismic or dynamic settlement at the site to calculate the ESP and in the COL. So that is the total eight open items.

CONSULTANT KRESS: Could you clarify this item 4-8 on the site-specific coefficient of friction?

DR. WANG: Okay. This open item is because in the standard design there is a requirement for the coefficient of friction, which is .7, because that is the value that was used to calculate the resistance to sliding of the foundation.

The question was asked, the interface between the base mat and the backfill. We would like to get a clear answer about that.

CONSULTANT KRESS: Does that enter the seismic analysis?

DR. WANG: It will be involved in the analysis statically and the seismic analysis regarding the sliding stability of foundations.

CONSULTANT KRESS: But the foundation is buried deep. I don't understand how you would even encounter any sliding, frankly. It is beyond me as to where this enters into the picture anywhere.

DR. WANG: Well, because, remember, this one safety-related structure is FWICC. That structure is build on the backfill soil. It is not into the ground.

CHAIRMAN CORRADINI: What Dr. Kress is asking is, the power block is sitting like this. You are asking for the interface here --

CONSULTANT KRESS: That's right.

CHAIRMAN CORRADINI: -- if you wiggle it. Are you saying that you are assuming the edges aren't there to anchor it and it is just doing this? What is the assumption?

DR. WANG: Okay. Because for this design, the standard design, they calculate the stability of the structure that you can ignore the embankment.

CHAIRMAN CORRADINI: Okay. So there is no sag?

DR. WANG: Right.

CHAIRMAN CORRADINI: Okay, fine.

DR. WANG: Because we needed to make sure the coefficient of friction will meet the design.

CONSULTANT KRESS: It sounds to me like that is not conservative, but it goes the other way. I would prefer to transfer the force completely through the building, which is --

CONSULTANT WALLIS: Would it be free to move around?

CONSULTANT KRESS: If it is free to move around, you are reducing the --

CONSULTANT WALLIS: It shakes what is inside if it moves around.

CHAIRMAN CORRADINI: We had an analysis in the DCD about this, which led to other questions. But I think I understand the open item.

CONSULTANT WALLIS: Well, so this coefficient of friction is when it is saturated soil? Does the liquid do something to the coefficient of friction?

DR. WANG: Actually, it is this coefficient of friction is based on the internal friction angle, and we use the so-called effective internal friction angle. It does not count on what pressure is there.

CONSULTANT WALLIS: But this is a wet surface. So the coefficient of friction, because it started moving, is probably quite different from what it is once it begins to move and you've got liquid layers between -- what coefficient of friction are you talking about, some completely static one or a dynamic one when it is moving?

DR. WANG: Okay. This parameter is the static parameters. It is the static --

CONSULTANT WALLIS: The static parameters?

DR. WANG: Yes. We are not talking about the dynamic of the coefficient of friction.

CONSULTANT WALLIS: So you are saying, will it move at all?

DR. WANG: And this is the design based on that, which as long as you meet this requirement, which means the structure, the foundation, will not slide.

Let's come down to the stability of the slope. That is Section 2.5.5.

For this section, there is one variance which requires you use the new information often during the COL application regarding the site and the soil properties, and to perform the new slope stability analysis, and the applicant did that.

There are no outstanding issues, although we issued three RAIs, and the applicant answered all the questions. Even that is okay. So we still conduct our own confirmatory analysis.

CHAIRMAN CORRADINI: Why?

DR. WANG: Why? Because the one thing, it is like we would like for some slopes we get like the factor of safety of 1.2 or even a smaller number there. And too, we would like to have tested to have our own confidence to see how we feel about the values, the numbers, that the applicant applied to us.

We cannot just say, okay, I see the application and everything is fine, and we say okay. The fact of that, we assure you the result of our confirmatory analysis.

Okay, this slide shows the slope. We chose to conduct our own confirmatory analysis. The slope, you can see from the figure, all the soil properties were obtained from the application, based on the laboratory tests and the field test results.

The only differences here are I did not ask the applicant to provide me their input file. I created our own input file here.

Also, during the calculation, the search for the failure surface of the slope probably also there is a little bit difference because, although we used the same software, in the software itself you can have your choice as to how to determine the failure surface.

So you can see I tried to get the factor of safety using a different method. In the COL application, the applicant provided us with the factor of safety using the Bishop method. If you read the numbers, yes, they are somewhat different here.

You ask why they are not identical. All I can tell you is, as I mentioned previously, I did not ask them for their input file. So I created my own input file. And too, because the method to search for the failure surface may be different.

CHAIRMAN CORRADINI: But I guess I have a simple question. Should I be concerned or not? And why should I be concerned?

DR. WANG: Okay. For the slope stability, generally, if you get the factor of safety greater than 1.0, which means the slope will not fail --

CHAIRMAN CORRADINI: Okay. All right.

DR. WANG: So I am not too worried. But if you read a number, it is 1.0-something, the lowest one I got is 1.026. Then people may have questioned, how about if I get 1.002001? Should I be worried?

CHAIRMAN CORRADINI: But I guess what I am asking is, I just want to move on, but I am trying to understand this figure. So the staff did a series of calculations using different assumptions and got everything from 1.026 all the way up to 1.105? Do I read this right?

DR. WANG: Yes.

CHAIRMAN CORRADINI: Okay. And you assumed a set of input, which you didn't necessarily check with the applicant, but you got above 1. So I get that part.

So the reason I am worried is because the green stuff could slosh into the gray area? Is that what I am worried about? And cover it up?

DR. WANG: Well, you look at the curve. Okay, that slope, the failure surface will be on the top, the green area.

CHAIRMAN CORRADINI: Right. Right.

DR. WANG: So, if that slope fails, that portion of the soil may move to --

CHAIRMAN CORRADINI: Fine. That's what I was asking.

DR. WANG: Yes.

CHAIRMAN CORRADINI: Okay. Got it. Thank you.

CONSULTANT WALLIS: That stuff is the IIA saprolite? The green stuff is a subportion of the orange stuff?

DR. WANG: Right. That portion of the soil would move if it did happen, if it did fail, that slope.

CONSULTANT WALLIS: Okay, but then you

have to put in a phi of 33 degrees Janbu, and if the phi had been 30 degrees for a smaller factor of safety, I'm not quite sure whether we should be concerned or not.

DR. WANG: Well, the answer is probably not. You know why?

CHAIRMAN CORRADINI: Okay. So then let's move on.

CONSULTANT WALLIS: So I should probably not be concerned? I don't know what that means.

DR. WANG: Okay.

CONSULTANT WALLIS: But the staff thinks it is okay?

DR. WANG: Okay. My answer is, why I said, "Probably not", because this method is a deterministic method. The other parameters used here were based on the many field and laboratory tests results, and it is more likely the parameters that were chosen here are more conservative.

CONSULTANT WALLIS: More conservative?

DR. WANG: More conservative, because of the variation, you know, in the geotechnical field, the variation is very, very huge. I can say it is huge. So that is why, for the geotechnical engineer, when we try to use one number here, we have got to be very, very careful.

For example, you will get a bounce here of like 200 and a couple of like 800. You will say, okay, can I use 800? That will never happen. Okay?

But there is still a concern here because of the variation. Because we also have the other concerns. So the next slide I will show you --

CONSULTANT WALLIS: The next slide bothers me a bit because you take the green point is the applicant's value.

DR. WANG: Right.

CONSULTANT WALLIS: Then you take a varying phi.

DR. WANG: Yes.

CONSULTANT WALLIS: But if you had taken your value of 1.098 and drawn a similar line, it would have cut down below 1.

DR. WANG: Right.

CONSULTANT WALLIS: So what does that tell you?

DR. WANG: Okay. The next slide, under the next one, gives you some flavor of the variability, how the variability affects --

CONSULTANT WALLIS: If I take your value of 1.098 at 33 --

DR. WANG: Yes.

CONSULTANT WALLIS: -- that is much lower. Then I draw sort of a parallel line to your line.

DR. WANG: Yes.

CONSULTANT WALLIS: And it goes below 1, doesn't it, when I get down to 30?

DR. WANG: No. Okay, here I am trying to show you that the variation of some parameters will affect the suitability of the slope.

CONSULTANT WALLIS: This is starting from 1.28 or something here?

DR. WANG: Yes.

CONSULTANT WALLIS: It's not 1.2? If you had started from 1.098, which is your value, see what I mean? If I take your Bishop value instead of the applicant's value --

DR. WANG: Yes.

CONSULTANT WALLIS: -- then this line would be lower.

CHAIRMAN CORRADINI: I want to understand, if we are going to get into these weeds, if there is a problem.

DR. WANG: No.

CHAIRMAN CORRADINI: Okay. Then I would rather move on.

CONSULTANT WALLIS: He says probably not. See, the only reason I am asking questions is I need some assurance that what he is doing is reasonable --

CHAIRMAN CORRADINI: Right.

CONSULTANT WALLIS: -- and the conclusion is valid. There seems to be enough vagueness that I am not quite sure how confident I should be.

MR. MUNSON: If I could, there's not a one-to-one relationship between phi and the factor of safety. On the next series of slides, there's several parameters that he varied over -- I'm Cliff Munson, the Branch Chief of Geosciences and Geotechnical Engineering.

He varied these three parameters over a wide range of values. So you can't just look at one factor of safety that he got for the overall result and go down and say, well, that corresponds to a phi of this value.

MEMBER STETKAR: What he has done here on the phi, if I can understand it, is holding soil properties' horizontal acceleration constant, what is the variability on the factor of safety by varying phi.

MR. MUNSON: Right, right. He is looking at it one parameter at a time.

MEMBER STETKAR: He is looking at one parameter variability.

CONSULTANT WALLIS: But he is using the applicant's value and not his value.

CHAIRMAN CORRADINI: Well, I mean let's just back up. I'm asking still if I'm worried, because you haven't even checked that your input is the same as the applicant's under the situation. So, until I hear that, I don't sense this is an audit calculation. Just where I am coming from.

So I look upon your values as relative, and the variation of the relative, but to compare them to the applicant's, I would have to be sure that what you are assuming and what they are assuming is on the same plane. Is that a fair statement?

DR. WANG: Yes, it is a fair statement.

CHAIRMAN CORRADINI: Okay.

DR. WANG: Yes.

CONSULTANT WALLIS: So why should I be reassured, just because you say there's no problem? The fact that there is no problem should follow logically from what you show me on the slide. That is the link I am missing.

CHAIRMAN CORRADINI: But I guess I don't think I want to -- unless there is a definite problem the staff wants to illustrate, what is bothering me is we are starting off with, we haven't even started with the same set of assumptions on the calculation. Until I do that, I don't think I can compare 1.-anything compared to 1.25.

CONSULTANT WALLIS: Well, presumably, they are starting with something which is pretty close.

MR. MUNSON: If I could, if you look at the next three graphs, he has varied phi, the cohesion and the acceleration over quite a wide range of values, and over the wide range of values he is still, for the most part, getting pretty high factors of safety. So I believe that is the factor that led us to determine that --

CONSULTANT WALLIS: Well, what you are telling me is the probability of phi being 30 degrees is very low or something like that?

MR. MUNSON: Right. You have to take phi all the way down to, say, 28 degrees, which I believe would be unreasonable; correct me if I am wrong.

CONSULTANT WALLIS: Using the applicant's value.

MR. MUNSON: The applicant's value is 33 degrees.

CONSULTANT WALLIS: Using the applicant's starting point.

CONSULTANT KRESS: I'm sorry. Is phi the angle of the slope with the horizontal?

MR. DAVEY: Sorry. Phi is the angle of internal friction of the soil.

CONSULTANT WALLIS: It's a property of the soil?

CHAIRMAN CORRADINI: Can I try it another way? I know about this. That is the reason I am thinking there is not a problem.

There is a continuum model. There is a basic physics model that says the maximum is somewhere around 30 to 32 degrees. If I do it other than that, it starts sliding, right? So I know the 32, the 30 degrees is about the right place to go, and it is unphysical that way and it is unphysical this way. It is unphysical this way because it will just slide back to 33. It is unphysical this way because it won't get to that point.

So I think the green dot, from a physics standpoint, is the starting point. It is unphysical -- so you just went to the extremes off of what is a reasonable starting point?

DR. WANG: Exactly.

CHAIRMAN CORRADINI: Okay. We don't think there is a problem. That is what I --

CONSULTANT WALLIS: Well, you don't think there is a problem.

CHAIRMAN CORRADINI: I mean it is not the angle of the slope of the soil. It is the internal way in which it essentially settles itself, which is sliding.

CONSULTANT WALLIS: This is the angle at which it would slide if it were put at this angle, isn't it. Angle of repose?

MR. DAVEY: It is the angle of repose, is what you are talking about, right.

CONSULTANT WALLIS: The property of the soil, and I am not sure you know the properties of soil that well. So it seems to me that the Chairman's conclusion that phi has to be very close to 33 is probably sort of a stab in the dark. But phi could quite easily be 31 or 35 because soils are not that reproducible. Now maybe I am completely wrong here.

DR. WANG: May I add a little bit more? Because for this presentation, we just gave you some summary. Actually, I did a lot more than that. I looked at the variability of the analysis. I happened to operate under that and it is around 20, and I can give you one number here.

If I use the variability that normally in the engineering field we use, for the other parameter I use, I get for that calculation, for the number, I got 1.09. The reliability or the failure, the probability of failure is .05 percent.

CONSULTANT WALLIS: .05 percent? That's five times 10 to the minus 4? That sort of thing is helpful. That is very helpful when you talk about a reliability analysis.

The logical thing, it seems to me, would be to put it in your uncertainties in terms of some probabilistic curves, and then figure out what is the confidence that you can get past some specification or some criterion, and then express that as a probability. Then that would tell us something.

DR. WANG: Well, the problem is the regulatory requirements; there is no such requirement. So we cannot require the applicant to use the reliability method to do their performance or their analysis.

CONSULTANT WALLIS: Civil engineering doesn't do that kind of thing, is it?

DR. WANG: Not in a standard. We do sometimes, but it is still not a standard.

CHAIRMAN CORRADINI: John, do you have a

question?

MEMBER STETKAR: I do on the slide that is actually up there with the variability as a function of horizontal peak ground acceleration. I want to make sure I understand this.

This does fix the soil properties and just vary the peak ground acceleration, right? So am I correct in saying that the slope will fail if I have a ground acceleration of .35g, let's say, a .32g or greater?

MR. MUNSON: Right, if it below 1.

MEMBER STETKAR: You are predicting slope failure?

MR. MUNSON: Right.

MEMBER STETKAR: Do you have any idea what the annual frequency of a .3g earthquake is at this site?

DR. WANG: Well, actually, in this site, the maximum, the maximum possible for the high-frequency earthquake, the maximum ground motion acceleration is .5.

MEMBER STETKAR: It's a maximum? Okay.

DR. WANG: Yes.

MEMBER STETKAR: But the slope is well-failed past there. I am asking you, do you know what the annual frequency, return period, however you calculate it, of a .32g earthquake is?

MR. MUNSON: We have to go back to the hazard curve to get that. I don't think we have that here, but I believe that would probably be 10 to the minus 4, 10 to the minus 5 kind of ground motion, .3, depending on the frequency.

MEMBER STETKAR: Yes, I would be interested in that answer.

MR. MUNSON: Okay.

MEMBER STETKAR: I didn't have the time to go look it up myself.

MR. MUNSON: Generally, what we do for the horizontal acceleration is we assume some fraction of the peak ground motion for this AH value, since that peak ground motion --

MEMBER STETKAR: Right, right, this is a dam. Okay.

CHAIRMAN CORRADINI: Why don't you go ahead and conclude?

DR. WANG: That will be our presentation on 2.5.

CHAIRMAN CORRADINI: Questions?

(No response.)

Let's take a break until 3:05.

(Whereupon, the foregoing matter went off the record at 2:52 p.m. and resumed at 3:07 p.m.)

CHAIRMAN CORRADINI: Let's start on Chapter 14. We are excited about Chapter 14. We have questions.

MS. BORSH: Shall we just skip to the questions?

CHAIRMAN CORRADINI: We have been trained at lunch; we have questions. No, go ahead.

MS. BORSH: Chapter 14, yes, describes our initial test program. We added information to the DCD sections that cover the initial test program for FSARs, ITAAC, and DAC closure. We added the description of the initial test program administration as an appendix to this chapter.

Next slide.

In Section 14.2, which describes the initial test program for the FSAR, we refer to FSAR Section 13.1 for information on the organization and staffing that will be in place to implement the pre-operational and start-up test program.

We describe the administration of the initial test program in an appendix to Chapter 14. We commit to making the start-up administrative manual available to the NRC for review at least 60 days prior to the scheduled start date of the pre-operational test program.

So, in Section 14.2, we provide another milestone. This one states that the approved test procedures will be available for review at least 60 days prior to their intended use for pre-operational tests and at least 60 days prior to scheduled fuel load for the power ascension tests.

We also commit to prepare start-up test reports in accordance with Reg Guide 1.16.

We address the DCD COL item by committing to make the detailed test schedule available for review prior to actual implementation, and we refer to Section 13.4 for the initial test program's implementation milestones.

Then we add a specific test here to the DCD's list of AC power system pre-operational tests. The test that we added demonstrates proper operation of the automatic transfer capability of the normal to alternate preferred power source.

MEMBER STETKAR: Do you know is that still in there? Or was that subsequently removed?

MS. BORSH: The tests that we added? It is still in Rev 1.

MEMBER STETKAR: Still in Rev 1?

MS. BORSH: Yes.

MEMBER STETKAR: Okay. I thought I read somewhere that that was folded into a different part of it. That is okay.

MS. BORSH: No, it should still be in there.

Section 14.2 still and the following sections, this is where we went on to add the site-specific pre-operational and start-up tests. These are in addition to the tests that we have incorporated by reference from the DCD.

We describe the pre-operational test for the station water system and the circulating water cooling towers. These descriptions include the purpose of the tests, the prerequisites that must be met, the general test methods, and the acceptance criteria.

Next, we define the initial start-up test for the CIRC cooling tower performance, including the purpose, prerequisites, test description, and acceptance criteria.

MEMBER STETKAR: Where are the pre-operational tests and start-up tests for the plant service water cooling towers?

MS. BORSH: Where the --

MEMBER STETKAR: The plant service water cooling towers? The cooling towers, not the amount of water in the basin, the cooling towers themselves, the ability of a cooling tower to remove the design basis heat load.

MR. HICKS: I think most of those are in the DCD and --

MEMBER STETKAR: No, they are not.

MR. HICKS: Well, then we added some. Didn't we add some in a response, the latest response?

MS. BORSH: An RAI response.

MR. HICKS: In an RAI response, we just recently added some testing.

MEMBER STETKAR: I didn't see any RAI that asked. I am going to ask the staff how come they didn't ask about that.

MR. HICKS: Yes, it was related to some of the open items in Chapter -- was it in this chapter?

MS. BORSH: Oh, no, we had some RAIs in Chapter -- John Modell, are you on the phone?

MR. MODELL: Yes, I just walked in.

MS. BORSH: John, welcome.

John Modell is from Dominion. He is our lead mechanical engineer.

John Stetkar from the ACRS, John, is

asking about where our plant service water cooling tower pre-operational tests are.

MR. MODELL: Yes.

MS. BORSH: Do you happen -- and I am sorry to catch you offguard like this, but do you happen to have an answer for John?

(Laughter.)

MEMBER STETKAR: No laughing.

MS. BORSH: That was not the answer, John.

MEMBER STETKAR: Thank you.

(Laughter.)

MR. MODELL: Well, I can say 14, and now I just need to find it in 14.

MEMBER STETKAR: I couldn't find it anywhere.

MR. MODELL: Well, again, Gina, it was in that last set of RAIs that we answered.

MS. BORSH: That is what Tom was thinking, too.

We will find that for you, John.

MEMBER STETKAR: Take it as an item. I would appreciate it because I looked through 14; I looked through 14 in the DCD.

MS. BORSH: Right.

MEMBER STETKAR: I can find basic basin

water capacity essentially, and in the DCD there are requirements for the flow through the system, you know, basic pumps and pipes and valves kind of thing, but I couldn't find anything anywhere for the cooling towers. It was kind of notable because you did specify tests for the CIRC water cooling towers.

MS. BORSH: Yes, and we have had some discussion with the NRC staff on testing of that part, the site-specific portion of that system. So Tom will look for it, and John will, while we go on.

MEMBER STETKAR: Thank you. Yes, that's fine.

MS. BORSH: Okay.

MR. MODELL: The RAI response, Gina, to 14.2.8, 2.18, that is where we talk about the plant service water system performance test.

MEMBER STETKAR: That is in the DCD, but, indeed, no mention is made of the cooling towers there, nor is it in 14.2.8.151.

MR. MODELL: It is the response to RAI 090201-12. In that FSAR markup, it talks about the performance test for the service water system, including the auxiliary heat sink.

MS. BORSH: You haven't seen that, I don't think, John.

MEMBER STETKAR: I haven't seen that.

MR. MODELL: Probably not.

MEMBER STETKAR: Does it mention the cooling towers or just simply the boil-the-water-off inventory? Those are two different issues.

MR. MODELL: It is the whole system, the plant service water system, and it includes the auxiliary heat sink, which is the cooling tower.

MEMBER STETKAR: Okay, good. Thank you.

MR. MODELL: Sure.

MS. BORSH: Okay. That will be Letter 36. We might be able to show you the specific markup, John, in just a minute.

MEMBER STETKAR: As long as it is documented somewhere, that is all I am trying to do.

MS. BORSH: Okay.

Now we are on 14.3, ITAAC.

MR. HICKS: There was a response to RAI Letter 36, and we added pre-operational test 14-2-8-1-51 into the COLA, where we test the auxiliary heat sink for the plant service water system.

MEMBER STETKAR: Okay. Great.

MR. HICKS: So it goes through fans, motors, all that kind of thing.

MEMBER STETKAR: Good. And what was the

RAI number?

MR. HICKS: Hold on. I'm trying to get back to that slide here. It was 9-2-1-12.

MEMBER STETKAR: Thank you.

MR. HICKS: You're welcome.

MS. BORSH: Thanks, John.

All right, moving on to ITAAC, this Section 14.3 of our FSAR references Part 10 of our COLA. In Part 10 of our North Anna COLA, we incorporate by reference DCD Tier 1 and the DCD ITAAC.

Then we added the site-specific ITAAC to Part 10. We used the criteria in NRC regulations and guidance and in the DCD to evaluate our site-specific systems and establish the ITAAC.

Site-specific ITAAC have been added for the emergency plan, the backfill under the Seismic Category I structures, and the site-specific portion of the plant service water system.

In Section 14.3(a), which is an appendix to the DCD, GEH describes the closure process for the DAC ITAAC. So, for us to address a DCD COL item, we stated that Dominion will use the standard approach for closing the design acceptance criteria ITAAC. This is the approach that is described in the DCD.

CHAIRMAN CORRADINI: So if I may ask about that then?

MS. BORSH: Yes.

CHAIRMAN CORRADINI: So the standard approach is known to you or still to be discussed between GE and the staff? In other words, will there be something in your document or will there be a supplemental to the DCD?

MS. BORSH: Right now, our plans are to use technical reports. It will not be part of the DCD. They will not be closed before the COL is issued. They will be closed after the DCD is certified and after we get our license, and we will not be using design certification amendments to close the ITAAC. We will be doing it through reports, and then asking for SERs from the NRC, so that other applicants, subsequent COLA applicants, can use those SER reports to close their ITAAC.

MEMBER STETKAR: You just mentioned you are going to be requesting an SER from the staff. This is important.

MS. BORSH: Yes.

MEMBER STETKAR: You will be requesting an SER, a formal SER, from the staff?

MR. HICKS: Yes, I think that is generally our approach on these things, is to do that.

MEMBER STETKAR: You have to identify yourself and stand up.

MR. WACHOWIAK: What Patricia said was the methodology that is outlined in DCD 14.3.A says that you could ask for an SER. What Dominion, I believe, is saying is that they will ask for an SER.

MEMBER STETKAR: Okay. Because I didn't read that anywhere here. There is a discussion in 14.3.4 in response -- this is in the SER -- there is a discussion about a commitment to provide information to the staff regarding a schedule for --

MR. WACHOWIAK: Right, right.

MEMBER STETKAR: -- information, but I didn't see anything anywhere that was a commitment for an actual safety evaluation report.

MR. HICKS: A commitment from us, you mean? Or from the staff?

MEMBER STETKAR: Either way.

MR. HICKS: I mean the bottom line, the DCD, like Rick was saying, in 14.3.A in the DCD, it talks about providing an SER or requesting an SER.

MEMBER STETKAR: That's an option. There are other options --

MR. HICKS: Right, that's true.

MEMBER STETKAR: -- that are possible on

the table.

CHAIRMAN CORRADINI: So let me lay out the broad picture, so you can see where our confusion lies.

What we are trying to understand is, and I think it is still under discussion, so I am trying to get your view, the applicant's view, about this: is it going to be an inspection? Will it be, essentially, a technical -- the way you answered it, the way I thought I heard you just say it is, you would like to see a technical report and an associated SER from the staff, given that report. That is what I heard you just say.

MS. BORSH: I am not sure if you are going to a level of detail -- we certainly have not come to any kind of official agreement with the staff --

CHAIRMAN CORRADINI: No, no.

MS. BORSH: -- about how this is going to work.

CHAIRMAN CORRADINI: No, that's fine. I just want to understand what your current understanding is, so I get it clear in my mind.

MEMBER STETKAR: Well, ask the staff.

CHAIRMAN CORRADINI: The staff will be up next. We will get them.

MS. BORSH: Okay.

CHAIRMAN CORRADINI: But I just want to understand, from your standpoint, what your feeling is on it. So that is all. That was my main point, because, as John said, I noted the schedule was kind of called out --

MS. BORSH: Yes.

CHAIRMAN CORRADINI: -- in terms of the various areas, but not what would be there at the time the schedule would be satisfied. That's all.

MEMBER STETKAR: Well, and also, one thing, the term "a baseline review report", notification was linked to the production of something called a baseline review report. It wasn't a topical report. It is a strangely-worded type of report.

MR. WACHOWIAK: The baseline review report is defined in the LTRs that describe the human factors process. I believe that is where the baseline review reports are described. So that is what it is alluding to.

MEMBER STETKAR: But they are not GE topical reports that will be requested for the staff to evaluate.

MR. WACHOWIAK: The intent on this is to package these many reports, because there's baseline review reports; also, in the software DAC there's a multitude of reports there as well, but if it was going to be a topical, it would be something that would package those other reports together into some kind of a reviewable unit, if you will.

CHAIRMAN CORRADINI: And that review, then, would generate, at least from the way I understand your guys' discussion, that would generate some sort of response SER from the staff?

MS. BORSH: That's what we are requesting because the strategy is -- I mean right now that is our plan. Our strategy is to have one design, one review, one issue, and close it, so that the S COLAs could have some advantage, right, of this process. So that is our general thinking.

CHAIRMAN CORRADINI: Okay, thank you.

MS. CAMPBELL: This is Patricia Campbell from GE/Hitachi.

I probably should clarify that we have had discussions with the staff about that approach. I am not sure that the staff is totally onboard.

CHAIRMAN CORRADINI: That's fine. We asked you. That's fine.

MS. CAMPBELL: Okay. Some say, yes, we could issue SERs and some staff say, no, we can't issue SERs; it would all be done by an inspection report.

CHAIRMAN CORRADINI: Well, that's fine. I just wanted to get your --

MS. CAMPBELL: There's some ambiguity at this point.

CHAIRMAN CORRADINI: -- picture of the elephant.

MEMBER STETKAR: I believe this is a mutual learning experience.

CHAIRMAN CORRADINI: Okay, thank you.

MS. BORSH: The last item on this slide is that we have provided a milestone for developing the DAC ITAAC closure schedule. That is in Rev 1 of FSAR.

14.AA, alpha/alpha, is the appendix that we added to provide the initial test program administration description. It has information about what is included, what structure systems and components are included in the program, what are the phases of the program, and it describes administrative controls we will put in place during that time, as we are implementing that.

Last slide, SER with open items. There are no open items in Chapter 14. There are three related ITAAC open items that are addressed and we have talked about previously in the other chapters that we presented. There are some questions about EP ITAAC that we are tracking, 13.3; backfill ITAAC, we just talked about that from 2.5.4, and plant service water ITAAC, which was from Section 9.2.1.

And that is all we have for our presentation. Questions?

Turn it over to NRC? Okay.

MR. KEVERN: Thank you, Gina. We think, on behalf of the staff, we consider that an accurate, although rather abbreviated, summary of the COL application on this subject. So we will move on to the staff's presentation.

Chapter 14, we have two topics on Chapter 14, 14.2, the same title as the chapter, the initial test program. That topic is going to be presented by Mike Morgan, who is the lead reviewer in the Quality Assurance Branch, the QA Branch, which is the technical branch that has the lead for that area of review.

14.3, initial tests, inspections, and analyses, I will be doing the presentation on 14.3, and I am doing it on behalf of many members of the staff.

What you see here in the third bullet,

ITAAC, as you well know, is a very cross-cutting topic, and it touches, at least in part, on all 20 branches involved in the review of the COL application. So, rather than taking time to list names, or whatever, I just do the abbreviations of the different entities. So we are talking 75 or so staff members. Presumably, I will be able to provide a summary of the presentation on 14.3 that will not embarrass anyone.

CONSULTANT WALLIS: Do I take it that Oak Ridge National Lab is a branch of the NRC?

MR. KEVERN: No. Where do you see ORNL?

CONSULTANT WALLIS: There is ORNLB.

MR. KEVERN: That is the Licensing Branch for Emergency Plan.

CONSULTANT WALLIS: It is nothing to do with Oak Ridge National Lab?

MR. KEVERN: That is correct. It has nothing to do with Oak Ridge National Lab.

MEMBER STETKAR: That is just Graham's method of --

MR. KEVERN: That's right. We could take the time to go through each of the 20 branches, if you wish.

CHAIRMAN CORRADINI: Oh, no. No.

MR. KEVERN: Okay.

CHAIRMAN CORRADINI: We want to get out. No.

MR. KEVERN: But then I could forego any technical discussion.

Okay, so moving on, this is just an outline of the presentation.

Moving on to the initial test program, Mike Morgan will be doing the presentation.

MR. MORGAN: Good afternoon, gentlemen.

My name is Mike Morgan. I am an operations engineer with the Construction Inspection Group in the Vendor Branch. We were asked to coordinate the activities involving Section 14.2. As you have already seen, there was a fair number of people involved in this review.

The first slide is the areas that we did, in fact, review. As you can see, we did the initial test program review, the summary of the program, and objectives, startup, admin manual, test procedures, the program, also the test program schedule and sequence, and we spent a great deal of time in the site-specific op/pre-op and start-up test area. Those are the areas that we focused on. All other areas that we incorporated by reference, and that's where we went with that.

In Section 14.2, the initial plant test program, the staff reviewed both the application and the DCD. FSAR 14.2.9 pertains to the site-specific plant testing information that is required for SSCs that are outside the scope of ESBWR DCD.

The staff, mainly engineers from the mechanical, electrical, and radiological areas, helped us in this review. They reviewed the abstracts for the proposed initial tests.

The staffs determined that proposed testing provided adequate coverage in accordance with Reg Guide 1.68, criterion for selection of plant tested. This is the initial test programs for water-cooled plants.

In this review, the staff confirmed that the applicant addressed required information related to the elements of the proposed initial test program.

I will step through these ones pretty quickly.

On Sections 14.2.1, summary of the test program and objectives; 14.2.2, start-up admin manual, test procedures, and the test program, and 2.7, the test program's schedule and sequence.

The staff confirmed that the applicant

addressed the required information to these elements within these various areas, and the staff concluded that the information presented in the FSAR was acceptable and met NRC regulatory requirements. I think I mentioned that before, too.

Now we go on to Section 14.2.9, site-specific pre-operational and start-up tests. In the area -- and it is mainly the mechanical areas -- this was reviewed by the technical staff from the Division of Safety Systems Risk Assessment and Balance of Plant. It was also reviewed, for the most part, in conjunction with Chapter 9 reviews.

The abstracts that we did, in fact, review -- and there are only five abstracts, by the way -- the abstracts we did review were the Station Water System Pre-operational Testing, Coolant Tower Pre-operational Testing, and Cooling Tower Performance Testing.

There were no requests for any additional information. The information contained was pretty complete. We felt that it was very consistent with 1.68. So we concluded that, for all of those abstracts, the proposed testing is acceptable.

We got into the electrical area. This is the electrical switchyard system pre-operational testing. This was conducted by the Division of Engineering, the Electrical Engineering Branch.

As you can see if you look at the slide, it is a fairly large amount of items in there. I think it kind of displays some of the thoroughness that a lot of the reviewers went into on their reviews of the abstracts.

During the review, the staff noted some areas that they needed some more information. So RAI 14.2-1 was produced. This involved availability of AC and DC switchyard equipment, questions on design limits of switchyard voltage stability and interfaces, operation of current and potential transformers, operation of high-voltage disconnecting ground switches, and finally, an operation of the automatic transfer from preferred power to alternate power. I think Gina touched upon that during her presentation. This was also covered in conjunction with their reviews on Section 8.

The first four items, the availability, design limits, operation areas, everything other than the automatic transfer, the applicant, as a response to the RAI, proposed a deletion of the original writeup, the abstract 14.2.9.1.4, and replaced it with 14.2.8.1.3.6, AC power distribution system pre-operational test. This covered more of the items that had been asked in the first four areas, and we found that to be a good response and an adequate response.

The last item, the automatic -- yes?

CONSULTANT WALLIS: What you really did was you didn't just replace; you actually expanded?

MR. MORGAN: Yes, yes. They basically pulled that off, put a new one in --

CONSULTANT WALLIS: With these other items, because the scope had now increased?

MR. MORGAN: Yes.

CONSULTANT WALLIS: Okay.

MR. MORGAN: Very much, sir.

The fifth item, applicant issued STD 14.2-4. This addresses specifically the auto-transfer from preferred to an alternate source.

MEMBER STETKAR: That's where I have to apologize. I forgot, and I didn't write it in my notes, about which sections of those two had been folded back in, and which ones had been separate. That's why I asked Gina in her presentation.

MR. MORGAN: There was a fair amount of discussion --

MEMBER STETKAR: Yes, yes.

MR. MORGAN: -- between the applicant and the reviewers --

MEMBER STETKAR: Thanks.

MR. MORGAN: -- on this very area.

MEMBER STETKAR: Yes. Thanks.

MR. MORGAN: But it was beneficial. The staff found that the response from the applicant was acceptable.

The last of the abstracts was the personal monitors, radiation survey instruments pre-operational testing. This review was conducted by a member of the Division of Construction Inspection, Operational Programs, and the Health Physics Health Branch. In fact, Mr. Hansen is in the audience today. So he can answer any specific questions you might have.

The staff issued four RAIs, 14.02-5, -6, and Supplemental RAIs 2-9 and 2-10. Basically, the first two were requests for lists of specific monitors and instruments that would be covered during the testing and lists of laboratory equipment that would be covered by the testing.

The supplementals were clarifications of positions. In one case, it was a clarification of a position about an NEI document, 07-03A, and its template. There was a question of content. Did it cover enough in these areas, and was it comparable to what was already out there within Reg Guide 1.68?

The last one was a clarification of standard commercial items. This was a clarification of the position that they had for the laboratory and portable instrumentation use for the radiation protection program, and what is tested within that scope.

The staff found that the applicant's responses were acceptable in this area, and they also conducted, the staff conducted their review in conjunction with Chapter 12. So there was a lot of merging there.

Post-COL activities and open items: the staff found that STD COL 14.2-1-A, the description of the initial test program administration, and NAPS COL 14.2-5-A, site-specific tests, adequately addressed information contained in FSAR Section 14.2.

And the staff has since considered some of these items. STD COL 14.2.2-H, 2.3-H, 2.4-H, and 2.6-H, the last two being NAPS COLs, that we are going to consider those as holder items, mainly because they have dates associated with them. Gina covered some of those dates, the 60 days before, and so on and so forth. So they will be a holder item position as we determine whether they will go in as license conditions or commitments or how we are going to look at that one.

CONSULTANT WALLIS: So how will they be reviewed by the staff?

MR. MORGAN: On these?

CONSULTANT WALLIS: They all look like pretty important items.

MR. MORGAN: We will receive, in the case of the start-up administration manual, the test procedures and the site-specific test procedures, the first two items and the last item, no later than 60 days before their intended use. They will be available to the NRC 60 days prior. So then they will immediately be going into a review phase on these.

CONSULTANT WALLIS: What will be the method of approval then? Send them a letter or what?

MR. MORGAN: We would go through this and, yes, there would be an official letter and go-ahead on these things. I would assume that's --

CONSULTANT WALLIS: There is some feeling that 60 days is going to be enough time to resolve everything?

MR. MORGAN: We have had a lot of discussion on that. It has been determined that 60 days is.

Go ahead.

MR. NAKOSKI: This is John Nakoski. I am the Branch Chief for the Quality and Vendor Branch for the BWRs.

They will be subject to inspection. We will review them. The inspection staff from the Center for Construction Inspection in Region 2 will review. The onsite residents will review. They are available for us to review 60 days prior to their use. They would be documented, the results of the review would be documented in the inspection report, is my understanding.

MR. MORGAN: I think that is the route that will be taken. It is a pretty standard route.

The third item, the test program schedule and sequence, now that doesn't have a 60-day type of attachment to it. But what it does say is that detailed testing will be developed and made available to the NRC before actual implementation. So, in other words, we will have a lot of time to take a look at it, make sure that it fits the bill, as it were, and then we will go ahead at that point.

Okay. Are there any questions that you might have?

(No response.)

I will pass this on to Tom Kevern for Section 14.3.

Thank you very much.

MR. KEVERN: Moving on to Section 14.3, inspections, tests, analyses, and acceptance criteria.

The first slide, I want to just identify the scope of information of staff review associated with 14.3. I am doing this because the information is in several different locations, and that is all on the same page.

Starting at the bottom of the slide, the design control document, Tier 1 is the part of the DCD what is defined as the top-level design information, as well as including all the specific ITAAC for systems within the scope of the certified design.

Section 14.3 of Tier 2 of the document addresses a lengthy discussion of ITAAC, but, specifically, for purposes of review here for North Anna, it identifies/provides a selection criteria and the methodology for not only Tier 1 information, but specifically for ITAAC that we are reviewing.

As far as the COL application is concerned, of course, we have all of the applicable FSAR sections in Chapters 2 through 19 that provide technical information for the topics of interest here, the system structures and components.

In Section 14.3 of the FSAR, which is Part 2 of the COL application, we specifically have a discussion of the ITAAC methodology and selection criteria used, intended to be used for North Anna, used by the applicant. Then in Part 10 of the application, we have the specific ITAAC applicable to North Anna. So a combination of all that information is what the staff review is associated with 14.3.

I would like to take a moment and talk about the regulatory basis. There are two specific parts of the regulations that apply. The first deals with interface requirements.

The DCD identifies specific requirements for the interface between what is considered is the scope of the certified design and where we transition to, in this case, the North Anna specific part of the design. So there are specific interface requirements that have to be addressed by the COL applicant consistent with 52.79, that section.

Then the 52.80, a more broad requirement pertaining to ITAAC that just focused on the last part of the paragraph there. The ITAAC, if performed and the criteria met, the facility will be constructed, has been constructed, and will operate in conformance with the license provisions of the Atomic Energy Act and Commission regulations. Then, of course, we have the specific criteria in the SRP.

The conclusions of our evaluation that would be corresponding to 52.79 and 52.80 on the previous slide are what you see on this slide, a little lengthy, but let me focus on the first bullet clear down to the third line from the bottom.

The staff concludes that the top-level design features and performance characteristics of the SSCs are appropriately included within the ITAAC.

Then, following on to that, the second bullet, again, reading near the bottom of that bullet, that the facility, if those ITAAC are implemented and the criteria met by the applicant, then the requirements identified in 52.79 and 52.80 will be met.

Now, of course, at this point in time, we are precluded from making those conclusions because of the open items. So then the third bullet on this slide just briefly identifies those open items.

Recall that, way back in June, we talked about Chapter 1, and we got this open item 1-1 that you have seen on every section that we have talked about, presented to ACRS. That is the fact that the review, the staff's review of the design certification application is still ongoing. We have yet to finalize that. So, rather than having specific items in every different section, we just flagged that as open item 1-1, and that transcends through the entire North Anna COL application review.

Then the same open items that Gina identified, we have an open item related to backfill ITAAC that we talked about an hour or so ago, and one on the plant service water system that was discussed back in the July presentation, as well as two related to specific aspects of the emergency planning ITAAC that, again, were addressed in Chapter 13 back last month.

Then, associated with 14.3, we have four confirmatory items.

I would like to back up a little bit, talk about the evaluation approach that would lead to the conclusions that I had on the previous slide. It is a three-part approach here for our evaluation process.

First, it addresses the certified design. The applicant has incorporated by reference Tier 1 in its entirety from the design control document. Of course, associated with that, we have open item 1-1.

A second is the selection criteria

methodology for the North Anna specific ITAAC. In this case, the North Anna applicant has identified that the selection criteria methodology will be identical to those that are addressed in the DCD. At this point in time, again, with the caveat about open item 1-1, but at this point in time, the staff has evaluated the selection criteria methodology in the DCD and found it acceptable.

So the plan is at North Anna, the Dominion applicant will apply that selection criteria methodology to the systems that were applicable to or the systems, rather, that are at North Anna, but they were not evaluated in the DCD. So, of course, a clarification there in parentheses. So that entails those portions of the North Anna systems that are outside the scope of the certified design, as well as any systems that are entirely North Anna-specific.

So, consistent with the standard review plan that says -- and I just do one extra, but a quote from the SRP -- that criteria and methodology is appropriate, and therefore, we find the selection criteria methodology utilized for North Anna to be acceptable.

The third phase of the review, or the third level, if you will, will be the COL-specific

ITAAC, which continues on on the next slide.

We evaluated this in the individual chapters and sections of our safety evaluation report, Chapters 2 through 19. That is why I want to make sure this is not administratively confusing. We did address in the scope of the technical evaluation of each of those systems over the last four meetings and then today not only the evaluation of the system, but to include the evaluation of any ITAAC, if applicable.

So, when the staff is reviewing the specific sections of the FSAR or the COL application for those SSCs, we evaluated the content of any ITAAC that were identified or that were incorporated by reference in the DCD. If no ITAAC were identified, then we evaluate the need for such ITAAC. I've got examples of that which are coming up in the next couple of slides.

So, again, just for administrative completeness, ITAAC related to physical security, at this point in time, are totally incorporated by reference, and we will address that in the SER 13.6 section.

The ITAAC specifically related to emergency planning are addressed in 13.3, and the system-specific ITAAC otherwise are addressed in the

Sections 2 through 19, using the example of 2.5 on backfill that we talked about earlier this afternoon.

So, moving on on the North Anna-specific ITAAC, again, for completeness, we've got the backfill; we've got the plant service water. Now we've got offsite power, and this is an example. I would like to take a moment because it illustrates the depth of the staff's evaluation.

Offsite power is a challenge for passive design plants, not safety-related, but not of importance to the staff. So, to make a long story short, both the AP1000 review and the ESBWR review for the COL applications, the staff is concerned about exactly what level of detail is necessary and exactly what is appropriate, including what ITAAC, if any, are necessary.

Well, to make a long story short, staff determined that ITAAC are necessary, specific ITAAC are necessary related to offsite power.

Going back, the DCD found that there were no ITAAC identified, as well as there were no interface requirements identified in the DCD. The staff determined that was inappropriate. So we issued RAIs to the PWR applicant and, correspondingly, issued RAIs to Dominion against North Anna to provide specific ITAAC to address not only the interface requirements that, presumably, were going to be provided in the DCD, but as well as the portions of the offsite power system specifically applicable or specifically part of the North Anna application.

The result of the RAIs and the responses, the bottom line was that we had responses back both in the DCD as well as COL application. We found those responses acceptable. We now do have specific ITAAC for offsite power. You have not seen those because they are in RAI responses. We can get that, if you are interested, but the reason you haven't seen it is because they will not be contained in the COL application until the next update, which is scheduled for December.

The same for the next revision of the DCD, which is scheduled for the latter part of this month, which you will see the first part of this interface requirement.

MEMBER STETKAR: Tom, just quickly, because we haven't seen it, do the ITAAC for the offsite power supply extend out to the interface that -- we have had quite a bit of discussion over license renewal. In that arena, the interface has been defined as the first active breaker at transmission system voltage, for example.

Are the offsite power ITAAC defined out to that functional interface for the offsite power system or are they not specified that way?

MR. KEVERN: The ITAAC are applicable out to where the transmission system starts. Now exactly where that is, I need -- and I don't have the technical expert here. So I can't give you --

MEMBER STETKAR: Okay. We can wait to see in the next version. I was just curious if you knew off the top of your head.

MR. KEVERN: The answer is yes, but I don't have the specific location within the switchyard of where that --

MEMBER STETKAR: I was just curious because there has been a lot of discussion in the license --

MR. KEVERN: Yes, sir.

MEMBER STETKAR: -- renewal arena about where exactly that interface is defined. We will see.

MR. KEVERN: Well, in part, what we end up with is, because of the close association between the Electrical Branch and NRO and their counterparts in NRR, that has been part of the discussion, but all of the plants in NRR are active plants. So that is part of the discussion.

MEMBER STETKAR: Okay. We will see it at some point.

MR. KEVERN: Okay.

MR. WACHOWIAK: I've got the text here with me. It says, "The interface between the normal preferred ESPWR certified plant onsite portion of the preferred power system and the site-specific offsite portion of the preferred power system is at the switchyard side terminals of the high-side motor-operated disconnect of the unit auxiliary transformer circuit breaker and the main generator circuit breaker."

MEMBER STETKAR: That's offsite and onsite. I'm asking about how far beyond that out does the interface go, because that defines what is being called switchyard ITAAC or offsite power ITAAC.

MS. BORSH: John, would you like me to see if our subject matter expert is on the line to answer?

MEMBER STETKAR: Probably not, in the interest of expedience.

MS. BORSH: Okay.

MR. KEVERN: Okay. For other systems then, moving on to North Anna-specific ITAAC, part of the methodology selection criteria for ITAAC that I mentioned on a previous slide, Dominion continues on for the rest of the systems. For the systems you see listed on the bullets on this slide, either for those systems that are totally North Anna-specific or for the portions of the system outside the scope of the certified design, the applicant identified that no ITAAC were appropriate for those systems.

Staff did an evaluation of the total list of systems in the FSAR; again, went back and looked at that, referencing the selection methodology and criteria that was accepted before. We determined two items here, the last two bullets. One is the list of systems is complete and, secondly, that no ITAAC for these systems is appropriate.

I would make a side administrative note here that, in quotation marks, no entry for the system, that is another item that is potentially not fully intuitively obvious to all readers of the manual, and that terminology is being changed in documents across the board generically. I don't even want to talk about that.

(Laughter.)

I don't want to start because I am sure you will have a comment on this, Dr. Corradini.

Included in 14.3 is the issue that Gina

briefly addressed in her presentation. There is a COL item addressing design acceptance criteria closure schedule. Let me focus on the last two words on that line, "closure schedule".

(Off-record comment.)

MEMBER STETKAR: Whoever is on the bridge line, if you can mute your phone, we would appreciate it.

MR. KEVERN: All right. So, in the three areas of Commission-approved DAC, piping design, human factors, and digital I&C --

(Off-record comment.)

CHAIRMAN CORRADINI: I'm not sure if they are on the bridge line. Is anybody on that bridge line?

(No response.)

Please mute it.

Shall we kill the bridge line? Do we have any technical people in the room?

All right, keep on going.

I don't think they can hear us.

Keep on going.

MR. KEVERN: All right. So, for those three areas, we do have DAC authorized. I recognize that -- sorry.

(Off-record comment.)

CHAIRMAN CORRADINI: That's all right. Keep on going. We will do our best.

MR. KEVERN: The topic we are on is the closure schedule. So, just addressing the schedule, the additional commitment by Dominion identified as scheduled, the staff was concerned that there was not sufficient lead time. So staff determined that, to support our resources, budget planning, schedules for North Anna as well as other COL applicants, that additional lead time was appropriate for this first-of-a-kind DAC information.

A little bit out-of-the-ordinary process. We did not issue RAIs because this was an issue that was applicable to all COLAs and all technologies. So we addressed this in a series of public meetings, got resolution back this past spring, the results of the multiple staff and industry interactions back this spring.

We have the applicant proposing detailed deliverables and schedules, and that if the staff finds it acceptable, that's why it is a confirmatory item.

Now, on this slide, I do not identify the specific dates for the three different topical areas.

I do have that identified in the SER, if you are interested in a specific.

I know this morning, when we were talking about piping design, for example, there was a question, and I can get the numbers --

CHAIRMAN CORRADINI: But just clarify for me, the six months is six months before what? That is what I wanted to make sure. You had decided on a schedule, but in all three cases, piping, human factors, as well as digital I&C was six months.

MR. KEVERN: Specifically, for piping, it is six months before scheduled completion of all ASME co-design reports for risk-significant piping packages, and six months prior to scheduled completion of pipe break hazards analyses. That is the way we ended up summarizing that.

CHAIRMAN CORRADINI: So where would that fit within the -- I am still struggling. That is a moveable target. That could be --

MR. KEVERN: Yes.

CHAIRMAN CORRADINI: -- way in advance of fuel load?

MR. KEVERN: Yes. It is a relative. Yes, it is a relative, not an absolute schedule.

CHAIRMAN CORRADINI: To give you time to

essentially review -- well, look at what is given to you?

MR. KEVERN: Yes, and I'm sorry to go off on a procedural tangent again, but --

CHAIRMAN CORRADINI: That's okay. The next thing I want to ask you is, what are you going to be given, and what are you going to do once you are given it?

MR. KEVERN: Well, one of the things we are not going to do is imply that the review is analogous to our safety evaluation review that we were doing to issue a COL. So this is post-COL issuance. Then the question from that time to when the details of the design and the DAC closure items I just identified for these three years, when those will be completed, we do not have an absolute schedule for that for North Anna or for anyone else.

CHAIRMAN CORRADINI: Okay, but let's just take the piping one, so I get it, because that is a good example.

So, six months prior to all of the issuance of these various ASME code reviews --

MR. KEVERN: Yes.

CHAIRMAN CORRADINI: -- and piping hazards analysis, six months before that, you will get a report? Okay.

MR. KEVERN: Multiple reports.

CHAIRMAN CORRADINI: Multiple reports, hopefully, rolled up into a super-report, but some sort of assembled report that will have details that show how the DAC has been closed.

Okay. So, when that occurs, at this point, staff will look at that report and then do what? Issue a report? Have a conversation? Consider an inspection? What?

MR. KEVERN: Jerry?

MR. WILSON: Jerry Wilson.

CHAIRMAN CORRADINI: Hello, Jerry.

MR. WILSON: Office of New Reactors.

This is a matter that is currently being discussed within our own management. We are trying to work out our procedures and guidance on how we are going to handle closures of all the DAC. So, at this point, I am not prepared to give you that answer. We are going to get back to the Committee on this in the future.

CHAIRMAN CORRADINI: So let me just, since we have all the parties at the table, they thought they were going to give you a rolled-up report and they would get from you an SER. What I am hearing from you is that may not be what they get back.

MR. WILSON: I'm not prepared to say how we are going to handle that. They can ask for whatever they want, but we'll see.

CHAIRMAN CORRADINI: Well, clearly, they are not the regulator.

MR. WILSON: Right.

CHAIRMAN CORRADINI: You can ask and you get it. They can ask and they may not. Okay. All right.

So, at this point, do you have at least attributes of what this process you will do will have in it? I mean I don't know what you will call it, but when you do it, do you know the activities you will do?

MR. WILSON: Yes. But, first of all, DAC is a subset of ITAAC. So, formally, this is an ITAAC. We have in 52.99, in the requirements, set forth how we are doing all of the ITAAC. The licensee in this particular case will be submitting closure documents to the NRC for all of the ITAAC. We will look at those. We are going to inspect some of them.

We are going to issue periodic notifications that have our conclusions relative to those closure documents. Then, at the end of the process, we are going to send in a recommendation to the Commission, and based on that, the Commission will make a determination and issue a finding on whether or not the ITAAC have been met. At a high level, that is how it is going to work.

Down in the details of how we are going to treat DAC, which is a special type of ITAAC, that is the process we are working out right now.

CHAIRMAN CORRADINI: So one more time at this, just so I get at least the attributes. So, the way I heard you explain it, in difference to what occurs in the DCD, where they present you something on paper, you look at it, and go, "Oops, here's 60 things we don't understand. Go away and tell us more.", and they come back; there will be no iteration on this? They will present a rolled-up report. This is what I am hearing. They will present some sort of rolled-up report on piping.

Let's take something that is not controversial, piping.

(Laughter.)

All right? And you will take that ensemble of reports and look through it, and you will give it, by inspection, review, whatever we call it, a thumbs-up or a thumbs-down, and make a recommendation to the Commission?

MR. WILSON: At a very high level, but that process of how we're doing it --

CHAIRMAN CORRADINI: But the attribute that I don't hear happening, just so I'm clear, the attribute I don't hear happening is some sort of back-and-forth with the applicant that says, "Okay, thank you very much, but tell us more" or "Give us that" or "Gee, that's not open, but vague. Clarify it."

MR. WILSON: I'm not prepared to answer that question yet.

CHAIRMAN CORRADINI: Okay. I'm sorry, I'm getting more educated on this whole thing.

MR. WILSON: Okay. So I will throw one more iron on the fire.

CHAIRMAN CORRADINI: Good.

MR. WILSON: Because you are asking about the FSAR, I just want to point out that, at some point, as part of the FSAR update requirement, and I'm talking about 50.71(e) now, after that licensee has resolved those DACs, completed their design work, submitted the closure notification, we expect that they will update their FSAR in those areas.

CHAIRMAN CORRADINI: So to be consistent with what they have sent you in this ensemble of information?

MR. WILSON: Be consistent with the level of information that is normally expected in an FSAR.

CHAIRMAN CORRADINI: That's helpful.

CONSULTANT WALLIS: And we have no role, is that right?

CHAIRMAN CORRADINI: I would say that my interpretation --

(Off-mic comment.)

Is the microphone on?

CONSULTANT WALLIS: The microphone was on when I made it, I think.

CHAIRMAN CORRADINI: The answer is, no, I don't think so. I think we have no official role.

CONSULTANT WALLIS: When you said we have no role, you meant to affirm that we have no role when you said no?

CHAIRMAN CORRADINI: Correct.

Go ahead, Tom.

MR. KEVERN: So back to this slide, that is why I wanted to focus on the closure schedule aspects. That is the topic of this interaction, and we will see, and that is why it is a confirmatory item. You will see the revised schedule that we have identified in the SER will be what materializes in the next revision of the FSAR.

The process and the mechanisms and the details, and so on, that is in the current, that is being developed, the Reg Guide that the ACRS has an interest in, is summarized; it is totally separate from this North Anna-specific. Whatever we end up with as far as the closure process for DAC and ITAAC will be implemented for North Anna, of course. So I wanted to differentiate the information on this slide from the generic subject that I know you folks are interested in.

Then, last and not least, there are post-COL activities addressing the license condition. The first bullet, specifically, the applicant stated that the ITAAC is a proposed license condition to be satisfied before fuel load, and we, of course, endorse that, but we go on one step further, using the template language that is in the SER, that we are not certain at this point in time what exactly we are going to require in the way of license conditions or what specific commitments we want to have identified in the FSAR relative to ITAAC, and that is still evolving.

As I mentioned earlier, we have a joint industry/staff working group that is developing what we call the model, the combined license, and what that will look like, and exactly how much will be rolled up in one topic versus different specific items.

That's it. Any questions or comments?

CHAIRMAN CORRADINI: Questions by the Committee? General questions to either Dominion or the staff?

(No response.)

Okay. If none, do you have any parting comments? Since we are now done officially with all the Subcommittee meetings relative to COL, any parting shots, Dr. Kress or Dr. Wallis? Parting comments?

CONSULTANT WALLIS: I don't have any shots.

I think, as I thought before, that I don't really have any issues. The only thing I thought I would mention again perhaps is that, if there is a presentation to the full Committee about items such as this third slide in question, that the reason that the conclusion follows from the slide should be more apparent.

CONSULTANT KRESS: I also do not have any parting shots.

I do think that the staff demonstrated competence and comprehensiveness in their review. I think this will set a good example for subsequent COLAs. I didn't see any show-stoppers.

I do have a few things that seemed a little strange to me. They don't have anything to do with whether this COLA ought to be approved or not.

One of them has to do with one of my issues is site population and distribution and density and distances. These requirements in the regulations were established, supposedly, for LWRs, which have a much higher risk status than an ESPWR. I keep wondering why they are still being applied like an ESPWR.

I was wondering, if somebody came forth with a PVMR, would they apply these same regulations for that or would they do it for each module, or what? It just seems like a strange thing. I know they are in the regulations, so we have to do it, but that sort of thing seemed a little strange to me.

I go away still not seeing the need for determining a coefficient of friction between the foundation and the underlying field. But, you know, if they think they need it, well, good.

I did appreciate getting this document on the missile, probabilistic missile analysis. I took a quick look at it, particularly the structural mechanics part. I would say it looks pretty good to me. I was a bit surprised. It looked very good to me.

I still think Dr. Wallis wanted to see the analysis of the explosion hazard.

CHAIRMAN CORRADINI: I'll see it in his consultant --

CONSULTANT WALLIS: Well, if you asked that question, yes, I did notice that they said that the tank full of gasoline couldn't explode. But, if it is almost empty, then it has got a lot of air in there, presumably, and that is when tanks do explode or could explode.

Since I haven't really had time to review it, I thought I would comment in writing on that.

CONSULTANT KRESS: And on another note, I was glad to see they removed the zinc injection. I think there's too many unanswered issues with respect to that.

I think I share John Stetkar's issue that maybe the frequency of airplane crashes is not using late data; that could be better. But that is not my area, so I don't know.

I had a hard time finding anything to complain about this.

CHAIRMAN CORRADINI: You tried.

CONSULTANT KRESS: Yes, I tried.

CHAIRMAN CORRADINI: I guess I had a couple of points, and I wanted, I guess, time to get to your response and a couple of things along with Dominion, because we are scheduled to have a full Committee on this. As for the time, the answer is I don't know, if you ask me. I have as much information as you guys do about Section 14.3

MR. KEVERN: We do have the date, though, right?

CHAIRMAN CORRADINI: I don't know that, either. I know it is in October. That is all I know.

MR. KEVERN: Okay.

CHAIRMAN CORRADINI: But what I was going to say, though, is that there's a couple of things that were brought up, three things, in fact, I have on my list, that I think kind of roll back, as a lot of the other ones we have, which are things we brought up which will essentially kind of devolve back into the DCD.

One is the dewatering system, why or why not? I look upon that as a DCD issue. I don't think necessarily it is a safety issue, but it appears to that you are vulnerable on safety systems.

The second one I have is the aircraft impact. Tom already mentioned it. John is actually the one that brought it up relative to the risk estimates. They appear to be based on old analysis through SRP. And again, they want to review that in some manner again as a generic issue.

We have already talked about the DAC. So there's no point in beating that one up again.

The only other one that I heard you guys were going to check out, just to clarify my confusion, is icing or ice storms essentially bounded by the snow load analysis that you normally do for this region of the country, particularly for safe shutdown.

Other than that, I guess the one thing I would ask from you, Tom, is, as we, the Committee, prepares to try to receive you guys at full Committee time, you kind of have got to give us some guidance as to where you are going to be relative to how many open items are still remaining, because you are closing out. As we even talked today, some of the things that we thought were open have already been resolved, as to what the open items are. Because you are looking to us for a letter in October on essentially the COL with open items, if I understand this correctly, and confirmatory items.

MR. KEVERN: Yes.

CHAIRMAN CORRADINI: So you kind of have to give us some guidance as to where you guys are coming into October, but we can talk about that offline.

Then there is a whole raft of other things. I think what I will plan to do is try to summarize, after I get the consultant reports from today, send through Chris what we think we heard from all four days of Subcommittee meetings. As Tom said -- I could be speaking incorrectly -- part of our Subcommittee is somewhere between here and there, I'm not sure where, on travel, but try to list what I think are issues. None of them, apparently, are show-stoppers, but issues that a lot of them tend to go back into the DCD, where they are going to have to be discussed.

I think we will see the GEH folks again in October or November.

So I think I have caught everything. Have I forgotten anything that you need in preparation for October? I guess I think I've caught most of it.

MR. KEVERN: Let me just address the status of open and confirmatory items. We take different snapshots in time. So we finished the SER chapters, and fortunately or unfortunately, we stretched the presentations to you over a period of three months.

So, recognizing that there was a major time lag there, I wanted to focus on, as possible, pointing out to you that this is an evolving situation. So the applicant continues to respond, and we continue to review. So I was trying to give you, where possible, an update as we are doing our presentations.

CHAIRMAN CORRADINI: Yes. So my feeling is the easiest thing, I mean not easiest, but the most efficient thing, I think, from both sides is that, as we approach October, sometime maybe mid-September, if I could get an update, that would be just a time at which -- and then, when we come to full Committee, you will tell us what else has transpired.

MR. KEVERN: Right.

CHAIRMAN CORRADINI: That is probably good enough at this point.

MR. KEVERN: My question there would be, if I provide that information, pick a date and a time, middle of September or whatever, is that a firm enough basis that you can --

CHAIRMAN CORRADINI: Sure.

MR. KEVERN: You don't have to go back and reference the ACRS itself?

CHAIRMAN CORRADINI: No, no.

MR. KEVERN: Okay, good. That's great. Yes, we will do that.

CHAIRMAN CORRADINI: Since, apparently, this is the first we have ever done, I have no clue exactly what is going to go into this. So the Committee, the older members will clearly guide me.

So I don't have anything else. Do you have anything else, Tom, that you need to clarify at this point, as we get towards October?

MR. KEVERN: No.

CHAIRMAN CORRADINI: Okay. Well, thanks to Dominion and GEH and the staff. Another fun Subcommittee meeting.

We're adjourned.

(Whereupon, at 4:16 p.m., the proceedings in the above-entitled matter were adjourned.)

Presentation to the ACRS Subcommittee

North Anna Unit 3 COL Application Review

Safety Evaluation Report with Open Items

Chapters 2, 3, and 14

August 21, 2009

ACRS Subcommittee Presentation North Anna Unit 3 COLA SER/OI

Staff Overview

- SER/OI complete (19 chapters)
  - Memorandum 08/07/09 to ACRS [ML092150277]
- ACRS Subcommittee
  - June 18 – Chapters 1, 4, 6, 7, 8, 15, 17, 18, & 19
  - July 21-22 – Chapters 5, 9, 10, 11, 12, 13, and 16
  - August 21 – Chapters 2, 3, and 14
- North Anna 3 COL Application, Revision 1 (12/08)
- Incorporated by reference
  - ESBWR Design Control Document, Revision 5
  - Early Site Permit (ESP-003)
- Presentation sequence
  - Dominion present FSAR content
  - Staff present evaluation

ACRS Subcommittee Presentation
North Anna Unit 3 COLA
SER/OI

Staff Overview (cont)

- Lesson Learned – ACRS feedback (June 18th meeting) regarding evaluation of "IBR" information
  - SER: "The staff reviewed … FSAR and checked the referenced DCD to ensure that the combination of the DCD and the information in the COL application represent the complete scope of information relating to this review topic. The review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to … ."
  - Staff ACRS presentations to include examples

North Anna 3

North Anna Unit 3
Presentation to ACRS Subcommittee
FSAR Chapter 2

Dominion

Chapter 2, Site Characteristics: Chapter Topics

- Introduction (Site Parameter versus Site Characteristic Comparisons)*
- Introduction (Site, EAB, and Population)**
- Nearby Industrial, Transportation, and Military Facilities**
- Meteorology**
- Hydrology**
- Geology, Seismology, and Geotechnical Engineering**
- ARCON96 Source / Receptor Inputs*

* FSAR contains supplemental information beyond DCD content

** FSAR section contains supplemental information beyond ESP SSAR content

Chapter 2, Site Characteristics: Supplemental Information

2.0 Introduction

Compares Unit 3 FSAR site characteristics and facility design values with corresponding DCD, ESP, or ESP Application SSAR values to determine if:

NAPS COL	Unit 3 site characteristics fall within DCD's site parameters
NAPS SUP	Facility design falls within ESP's site characteristics and design parameters
NAPS SUP	Unit 3 site characteristics and design values fall within SSAR site characteristic and design parameter values

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.0 Introduction (cont)

NAPS COL

Information on Unit 3 site characteristics is provided in Sections 2.1 through 2.5 of the COLA FSAR, which incorporate by reference, the corresponding ESP Application SSAR sections

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.0 Introduction (cont)

NAPS ESP VAR

COLA FSAR Table 2.0-201, *Evaluation of Site/Design Parameters and Characteristics*, has seven variances

- NAPS ESP VAR 2.0-1a-l – Long-Term Dispersion Estimates (X/Q and D/Q)
- NAPS ESP VAR 2.0-2 – Hydraulic Conductivity
- NAPS ESP VAR 2.0-3 – Hydraulic Gradient
- NAPS ESP VAR 2.0-4 – Vibratory Ground Motion
- NAPS ESP VAR 2.0-5a-h – Distribution Coefficients (Kd)
- NAPS ESP VAR 2.0-6 – DBA Source Term Parameters and Doses
- NAPS ESP VAR 2.0-7a-b – Coordinates and Abandoned Mat Foundations

Chapter 2, Site Characteristics: Supplemental Information

2.1 Introduction

ESP Application SSAR Section 2.1 is incorporated by reference and supplemented with:

NAPS COL	Site plan for Unit 3 at the NAPS site
NAPS ESP COL	Coordinates of the Unit 3 Reactor Building
NAPS ESP PC	Updated ownership and control information
NAPS ESP COL	Arrangements with appropriate agencies for emergencies

Dominion

Chapter 2, Site Characteristics: Section 2.1 - SER Open Items

- No Open Items
- No Confirmatory Items

Chapter 2, Site Characteristics: Supplemental Information

2.2 Nearby Industrial, Transportation, and Military Facilities

SSAR Section 2.2 is incorporated by reference and supplemented with:

NAPS ESP COL	Nearby industrial facilities are not hazardous
NAPS COL	Identified an additional airport
NAPS COL	Identified an additional military training flight path

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.2 Nearby Industrial, Transportation, and Military Facilities (cont)

SSAR Section 2.2 supplements (cont):

Evaluated potential accidents including:

NAPS COL	Gasoline tanker truck explosion hazards due to local deliveries on-site
NAPS ESP COL	Chemical materials stored on-site
NAPS COL	Aircraft hazards for Unit 3 effective plant areas
NAPS COL	Off-site wildfire hazards

Dominion

Chapter 2, Site Characteristics: Section 2.2 - SER Open Items

- 2 Open Items
  - Rationale for screening chemicals out as hazards to the control room
  - Modeling details for calculating toxic chemical concentrations in the control room
- No Confirmatory Items

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Chapter 2, Site Characteristics: Supplemental Information

2.3 Meteorology

SSAR Section 2.3 is incorporated by reference and supplemented with:

NAPS COL	Coincident wet-bulb temperature corresponding to the 100-year return period value for maximum dry-bulb temperature
NAPS COL	Basic wind speed for Unit 3 nonsafety-related structures
NAPS ESP COL	Evaluated potential impacts of cooling tower operations

Chapter 2, Site Characteristics: Supplemental Information

2.3 Meteorology (cont)

SSAR Section 2.3 supplements (cont):

NAPS COL — Highest building at Unit 3 does not influence meteorological measurements

NAPS COL — Entire EAB is located beyond the wake influence zone that can be induced by tall Unit 3 buildings

NAPS ESP COL — Determined onsite χ/Q values for evaluating potential doses from accidents

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.3 Meteorology (cont)

SSAR Section 2.3 supplements (cont):

NAPS COL	Determined offsite χ/Q and D/Q values for evaluating doses from normal operations
NAPS ESP VAR	Some χ/Q and D/Q values are larger than ESP and SSAR values due to changes in distances to receptors

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.A ARCON96 Source/Receptor Inputs:

NAPS COL Provides instrumentation heights and meteorological data

NAPS COL Identifies Unit 3 receptor to source directions - DCD directions are adjusted by an angle of approximately 24 degrees counterclockwise between ESBWR plant north and Unit 3 plant north

Chapter 2, Site Characteristics: Supplemental Information

2.A ARCON96 Source/Receptor Inputs (cont):

NAPS COL — Provides on-site X/Q values from site-specific analysis

NAPS COL — Administrative controls to ensure that doors and personnel air locks on East sides of Reactor Building or Fuel Building are promptly closed under conditions indicative of a fuel handling accident

Chapter 2, Site Characteristics: Section 2.3 - SER Open Items

- No Open Items
- No Confirmatory Items

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology

SSAR Section 2.4 is incorporated by reference and supplemented with:

NAPS COL — Layout of Unit 3 will affect a few small wetlands and the upstream portions of two intermittent streams that flow into Lake Anna

NAPS COL — Design plant grade for safety-related SSCs is at Elevation 290 ft msl providing adequate freeboard above the design basis flooding level

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS ESP COL — Safety-related SSCs are located at elevations above the maximum water surface elevation produced by local intense precipitation

NAPS COL — The water supply to the UHS is above design plant grade elevation and therefore capable of withstanding the PMF on streams and rivers without loss of the UHS safety functions

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS ESP COL The UHS for the passive ESBWR design does not use safety-related engineered underground reservoirs or storage basins; even if Lake Anna were to be drained due to a dam failure, no safety-related structures or systems for Unit 3 would be adversely affected

NAPS COL The emergency cooling water for Unit 3 is provided from the UHS, which is not affected by ice conditions

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS ESP COL — The UHS for Unit 3 has water in place during Unit 3 operation; Lake Anna is not used for safety-related water withdrawals for Unit 3

NAPS ESP COL — The embankment for the water intake structure is protected by rip-rap to prevent local runoff from eroding this structure; although protected, the intake structure is not safety-related

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS COL

The maximum PMP water level in the power block area is 2.8 ft below the design plant grade elevation for safety-related facilities; no flood protection measures, no technical specifications, and no emergency procedures are required to implement flood protection activities

NAPS ESP COL

The circulating water system operates in either of two operating modes: Energy Conservation (EC) without the dry cooling tower and Maximum Water Conservation (MWC) with the dry cooling tower

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS COL
NAPS ESP VAR

Provided supplemental information based on additional borings, groundwater level measurements, hydraulic conductivity testing

NAPS COL
NAPS ESP VAR

Provided supplemental information on groundwater supply wells, groundwater use, and groundwater level monitoring program

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS COL

The estimated maximum groundwater level that could occur in the power block area is 7 ft below the design plant grade elevation of 290 ft; therefore, a permanent dewatering system is not required for safe operation of Unit 3

NAPS COL
NAPS ESP PC

Mitigating design features are incorporated into the design of Unit 3 to preclude an accidental release of liquid effluents

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.4 Hydrology (cont)

SSAR Section 2.4 supplements (cont):

NAPS COL — An accidental release of radioactive liquid effluent to either groundwater or surface water complies with 10 CFR 20 limits for release to unrestricted areas

NAPS COL — No technical specifications or emergency procedures are required to prevent hydrological phenomena from degrading safety-related or RTNSS SSCs

NAPS ESP COL — Unit 3 will shut down when the water level in Lake Anna drops below Elevation 242 ft msl

Dominion

Chapter 2, Site Characteristics: Section 2.4 - SER Open Items

- 4 Open Items
  - FSAR description regarding locally intense precipitation flood
  - PMP flows at the Units 1 and 2 plant access road
  - Modeling of groundwater elevations in the power block area
  - Provide transport analysis using the maximum observed hydraulic conductivity and minimum site-specific Kd values
- No Confirmatory Items

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5 Geology, Seismology, and Geotechnical Engineering

SSAR Section 2.5.1, Basic Geologic and Seismic Information, is incorporated by reference and supplemented with:

NAPS COL

Geological data collected from the additional Unit 3 borings is presented to further describe the site stratigraphy

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.1 Basic Geologic and Seismic Information (cont):

NAPS ESP PC
NAPS ESP VAR

Zone IIA soil will not be used as structural fill to support Seismic Category I or II structures

NAPS COL

Zones III-IV and IV are suitable bearing surfaces on which to found Seismic Category I structures

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.1 Basic Geologic and Seismic Information (cont):

NAPS ESP PC — Weathered or fractured rock at the foundation level for safety-related structures will be excavated and replaced with lean concrete before foundation construction

NAPS ESP PC — Future excavations for safety-related structures will be geologically mapped and unforeseen geologic features will be evaluated (NRC notified for examination and evaluation)

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.2 Vibratory Ground Motion:

NAPS COL — Seismic wave transmission characteristics are described including the shear wave velocity profiles of rock and soil under Unit 3

NAPS ESP VAR — At the specific locations of the RB/FB, CB, and FWSC, the control point elevation for seismic analysis (top of competent rock at 273 ft) changed from that in the SSAR (250 ft) and results in a variance from the SSAR for the control point SSE response spectra

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.2 Vibratory Ground Motion (cont):

NAPS COL The horizontal and vertical seismic response spectra are provided for the control point elevation, and for the foundation elevations for RB/FB, CB, and FWSC

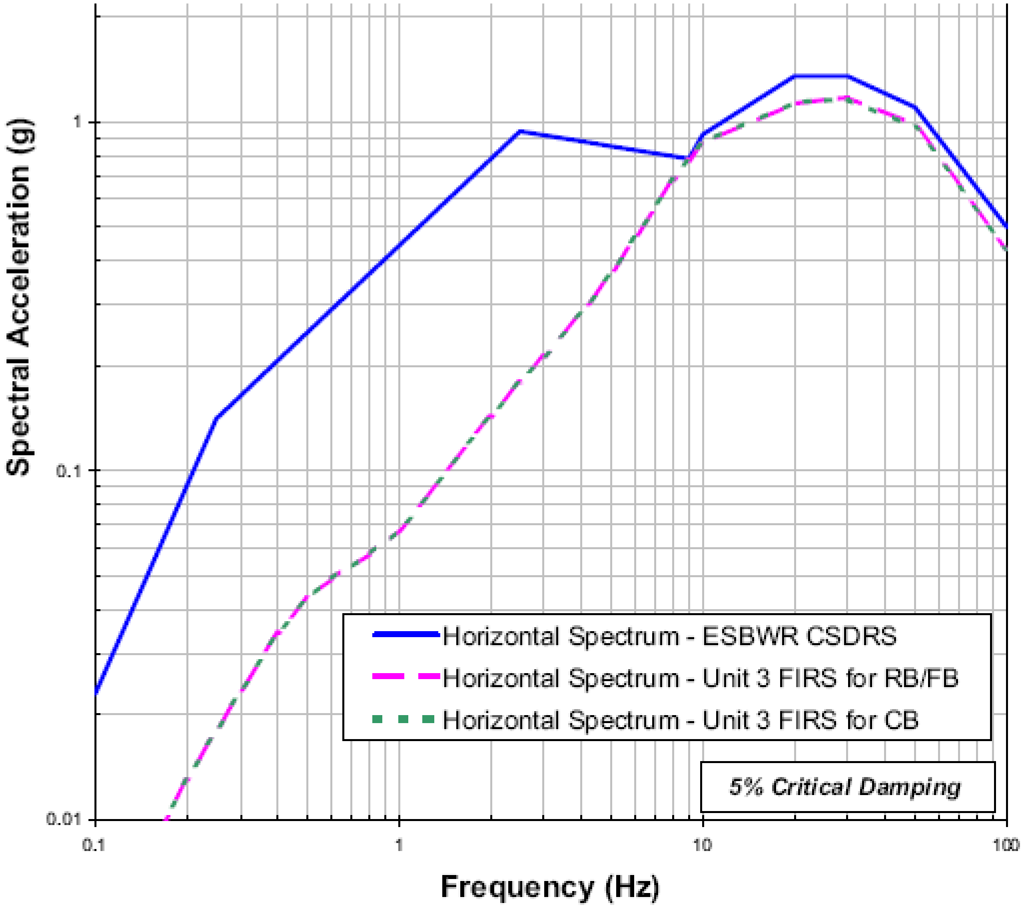
See the next slide for the comparison of Horizontal CSDRS with Unit 3 FIRS for RB/FB

NAPS COL Unit 3 OBE ground motion is one-third of FIRS and is bounded by DCD OBE

Dominion

Chapter 2, Site Characteristics: Supplemental Information

FSAR Figure 2.0-201



Chapter 2, Site Characteristics: Supplemental Information

2.5.3 Surface Faulting:

NAPS COL Borehole data showed no evidence of Quaternary fault movement

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Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations:

NAPS COL

- FSAR Section 2.5.4 integrates SSAR information with results from additional Unit 3 borings
- Properties of Subsurface Materials
  - Presents overview of subsurface profiles and materials
  - Describes field investigations
  - Presents laboratory tests on soil and rock samples from field investigation, along with test results
  - Provides engineering properties of subsurface materials

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

Foundation Interfaces

NAPS ESP COL — Provides locations of site exploration points for Unit 3 subsurface investigation

NAPS ESP COL — Presents excavation plan for safety-related and other major facilities, including plan outline for structures

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

NAPS COL

Geophysical Surveys

- Field electrical resistivity tests
- Geophysical down-hole tests
- Seismic cone penetrometer tests
- Results of shear and compression wave velocity tests

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

NAPS ESP COL **Excavation and Backfill**

- Describe extent of Seismic Category I excavations, fills, and slopes
- Discuss excavation methods and stability
- Identify backfill sources, quantities, compaction specifications, and quality control

NAPS ESP PC

- Excavations for safety-related structures will be geologically mapped and unforeseen geologic features will be evaluated (NRC notified for examination and evaluation)

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

Groundwater Conditions

NAPS COL	Groundwater levels require temporary dewatering of foundation excavations below the water table during construction
NAPS COL	Maximum groundwater level is at elevation 283 ft which is below maximum of 288 ft per DCD site parameter (2 ft below grade elevation)
NAPS ESP COL	No permanent dewatering system is required

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

NAPS COL — Response of Soil and Rock to Dynamic Loading

NAPS ESP COL — SHAKE2000 program used to compute the site dynamic responses. Data required included:

NAPS ESP COL
- Shear wave velocity (SWV) profiles of bedrock and soil
- Variation with strain of shear modulus and damping values of weathered rock and soil
- Site-specific seismic acceleration-time histories

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

NAPS COL

SWV profiles for soil used for:

NAPS ESP COL

- Slope stability analysis
- Liquefaction analysis
- Backfill for FWSC
  - Remove saprolite
  - Replace with sound, well-graded granular material
  - No measured SWV for backfill; used estimates for analyses

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

NAPS COL

Liquefaction Potential

NAPS ESP PC

Chances of liquefaction occurring in the Zone IIA saprolite are extremely low. Any liquefaction of the Zone IIA saprolite that does occur will not impact the stability of any Seismic Category I or II structure

Dominion

Chapter 2, Site Characteristics: Supplemental Information

2.5.4 Stability of Subsurface Materials and Foundations (cont):

Static Stability

NAPS COL	Allowable bearing capacity values are adequate for Seismic Category I and II structures, and the Radwaste Building
NAPS ESP COL	Total and differential settlement values are within the limits for the Seismic Category I structures
NAPS ESP COL	Static and seismic lateral earth pressures are provided

Chapter 2, Site Characteristics: Supplemental Information

2.5.5 Stability of Slopes:

NAPS ESP COL
NAPS ESP VAR

Presents information on stability of permanent slopes

NAPS ESP COL

Existing Service Water Reservoir slope and new slope southeast of the FWSC remain stable under long-term static and design seismic conditions

Chapter 2, Site Characteristics: Section 2.5 - SER Open Items

- 8 Open Items
  - Concrete fill properties
  - Confirmation of backfill properties
  - Minimum SWV for backfill below FWSC
  - ESP vs COLA dynamic settlement
  - Concrete fill bearing capacity
  - Local failure of backfill
  - Dynamic bearing capacity
  - Coefficient of friction against sliding
- No Confirmatory Items

Presentation to the ACRS Subcommittee

North Anna Unit 3 COL Application Review

SER/OI Chapter 2
Site Characteristics

August 21, 2009

ACRS Subcommittee Presentation
North Anna SER/OI Chapter 2

- Section 2.0 Site Characteristics
- Section 2.1 Geography and Demography
- Section 2.2 Nearby Industrial, Transportation, and Military Facilities
- Section 2.3 Meteorology
- Section 2.4 Hydrologic Engineering
- Section 2.5 Geology, Seismology, and Geotechnical Engineering

ACRS Subcommittee Presentation
North Anna SER/OI Section 2.0

Content of Section 2.0

- FSAR Section 2.0 incorporates by reference ESBWR DCD Section 2.0

- NAPS COL 2.0-1-A Site Characteristics Demonstration

- NAPS COL 2.0-2-A through 2.0-30-A
  Standard Review Plan Conformance

- NAPS SUP 2.0-1

- NAPS SUP 2.0-2

ACRS Subcommittee Presentation
North Anna SER/OI Section 2.0

Regulatory Evaluation

- The staff looked for completeness in the following tables:
  - Table 2.0-201 Evaluation of DCD site parameters, ESP site characteristics and Unit 3 site characteristic.
    - No departures
    - 7 variances – evaluated in their respective technical sections
  - Table 2.0-2R identifies the COL items for this chapter and the FSAR section where each item is addressed.
- The technical evaluation is provided in Sections 2.1 through 2.5.

ACRS Subcommittee Presentation
North Anna SER/OI Sections 2.1 & 2.2

Staff Review Team

- Project Managers
  - Tom Kevern, Lead PM, DNRL/NGE 1
  - Ilka T. Berrios, Chapter PM, DNRL/NGE 1

- Technical Staff
  - S. Rao Tammara, Lead Reviewer, Sections 2.1 and 2.2
  - Carolyn Lauron, Acting Branch Chief

ACRS Subcommittee Presentation
SER/OI Sections 2.1 & 2.2

Content of Sections 2.1 & 2.2

- FSAR Sections 2.1 & 2.2 incorporate by reference Revision 9 to the North Anna ESP SSAR.

- Section 2.1 Introduction
  - NAPS COL 2.0-2-A Site Location and Description
  - NAPS COL 2.0-3-A Authority
  - NAPS COL 2.0-4-A Population Distribution
  - NAPS ESP COL 2.1-1 Site Location
  - NAPS ESP COL 2.1-2 Control of Activities Unrelated to Plant Operation
  - NAPS ESP PC 3.E(1) Authority

- Section 2.2 Nearby Industrial, Transportation, and Military Facilities
  - NAPS COL 2.0-5-A Nearby Industrial, Transportation, and Military Facilities
  - NAPS COL 2.0-6-A Evaluation of Potential Accidents
  - NAPS COL 2.0-8-A Truck Traffic
  - NAPS ESP COL 2.2-1 Industrial Facilities
  - NAPS ESP COL 2.2-2 On-Site Chemicals

ACRS Subcommittee Presentation
SER/OI Sections 2.1 & 2.2

Regulations and Review Guidance

- 10 CFR 50.33
- 10 CFR 50.34(a)(1)
- 10 CFR 52.17(a)(1)
- 10 CFR 52.79(a)(1) & 52.79(b)
- 10 CFR 100.3
- 10 CFR 100.20(a) & 100.20(b)
- 10 CFR 100.21(b)
- SRP Sections: 2.1.1, 2.1.2, 2.1.3, 2.2.1, 2.2.2, 2.2.3
- Regulatory Guides: 1.78, 1.91, 1.206, 4.7

ACRS Subcommittee Presentation SER/OI Sections 2.1 & 2.2

Key Review Areas

- **2.1 Geography and Demography**
  - **Site Location and Description**
    - Coordinates, site boundaries, orientation of principal plant structures, location of highways, railroads, waterways that traverse the exclusion area
  - **Exclusion Area Authority and Control**
    - Legal authority, control of activities unrelated to plant operation, arrangements for traffic control
  - **Population Distribution**
    - Current and future population projections, characteristics of the Low Population Zone (LPZ), population center distance, and population density

ACRS Subcommittee Presentation SER/OI Sections 2.1 & 2.2

Key Review Areas

- **2.2 Nearby Industrial, Transportation, and Military Facilities**
  - **Identification of Potential Hazards in Site Vicinity**
    - Maps of site and nearby significant facilities and transportation routes
    - Description of facilities, products, materials, and number of people employed
    - Description of pipelines, highways, waterways, railroads and airports
    - Projections of industrial growth

ACRS Subcommittee Presentation
SER/OI Sections 2.1 & 2.2

Key Review Parameters

- **Evaluation of Potential Accidents**
  - Design-Basis Events: Accidents that a probability of occurrence on the order of magnitude of 10^{-7} per year or greater and potential consequences exceeding 10 CFR 100 dose guidelines

- **Explosions and Flammable Vapor Clouds**
  - Truck Traffic, Pipelines, Mining Facilities, Waterway Traffic, Railroad traffic

- **Release of Hazardous Chemicals**
  - Transportation Accidents, Major Depots, Storage Areas, Onsite Storage tanks

- **Fires**
  - Transportation Accidents, Industrial Storage Facilities, Onsite Storage, Forest

- **Radiological Hazards**
  - Impact of North Anna Units 1 and 2 on North Anna Unit 3

ACRS Subcommittee Presentation
SER/OI Sections 2.1 & 2.2

Conclusions

- The staff reviewed the information provided by the applicant in Section 2.1, and concluded that the information provided is sufficient and conforms the requirements of 10 CFR 50.34(a)(1), 10 CFR 52.79(a)(1), 10 CFR 100.3, 10 CFR 100.20(a) and 10 CFR 100.21(b).

- The staff reviewed the information provided and evaluations performed by the applicant addressed in Section 2.2, and concluded that the information provided is sufficient to satisfy the requirements of 10 CFR 50.34(a)(1), 10 CFR 52.79(a)(1)(vi) and 10 CFR 100.20(b).

- The evaluation of potential accidents identifies two open items 2.2.3-5 and 2.2.3-7, which need further resolution.

ACRS Subcommittee Presentation
North Anna Sections 2.1 & 2.2

Discussion/Committee Questions

ACRS Subcommittee Presentation
SER/OI Section 2.3

Staff Review Team

- Project Managers
  - Thomas Kevern, Lead PM, DNRL/NGE1
  - Ilka Berrios, Chapter PM, DNRL/NGE1

- Technical Staff
  - Brad Harvey, Lead Reviewer, DSER/RSAC
  - Kevin Quinlan, Presenter, DSER/RSAC
  - Carolyn Lauron, Acting Branch Chief, DSER/RSAC

ACRS Subcommittee Presentation
SER/OI Section 2.3

Content of Section 2.3

- FSAR Chapter 2.3 incorporates by reference Revision 9 to the North Anna ESP SSAR.

- COL items and a variance
  -NAPS COL 2.0-7-A – Regional Climatology
  -NAPS COL 2.0-8-A – Local Meteorology
  -NAPS ESP COL 2.3-1 – Cooling Tower-Induced Effects
  -NAPS COL 2.0-9-A – Onsite Meteorological Measurements Program
  -NAPS COL 2.0-10-A – Short-Term Dispersion Estimates
  -NAPS COL 2A.2-1-A – Confirmation of ESBWR X/Q Values
  -NAPS COL 2A.2-2-A – Confirmation of Reactor Building X/Q Values
  -NAPS ESP COL 2.3-2 – Control Room Atmospheric Dispersion Factors
  -NAPS COL 2.0-11-A – Long-Term Diffusion Estimates
  -NAPS ESP COL 2.3-3 – Release Points and Receptor Locations
  -NAPS ESP VAR 2.0-1 – Long-Term Dispersion Estimates (X/Q and D/Q)

ACRS Subcommittee Presentation
SER/OI Section 2.3

Regulations and Review Guidance

- 10 CFR Part 20, Subpart D
- 10 CFR Part 50, Appendixes A, E, and I
- 10 CFR 52.79
- 10 CFR 100.20 and 100.21
- SRP Sections: 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.3.5, and 15.0.3
- Regulatory Guides: 1.23, 1.109, 1.111, 1.112, 1.194, 1.206

ACRS Subcommittee Presentation
SER/OI Chapter 2.3

Technical Topics of Interest

- **2.3.1 Regional Climatology**

  - Comparison of climatic site parameters and site characteristics
    – 50-year/100-year Wind Speed (3-second gust)
    – Maximum Tornado Wind Speed
    – Maximum Roof Load (Winter Precipitation)
    – 0% Exceedence and 100-year Return Period Temperatures

- **2.3.2 Local Meteorology**
  – NAPS ESP COL 2.3-1 addressed the Cooling Tower-Induced Effects on Temperature, Moisture, and Salt Deposition

ACRS Subcommittee Presentation
SER/OI Chapter 2.3

Technical Topics of Interest

- **2.3.4 Short-Term (Accident) Diffusion Estimates**
  - Comparison of atmospheric dispersion site parameters and site characteristics
  - ESP SSAR presented EAB & LPZ χ/Q values
  - NAPS ESP COL 2.3-2 presented new accident χ/Q values for Unit 3 releases to the Unit 3 control room and TSC

- **2.3.5 Long-Term (Routine) Diffusion Estimates**
  - Comparison of atmospheric dispersion site parameters and site characteristics
  - NAPS ESP COL 2.3-3 verified release points and receptor locations
  - NAPS ESP VAR 2.0-1 recalculated North Anna 3 maximum long-term (routine release) χ/Q and D/Q values at specific receptors of interest.
    - Resulted from updated land-use census data in the Dominion NAPS 2006 AREOR.

ACRS Subcommittee Presentation
SER/OI Section 2.3

Conclusion

- All regulatory requirements satisfied
- No open items

ACRS Subcommittee Presentation
North Anna Section 2.3

Discussion/Committee Questions

Presentation to the ACRS Subcommittee

North Anna Unit 3 COL Application Review
SER/OI Section 2.4
Hydrologic Engineering

August 21, 2009

ACRS Subcommittee Presentation
SER/OI Section 2.4

Staff Review Team

- **Project Managers**
  - Thomas Kevern - Lead PM, DNRL/NGE1
  - Ilka Berrios - Section PM, DNRL/NGE1

- **Technical Staff**
  - Mark McBride – Reviewer, DSER/RHEB
  - Stephen Breithaupt – Reviewer, PNNL
  - Philip Meyer – Reviewer, PNNL
  - Christopher Cook – Reviewer, DSER/RHEB
  - Richard Raione – Branch Chief, DSER/RHEB

ACRS Subcommittee Presentation
SER/OI Section 2.4

General Conditions

- **Regulatory Basis**
  - **Sections 2.4.1 to 2.4.13**
    - Applicant incorporated by reference from North Anna ESP SSAR
    - Guidance from NUREG-0800
- **Post-COL Activities**
  - None for any subsection
- **Selected technical topics of interest**

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.1 – Hydrologic Description

- **ESP Permit Condition 3.E(2)** – Single unit only. The permit condition for second unit cooling no longer applies.
- **Conclusion** - *The identified site characteristics meet the requirements of 10 CFR 52.79 and 10 CFR 100.20(c) with respect to establishing the design basis for SSCs important to safety.*

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.2 - Floods

- **Two Different Flooding Issues:**
  - Watershed-Scale Flooding
  - Locally Intense Precipitation Flooding

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.2 – Floods (continued)

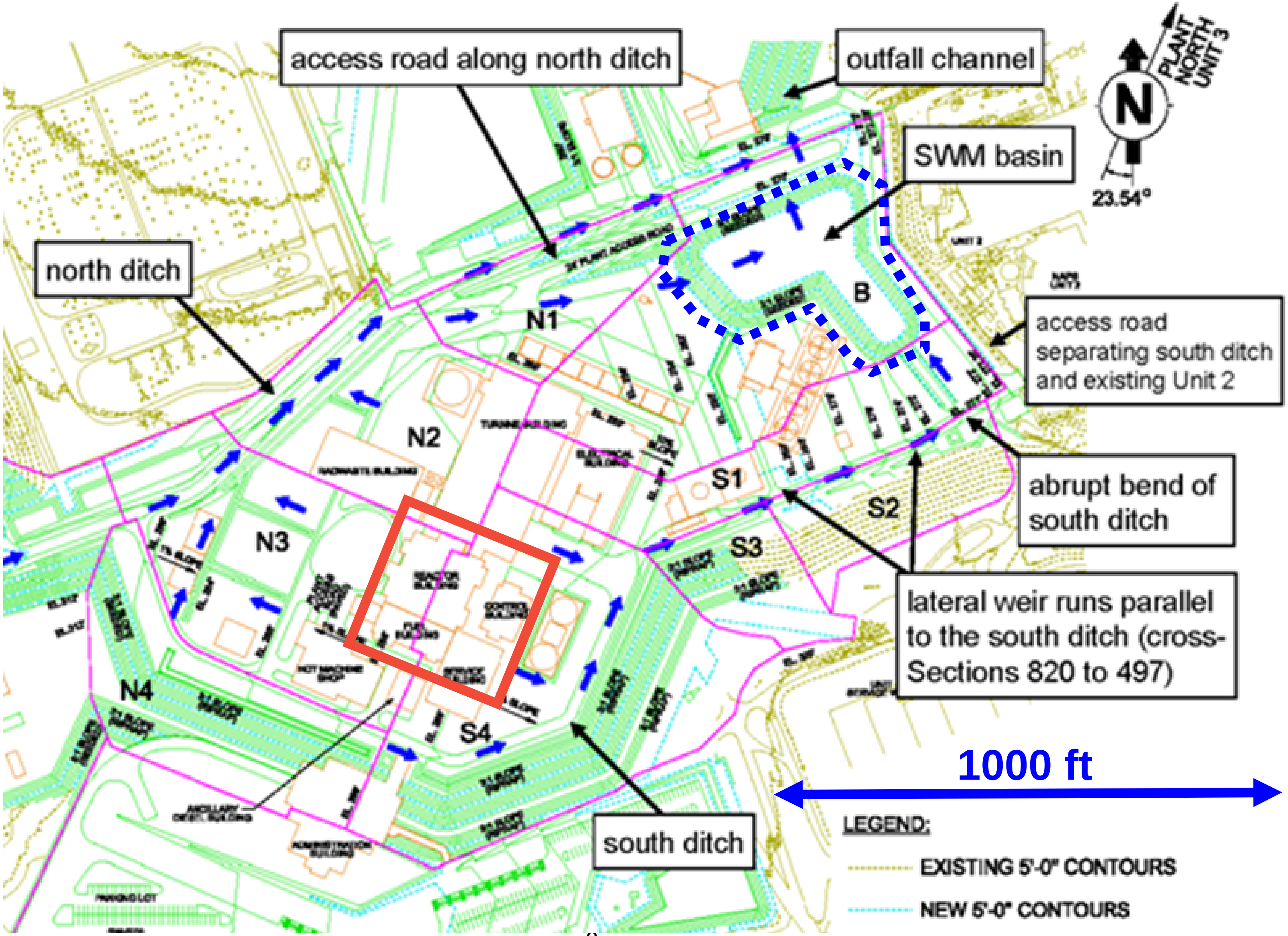
- **Watershed-Scale Flooding**
  - ESP SSAR 2.4.2 incorporated by reference.
  - The design plant grade elevation is above probable maximum flood in Lake Anna's watershed, the simultaneous failure of upstream storage reservoirs, and coincident wave action.
- **Key Elevations**
  - 290 ft = Unit 3 plant grade elevation
  - 289 ft = DCD maximum flood elevation
  - 270 ft = Maximum flood elevation in Lake Anna from PMF in Lake Anna watershed, failure of upstream reservoirs, and waves.

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.2 – Floods (continued)

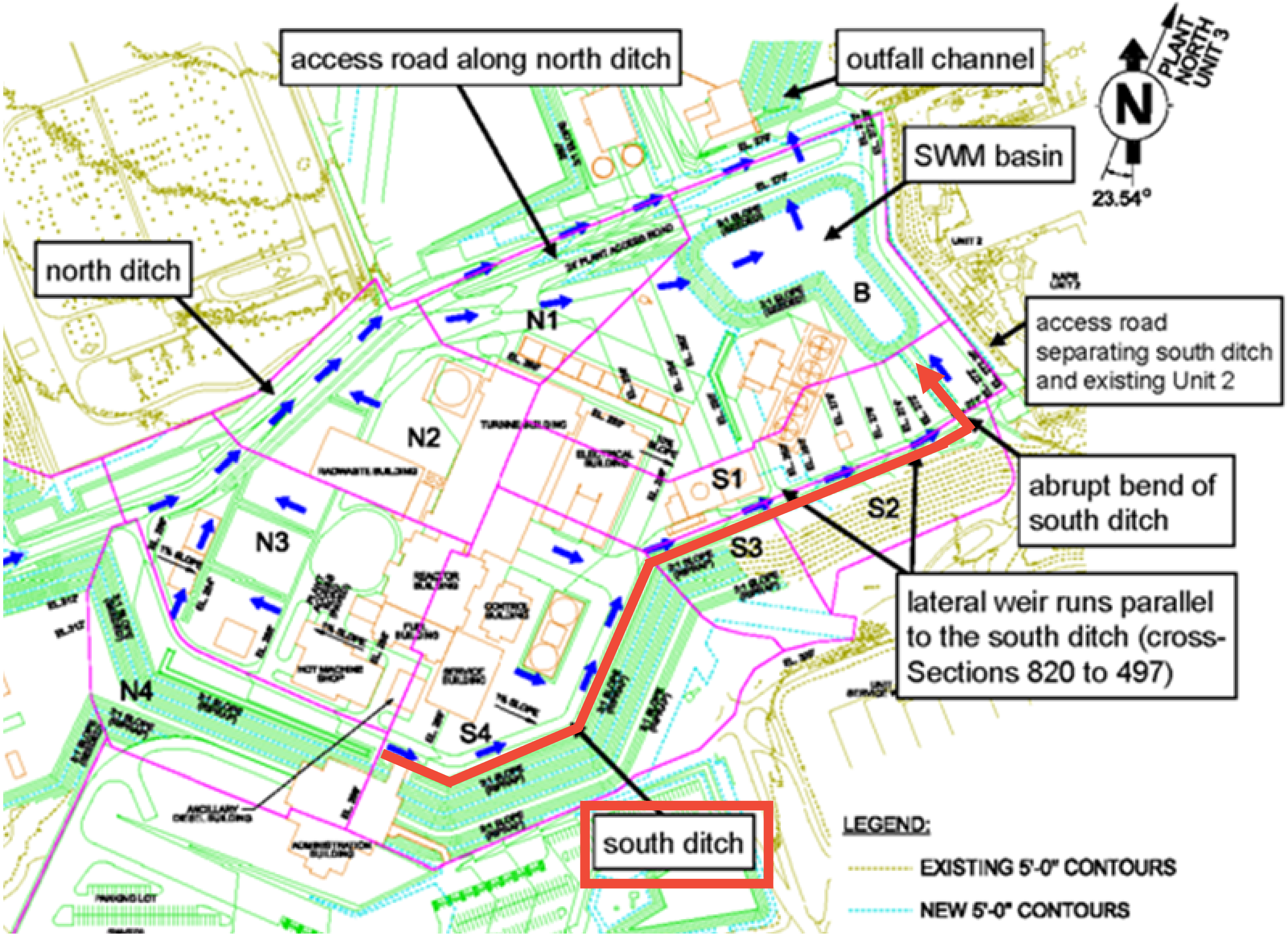
- **Locally Intense Precipitation Flooding**
  - **NAPS ESP COL 2.4-4 (Grading) and 2.4-5 (Elevations of safety-related structures)**
    - Applicant provided HEC-RAS input files for analysis of the locally intense PMP and associated site drainage.
    - NRC staff reviewed HEC-RAS model and conducted sensitivity analyses

Section 2.4.2 – Floods (continued)



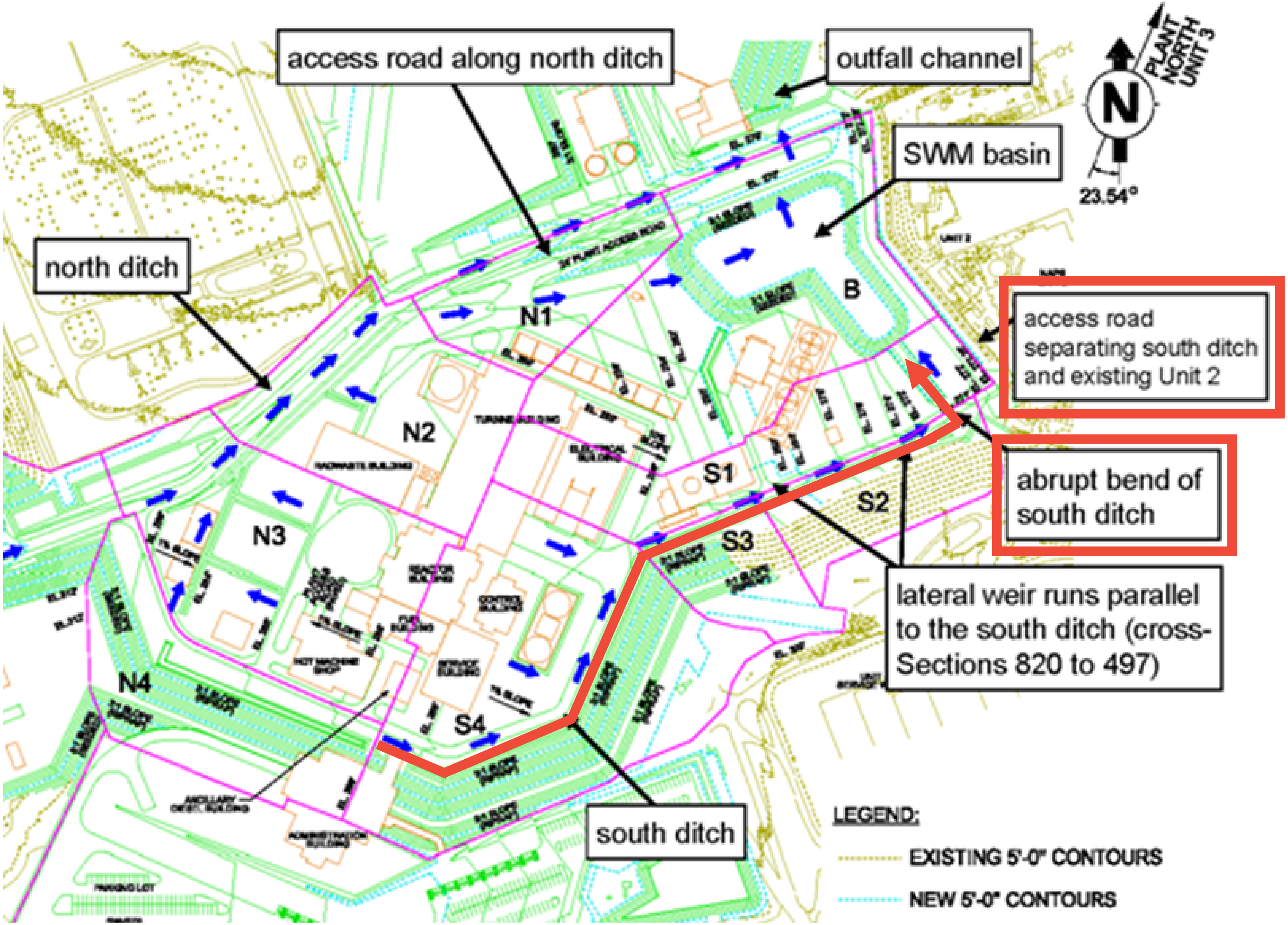
Based on FSAR Figure 2.4-201

Section 2.4.2 – Floods (continued)



Based on FSAR Figure 2.4-201

Section 2.4.2 – Floods (continued)



Based on FSAR Figure 2.4-201

ACRS Subcommittee Presentation
SER/OI Section 2.4
Section 2.4.2 – Floods (continued)

- **HEC-RAS Modeling**
  - **NRC Technical Evaluation**
    - Reviewed applicant’s HEC-RAS model set up
    - Evaluated applicant’s HEC-RAS results
    - Conducted sensitivity analyses on applicant’s HEC-RAS inputs
  - **Key Modeling Conditions**
    - Culverts are blocked (in applicant’s model setup)
    - Potential for channel and weir blockage by debris
    - Effect of channel overflow on flow at abrupt bend

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.2 – Floods (continued)

- **HEC-RAS Modeling** (continued)
  - **HEC-RAS Maximum Water Surface Elevations**
    - Not high enough near nuclear island to be problematic
  - **HEC-RAS Results in South Ditch**
    - High velocities (> 10 ft/s) and hydraulic jumps upstream of abrupt bend
      - No safety-related areas affected
    - At abrupt bend and road crossing, maximum elevation is 272.02 feet; safety dike (access road) elevation is 272.25 feet.
      - Elevation difference = 0.23 feet
      - Could affect safety-related areas
      - Existing Unit 1 and 2 yard is at 270.0 feet

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.2 – Floods (continued)

- **Open Item 2.4.2-2**
  - (a) Provide updated HEC-RAS input files for NRC review. Addresses DCD Rev. 5, addition of Ancillary Diesel Building.
  - (b) Provide additional details on the South Ditch to ensure system will function as described.
- **Open Item 2.4.2-3**
  - Uncertainty that flood will overtop access road/safety dike that protects existing units

ACRS Subcommittee Presentation
SER/OI Chapter 2.4

- **Section 2.4.3 – Probable Maximum Flood on Streams and Rivers**
  The staff concluded that the identified design bases meet the requirements of 10 CFR 100.20(c) with respect to establishing the design basis for SSCs important to safety.

- **Section 2.4.4 – Potential Dam Failures**
  The staff concluded that the identified design bases meet the requirements of 10 CFR 100.23(d) and 10 CFR 100.20(c), with respect to establishing the design basis for SSCs important to safety.

ACRS Subcommittee Presentation
SER/OI Section 2.4

- **Section 2.4.5 – Probable Maximum Surge and Seiche Flooding**

  NRC staff confirmed that there is no outstanding information.

- **Section 2.4.6 – Probable Maximum Tsunami Hazards**

  NRC staff confirmed that there is no outstanding information.

ACRS Subcommittee Presentation
SER/OI Section 2.4

- **Section 2.4.7 – Ice Effects**
  Staff concluded that the identified site characteristics meet the requirements of 10 CFR 52.79 and 10 CFR 100.20(c) with respect to determining the acceptability of the site for the ESBWR design, and establishing the design basis for SSCs important to safety.

- **Section 2.4.8 – Cooling Water Canals and Reservoirs**
  NRC staff confirmed that the applicant has addressed the relevant information and there is no outstanding information.

- **Section 2.4.9 – Channel Diversions**
  NRC staff confirmed that there is no outstanding information.

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.10 – Flooding Protection Requirements

- **Summary**
  - Section 2.4.10 is dependent on results from Section 2.4.2.
  - Section 2.4.2 has two Open Items (2.4.2-2 and 2.4.2-3). Resolution of these Open Items is necessary for staff to complete this section.

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.11 – Low Water Considerations

- **Conclusion**

  The identified design bases meet the requirements of 10 CFR 100.20(c) with respect to determining the acceptability of the site for the ESBWR design, and for establishing the design basis for SSCs important to safety.

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.12 – Groundwater

- **Variances (All accepted)**
  - **NAPS ESP VAR 2.0-2, Hydraulic Conductivity**
    Higher estimate based on Unit 3 field investigation
  - **NAPS ESP VAR 2.0-3, Hydraulic Gradient**
    Higher estimate based on head measurements from Unit 3 field investigation
  - **NAPS ESP VAR 2.4-1, Void Ratio, Porosity, and Seepage Velocity**
    Higher seepage velocity based on Unit 3 field investigation
  - **NAPS ESP VAR 2.4-2. NAPS Water Supply Well Information**
    Corrected and supplemental information was provided on existing onsite supply wells. Staff concluded that a pathway to the NANIC supply well was implausible.

ACRS Subcommittee Presentation
SER/OI Section 2.4
Section 2.4.12 – Groundwater (Continued)

- **Open Item 2.4.12-2**
  - **Concern:** Groundwater level must be more than 2 ft below plant grade of 290 ft
  - Model sensitivity studies of effect of drain cell properties on groundwater elevations
  - Effectiveness of surface water drainage as groundwater drains

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.13 Accidental Releases of Radioactive Liquid Effluents

- **ESP Permit Condition 3.E(3) Features to Preclude Accidental Releases of Radionuclides into Potential Liquid Pathways**
  – Below-grade tanks are in steel-lined compartments large enough to contain entire contents
  – Above-grade condensate storage tank is in a basin large enough to contain entire contents
  – *Staff concluded that these design features satisfy the permit condition*

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.13 Accidental Releases of Radioactive Liquid Effluents (Continued)

- **Variance: NAPS ESP VAR 2.0-5**
  - Applicant requests use of smaller distribution coefficient (K_d) values than those in ESP
  - *Resolution contingent on Open Item 2.4.13-4*

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.13 Accidental Releases of Radioactive Liquid Effluents (Continued)

- **Open Item 2.4.13-4**
  - **Concern**: Applicant stated that their transport analysis is a bounding analysis. Staff wants to verify that this is the case.
  - **Staff issues**:
    - Certain literature K_d values used in transport analysis were greater than minimum measured onsite K_d
    - Hydraulic conductivity used in transport analysis was less than the maximum measured onsite
    - Staff requested a transport analysis using minimum K_d and maximum hydraulic conductivity

ACRS Subcommittee Presentation
SER/OI Section 2.4

Section 2.4.14 - Technical Specifications and Emergency Operation Requirements

- **Conclusions**
  - *No emergency procedures or technical specifications are necessary to prevent hydrological phenomena from degrading the UHS.*
  - *No outstanding information is expected to be addressed in the FSAR related to this section.*
  - *The requirements of 10 CFR 50.36 and 10 CFR 100.20(c) have been met with respect to determining the acceptability of the site for the ESBWR design.*

ACRS Subcommittee Presentation
SER/OI Section 2.4

North Anna Unit 3 COL Application Review

SER/OI Section 2.4

Hydrologic Engineering

Questions

Presentation to the ACRS Subcommittee

North Anna Unit 3 COL Application Review

SER/OI Chapter 2.5
Geology, Seismology, and Geotechnical Engineering

August 21, 2009

ACRS Subcommittee Presentation
SER/OI Chapter 2.5

Staff Review Team

- **Project Managers**
  - Thomas Kevern - Lead PM, DNRL/NGE1
  - Ilka Berrios - Section PM, DNRL/NGE1

- **Technical Staff**
  - Dr. Weijun Wang, Geotechnical Reviewer
  - Dr. Vladimir Graizer, Geophysicist Reviewer
  - Jenise Thompson, Geologist Reviewer
  - Dr. Clifford Munson, Chief, DSER/RGS2

ACRS Subcommittee Presentation
SER/OI Chapter 2.5

Content of COL Application

- **Incorporated by Reference**

  Early Site Permit (ESP) was incorporated by reference in application

- **COL Items**

  Addressed 4 NAPS COL items

- **Items Related to Early Site Permit**

  Addressed 11 NAPS ESP COL items
  Addressed 4 ESP Permit Conditions
  Addressed 4 ESP Variances

ACRS Subcommittee Presentation
SER/OI Chapter 2.5

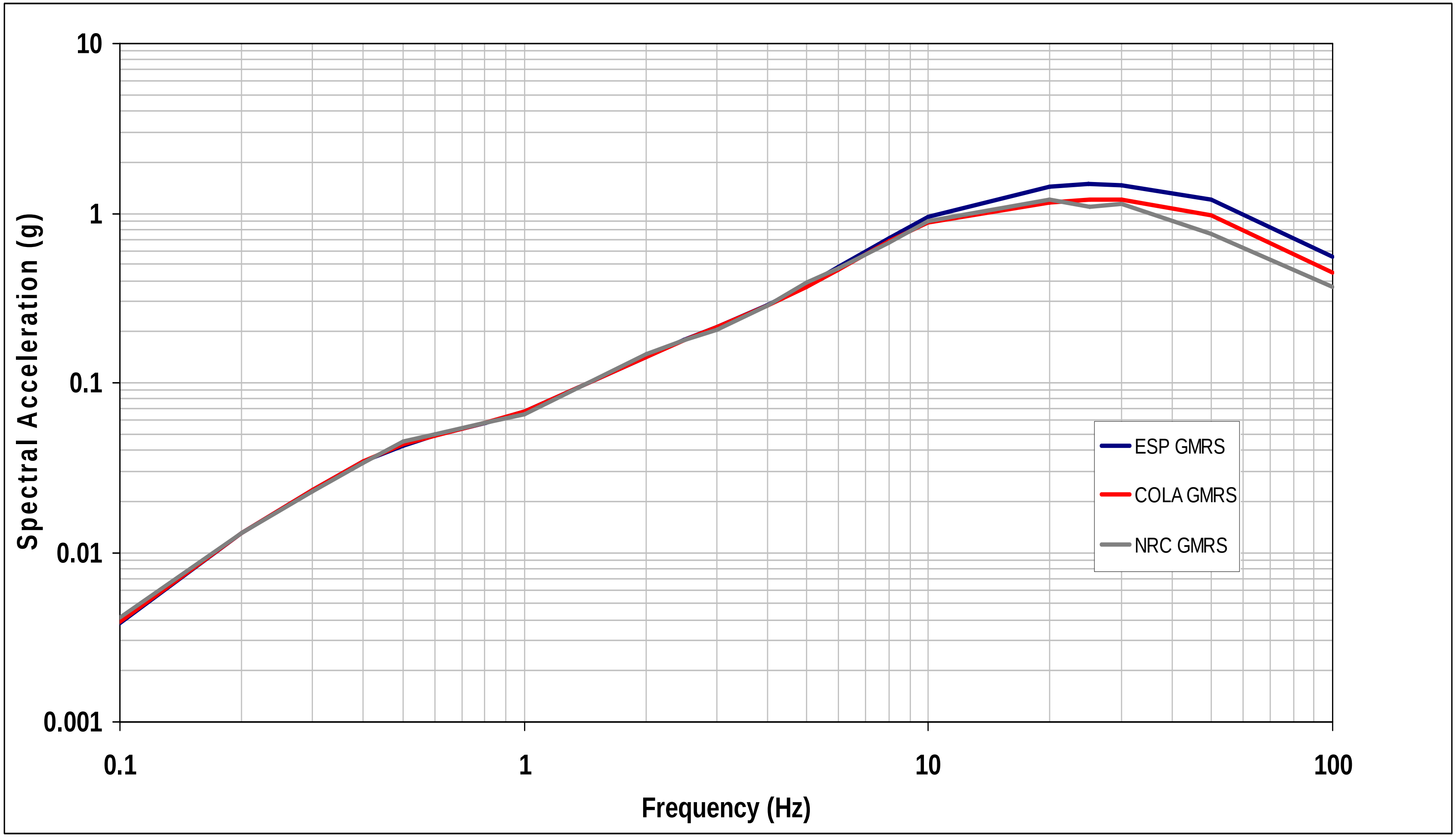
- **2.5.1 Basic Geologic & Seismic Information**
- **2.5.3 Surface Faulting**
  - Incorporated by reference
  - Provided additional site geologic and seismic information
  - No outstanding issues

- **2.5.2 Vibratory Ground Motion**

Addressed COL items and ESP permit conditions:

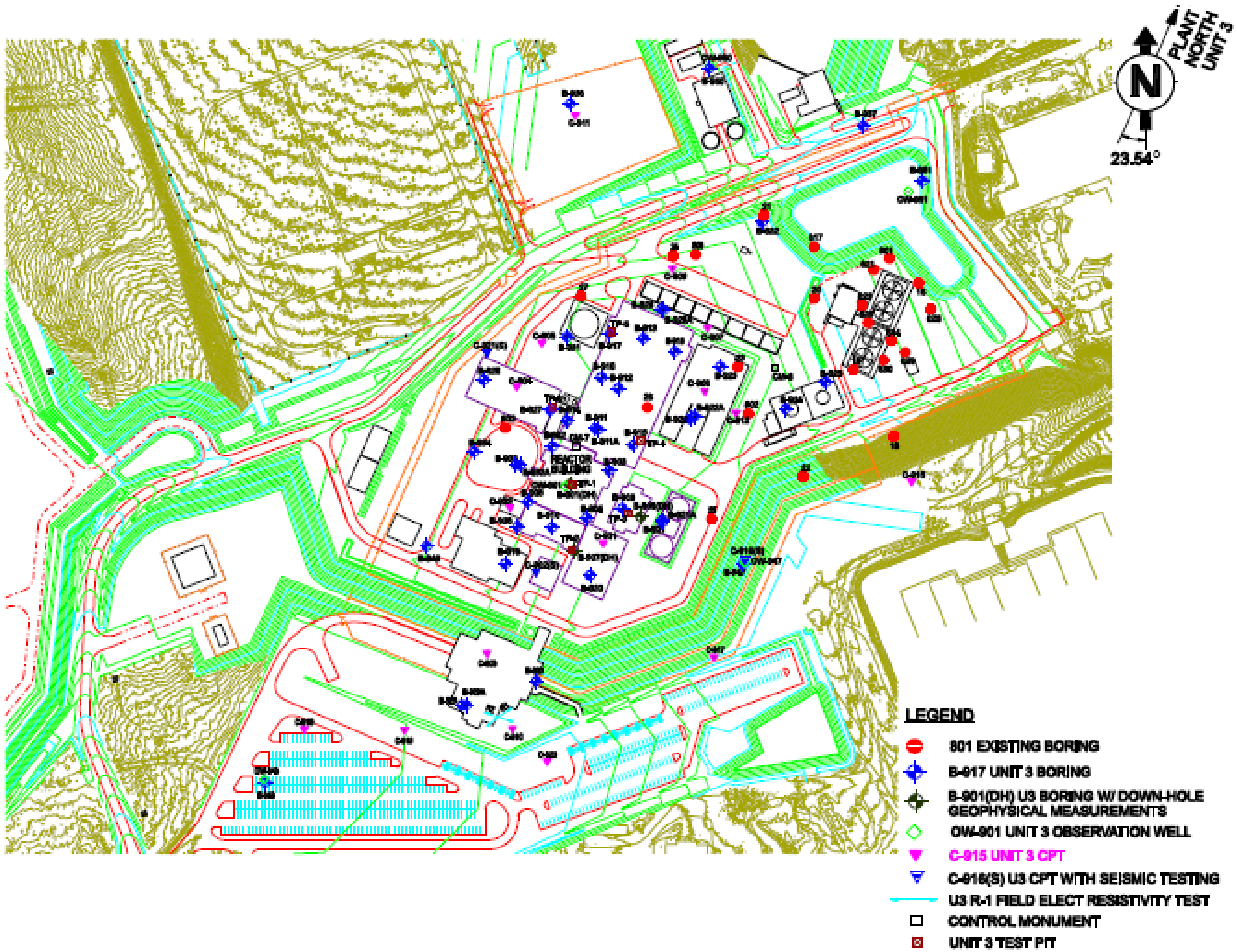
- Changed site response analysis control point elevation from 76.2 m (250 ft) to 83.2 m (273 ft)
- Revised ground motion response spectra (GMRS) based on new control point elevation and updated site subsurface profile
- Developed foundation input response spectra (FIRS) at elevations: 73.5 m (241 ft), 68.3 m (224 ft), and 86.0 m (282 ft) for the CB, RB/FB, and FWSC foundations

Comparison of Horizontal Ground Motion Response Spectra (GMRS)



- **2.5.4 Stability of Subsurface Materials and Foundations**
  - Addressed the COL items by providing additional boring data, site soil profiles, subsurface material properties, and stability analyses.
  - Responded to 11 RAIs
  - 8 Open Items/Supplemental RAIs

Unit 3 Boring Locations – Power Block



ACRS Subcommittee Presentation
SER/OI Chapter 2.5

Site Investigations	ESP	COL
Borings	7	55
CPTs	8	23
Test Pits	0	6
Observation Wells	9	7
P-S Velocity Test	5	6

ACRS Subcommittee Presentation
SER/OI Chapter 2.5

- **2.5.4 Stability of Subsurface Materials and Foundations Open Items (OI)**
  - **OI 2.5.4-3 and 6**: Lack of information on concrete fill
  - **OI 2.5.4-4 and 5**: Did not adequately characterize the static and dynamic properties of the backfill soil (ITAAC issue) including minimum shear wave velocity determination
  - **OI 2.5.4-7 and 11:** Did not address the possibility of local failure in foundation stability analysis, and justify dynamic bearing capacity
  - **OI 2.5.4-8:** Did not clarify the site-specific coefficient of friction at foundation interface
  - **OI 2.5.4-10:** Did not clearly explain why estimated dynamic settlement in ESP SSAR is almost 3 times of that in COL FSAR

- **2.5.5 Stability of Slopes**
  - Addressed COL item by performing new slope stability analyses
  - ESP Variance 2.5-1: use of updated soil information in COL FSAR instead that in ESP SSAR for slope stability analysis.
  - Staff performed confirmatory analysis to verify conclusions on slope stability
  - Resolved 3 RAIs and no outstanding issues

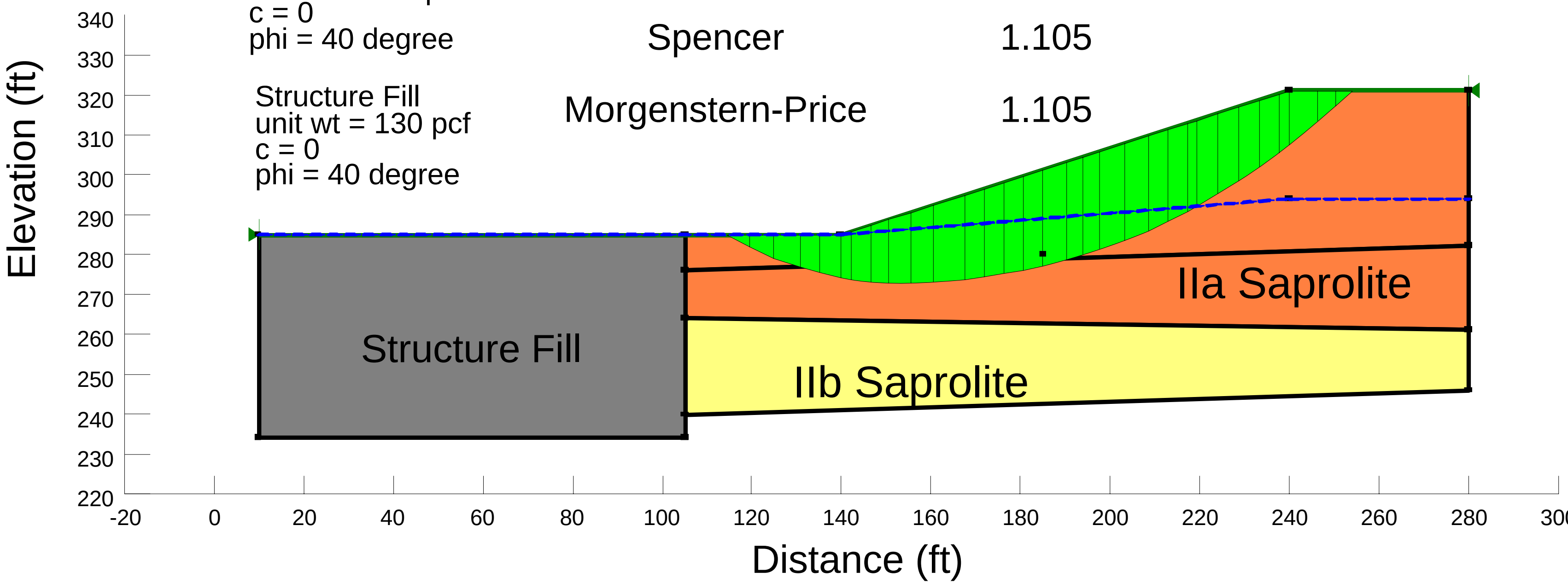
Staff Stability of Slopes Confirmatory Analysis

Method	Staff FS	Applicant FS
Ordinary	1.091	
Bishop	1.098	1.25
Janbu	1.026	
General Limit Equilibrium (GLE)	1.105	
Spencer	1.105	
Morgenstern-Price	1.105	

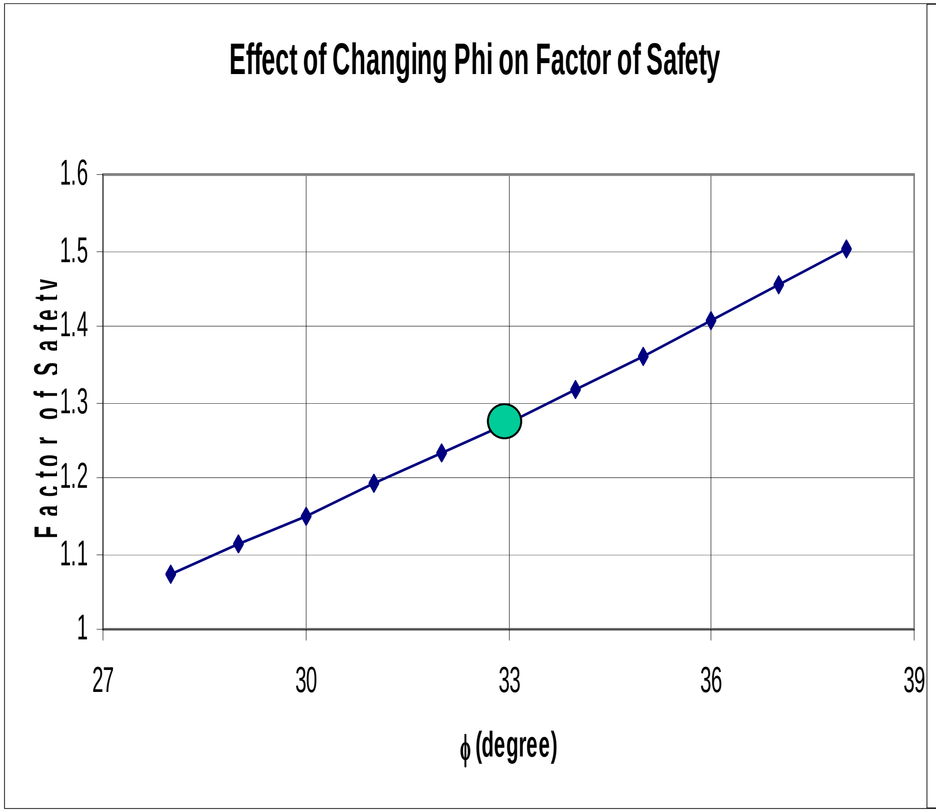
IIa Saprolite
unit wt = 125 pcf
c = 125 psf
phi = 33 degree

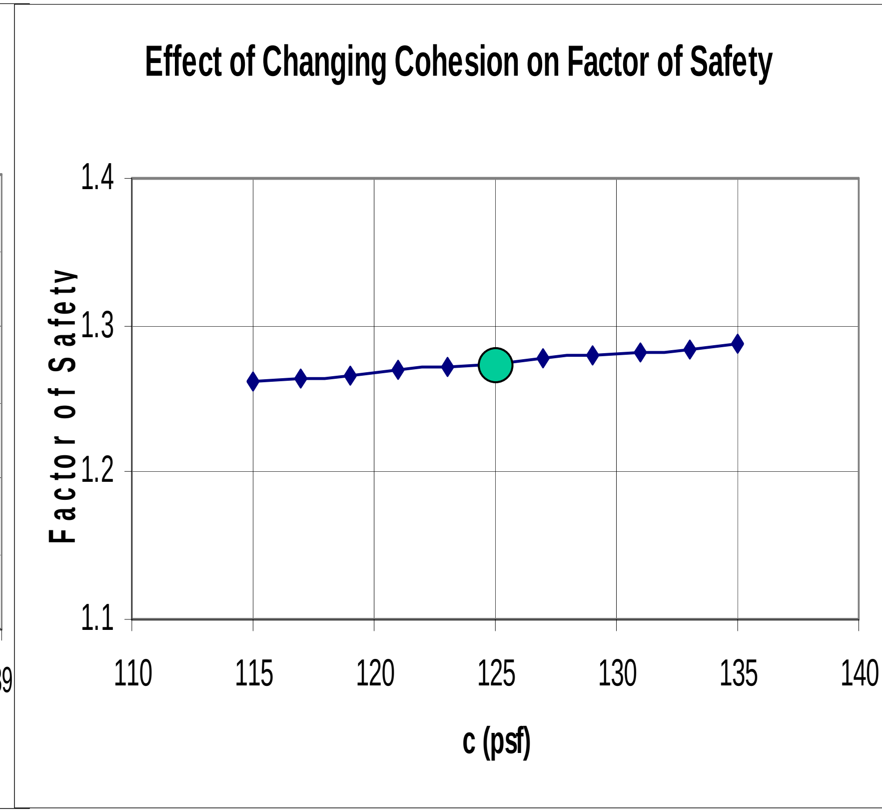
IIb Saprolite
unit wt = 130 pcf
c = 0
phi = 40 degree

Structure Fill
unit wt = 130 pcf
c = 0
phi = 40 degree



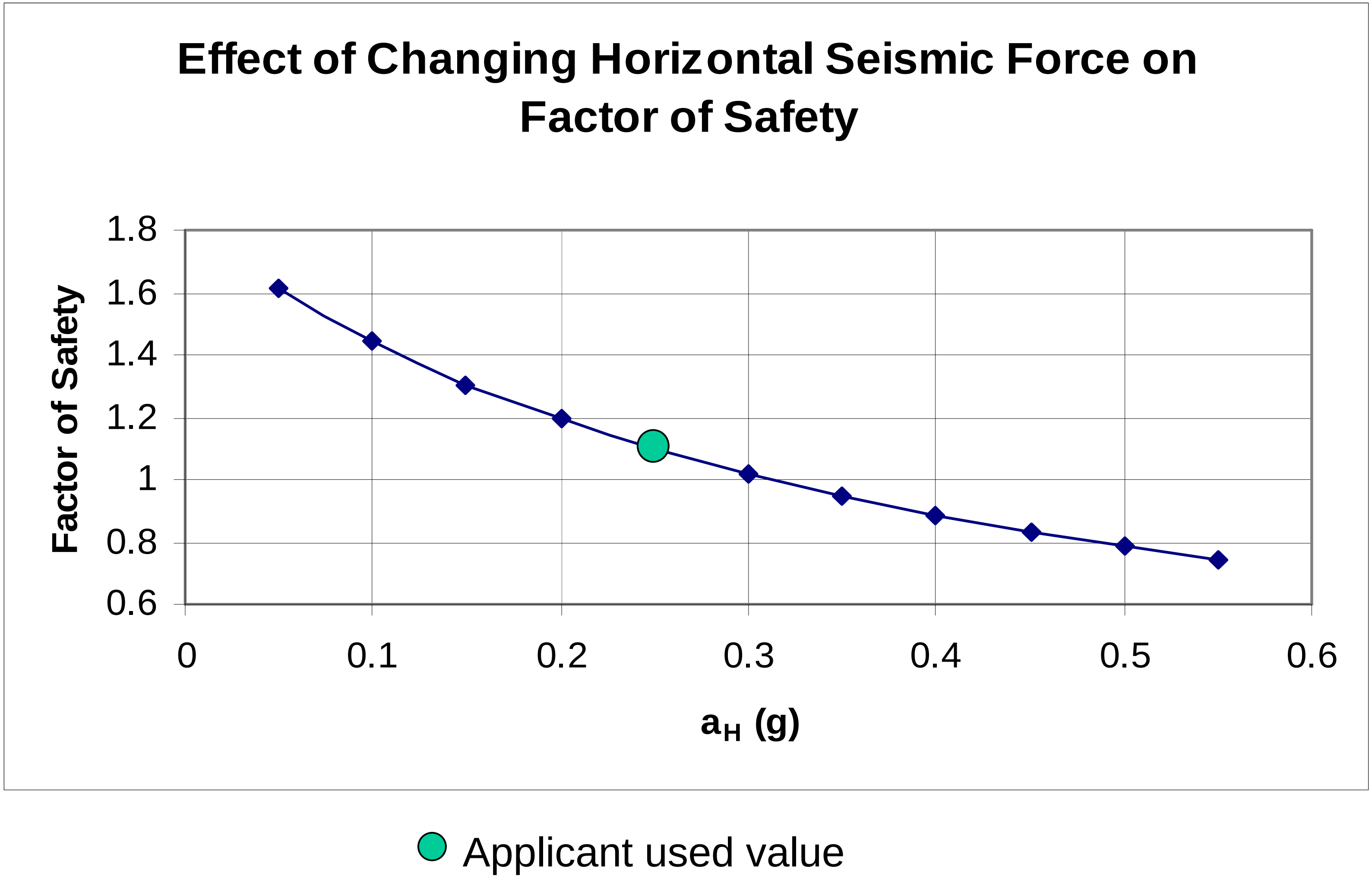
Staff Stability of Slopes Confirmatory Analysis





● Applicant used value

Staff Stability of Slopes Confirmatory Analysis



ACRS Subcommittee Presentation
SER/OI Chapter 2.5

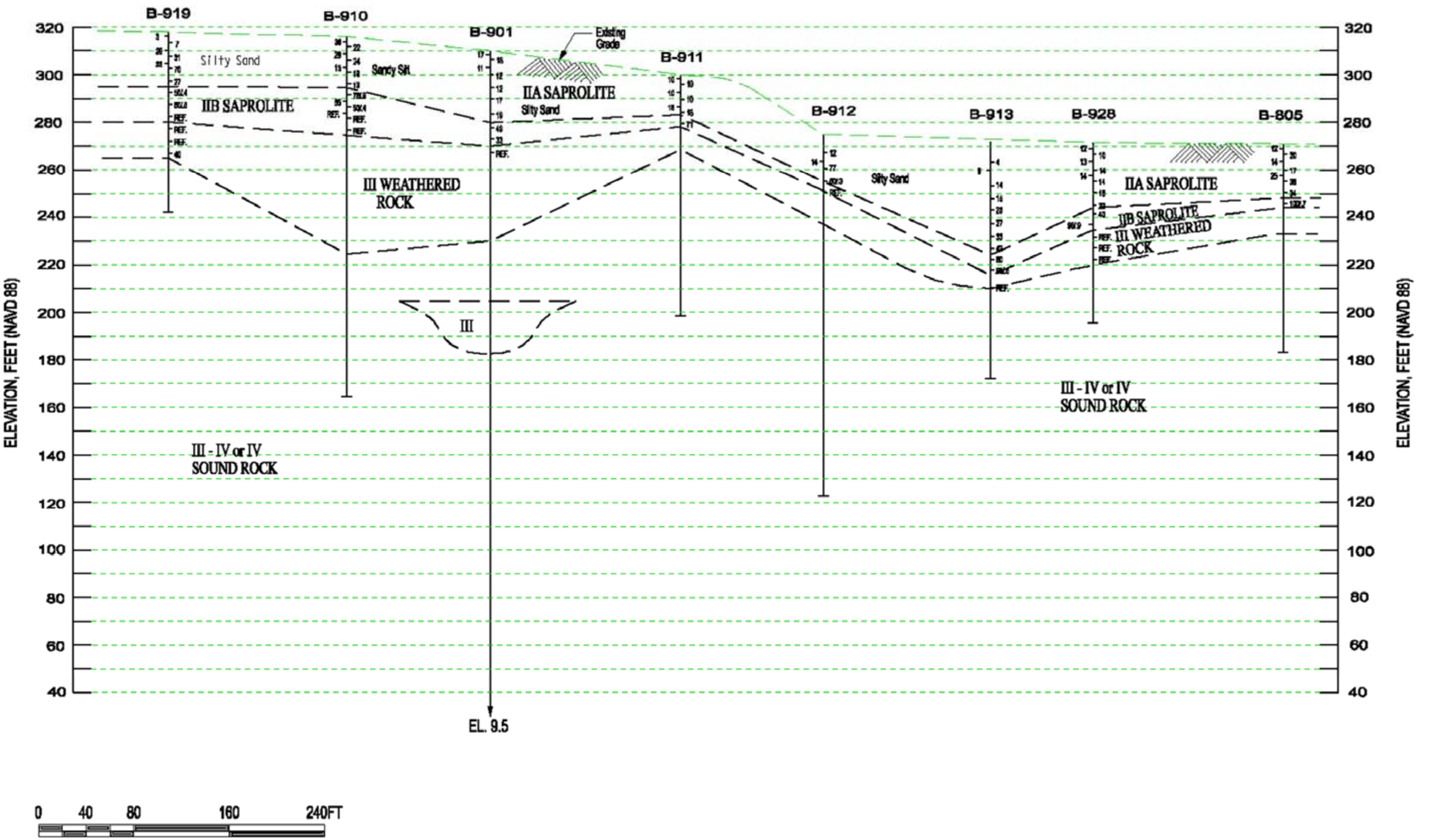
Conclusions

- The applicant addressed all COL and ESP COL items, as well as ESP permit conditions
- All ESP variances are acceptable
- There are eight open items addressed in supplemental RAIs

ACRS Subcommittee Presentation
SER/OI Chapter 2.5

Discussion/Committee Questions

Typical Subsurface Profile Across Unit 3 Power Block Area



North Anna 3

North Anna Unit 3
Presentation to ACRS Subcommittee
COLA - Chapter 3

Dominion

Chapter 3, Design of Structures, Components, Equipment, and Systems: Chapter Topics

- Conformance with NRC General Design Criteria
- Classification of Structures, Systems and Components*
- Wind and Tornado Loadings
- Water Level (Flood) Design
- Missile Protection*

* FSAR contains supplemental information (beyond DCD content) on this topic

Chapter 3, Design of Structures, Components, Equipment, and Systems: Chapter Topics (cont)

- Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping
- Seismic Design*
- Seismic Category I Structures
- Mechanical Systems and Components*
- Seismic and Dynamic Qualification of Mechanical and Electrical Equipment*

* FSAR contains supplemental information (beyond DCD content) on this topic

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Chapter Topics (cont)

- Environmental Qualification of Mechanical and Electrical Equipment*
- Piping Design Review**
- Threaded Fasteners - ASME Code Class 1, 2, and 3**
- Appendices
  - Seismic Soil-Structure Interaction Analysis*

* FSAR contains supplemental information (beyond DCD content) on this topic

** New FSAR section (DCD does not include this section)

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information

3.2 Classification of Structures, Systems and Components

STD CDI — Unit 3 includes a Hydrogen Water Chemistry System (HWCS)

STD CDI — Unit 3 does not include Zinc Injection System

NAPS CDI — Unit 3 does not include a Cold Machine Shop

Dominion

Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.5 Missile Protection

STD SUP	Provided cross-reference to site-specific missile information
STD SUP	Provided cross-reference to site-specific aircraft hazard analysis

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.7 Seismic Design

NAPS SUP	Provided cross-references to site-specific GMRS, FIRS, and comparison information
NAPS SUP	Provided cross-reference to site-specific earthquake ground motion time history information
NAPS SUP	Provided cross-reference to site-specific information on the properties of subsurface materials

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.7 Seismic Design (cont)

NAPS SUP — Provided cross-reference to figure with site-specific locations of structures

NAPS SUP — Provided commitment to implement site-specific seismic monitoring program prior to receipt of fuel on site

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.9 Mechanical Systems and Components

NAPS COL	Provided information on vibration assessment program schedule in accordance with RG 1.20 for non-prototype internals
STD COL	Provided milestone for completing ASME stress reports for equipment segments subject to loadings that could result in thermal or dynamic fatigue, and for updating FSAR

Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.9 Mechanical Systems and Components (cont)

STD COL — Provided full description of snubber preservice and inservice examination and testing programs

STD COL — Provided milestone for program implementation, including development of a plant-specific data table for snubbers

Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.9 Mechanical Systems and Components (cont)

STD COL

Provided full description of ASME OM Code preservice and inservice examination and testing programs, and milestone for program implementation

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

STD COL	Provided milestone for submitting implementation schedule for seismic and dynamic qualification of mechanical and electrical equipment
STD COL	Provided milestone for completing Dynamic Qualification Report (DQR)
STD SUP	Addressed Quality Assurance Program requirements for equipment qualification files

Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.11 Environmental Qualification of Mechanical and Electrical Equipment

STD COL

Provided milestone for implementing environmental qualification (EQ) program that includes completion of the plant-specific EQ Documentation

Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.12 Piping Design Review

STD SUP — Provided cross-references to DCD for seismic and nonseismic piping and supports

STD SUP — Location and distance between piping systems will be established as part of completion of ITAAC

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Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3.13 Threaded Fasteners - ASME Code Class 1, 2, and 3

STD SUP

Provided cross-reference to DCD sections for criteria for material selection, design, inspection, and testing of threaded fasteners

Dominion

Chapter 3, Design of Structures, Components, Equipment, and Systems: Supplemental Information (cont)

3A	Seismic Soil-Structure Interaction Analysis
NAPS CDI	Site-specific geotechnical data described in Chapter 2
NAPS CDI	Data is compatible with site enveloping parameters considered in standard design
NAPS CDI	Provided site plan in Chapter 2

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Chapter 3, Design of Structures, Components, Equipment, and Systems: SER Open Items

- 7 Ch 3 Open Items, 1 Ch 2 Open Item
  - List of SSCs necessary for continued operations after OBE
  - Editions of codes and standards for specific SSCs
  - Identification of site-specific SSE and OBE
  - FWSC site-specific SSI analysis [Chapter 2 Open Item]
  - Process for design and qualification of mechanical equipment including design and procurement specifications
  - Implementation plan for equipment qualification
  - Plant-specific EQ Document
  - Implementation of EQ Program
- 3 Confirmatory Items

Dominion

Presentation to the ACRS Subcommittee

North Anna Unit 3 COL Application Review

SER/OI Chapter 3
Design of Structures, Components, Equipment, and Systems

August 21, 2009

North Anna COL Chapter 3
Staff Review Team

- **Project Managers**
  - Thomas Kevern, Lead PM, DNRL/NGE1
  - Michael Eudy, Chapter PM, DNRL/NGE1

- **Technical Staff Presenters**
  - Yuken Wong, Reviewer, EMB2
  - Manas Chakravorty, Reviewer, SEB2
  - PY Chen, Reviewer, EMB2
  - Thomas Scarbrough, Reviewer, CIB2

Summary of Supplemental Information for North Anna COL Chapter 3

FSAR Section		Summary of Supplemental Information
*** 3.2.1 & 3.2.2 (slide 6)**	Classification of Structures, Systems and Components & System Quality Group Classification	STD CDI: Classification Summary-Hydrogen Water Chemistry System STD CDI: Classification Summary-Zinc Injection System NAPS CDI: Classification Summary-Cold Machine Shop
*** 3.5 (slide 7)**	Missile Protection	STD SUP 3.5-1: Site Proximity Missiles STD SUP 3.5-2: Aircraft Hazards Copy of MFN 09-484 provided to committee
*** 3.7.1 (slide 8)**	Seismic Design Parameters	NAPS SUP 3.7-1: Site Specific Design Ground Motion Response Spectra NAPS SUP 3.7-2: Site Specific Design Ground Motion time History NAPS SUP 3.7-3: Supporting Media for Seismic Category I Structures
*** 3.7.2 (slide 8)**	Seismic System Analysis	NAPS SUP 3.7-4: Soil Structure Interaction NAPS SUP 3.7-5: Interaction of Non-Category I Structures with Seismic Category I Structures

Summary of Supplemental Information for North Anna COL Chapter 3 (cont.)

FSAR Section		Summary of Supplemental Information
3.7.4	Seismic Instrumentation	NAPS SUP 3.7-6: Seismic Instrumentation
*** 3.9.2 (slide 9)**	Dynamic Testing and Analysis of Systems, Structures and Components	NAPS COL 3.9.9-1-H: Reactor Internals Vibration Analysis, Measurements and Inspection Program
*** 3.9.3 (slide 10)**	ASME Code Class 1, 2 and 3 Components, Component Supports and Core Support Structures	STD COL 3.9.9-2-H: ASME Class 2 or 3 or Quality Group D Components with 60 Year Design Life STD COL 3.9.9-4-A: Snubber Inspection and Test Program
*** 3.9.6 (slides 11-17)**	Inservice Testing of Pumps and Valves	STD COL 3.9.9-3-A: Full description of IST program and milestones STD COL 3.9.9-4-A: Description of snubber preservice and inservice inspection and testing progam STD SUP 3.9-1: ASME OM Code beyond DCD provisions
*** 3.10 (slide 18)**	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment	STD COL 3.10.4-1-A: Dynamic Qualification Report

Summary of Supplemental Information for North Anna COL Chapter 3 (cont.)

FSAR Section		Summary of Supplemental Information
*** 3.11 (slides 19-20)**	Environmental Qualification of Mechanical and Electrical Equipment	STD COL 3.11-1-A: Environmental Qualification Document
*** 3.12 (slide 21)**	Piping Design Review	STD SUP 3.12-1: Piping Design Review STD SUP 3.12-2: Completion of ITAAC
3.13	Threaded Fasteners (ASME Code Class1, 2 and 3)	STD SUP 3.13-1: Threaded Fasteners ASME Code Class 1, 2 and 3

Seismic Classification and System Quality Group Classification Section 3.2.1 and 3.2.2

Sections 3.2.1 and 3.2.2 address seismic classification of systems, structures, and components (SSCs) and the quality group classification of systems and components, respectively. New information included:

•STD CDI – Revision of data in Table 3.2.1 for hydrogen water chemistry and zinc injection systems

•NAPS COL – Revision of Table 3.2.1 to eliminate the cold machine shop

Open Item:

•03.02.01-3: List of SSCs necessary for continued operation following an OBE

Missile Protection Section 3.5

3.5.1.5 Site Proximity Missiles:

STD SUP 3.5-1 addressed the site-specific information pertaining to site proximity missile sources and evaluation for potential hazard. The RAI responses are considered to be adequate, acceptable and support safe operation of proposed Unit 3.

3.5.1.6 Aircraft Hazards:

STD SUP 3.5-2 addressed the site-specific aircraft hazards analysis. The total probability of an aircraft crash into the plant was determined to satisfy the acceptance criterion (1 x E-6 per year).

MFN 09-484:

Courtesy copy of ESBWR Steam Turbine – Low Pressure Rotor Missle Generation Probability Analysis provided to ACRS per July 21-22 follow-up

Seismic Design Parameters Section 3.7.1
& Seismic System Analysis Section 3.7.2

Supplemental Information:

•NAPS SUP 3.7-1: Provides Site Specific GMRS
•NAPS SUP 3.7-2: Provides Site Specific Ground Motion Time History
•NAPS SUP 3.7-3 & 3.7-4: Provide Site-Specific Properties of Sub-Surface Materials
•NAPS SUP 3.7-5: Provides Locations of Structures:

Technical Evaluation:

•Site-specific seismic design parameters for RB/FB and CB fall within the range of parameters considered in the DCD. Corresponding FIRS are bounded by the CSDRS

•RAI 3.07.01-2: Requested the applicant to include in Section 3.7.1 both the site specific SSE and the corresponding OBE.

•RAI 02.05.04-13: The applicant concluded backfill for the FWSC does not meet the DCD site parameter. The applicant will perform site specific SSI analysis for the FWSC to demonstrate its seismic adequacy. This analysis is not yet complete. This issue will be addressed by Open Item 02.05.04-13.

Dynamic Testing and Analysis of Systems Structures and Components Section 3.9.2

Section 3.9.2 describes the criteria, testing procedures, and dynamic analyses employed to ensure the structural and functional integrity of reactor internals, systems, components, and their supports. New information reviewed included:

•NAPS COL 3.9.9-1-H Initial Startup Flow-Induced Vibration Testing of Reactor Internals - revised the text in the DCD to include reference to topical reports and provide schedule information for the vibration assessment program as called for in RG 1.20.

•Dominion submitted both a plan and schedule for implementation vibration assessment program. Staff notes that actual program details are being addressed in the DCD review. Based on the review of additional information provided by the applicant to address potential adverse flow effects of the reactor internals, the staff closed the issued RAIs. The staff finds the information in this section to be acceptable and there are no open items for this section.

ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures
Section 3.9.3

Section 3.9.3 addresses the structural integrity of pressure-retaining components, their supports, and core support structures. New information for review included:

STD COL 3.9.9-2-H: Piping Design Report Schedule

- Stress reports to be completed within 6 months of completion of ITAAC Table 3.1-1

STD COL 3.9.9-4-A: Snubber Preservice and Inservice Examination and Testing

- Additional detail added to address snubber preservice examination and testing
- Additional detail and codes added to address snubber inservice examination and testing
- Snubber support data is to be added to the FSAR once ITAAC are complete

Confirmatory Item 3.9.3-02:

- Dominion to correct the reference to an ITAAC table when preparing the requested plant-specific snubber information.

Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints Section 3.9.6

- NAPS Unit 3 COL application relies on ESBWR DCD and NAPS Unit 3 FSAR to fully describe functional design, qualification, and IST programs for pumps, valves, and dynamic restraints

- In response to RAIs, Dominion and GEH revised NAPS Unit 3 FSAR and ESBWR DCD to fully describe functional design, qualification, and IST programs in support of COL application

- NRC staff audit of GEH design and procurement specifications in July 2009

Functional Design and Qualification Section 3.9.6

- NAPS Unit 3 FSAR Section 3.9 incorporates by reference ESBWR DCD to support functional design and qualification of safety-related components.
- ESBWR DCD requires use of ASME Standard QME-1-2007 that reflects lessons learned from plant operating experience for functional design and qualification of new valve qualification (revision to Regulatory Guide 1.100 for generic use of ASME QME-1-2007 underway).
- ESBWR DCD requires implementation of key aspects of QME-1-2007 for valves previously qualified, including comparative analysis between QME-1-2007 and previous qualification method.

Functional Design and Qualification Section 3.9.6 (continued)

- ESBWR DCD describes design process for dynamic restraints based on ASME BPV Code, Section III, Subsection NF.
- ESBWR DCD requires flow-induced vibration qualification of applicable components, and confirmation during startup testing program for NAPS Unit 3.
- NRC staff considers ESBWR functional design and qualification methods that include lessons learned from plant operating experience to be acceptable for NAPS Unit 3 pending resolution of open and confirmatory items.

IST Operational Program
Section 3.9.6

- NAPS Unit 3 FSAR Section 3.9 incorporates by reference ESBWR DCD to support IST program description

- ESBWR DCD Section 3.9.6 describes valve IST program based on 2001 Edition/2003 Addenda of ASME OM Code incorporated by reference in 10 CFR 50.55a

- ESBWR DCD Table 3.9-8 lists valves within IST program scope including valve and actuator types, Code class and category, valve function and positions, and test parameters and frequency
(no safety-related pumps and motor operated valves in ESBWR design)

IST Operational Program
Section 3.9.6
(continued)

- NAPS Unit 3 FSAR supplements valve IST provisions in ESBWR DCD for preservice testing, valve exercising, IST reference values, solenoid-operated valve testing, prohibition of preconditioning, and check valve testing and acceptance criteria.

- NAPS Unit 3 FSAR specifies provisions for periodic verification of design-basis capability of safety-related power-operated valves that apply lessons learned from plant operating experience, including key program attributes listed in Regulatory Issue Summary 2000-03.

IST Operational Program
Section 3.9.6
(continued)

- NAPS Unit 3 FSAR Section 3.9.3.7.1(3)e describes program for snubber preservice and inservice examination and testing consistent with ASME OM Code, Section ISTD

- License condition will require Dominion to provide program development schedule for planning NRC inspections of IST operational program during plant construction

- NRC staff considers NAPS Unit 3 FSAR together with ESBWR DCD to provide full description of NAPS Unit 3 IST program consistent with SECY-05-0197 pending resolution of open and confirmatory items

Implementation of
ESBWR DCD Provisions
Section 3.9.6

- NRC staff requested GEH and Dominion to make available documentation to demonstrate implementation of ESBWR DCD provisions for functional design, qualification, and IST programs in support of NAPS Unit 3 COL application.

- In July 2009, NRC staff performed an audit of GEH functional design and qualification process at Wilmington, NC, office.

- NRC staff preparing report on audit findings with any specific follow-up items.

Seismic and Dynamic Qualification of Mechanical and Electrical Equipment
Section 3.10

Section 3.10 addresses methods of test and analysis employed to ensure functionality of equipment under the full range of normal and accident loadings. New information for review included:

STD COL 3.10.4-1-A: Dynamic Qualification Report

- Schedule to be provided within 12 months after issuance of the COL
- Test and analysis results to be available prior to fuel load
- Staff found the applicant's response to STD COL 3.10.4-1-A to be insufficient.

Open Item:

- RAI 3.10-1: Applicant to provide an implementation plan and completion schedule if the actual results of qualification can not be made available. The plan and schedule should define the planned approach to qualification and a schedule such that the results can be reviewed prior to installation of equipment.

Environmental Qualification of Mechanical and Electrical Equipment
Section 3.11

- NAPS Unit 3 FSAR incorporates by reference ESBWR DCD for description of EQ program for mechanical and electrical equipment

- Implementation of EQ program will be in accordance with milestone in FSAR Section 13.4

- COL Information Item 3.11-1-A states that COL Applicant will provide a full description and milestone for program implementation of EQ program that includes completion of plant-specific EQ Document. NAPS Unit 3 FSAR references DCD Section 3.11 with milestone to be provided per FSAR Section 13.4.

NRC Review of NAPS Unit 3 FSAR Section 3.11

- NRC accepted NEDE-24326-1-P on GE EQ Program in NUREG-1503 (ABWR SER).

- ESBWR DCD description of EQ process acceptable based on previous GE methodology.

- ITAAC will confirm EQ of electrical and mechanical equipment prior to plant startup.

- License condition for EQ operational program schedule.

- NRC staff performed audit of EQ process at GEH Wilmington office in July 09 with report being prepared with any specific follow-up items.

ASME Code Class 1, 2, and 3 Piping Systems, Piping Components, and Their Associated Supports Section 3.12

Section 3.12 addresses piping design. Information in the application included:

STD SUP 3.12-1:

- Piping design methodology is addressed in application Sections 3.7, 3.9, 5.2, and 5.4 and Appendices 3D and 3K

STD SUP 3.12-2:

- Location and distance of piping systems will be established as part of the completion of ITAAC

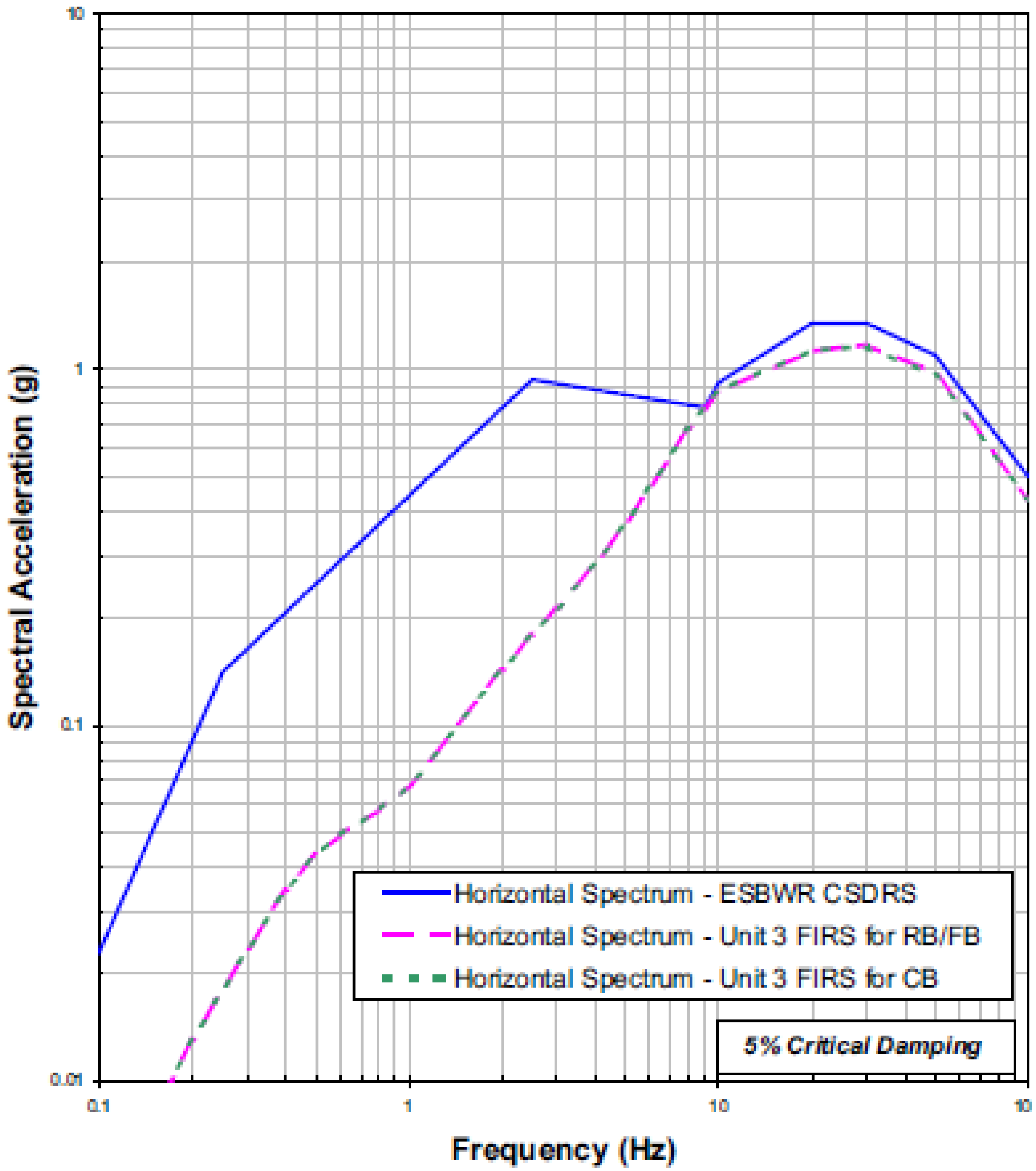
The design has design acceptance criteria (DAC) for piping, so actual design will be completed and reviewed as part of ITAAC after the COL is issued

Overview of North Anna RCOL Chapter 3 – Design of Structures, Components, Equipment, and Systems

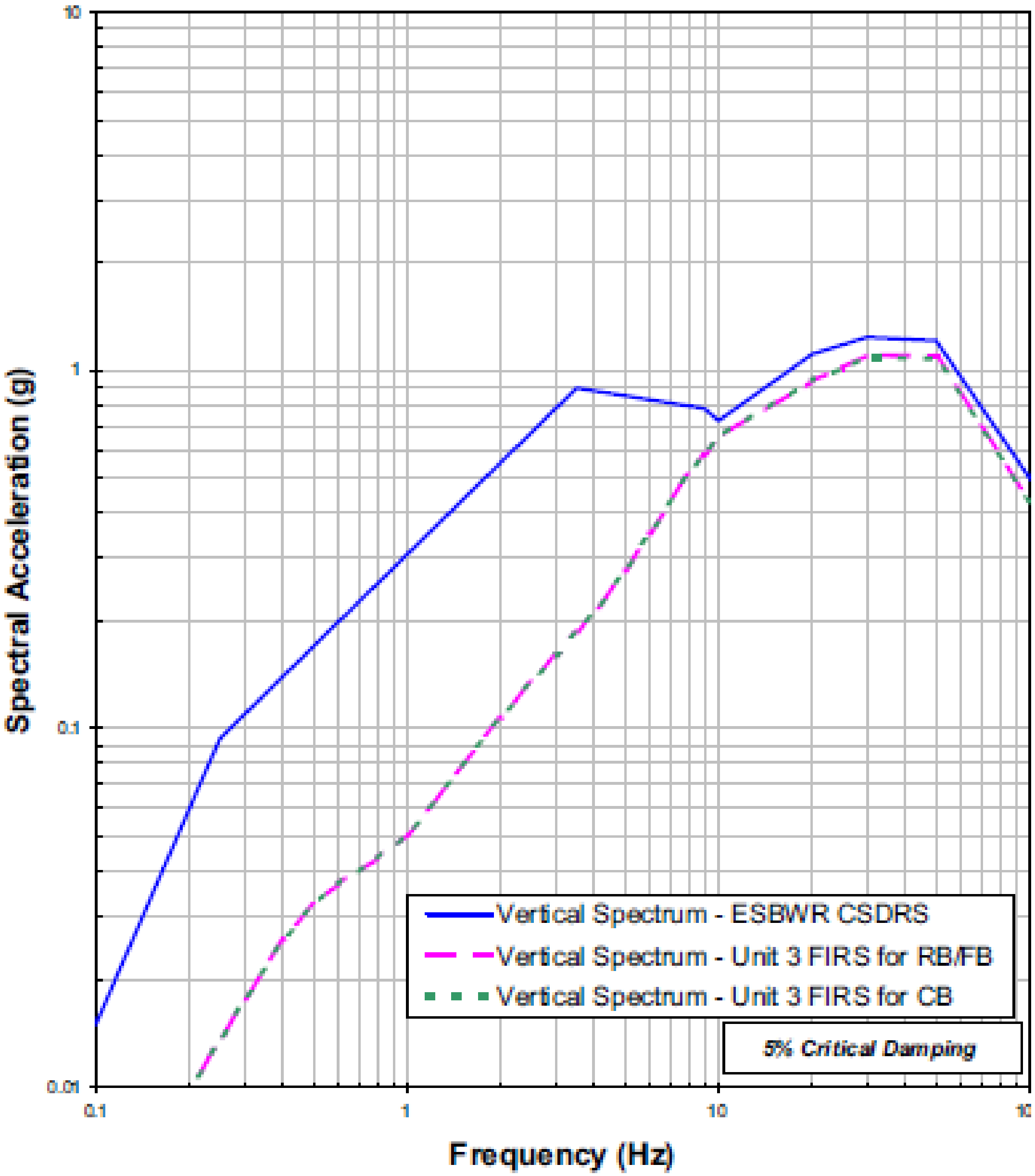
Discussion/Committee Questions

Backup Slides

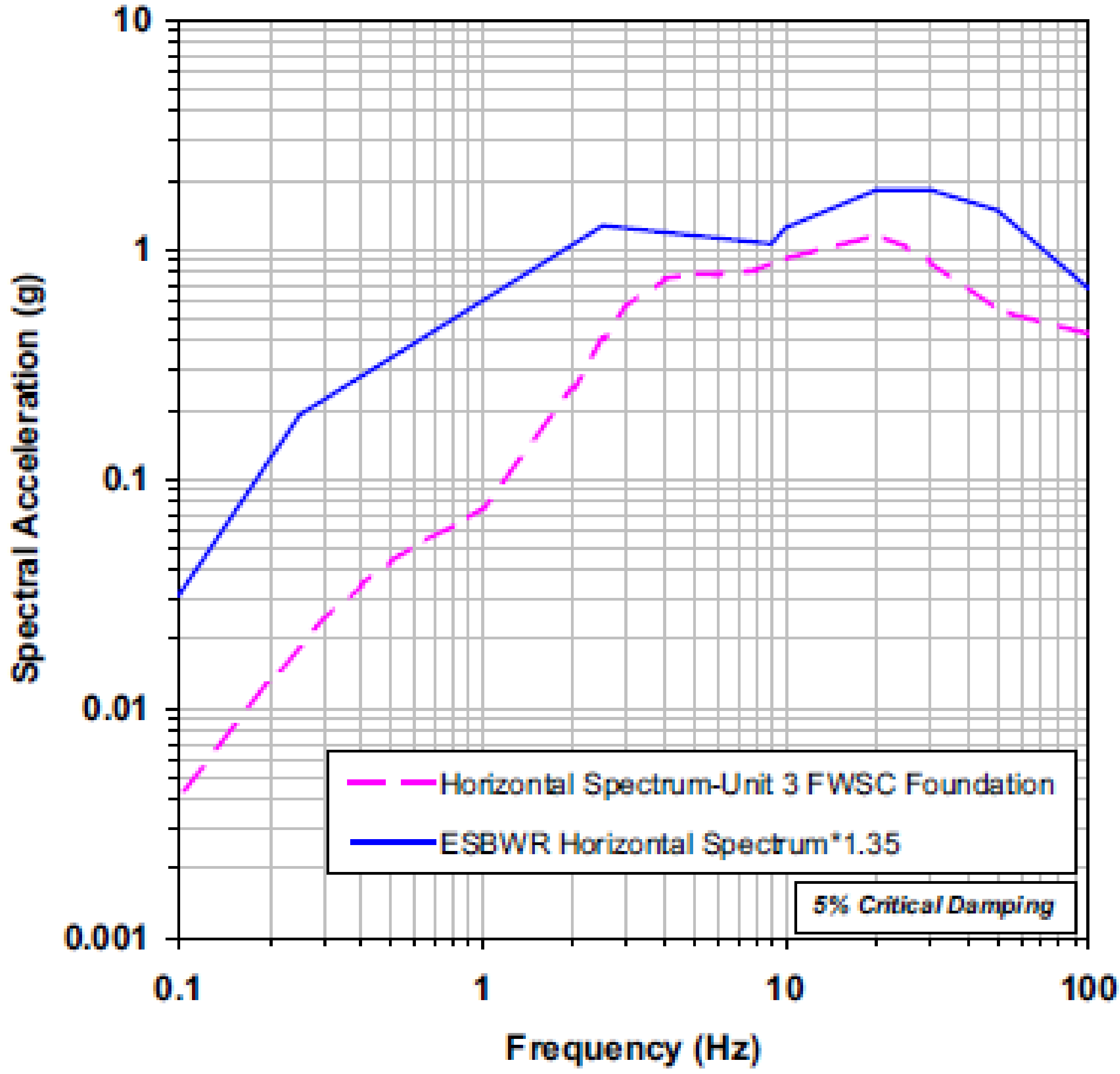
Horizontal CSDRS & Unit 3 FIRS for RB/FB and CB (3.7 backup slide 1)



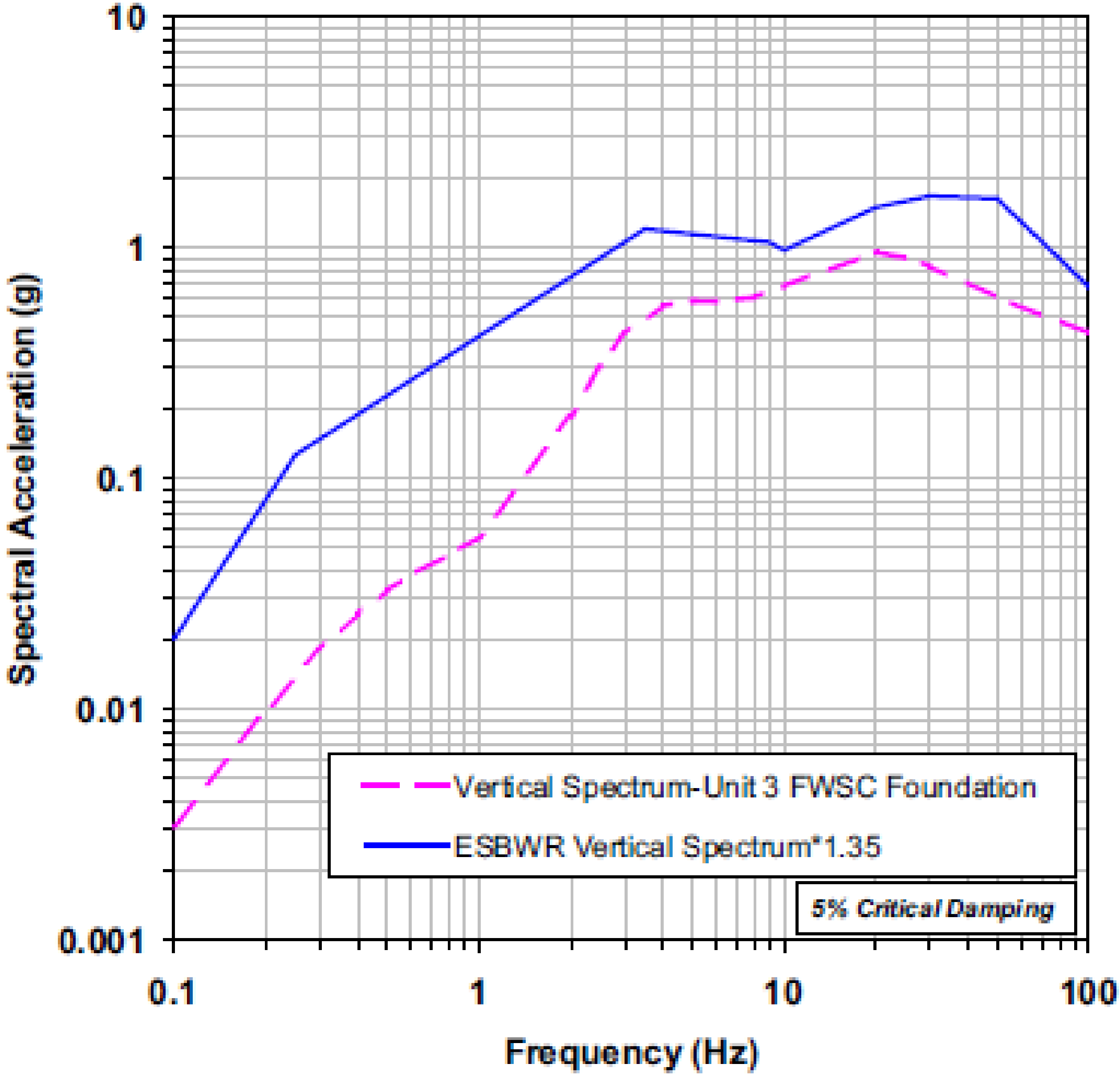
Vertical CSDRS & Unit 3 FIRS for RB/FB and CB (3.7 backup slide 2)



Horizontal CSDRS & Unit 3 FIRS for FWSC (3.7 backup slide 3)



Vertical CSDRS & Unit 3 FIRS for FWSC (3.7 backup slide 4)



ACRS Subcommittee Presentation
SER/OI Chapter 3, Sections 3.7- Seismic Design
(backup slide 5)

Departures/Supplements	Staff Evaluation	Conclusion
NAPS SUP 3.7-1: The site-specific design Ground Motion Response Spectra (GMRS) and the FIRS are described in Section 2.5.2. The CSDRS are compared with the FIRS in Table 2.0-201.	Site specific SSE should be established as free-field GMRS that would be used to determine whether the plant shutdown would be required following a seismic event.	RAI 3.07.01-2 (Open) Requested the applicant to include in Section 3.7.1.1.4 both the site specific SSE and the corresponding OBE that would be required for operating the plant and setting up the seismic instrumentation, as required in FSAR Section 3.7.4.
NAPS SUP 3.7-2: The site-specific earthquake ground motion time history is described in Section 2.5.4.	Section 2.5.4 did not include time history information.	RAI 03.07.01-1 (Resolved) Requested the applicant to identify the appropriate FSAR sections and figures that address ground motion time histories. The applicant responded that Section 2.5.4 has further referencing to applicable SSAR sections that addressed the issue.

ACRS Subcommittee Presentation SER/OI Chapter 3, Section 3.7 – Seismic Design (backup slide 6)

Departures Supplements	**Staff Evaluation**	**Conclusion**
NAPS SUP 3.7-3 & 3.7-4: Section 2.5.4 provides site-specific properties of subsurface supporting media for Category I structures.	The backfill for the FWSC does not meet the DCD site parameter for minimum shear wave velocity. As such per Note 16 of DCD Tier 2, Table 2.0-1, the applicant will re-perform the FIRS and perform a site specific SSI analysis for the FWSC to demonstrate its seismic adequacy.	This analysis is not yet complete. This issue will be addressed by **Open Item 02.05.04-13 (item1.d)**

ACRS Subcommittee Presentation
SER/OI Chapter 3, Section 3.7 – Seismic Design
(backup slide 7)

Departures/Supplements	Staff Evaluation	Conclusion
NAPS SUP 3.7-5: Interaction of Non-Category I Structures with seismic Category I Structures. The locations of structures are provided in Figure 2.1-201.	Neither FSAR Section 3.7.2.8 nor the referenced Figure 2.1-201 includes all of the information required per C.I.3.7.2.8 of RG 1.206 to verify protection of seismic Category I structures from the failure of non-Category I structures as a result of seismic effects. ESBWR DCD 3.7.2.8 only includes the design criteria to be applied in plant design.	The staff issued **RAI 03.07.02-1 (closed)**, which requested the applicant to provide the identification and location of each Category I, II, and nonseismic structures, including the distance between structures and the height of each structure. Based on the information provided by the applicant, the staff found that all site specific nonseismic structures have heights that are less than the distance separating them from the nearest Category I structures.

Seismic Instrumentation Section 3.7.4 (backup slide 8)

•The seismic instrumentation that includes triaxial time-history accelerographs capable of recording an earthquake at the free-field and other locations required by the RG 1.12 will be installed at the NAPS site.

•Seismic instrumentation will satisfy technical criteria required by RG 1.12 and the installation and operability of the seismic monitoring program will be demonstrated before receiving fuel at the NAPS site.

•NRC staff reviewed the application and checked the DCD and confirmed that the applicant has addressed the relevant information relating to seismic instrumentation, and no outstanding information is expected to be addressed in the COL FSAR related to this subsection.

North Anna 3

North Anna Unit 3 COLA
Presentation to ACRS Subcommittee
Chapter 14

Dominion

Chapter 14, Initial Test Program: Chapter Topics

- Initial Test Program for Preliminary Safety Analysis Reports
- Initial Plant Test Program for Final Safety Analysis Reports*
- Inspections, Tests, Analysis and Acceptance Criteria*
- Design Acceptance Criteria ITAAC Closure*
- Description of Initial Test Program Administration**

* FSAR contains supplemental information (beyond DCD content) on this topic
** New FSAR section (DCD does not include this section)

Chapter 14, Initial Test Program: Supplemental Information

14.2 Initial Plant Test Program for Final Safety Analysis Reports

NAPS SUP	Supplemental information on organization and staffing provided in Section 13.1
STD COL	Administration of the Initial Test Program described in Appendix 14AA
STD COL	Milestone to develop the Startup Administrative Manual (SAM)

Chapter 14, Initial Test Program: Supplemental Information

14.2 Initial Plant Test Program for Final Safety Analysis Reports (cont)

STD COL — Specified milestones to develop test procedures for preoperational tests and for power ascension tests

STD SUP — Committed to prepare startup test reports in accordance with RG 1.16

Chapter 14, Initial Test Program: Supplemental Information

14.2 Initial Plant Test Program for Final Safety Analysis Reports (cont)

STD COL
- Committed to develop detailed testing schedule and provide implementation milestones for the Initial Test Program

STD SUP
- AC power system preoperational tests include proper operation of the automatic transfer capability of the normal to the alternate preferred power source

Chapter 14, Initial Test Program: Supplemental Information

14.2 Initial Plant Test Program for Final Safety Analysis Reports (cont)

NAPS SUP — Defined preoperational tests for Station Water System and CIRC cooling towers

NAPS SUP — Defined initial startup test for CIRC cooling tower performance

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Chapter 14, Initial Test Program: Supplemental Information

14.3 Inspections, Tests, Analysis and Acceptance Criteria (ITAAC)

- STD COL Provided plant-specific Emergency Planning ITAAC in COLA Part 10
- STD COL Provided site-specific ITAAC in COLA Part 10:
  - Backfill under Seismic Cat I structures
  - Plant Service Water System

Chapter 14, Initial Test Program: Supplemental Information

14.3A Design Acceptance Criteria ITAAC Closure Process

NAPS COL — Unit 3 will use the standard approach for Design Acceptance Criteria (DAC) ITAAC closure

NAPS COL — Milestone provided for development of a DAC ITAAC closure schedule

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Chapter 14, Initial Test Program: Supplemental Information

14.AA Description of Initial Test Program (ITP) Administration

STD COL

Provided requirements to be included in Startup Administrative Manual, including applicability, phases, and administrative controls

Chapter 14, Initial Test Program: SER Open Items

- No Open Items in Chapter 14
- Three related ITAAC Open Items in Other Chapters:
  - EP ITAAC – Section 13.3
  - Backfill ITAAC – Section 2.5.4
  - PSWS ITAAC – Section 9.2.1
- 4 Confirmatory Items

Presentation to the ACRS Subcommittee

North Anna Unit 3 COL Application Review

SER/OI Chapter 14
Initial Test Program

August 21, 2009

ACRS Subcommittee Presentation
SER/OI Chapter 14

Staff Review Team

- Project Managers
  - Thomas Kevern, Lead PM, DNRL/NGE1
  - Stephen Koenick, Reviewer, DNRL/DDIP
  - Eric Oesterle, Reviewer, DNRL/DDIP

- Technical Staff
  - John Nakoski, Chief, CQVB
  - Mike Morgan, Lead Reviewer, CQVB
  - Frank Talbot, Reviewer, CQVB

- Technical Branches

  DCIP/CCIB, CHPB, COLP, CQVB, CTSB; DE/CIB, EEB, EMB, ICE, SEB; DSER/RGS, RHEB, RSAC; DSRA/SBCV, SBPB, SPLB, SRSB; NSIR/DPR/DDEP/ORNLB, DSP/DDRS

ACRS Subcommittee Presentation
SER/OI Chapter 14

Presentation Outline

- Content of COL application
  - Incorporated by Reference
  - COL items (STD and NAPS)
  - Conceptual Design Information (CDI)
  - Other Supplemental Information
- Regulatory Bases
- Technical Topics of Interest
- RAIs / Open Items
- Conclusions
- Post COL activities
- Discussion / Committee questions

Section 14.2

Initial Test Program

ACRS Subcommittee Presentation
SER/OI Section 14.2

Areas Reviewed

- Section 14.2, “Initial Plant Test Program”
- Section 14.2.1, “Summary of Test Program and Objectives”
- Section 14.2.2, “Startup Admin Manual/Test Procedures/Program”
- Section 14.2.7, “Test Program Schedule and Sequence”
- Section 14.2.9, “Site-Specific Preoperational and Start up Tests”

ACRS Subcommittee Presentation
SER/OI Section 14.2

Section 14.2 - Initial Plant Test Program

- The staff reviewed both the application and the DCD
- FSAR 14.2.9 contains site-specific initial plant testing information that is required for SSCs that are outside the scope of the ESBWR DCD.
- NRC staff – for review of tests to be performed in the mechanical, electrical, and radiological instrument areas - reviewed abstracts of the proposed initial tests.
- The staff determined if proposed testing provided adequate coverage, in accordance with Regulatory Guide 1.68, Section C.1, “Criteria for Selection of Plant Features To Be Tested”.
- The staff confirmed the applicant addressed required information related to elements of the proposed initial test program.

ACRS Subcommittee Presentation
SER/OI Section 14.2

Section 14.2.1 – Summary of the Test Program/Objectives

- The staff confirmed that the applicant addressed required information related to elements and objectives of their program
- The staff concluded that information presented in the FSAR was acceptable and met NRC regulatory requirements

Section 14.2.2 – Startup Administration Manual, Test Procedures, and Test Program

- The staff confirmed that the applicant addressed required information related to elements of the proposed Startup Administration Manual (SAM), test program and test procedures
- The staff concluded that the information presented in the FSAR was acceptable and met NRC regulatory requirements

Section 14.2.7 – Test Program Schedule and Sequence

- The staff confirmed that the applicant addressed required information related to elements of the proposed Test Program Schedule and Test Sequence
- The staff concluded that the information presented in the FSAR was acceptable and met the NRC regulatory requirements

ACRS Subcommittee Presentation
SER/OI Section 14.2

Section 14.2.9 – Site Specific Preoperational and Startup Tests

- Abstracts were reviewed by the staff for FSAR Sections
  - 14.2.9.1.1, “Station Water System Preoperational Testing”
  - 14.2.9.1.2, “Cooling Tower Preoperational Testing,”
  - 14.2.9.2.1, “Cooling Tower Performance Testing

- The staff concluded that all of the above abstracts for proposed initial plant testing are acceptable.

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Section 14.2.9 – Site Specific Preoperational and Startup Tests (Continued)

- Abstract for FSAR 14.2.9.1.4, Electrical Switchyard System Preoperational Testing" was reviewed and staff issued RAI 14.02-1:
  - availability of AC and DC to switchyard equipment
  - design limits of switchyard voltage/stability/interfaces
  - operation of current and potential transformers
  - operation of high voltage disconnect and ground switches
  - operation of automatic transfer from preferred to alternate power
- For the first 4 items, the applicant proposed deletion of 14.2.9.1.4 and replacement with 14.2.8.1.36, "AC Power Distribution System Preoperational Test"
- To address the fifth item, the applicant issued STD SUP 14.2-4.
- The staff found the applicant's response acceptable.

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Section 14.2.9 – Site Specific Preoperational and Startup Tests
(Continued)

- The staff reviewed the abstract for FSAR 14.2.9.1.3, "Personnel Monitors and Radiation Survey Instruments Preoperational Testing"
- The staff issued RAIs 14.02-5 and 14.02-6 and supplemental RAIs 14.02-9 and 14.02-10:

  - lists of the specific monitors and instruments that will be covered by testing
  - lists of laboratory equipment that will covered by testing
  - clarification of a position that NEI 07-03A also specifies equipment to be tested
  - clarification of a position that laboratory and portable instrumentation used for radiation protection are tested within the scope of the Radiation Protection Program
- In response to RAIs, the applicant provided proper listings of all equipment and clarified the stated positions.
- The staff found that the applicant's response was acceptable.

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Section 14.2 – Post-COL Activities and Open Items

- The staff found the following COL items were adequately addressed by information contained in FSAR Section 14.2:
  - STD COL 14.2-1-A, “Description – Initial Test Program Administration”
  - NAPS COL 14.2-5-A, “Site-Specific Tests”
- The staff determined the following COL items are considered “holder items” that require disposition as license conditions or commitments:
  - STD COL 14.2-2-H, “Startup Administration Manual”
  - STD COL 14.2-3-H, “Test Procedures”
  - NAPS COL 14.2-4-H, “Test Program Schedule and Sequence”
  - NAPS COL 14.2-6-H, “Site-Specific Test Procedures”
- The SER for the ESBWR DCD is not complete (Open Item 1-1)

Section 14.3

Inspections, Tests, Analyses, and Acceptance Criteria

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COLA

- Part 2/FSAR Sections – technical information for SSCs
- Part 2/FSAR/Section 14.3 – ITAAC methodology and criteria
- Part 10 – COL-specific ITAAC

DCD

- Tier 2/Section 14.3 – selection criteria and processes for Tier 1 information and ITAAC
- Tier 1 – top-level design information including ITAAC

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Regulatory Basis:

- 10 CFR 52.79(d)(2)
  - requires FSAR to demonstrate that interface requirements for certified design are met
- 10 CFR 52.80(a)
  - requires that a COLA contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and acceptance criteria met, the facility has been constructed and will operate in conformity with the COL, the provisions of the Act, and the Commission's rules and regulations
- NUREG 0800 (SRP Section 14.3)

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Evaluation Conclusion (open items preclude)

- Based on review of the applicant’s implementation of the selection methodology and criteria for the development of ITAAC, which was incorporated by reference from Section 14.3 of the ESBWR DCD, the staff concludes that the top-level design features and performance characteristics of the SSCs are appropriately included in the proposed ITAAC.
- The staff concludes that the design features and performance characteristics of the SSCs can be verified adequately by the proposed ITAAC; therefore, the staff concludes that the ITAAC proposed by the COL applicant for the facility meet the requirements of 10 CFR 52.79(d)(2) and 10 CFR 52.80(a).
- Open Items: 1-1, Backfill ITAAC – Section 2.5.4, PSWS ITAAC – Section 9.2.1, EP ITAAC – Section 13.3
- Confirmatory Items (4)

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Evaluation Approach

- Certified Design ITAAC
  - DCD Tier 1 – incorporated by reference
  - Open Item 1-1
- Selection Criteria and Methodology – COL-specific ITAAC
  - Same as DCD
    (staff evaluated – found acceptable)
  - Applied to systems not evaluated in DCD
    (portion outside scope of certified design + entirely NAPS-specific)
  - Consistent with SRP – "… type of information and the level of detail are based on a graded approach commensurate with the safety significance of the SSCs …"
  - Staff finds acceptable
- COL-specific ITAAC

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Evaluation Approach (cont)

COL-specific ITAAC

- Included within scope of staff’s technical evaluation of SSCs
  - Evaluate content of ITAAC
  - Evaluate need for ITAAC if none identified
- Physical Security (SER 13.6)
- Emergency Planning (SER 13.3)
- System-specific (SER Chapters 2 – 19)

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COL-specific ITAAC – Systems

- Backfill under Category I Structures

  (SER 2.5.4 – open item)
- Plant Service Water System

  (SER 9.2.1 – open (confirmatory) item)
- Offsite Power
  - Staff determined ITAAC necessary
  - RAI (DCD) to identify offsite power interface requirements
  - RAI (FSAR) to provide ITAAC (interface requirements + portion of offsite power system)
  - Responses by applicants
  - Confirmatory item

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COL-specific ITAAC – Other Systems

- "No entry for this system" (i.e., no ITAAC for listed systems)
  - Circulating Water System (outside scope of certified design)
  - Station Water System (including intake structure and servicing equipment)
  - Yard Fire Protection System (outside scope of certified design)
  - Potable & Sanitary Water Systems
  - Makeup Water System
  - Hydrogen Water Chemistry System
  - Meteorological Monitoring System
- Staff finds list of FSAR systems to be complete
- Staff finds "no entry" acceptable for these systems

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Design Acceptance Criteria (DAC) Closure Schedule

- Piping Design, Human Factors Engineering, Digital Instrumentation and Controls
- Staff concern – proposed schedule not support resource and budget planning
- ESBWR DCWG public meetings – staff/industry interactions
  - Applicant proposed detailed deliverables and schedules
  - Staff finds proposed resolution acceptable
- Confirmatory item

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Post COL Activities

License Condition

- Applicant states (Part 10) that completion of COLA ITAAC is a proposed license condition to be satisfied before fuel load.

- The staff, before finalizing the SER, will determine specific commitments to be included as conditions to the license.

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Discussion/Committee Questions