Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards AP1000 Subcommittee

Docket Number: N/A

Location: Rockville, Maryland

Date: October 22, 2015

Work Order No.: NRC-1980 Pages 1-172

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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AP1000 SUBCOMMITTEE

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THURSDAY,

OCTOBER 22, 2015

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Harold B. Ray, Meeting Chairman, presiding.

COMMITTEE MEMBERS:

HAROLD B. RAY, Meeting Chairman

DENNIS C. BLEY, Member

SANJOY BANERJEE, Member

PETER C. RICCARDELLA, Member

STEPHEN P. SCHULTZ, Member

GORDON R. SKILLMAN, Member

DESIGNATED FEDERAL OFFICIAL:

PETER WEN

ALSO PRESENT:

DANIEL M. BARSS, NSIR

LAWRENCE J. BURKHART, NRO

DANNY CHIEN, NRO

CHRISTOPHER FALLON, Duke

VLADIMIR GRAIZER, NRO

BRIAN HUGHES, NRO

ROBERT KITCHEN, Duke

VERA MARIELIZ, NRO

SHEILA RAY, NRR

ROBERT ROCHE-RIVERA, NRO

LISA SCHLEICHER, NRO

JOHN P. SEGALA, NRO

ANGELO STUBBS, NRO

LARRY TAYLOR, Duke

KENNETH THOMAS, NSIR

VAUGHN THOMAS, NRO

JAMES THORNTON, Duke

JOHN THRASHER, Duke

ALEXANDER TSIRIGOTIS, NRO

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8:30 a.m.

CHAIRMAN RAY: Back on the record and we'll resume our meeting which we began yesterday, the Subcommittee for the Lee COLA.

The introductory remarks which I made yesterday apply still to today's meeting, which is a continuation of yesterday's meeting. We broke yesterday afternoon following a presentation by Duke of Chapter 3.7 and two departures, 2.0-1 and 3.8-1. And now we will resume with presentations by the staff similarly of the same scope.

And I'll ask, Brian, if you have any introductory remarks that you'd like to begin with, please proceed.

MR. HUGHES: Thank you, Chairman Ray, members. And today we're going to discuss -- start off for the William States Lee III Nuclear Station Units No. 1 and 2 combined operating license application review. And this presentation is going to be a continuation of Section 3.7, the seismic

design and also design of Category I structures. And I'll turn this over to Robert Rivera and Vaughn Thomas.

Robert?

MR. ROCHE-RIVERA: Thank you, Brian. Good morning, Chairman Ray and members of Committee. My name is Robert Roche-Rivera. I'm a structural engineer.

I think we can go to the next slide, please. Yes, a structural engineer in the Office of New Reactors, Structural Engineering Branch. I've been with the NRC a little bit over nine years and I'm the lead reviewer for Section 3.7, the seismic analysis.

MR. HUGHES: If I could just interrupt?

MR. ROCHE-RIVERA: Yes.

MR. HUGHES: I missed Vera. Could you raise your hand, Vera Marieliz? She's also part of the presentation. Okay.

MR. ROCHE-RIVERA: So, yes, this slide just shows the review team for Sections 3.7 and 3.8.

So we can move to the next slide. So the outline for our presentation today will cover the staff evaluation of the Departure 2.0-1 and

Departure 3.8-1, which are identified in Sections 3.7 and 3.8, respectively. And essentially the evaluation of the supplemental information related to those departures, which covers of course the site-specific analysis.

Next slide. So basically Departure 2.0-1 identifies that the site-specific spectra exceeds the CSDRS hard rock high frequency spectra, the AP1000 hard rock high frequency spectra. To address that exceedance the applicant performed site-specific analysis to demonstrate that design adequacy, the AP1000 design adequacy for the W.S. Lee Site. So, again that's covered. That's Departure 2.0-1 and the staff evaluation of the Departure 2.0-1 is accomplished by the evaluation of the supplemental information documented in the site-specific analysis performed by the applicant. The staff also performed an audit in May 2014 to review the details of the applicant's site-specific analysis.

This slide covers the develop of the foundation input response spectra. The staff identified an item that needed clarification with regards to the development of the FIRS. The issue

was that the transfer functions associated with the Unit 1 profile, which includes the concrete layer, showed that from approximately the frequency range of 30 hertz to 100 hertz there's supposed to be an amplification, or show amplification of spectral accelerations, which means that the FIRS should be greater than the GMRS in the higher frequency range. But in contrast when you look at the applicant's GMRS in the higher frequency range, the GMRS resulted or contained higher spectral acceleration, not the FIRS. So to address this issue and in response of staff request for additional information the applicant performed sensitivity studies in which they developed alternate GMRS and FIRS and demonstrated or concluded that the reason for the differences observed between the transfer functions and the actual calculated GMRS and FIRS is due to a different interpolation scheme used to determine the spectral accelerations of the higher frequencies.

And the slides talks about the 25 hertz and 100 hertz. If you remember yesterday we mentioned that the uniform hazard spectrum, it's calculated at seven frequencies, right? And then in

between those frequencies then interpolation takes place to determine the additional spectral accelerations associated for those frequency ranges. So the applicant in this response and with their sensitivity analysis demonstrated the difference between the GMRS and the FIRS was associated with a different scheme, interpolation scheme used for one versus the other, and specifically for that frequency range.

Next slide. In addition to --

MEMBER SKILLMAN: Back up one, please.

MR. ROCHE-RIVERA: Yes.

MEMBER SKILLMAN: Robert, is there precedent for accepting the explanation of interpolation as acceptable?

MR. ROCHE-RIVERA: I'm going to get into some details about the additional efforts performed by the staff to determine the acceptability. And in short, yes, the interpolation scheme is acceptable. That's implemented by the applicant.

MEMBER SKILLMAN: Thank you.

MR. ROCHE-RIVERA: Yes. So in addition to the applicant analysis the staff performed a confirmatory analysis. And shown in this plot here

the red curve, it's the FIRS calculated by the staff which takes into account the effects of the concrete layer. And then the blue curve is the FIRS, the Unit 1 FIRS calculated by the applicant. Based on the staff calculation the staff confirmed indeed that the reason for the -- or concurred with the applicant that the reasons for the differences is explained by the use of different a interpolation scheme.

Again, the particular interpolation scheme is acceptable to the staff and based on the staff review of the RAI response of the FSAR and based on the confirmatory analysis performed by the staff the staff found the methodology implemented by the applicant to develop the FIRS acceptable.

Want to stop here?

CHAIRMAN RAY: Well, yes, because you found it acceptable. But of course there's a substantial difference at the higher frequency, so on what basis was it deemed acceptable?

MR. ROCHE-RIVERA: Okay. So, I'll defer to my colleagues in the audience who performed the confirmatory analysis. One aspect that I also want to highlight is that right now the blue curve is the

Unit 1 FIRS. I just want to remind you that for the site-specific analysis the applicant envelopes both the Unit 1 FIRS and the GMRS, which brings you closer to the calculated curve by the staff.

CHAIRMAN RAY: Well, I'm not sure how to follow that.

MR. GRAIZER: Can I answer this question, please?

CHAIRMAN RAY: You may.

MR. GRAIZER: Okay. My name is Vladimir Graizer and I'm a seismologist and we did this intensive testing.

Okay. Let me again say what was just said before. Actually, a response spectra, uniform hazard response spectrum is calculated at seven frequencies. And clearly there is a big gap between 25 hertz, if you look at this, and 100 hertz. And basically everything between 25 hertz and 100 hertz depend upon the scheme of interpolation which is used. And clearly we used a little bit more simple scheme of interpolation. In a way it's similar -- it is not right, but it is similar to let's say cubic interpolation. Clearly what applicant is doing is more complex interpolation.

Now, it is actually based on what is called NUREG-6728, Spectral Shape. Basically the difference is how you connect this two dots, 25 hertz and 100 hertz. And this is why kind of -- we saw this in a number of cases including 2.1 recommendation for Fukushima. It's not simple case when we have this difference, but in plain and simple the difference is not really significant physically. It's only artifact, if I may say, of different mathematical schema.

And just to make sure that -- of course it does look good sometimes. This is why in the future it will be avoided, because the project called NJ East, which is kind of close to be finished, that's calculations of spectral acceleration at much more frequencies, and specifically at frequencies of 50 hertz, 40 hertz. This is why kind of -- let's say in the future those differences will be minimized or maybe will be gone. But today, again just to rephrase it again, that's not a physical difference. it's a difference in mathematical approach to connecting two frequencies, 25 and 100 hertz.

CHAIRMAN RAY: Well, you kind of

answered what I was going to say. It doesn't matter what your field is. If you're doing interpolation and you get to a point where it makes a difference, you usually pick a couple more points and see what it ought to be. Is that a big effort in calculation to go back and have one or two additional frequencies?

MR. GRAIZER: It's not a big effort. It's a difference in regulations. Regulations ask us to do it at 25 and 100 hertz. That's current regulations. This is why kind of --

CHAIRMAN RAY: So it's not math and science? It's something else? Okay.

MR. GRAIZER: Well, yes, whatever -- that's probably correct explanation.

MEMBER RICCARDELLA: Excuse me.

MR. GRAIZER: Sure.

MEMBER RICCARDELLA: Could you just briefly describe the analytical process that's used to go from GMRS to FIRS at --

MR. GRAIZER: Okay. The process between GMRS and FIRS, in general the process is kind of same. You go to the hard rock elevation and hard rock means 2,800 meters per second or 9,200 feet per

second. This is our level from which we start all our process. At this level uniform hazard response spectrum is calculated. After that you propagate this through the column. And there are some cases when GMRS is exactly same as FIRS. And I believe it's for Unit 1.

MEMBER RICCARDELLA: Unit 2, I think.

MR. GRAIZER: Oh, Unit 2 probably.

MEMBER RICCARDELLA: Yes, Unit 2.

MR. GRAIZER: Yes, for Unit 2 it's same, because hard rock is at the surface. Now, in case for Unit 2 on the top of hard rock you basically -- you have a layer of 232 feet concrete. And you propagate this from again a hard rock level to the top. Of course in this case for Lee it's pretty simple because 23.5 feet, there is a quarter length formula which shows the site amplification.

MEMBER RICCARDELLA: Oh, so it's a formula?

MR. GRAIZER: Yes, basically --

MEMBER RICCARDELLA: It's not a numerical --

(Simultaneous speaking)

MR. GRAIZER: No, it's a formula. And

basically quarter length waves are amplified by the layer. And this layer, if I am right, it's about 50 hertz --

MEMBER RICCARDELLA: I see.

MR. GRAIZER: -- amplification of this specific layer in this specific case. Now, in other cases, not in case of Lee, you go basically two different site response. One you propagate out to GMRS level, which can be different elevation from foundation in -- with response spectrum.

MEMBER RICCARDELLA: Okay.

MR. GRAIZER: Or sometimes there are -- and there is a number or foundation input response spectrum. Depends upon the depth of foundation.

MEMBER RICCARDELLA: So you put in a sine wave at 25 hertz and then you put in another sine wave at 100 hertz and you see what the amplification is and you interpolate between the two. Is that correct?

MR. GRAIZER: In a way, yes. You have a summation, a number of sine waves. You're right. It's an integral -- all this waves. And depend upon the frequency. Some of them are amplified. Some of them are -- they're amplified depend upon --

MEMBER RICCARDELLA: Okay.

MR. GRAIZER: -- the layer properties.

MEMBER RICCARDELLA: I understand.

MR. ROCHE-RIVERA: Did that answer the question?

MEMBER RICCARDELLA: Yes.

CHAIRMAN RAY: Well, yes, I guess it leaves me wondering though why the record that we have, and what's stated in the screen here for example, lacks the kind of additional information that you're providing us. I mean, you just look at the curve and you'd think that's a significant difference. You read the words and it says that what they have done is acceptable. And the explanation that you're providing reconciles that, I think, but it's not as clear as it should be, I think.

MEMBER RICCARDELLA: The red curve that you're showing there, the NRC FIRS --

MR. ROCHE-RIVERA: Yes.

MEMBER RICCARDELLA: -- is that very close to the GMRS on the previous slide, the red curve GMRS on the previous slide?

MR. ROCHE-RIVERA: It is closer, yes.

MEMBER RICCARDELLA: Yes. So, and what you said is they use --

MR. ROCHE-RIVERA: They use the envelope of both.

MEMBER RICCARDELLA: -- the envelope of both.

MR. ROCHE-RIVERA: Yes.

MEMBER RICCARDELLA: So it's really kind of a -- no never mind. I think --

MEMBER BLEY: On a practical basis it's --

CHAIRMAN RAY: They use the envelope of both. Expand on that, Pete. What do you --

MR. ROCHE-RIVERA: Oh, it's the FIRS -- what truly we call the FIRS is for Unit 1, which incorporates the concrete layer, right? So it accounts for the propagation from the rock to the concrete and to the level of the bottom of the basement, of the nuclear island.

Now, the GMRS is the FIRS, but for Unit 2, because Unit 2 is directly supported on rock.

CHAIRMAN RAY: Yes, I understand that.

MR. ROCHE-RIVERA: So, for the site-specific analysis that were presented yesterday the

actual analysis are based on the envelope of the two curves, which means that the time histories that we use for the site-specific analysis weren't matched to the envelope of the two curves.

CHAIRMAN RAY: Well, but all I'm saying is that absent the discussion that we've just had, that's very hard to figure out or assume from what's presented. And with the explanation, all right, we understand it sitting here, but I'm looking ahead to Full Committee meeting, things like that. This is not -- you just throw something up there like that. Then you have to go through this long explanation back and forth. In particular you're talking with people who maybe are a little more distant from what you're discussing. I'm just telling to me you need to find a way to communicate it better so that people can more easily accept what you're saying, because it's not apparent.

MR. ROCHE-RIVERA: I will say, Chairman Ray, the comment is well-taken. I think we'll take it back and potentially revise for the greater --

CHAIRMAN RAY: Yes, find some way to communicate it.

MR. ROCHE-RIVERA: -- for the further

meetings. I think this is -- essentially it is explained in detail on the Safety Evaluation Report. But, yes, the comment is well-taken. We'll go back and find a way to better way to present or capture all this information for future reference.

MEMBER BLEY: I was trying to compare a couple of the curves. Look at page 70, one step ahead. Okay. It's different up here than on the printed version. The printed version the log scale is screwed up. So I don't know what happened between -- if you look at the printed version up between 10 and 20 hertz, the log scale got stretched or something. On the printed version, not on the screen. The screen looks okay.

MR. ROCHE-RIVERA: Okay.

MR. GRAIZER: And you know, just a short comment. I usually for my own purposes -- you're right about log scale. I plot response spectra in both ways, in log log like it is here and in log normal. Because one scale helps you to look at high frequencies. Another scale is very helpful with looking at the low frequencies. This is why kind of, just to explain, in our -- in a lot of confirmatory analysis that we do we look at all

these details. We don't necessarily present all these details at the Committee level.

CHAIRMAN RAY: Okay. That's --

MEMBER SCHULTZ: Robert, I wanted to go back to slide 68 for a moment.

MR. ROCHE-RIVERA: Okay.

MEMBER SCHULTZ: Because we said when we got into the spectral analysis for the foundation -- I wanted to get more information about the timing here of your evaluation. And specifically you state that staff conducted the audit in May of 2014. What was the scope of that audit, because you simply state it here as if you're trying to resolve something. And the slide shows the graph. I think you mean something more elaborate associated with the level of effort there.

MR. ROCHE-RIVERA: And we can definitely elaborate. This is of course intended to discuss that we did look at this review in detail and that we performed an audit of the calculations. The scope of the audit was very focused on the actual site-specific analysis, the seismic analysis. And we covered essentially everything related to Section 3.7, 3.8 and discussions including aspects for

seismic margin assessment, which was touched on like yesterday.

MEMBER SCHULTZ: So, yes, that's what I wanted to get to. Yesterday we had a fairly thorough discussion about all of the evaluations that the applicant had done to evaluate the situation given that there was an exceedance on the curve.

MR. ROCHE-RIVERA: Yes.

MEMBER SCHULTZ: As we step through this today in three slides it left the impression that your focus was simply the interpolation of the response spectrum.

MR. ROCHE-RIVERA: Oh, no, no, no. No, no.

MEMBER SCHULTZ: So I --

(Simultaneous speaking)

MR. ROCHE-RIVERA: No, no, no. That's the starting point.

(Simultaneous speaking)

MEMBER SCHULTZ: -- that impression. And I think --

PARTICIPANT: This was one RAI, right?

MR. ROCHE-RIVERA: Yes, this was just

one RAI. And it's -- I'm trying covered the information in order. The first is the starting point, right, because it's the load, and it's just highlighting an aspect of the staff review in that regard. But we'll get -- now the next slide following the first discussion is actually getting into the details of the staff review of the site-specific analysis.

MEMBER SCHULTZ: So when you did the audit the calculations and information that the applicant presented yesterday was relatively complete?

MR. ROCHE-RIVERA: Yes.

MEMBER SCHULTZ: Okay.

CHAIRMAN RAY: Well, and specifically it included the Appendix 3I calculations.

MR. ROCHE-RIVERA: Definitely. Yes, that's the bulk of the analysis, of the evaluation. Yes, that's really how the exceedance shown in this screen is justified, is by that site-specific evaluation, which is consistent with, as you pointed out -- or the documentation, I should I, Appendix 3I or the Technical Report 115 from the AP1000.

MEMBER SCHULTZ: I just wanted to get

the breadth of your review on the record.

MR. ROCHE-RIVERA: Yes.

MEMBER SCHULTZ: Thank you.

MR. ROCHE-RIVERA: Thank you.

CHAIRMAN RAY: Well, I'm still intrigued, I guess I'd say, not mystified as I was yesterday, by the fact that we don't just envelope those curves with a single curve and single analysis, but I'm not going to repeat that discussion unless you have something you want to add to it. But basically we're following the formulation in the certified design itself as the stepwise process. If this, then that. If that, then --

(Simultaneous speaking)

MR. ROCHE-RIVERA: Correct.

(Simultaneous speaking)

CHAIRMAN RAY: -- with the final step process here that's set forth in the certification. But some of us who were involved in the certification think how did we get there, and we can't -- it's a little hard to figure out at this point, but also beside the point.

All right. If there's nothing else in

the way of questions, we'll ask you to proceed.

MR. HUGHES: Excuse me, Chairman Ray. Would you like a copy -- us to provide the Committee a copy of that audit report from May?

CHAIRMAN RAY: Does any member wish to see it?

(No audible response)

MR. HUGHES: No?

CHAIRMAN RAY: I don't think so.

MR. HUGHES: Okay.

CHAIRMAN RAY: Thank you. I can come back to that, Brian. Thanks for offering.

MR. HUGHES: Yes.

CHAIRMAN RAY: It may become material, but for now we'll simply --

MR. HUGHES: That's fine.

CHAIRMAN RAY: -- accept what we've been told. Proceed.

MR. ROCHE-RIVERA: Okay. So now this is where we start our discussion with regard to the site-specific analysis of the actual nuclear island and Seismic Category II structures. The applicant performed a frequency domain chemistry analysis with the program ASC. And as characterized yesterday,

the applicant performed for the nuclear island two types of analysis, nuclear island and structures. This slide focuses first on the nuclear island structures. In subsequent sites we'll talk about the Seismic Category II structures.

So they performed two types of analysis. They performed coherent analysis, what's called coherent analysis for both Unit 1 and Unit 2 cases, meaning that the nuclear islands for Unit 1 with its specific rock profile and the Unit 2 nuclear island with its rock profile. And again, the difference between one and the other is the concrete layer.

So they performed those analyses and then they compared in-structure response spectra at the six key locations. Now, the staff reviewed those in-structure response spectra and determined that indeed they are very consistent, they're very similar. And also that concurs with the determination of the applicant. And based on that comparison, based on that compatibility or consistency in the in-structure response, the applicant used a Unit 1 profile which accounts for the effects of the concrete layer as the case to be further evaluated in the incoherency analysis. So

structure interaction analysis using the program ACS SASSI and incorporating the incoherency function, which results in reductions to the in-structure response.

MEMBER RICCARDELLA: Could you please just give me like a one or two-sentence description of the difference between coherent and incoherent analysis?

MR. ROCHE-RIVERA: Of course. Coherent, the terminology coherent and incoherency refers specifically to the ground motion. If it is coherent, it is assumed that at every point, let's say under the basement foundation, the motion is the same. But incoherency analysis accounts for variability of the motion in different points under the foundation of the nuclear island. And that's consistent with the approved developed -- what's called coherency functions in ISG-1 which are based on measured data, free-field measured data, and are a function of -- and show differences in motion and provides relationships as a function of separation distance and frequency.

MEMBER RICCARDELLA: Okay. Thank you.

MR. ROCHE-RIVERA: Okay? So again, just

going back, so the applicant performed the incoherency analysis based on the Unit 1 profiles, based on the justification that we just provided, based on that comparison between the Unit 1 and Unit 2 cases' coherent analysis. As indicated yesterday or discussed yesterday also, the applicant used an update model, a refined model as compared or relative to the Rev 19 model. To determine the adequacy of that model, the staff reviewed that model consistent with the criteria in Section 3G.2.2.2 of the DCD, which validates the NI20 model against a more refined model also incorporated in the DCD called NI10.

NI10 in the DCD is the model used for the hard rock fixed space case which is different. It's not the hard rock high frequency evaluation. The AP1000 certified design uses the NI20 model for the hard rock high frequency evaluation. So and then in the DCD in terms of the validation of the NI20 versus the validation of -- the adequacy of the NI20 model it is determined based on a comparison to the NI10 model. The staff performed a consistent comparison or reviewed a consistent comparison of the NI20 updated model versus the NI10

model and determined that those comparisons demonstrate dynamic equivalency. and that was determined based on review of in-structure response spectra results And the six key locations, and more than the six key locations as during the audit.

MEMBER RICCARDELLA: Just from my copies, as I understand it, the difference between NI20 and NI10 is 20-foot elements, finite element sizes versus 10-foot finite elements.

MR. ROCHE-RIVERA: Yes, essentially. Yes, that's what it is. It's the average size of the elements.

MEMBER RICCARDELLA: Less refined. The NI20 is a less refined model. But they showed equivalence?

MR. ROCHE-RIVERA: Yes, they showed equivalence in terms -- when you look at the in-structure response spectra and affected masses, yes, model properties.

CHAIRMAN RAY: And I forget the word now that you used, but you were saying there was a -- two things were shown as the same. Are you talking about Unit 1 and Unit 2 when you said that?

MR. ROCHE-RIVERA: Initially, yes.

Initially in the earlier part of the presentation for this slide I was referring to the site-specific analysis performed for Unit 1 and Unit 2 --

CHAIRMAN RAY: Yes.

MR. ROCHE-RIVERA: -- and the fact that -- and each one with their own rock profiles and the fact that when you looked at the in-structure response spectra at the six key locations they're consistent.

CHAIRMAN RAY: And that's between the two units?

MR. ROCHE-RIVERA: And that's between the two units. And then based on that comparison the applicant performs subsequent incoherent analysis based on the Unit 1 profile.

CHAIRMAN RAY: Okay. All right.

MR. ROCHE-RIVERA: So any more questions?

(No audible response)

MR. ROCHE-RIVERA: Next slide. Now, to evaluate the adequacy of the implementation of the incoherency function, the staff reviewed really the level of reductions obtained by the implementation of these incoherency functions. And the staff

reviewed that in light of the reductions observed in the AP1000 certified design for the hard rock high frequency evaluation. And based on the staff review of comparison of the maximum --

CHAIRMAN RAY: Okay. Stop for a second.

MR. ROCHE-RIVERA: Yes.

CHAIRMAN RAY: The reductions observed. Explain what you mean.

MR. ROCHE-RIVERA: Well, when you incorporate incoherency function into the ACS SASSI analysis, the resultant in-structure response spectra, specifically in the high frequency range, is reduced as compared to the coherent analysis without the incorporation of incoherency.

CHAIRMAN RAY: Okay.

MR. ROCHE-RIVERA: Right?

CHAIRMAN RAY: Yes.

MEMBER RICCARDELLA: Because you're not shaking everything the same. You're shaking different --

MR. ROCHE-RIVERA: With different --

MEMBER RICCARDELLA: -- parts differently, yes.

MR. ROCHE-RIVERA: So the staff

evaluated the reductions obtained in the site-specific analysis versus the reductions obtained in the certified design for the HRHF, hard rock high frequency evaluation and determined that they were -- and they're consistent. The maximum reduction observed in the site-specific analysis are consistent with the maximum reduction observed in the hard rock high frequency analysis in the certified design, and therefore determined that the implementation of the incoherency function for the Lee site is acceptable.

As just pointed out a few seconds ago, this in-structure response spectra which incorporates this reduction now -- and I should say as described yesterday, is largely -- really it's largely enveloped by the in-structure response spectra from the certified design, but it does exhibit exceedances. And we went over that yesterday.

And now to address those exceedances, then -- and in accordance with the process delineated in Chapter 2, as discussed yesterday, then the applicant performs further evaluations that are consistent with the procedure or evaluations in

Appendix 3I of the CD. And that's what we're getting into the next slides.

And that's really a screening evaluation on the selection of a representative sample of structure, system and components. For the structures the applicant evaluated persons of the auxiliary building, the shied building and the containment internal structures consistent again with the Appendix 3I and Technical Report 115. And the specific comparison that the applicant looked at in terms of structures was forces.

One thing is the ground motion input, right, for which we see the exceedance. Well, now when we look into the effects into the structures of that ground motion versus what was done for the certified design, the findings are that when you're looking at the forces, really the certified design, specifically the CSDRS bound the site-specific forces with adequate margin as well. Those loads are just much higher than the site-specific --

CHAIRMAN RAY: Well, yes, obviously because the site-specific at the lower frequencies is much lower than the --

MR. ROCHE-RIVERA: Correct.

CHAIRMAN RAY: -- certified design.

MR. ROCHE-RIVERA: Correct.

CHAIRMAN RAY: So of course that's going to be the case.

MR. ROCHE-RIVERA: Correct, for structures.

CHAIRMAN RAY: For structures.

MR. ROCHE-RIVERA: Correct. So the staff reviewed all those comparisons at the different locations. And there was an example presented yesterday and we found those essentially confirm that indeed the CSDRS bounds the site-specific case. And on that basis the staff's conclusion is that the certified design to the CSDRS, design to the CSDRS continues to be adequate to the site-specific case.

Now, I'm going to make a few remarks about the other system and components evaluated including piping, primary components and supports and equipment. Of course, that was discussed yesterday. The applicant's evaluation also included the evaluation of primary components. Specifically they looked at supports for the reactor vessel, the steam generator and also of the reactor coolant

system. And they also looked at forces in moments there. So for that primary equipment, consistent with what was shown in Appendix 3I, again the CSDRS does bound the loading from the site-specific case.

For the piping aspect of the evaluation, consistent with the design acceptance criteria in the DCD, piping is really designed to both the CSDRS and the HRHF, the hard rock high frequency spectra. The applicant's site-specific analysis also included -- an evaluation however presented the sample of piping packages informed of course by the exceedances of the in-structure response spectra observed in the site-specific analysis. And they show that when they look at the stresses for piping, that indeed the certified design, the stresses associated with the certified design also bound the site-specific case.

Now, moving to equipment. Equipment, high frequency sensitive equipment, as was described yesterday, is qualified to both the required response spectra from the CSDRS and a required response spectra for the HRHF AP1000 curve, right? So, it's the envelope of those two cases. What the applicant is showing by their analysis also of a

representative sample of equipment is that the actual test response spectra associated with that required response spectra bounds both the certified design response spectra and the site-specific required response spectra. And based on that comparison the applicant has high confidence that really the certified design controls -- the requirements of the certified design controls the site-specific case.

Now, in addition to that --

MEMBER BLEY: Before you leave that one --

MR. ROCHE-RIVERA: Yes.

MEMBER BLEY: -- tell us a little more about how you looked at the sample they took of equipment and why you think that's broad enough that you're satisfied all the equipment should be reasonably in the same range.

MR. ROCHE-RIVERA: I'm going to defer to my colleagues in the audience who supported the review of equipment, but essentially when you look at equipment to be part of this evaluation, the screening criteria is where is the fundamental frequency of that equipment. The seat aligns with

the peaks of the required response spectra for the hard rock high frequency case or in this case the site-specific case. That's part of the screening criteria. And if --

MEMBER BLEY: Well, while your colleagues come to the microphone, let me just say you used a term there which is very important to me at least, which is this required response spectra, which is the real criteria for going forward for replacement equipment and all the rest of it. But anyway, do you have somebody you wanted to add --

MR. ROCHE-RIVERA: There is somebody here in the audience.

MEMBER BLEY: He can't decide who wants to do it.

(Laughter)

MEMBER BLEY: Where are those criteria spelled out, the acceptance criteria?

MR. ROCHE-RIVERA: So the screening criteria is called out in both Appendix 3I and the TR-115.

MEMBER BLEY: Okay. Oh, we have a gentleman.

CHAIRMAN RAY: Okay. Identify yourself

and --

MR. TSIRIGOTIS: My name is Alexander Tsirigotis. I work for NRO in the Division of Engineering in the mechanical --

CHAIRMAN RAY: Would you get closer to the mic, please?

MR. TSIRIGOTIS: (Off microphone)

CHAIRMAN RAY: You'll need to -- we're not able to pick you up on the record.

MR. TSIRIGOTIS: Can you hear me now?

CHAIRMAN RAY: Yes.

MR. TSIRIGOTIS: Well, I didn't perform this review. The person who performed this review is not with the Agency anymore. I noticed that the screening criteria were based on very importance -- on the equipment that were important to safety and their ability to achieve safe shutdown according to location in the areas of the plant that are susceptible to large high frequency seismic inputs that they have exceeded significant model response within the region of high frequency application. And the position or significant total stresses is compared to allowable when considering load combinations that include seismic.

Also, when -- for equipment that were susceptible to high frequencies the applicant stated that they have qualified by the test response spectra, by tests. The test response spectra, I saw in one of the references, reference 206 of Section 17, I believe. This spectra are higher than both the CSDRS and the HRHF. Therefore, there should be no issue in that area.

CHAIRMAN RAY: I'm not sure I understood what you just said.

MEMBER BLEY: Well, for the equipment they tested.

CHAIRMAN RAY: Oh, for the TRS?

MEMBER BLEY: And my question had been how do we know you had a sufficient sample of different kind of equipment so that we were looking at a representative sample of the equipment that would -- that's important that would be subjected to the earthquake excitation?

MR. TSIRIGOTIS: Perhaps I didn't make myself clear. The licensee stated that no high frequency safety equipment is qualified by analysis. They are qualified by testing.

MEMBER BLEY: All the equipment?

MR. TSIRIGOTIS: The high --

(Simultaneous speaking)

MEMBER BLEY: That's what I thought from yesterday. Today I heard "sample" used and made me nervous.

MR. TSIRIGOTIS: No, the sampling was done for piping.

MEMBER BLEY: Okay.

MR. TSIRIGOTIS: But if anybody knows anything different, please --

CHAIRMAN RAY: I think I heard what he said.

MEMBER BLEY: You're no on.

MR. HUGHES: Oh, I'm sorry. The instrumentation and various electrical and components are all tested.

MEMBER BLEY: Thank you. That's what I wanted to hear.

CHAIRMAN RAY: It's very, very hard to qualify electronic equipment by analysis. It almost always has to be tested. So you got a test response spectrum and you got a required response spectrum?

MR. HUGHES: Correct.

CHAIRMAN RAY: All right.

MR. HUGHES: And in addition that the applicant is required to carry those specifications forward for all future procurements.

CHAIRMAN RAY: Okay. I guess one question would be; and this is just for me, the stiff part of the structure courses and the vertical direction in this site has -- because it's hard rock, has a very high vertical by comparison with a soft site. So I was looking for some locations -- I guess there are six locations that are screened initially -- some location where the vertical component would be significantly larger, but I didn't see any in the work that was in the backup slides and so on that they've presented. It as if both horizontal and vertical are comparable in structure, which I mean, for the horizontal motion of course the buildings are very -- relatively flexible and it's very hard to get high frequency in, but vertically that's not so hard. And like I say, the buildings are stiff in the vertical direction.

So you guys have looked at all that and you're satisfied with the --

MR. ROCHE-RIVERA: Yes, and again it's

the same logic about what's really the important frequency range for structures and --

CHAIRMAN RAY: Yes, well like I say, in the vertical direction it's a little different than --

MR. ROCHE-RIVERA: It's a little bit higher. It's a little bit higher, but still --

CHAIRMAN RAY: Oh, okay. But --

MR. ROCHE-RIVERA: But still because of the contribution of the lower models -- the higher contribution of the lower models to the total response it still accounts for the minimum contribution of the higher models which have like a higher content of spectra acceleration.

CHAIRMAN RAY: Any other questions at this point? If not, we'll ask you to proceed.

(No audible response)

MR. ROCHE-RIVERA: Okay.

CHAIRMAN RAY: Bill, you okay?

PARTICIPANT: Yes.

CHAIRMAN RAY: All right.

MR. ROCHE-RIVERA: So next slide. Now here we're going to address the site-specific analysis for the Seismic Category II structures.

The certified design included what's call a structural interaction analysis. That included representation of the adjacent Seismic Category II structures on the nuclear island. And really the focus is on establishing that there's not a potential for adverse interaction between the adjacent Category II structures and the nuclear island such that they would affect the function of the nuclear island structures.

So to do that we look at the -- we focused really a lot of our review in regards to the relative displacements between these structures. The requirements from the DCD for this -- no adverse interaction between Seismic Category II structures and the nuclear island is it's -- it has or it requires a minimum gap of two inches below grade and four inches above grade. The site-specific analysis performed by the applicant demonstrates that the relative displacements for the site-specific load are much, much lower than the spacing provided or required by the certified design. And therefore, it confirms the acceptability or the adequacy of the gap and the fact that there's no adverse interaction between the Seismic Category II structures and the

nuclear island.

In addition to that we also looked at the stability of those structures as -- the overall stability of those structure: sliding stability and overturning stability. And in regards to that, the applicant's calculation demonstrated that the factors of safety for sliding and overturning of those structures really are much -- are higher than the required factors of safety for the Seismic Category I structures, which again confirms not adverse interaction between the adjacent structures and the nuclear island structures.

Now, next slide, which is also still related to the Seismic Category II evaluation. Now, when you looked at the foundation response spectra for the Seismic Category II structures, the horizontal spectra, it's really largely enveloped for the site-specific site. And this spectra is mostly important for what we just discussed, for the interaction, potential for lateral interaction between the adjacent structures on the nuclear island. Now, when you look at the foundation spectra for these structures, both the annex and the turbine building first bay, then there are

exceedances over the foundation response spectra included in the certified design for these structures.

These exceedances are more important to design of local members such as floors and roof. This is in the vertical direction. And to address that, the applicant has committed to a design of this adjacent Seismic Category II structures to both the CSDRS and the site-specific case. The design of the structures according to the certified design, it follows the criteria implemented for the health insurance structure for the Seismic Category I structures in terms of that it uses the same design codes and allowables are applicable to the Seismic Category II structures.

The staff found the site-specific evaluations for these structures and for -- to surely demonstrate that there's no adverse interaction between those structures. And that's demonstrated by the displacement and stability results. And the staff finds acceptable that the applicant has committed to a design that meets both the requirements of the certified design and the site-specific design.

CHAIRMAN RAY: Understood.

MR. ROCHE-RIVERA: So we can move to the next slide. And just a brief slide on seismic margin. Really in conclusion, what the staff found based on its review is that the applicant's analysis demonstrates really that the site-specific case -- it's really controlled -- I mean, that the design of the AP1000 is controlled by the certified design. And it is applicable to the site-specific case. As such, really the seismic margin assessment performed for the certified design continues to be applicable to the site. And in addition to that, the staff finds that there are no like so related failure that could potentially affect the conclusions for the seismic margin assessment in the certified design.

CHAIRMAN RAY: So can you say then that the exceedances don't reduce the seismic margin?

MR. ROCHE-RIVERA: Correct. Correct. As pointed yesterday, the applicant indicated that the seismic margin or HCLPF values for the site-specific case would be greater for the Lee site as compared to the certified design. And that's shown by the fact that the design is really controlled by the CSDRS as demonstrated by the applicant's

analysis rather than the site-specific loading.

CHAIRMAN RAY: Well, again I would point out that you can read things that we were provided in advance of this meeting to indicate otherwise, namely that the exceedances were accommodated within the margin, which to me is the same thing as saying the margin was reduced by the exceedances.

MR. ROCHE-RIVERA: I know the word "margin" was used in a different context yesterday. What we really mean is that the forces from the certified design really bound the forces from the site-specific case. This is a different -- it's the actual seismic margin assessment for Chapter 19.

CHAIRMAN RAY: Yes.

MR. HUGHES: So could you repeat that again, Robert? What you're saying is the forces --

MR. ROCHE-RIVERA: Yes, the certified design bounds the site-specific case. And it's demonstrated, as we just went through, by different means. Forces for structures, stresses for piping, test response spectra for equipment.

CHAIRMAN RAY: But that's another way of saying that the exceedances don't reduce the margin. They don't consume the margin --

MR. ROCHE-RIVERA: Correct.

CHAIRMAN RAY: -- that exists or has been --

MR. ROCHE-RIVERA: Correct.

CHAIRMAN RAY: -- assessed to exist.

MR. ROCHE-RIVERA: Correct.

CHAIRMAN RAY: Yes. Well, like I say, you don't come to that conclusion automatically by at least not agreeing what is set forth initially, but it's good to get that clarified. Okay. Anything else?

MR. ROCHE-RIVERA: That concludes my part of the presentation.

CHAIRMAN RAY: All right. I know we've got more to go here before we're done with this section, a little bit more, but is there any other questions that we have on the segment that Robert's been talking about?

(No audible response)

CHAIRMAN RAY: Okay. If not, then we can move on, I guess, to lateral earth pressure.

MR. THOMAS: Good morning, Chairman Ray and members of the staff. My name is Vaughn Thomas. I'm a structural reviewer in the Office of New

Reactors. I've been with the NRC about 13 years. I've worked in pretty much all the COL that's referenced the AP1000 DCD. In the next couple slides I'm going to present the staff's safety concern related to Section 3.8 of the Lee application.

Section 3.8 of the Lee application incorporated the DCD application, and they provided additional supplemental information including Departure 3.8-1, which we talked about yesterday. The staff talked about it along with the applicant.

As you can see on this slide, Combination 7 which we'll talk about a little later, the site-specific passive pressures are pretty much exceeding the AP1000 certified design passive pressure in both the north-south and the east-west directions. So the staff focused its safety review primarily on the impact of the accidents of the exceedance on the exterior of the walls below the -- the exterior of the below-grade walls of the NI, which is categorized as safety categorized structure.

Next slide, please. The safety concern is that nine load combinations are used to develop

the passive pressure acting on the exterior of the below-grade walls of the NI to ensure that the site is bounded by the AP1000 certified design passive pressure. However, in reviewing the application the staff noticed that the site-specific passive pressure acting on the below-grade walls of the NI departs from the AP1000 certified design in that it exceeds the passive pressure evaluated and documented in the AP1000 DCD for particular Load Combination 7. So as a result the staff requested additional information to confirm that the applicant's site-specific passive pressure are bounded by the AP1000 certified design passive pressures.

Next slide, please. As the applicant stated yesterday and the Chapter 2 guys from the staff yesterday, the applicant performed the site-specific sensitivity study to demonstrate that the actual site-specific passive pressure during the actual site-specific passive pressure are bounded by AP1000 certified design. The applicant compared the site-specific passive pressures of the NI loads combinations corresponding to the AP1000 passive pressure. The applicant demonstrated that the depth

of the ground water level at the site contributed to the resulting higher passive pressure. As you can see, the ground water level at the site of the Lee site is eight feet, whereas with the AP1000 it's about two feet, a difference of six feet of heavy soil results in this increase of higher earth passive pressure.

The applicant also demonstrated that the maximum lateral displacement at the base of the NI when subject to seismic loads are not necessarily capable of developing the full passive pressure. It is stated in the DCD Section 3.8.5 that the maximum lateral displacement of the base of the NI when subjected to the certified design response factor is expected to be 0.12 of an inch including buoyancy and 0.9 of an inch considering -- no, sorry, 0.12 of an inch neglecting buoyancy and 0.19 of an inch considering buoyancy.

Given the effects of the Lee site-specific NI FIRS are bounded by the effects of the AP1000 CSDRS, it is expected that the Lee site-specific laterally displacement will be less than that of the AP1000. And those small displacements are not capable of developing full passive pressure.

So, in all, the applicant did demonstrate that the actual site passive pressure resulting from the NI FIRS are less than the AP1000 passive pressures when subject to Load Combination 7.

In conclusion, the staff concludes that the information provided by the applicant demonstrated the passive pressure at the site will not be fully developed and that the passive pressures for the exterior of the walls below the NI of the AP1000 standard design continue to bound the passive pressures that actually occur at the Lee site. Therefore, this issue is resolved by the staff and currently is being tracked as a confirmatory item. And this basically concludes my presentation.

CHAIRMAN RAY: All right. Any questions on this?

MEMBER SKILLMAN: Yes, I do. The displacements, Vaughn, that you identify in your second bullet there, are those dependent upon the density of the fill on the foundation?

MR. THOMAS: Yes.

MEMBER SKILLMAN: And is there an ITAAC or some requirement?

MR. THOMAS: There's a statement from the DCD. The DCD stated that the -- well, basically, that's what the applicant -- they did a confirmatory analysis to show that the values are less than the AP1000s.

MEMBER SKILLMAN: Okay. Thank you, Vaughn.

CHAIRMAN RAY: Anything else?

(No audible response)

CHAIRMAN RAY: Okay. Brian, I think you're done for this session.

MR. HUGHES: Yes.

CHAIRMAN RAY: We're now just an hour behind, but if you'll look at the agenda today, we'll make that up and expect to finish on time today. So, we're ready now for you guys to pick up the Chapter 6 and 8 discussions as shown in the agenda.

MR. KITCHEN: Good morning, Mr. Ray.

CHAIRMAN RAY: Good morning.

MR. KITCHEN: Bob Kitchen with Duke Energy. I wanted to start off -- there was a question yesterday I think Dr. Banerjee asked about the prevailing wind direction at the Lee site. This

is a pictorial. This is backup slide 10 that shows a prevailing wind. And there's two wind roses here. We have two towers on the site, and I'll show you the locations in just a minute. The left is Tower 2, which is used for the data we have for COLA, the two years of net data that were provided. And the picture on the right shows the replacement tower.

MR. THORNTON: Yes, I'd just point out on that slide, Bob, that, yes, the prevailing winds are from the northwest and generally follows the slight river valley that we have with the Broad River. But in terms of the chemical analysis that we'll be discussing in Chapter 6, we use worst case low wind speed conditions and stability classes in our chemical evaluations to the extent that it's directionally dependent.

MEMBER BANERJEE: What's the probability of --

MEMBER SCHULTZ: Your mic isn't close enough. You're not recorded.

MEMBER BANERJEE: Oh, sorry.

MR. THORNTON: You want to bring that back up slide up again? It's shown there. We'll zoom in a little bit and you might be able to see.

It's going to show you wind speeds. And zoom in just a little bit.

MR. KITCHEN: Boy, you really are testing my knowledge.

MR. THORNTON: Yes.

MEMBER BANERJEE: You are zoomed in as best as you can?

MR. THORNTON: Yes, okay. That's full screen. All right.

But anyway, both wind speed and stability would be a fairly low probability condition. We assumed one meter per second wind speed in order to ensure that --

MEMBER BANERJEE: The calculation.

MR. THORNTON: -- it's transporting in the direction toward the site. And you'd want to superimpose that, the probability of the direction and I guess high stability F or G to give you a total probability of it actually -- weather conditions actually being this favorable to transporting the cloud as intact as possible from the spill location to the control room intake.

MEMBER BANERJEE: So the probability is quite low of --

(Simultaneous speaking)

MR. THORNTON: Yes, but we count on that in the analysis.

MEMBER BANERJEE: Yes, you take that into account? Okay.

MR. KITCHEN: Just to go back, this is the presentation. This was a slide that was used yesterday. The data are from two towers. The original tower is located at this point on the site. You can see of course where the cooling towers are going to be. So we need to move that tower. So we've installed the second tower, and that's the permanent tower over here. And that's why there were two wind roses shown on that pictorial.

So anyway, that was a follow-up from yesterday and I think we said that we would discuss it today, and it's appropriate. This is a topic where that's of interest.

MEMBER BANERJEE: Thank you.

MR. KITCHEN: And Jim Thornton is going to present the discussion on toxic gas.

MR. THORNTON: I'm Jim Thornton. I'm licensing manager for the Lee project. I'll be providing the overview of Chapter 6.

Chapter 6 is largely based on standard content, but it does contain some site-specific chemical hazard information. Chapter 6 includes an assessment of the main control room impact from postulated offsite and onsite chemical spills.

Next slide. In terms of the offsite, it talks of chemical hazards. The greatest risk within five miles of the site was determined to be an accidental release involving a mobile source traveling on local highways. A chemical spill involving a large tanker truck carrying 22 tons of liquefied chlorine is postulated to occur at the point of closest approach of the nearest highway approximately 3.2 miles west of the Lee site. Again, while we applied meteorological assumptions to this analysis, that point really just establishes the shortest distance for dispersion purposes.

MEMBER SKILLMAN: Jim, why did you choose the chlorine tanker versus something else?

MR. THORNTON: Well, it was a combination of the hazards, permanent facilities, industrial facilities, pipelines, transportation routes that were identified within five miles of the plant. So it was really a mobile source on a

highway that we identified as the credible risk within five miles. And chlorine was selected since it's one of the more toxic chemicals commonly transported on highways.

MEMBER SKILLMAN: Was any consideration given to an accident involving a propane truck where the gas cloud remained intact and detonated?

MR. THORNTON: That would be a Section 2.2 question in terms of explosive hazards. I'm not sure to what extent propane tankers were involved in that overpressure analysis.

MEMBER SKILLMAN: The same phenomenology that Dr. Banerjee is talking about for chlorine also applies to explosive --

MR. THORNTON: Flammable and explosive gases.

MEMBER SKILLMAN: I lived in a community where a gas truck did burst and just because the temperature is in dew point the cargo remained intact and flowed into a valley. And when it ignited, it looked as if an atomic bomb had detonated down there. So, it would be the same phenomenology that Dr. Banerjee is talking about.

MR. THORNTON: But that would be

somewhat dependent on local terrain. We didn't bring any slides that show local terrain very well, but there are ridges and valleys between Highway 329 and the site that would probably not be favorable for that type of event. But again, the analysis that was done for explosive gases will get --

(Simultaneous speaking)

MEMBER SKILLMAN: Right. I'm out of place in this chapter, but I understand the logic for the chlorine tanker. Thank you.

MR. THORNTON: You're welcome.

MEMBER BANERJEE: So just a couple of questions. Did you analyze a path release or did you analyze a continuous release, or both from the chlorine. Like the tanker burst or did the tanker sort of leak out in a jet? Both cases are important.

MR. THORNTON: It was spill. Surface area was assumed and the evolution of the vapor cloud from the --

(Simultaneous speaking)

MEMBER BANERJEE: So it was puff release --

MR. THORNTON: Puff release.

MEMBER BANERJEE: -- that was transported down? And that's what ALOHA calculated?

MR. THORNTON: That's correct. Well, we used both ALOHA and HABIT, but --

MEMBER BANERJEE: HABIT would be more at the control room, right?

MR. THORNTON: Well, I'll get into it --

MEMBER BANERJEE: Okay.

MR. THORNTON: -- on the next slide exactly how we used those two codes in combination.

MEMBER BANERJEE: Fine.

MR. THORNTON: Evaluation did use a hybrid, a two-step approach, use two different computer codes to model dispersion of chlorine as it was transported by light winds from the spill locations at the plant site. The ALOHA code was utilized to model the initial dispersion where chlorine is expected to be a heavy gas, and the HABIT code was then used to complete the dispersion analysis and calculate the main control room. I've got a pictorial on the next slide that will show that.

The two-step approach was necessary because the ALOHA code has a run time restriction in

it and it's not ideal for getting full credit for dispersion for the long transport distances with low wind speed conditions. It times out essentially. Otherwise, ALOHA is capable of both heavy gas dispersion and neutrally buoyant gases.

MEMBER BANERJEE: But there's a natural transition?

MR. THORNTON: Right.

MEMBER BANERJEE: Yes.

MR. THORNTON: Right. But I'll explain how we use the two codes together with this pictorial on the next slide.

MEMBER BLEY: Before you go through that, I want to go back to Dick's question. Although it was out of place it was in place. Yesterday we did 2.2 and we didn't really talk about this one in detail. They looked at an explosion at the road. I'm not sure if they looked at the chance that it actually drifted toward the site, and maybe that's something we want to go back to at a point. But let him go ahead if

you're --

MEMBER SKILLMAN: Yes, thank you.

MR. THORNTON: This slide shows the

location of the postulated offsite spill location on Highway 329, about 3.2 miles west of the site. I'll just show you with the point. Right here. And we've got it identified with a flag. That's the actual closest approach for a major highway to the Lee site and that's where we initiated the ALOHA calculation. The map also illustrates that the two-step approach. But basically we had a 22-ton chlorine tanker release on Highway 329 there at the closest approach and we initiated the ALOHA calculation. ALOHA modeled the initial evolution of the toxic vapor cloud from the spill and modeled the vapor transport to a point downwind where sufficient dispersion has occurred such that the vapor cloud could then be conservatively modeled as a neutrally buoyant gas at that second location.

And at that second location we picked up the analysis with HABIT. We re-initiated the spill assumption and allowed HABIT then to create a gas cloud and using a neutrally buoyant Gaussian dispersion, continued to model dispersion all the way to the plant --

(Simultaneous speaking)

MEMBER BANERJEE: What distance was

that?

MR. THORNTON: I don't have the --

MEMBER BANERJEE: It's quite short.

MR. THORNTON: -- specific distances. Yes, it -- it's on the slide?

PARTICIPANT: Yes, the box is on --

(Simultaneous speaking)

MR. THORNTON: Okay. Yes.

PARTICIPANT: It's 4,485 meters.

MR. THORNTON: Yes, it's got it measured in meters there.

MEMBER BANERJEE: That's fine.

MR. THORNTON: The ALOHA transition to reach 10,000 ppms and would have automatically transmissioned at 4,485 meters. So that's 615 meters, I think is where it would have transitioned the dispersion model from. Heavier than air to Gaussian dispersion.

MEMBER BANERJEE: Is that because it took into account that ridge that mixed it?

MR. THORNTON: No, we assumed a zero meter elevation height and an open country terrain factor. So we didn't account for any ridges or valleys in the terrain between the spill site and

the control room --

(Simultaneous speaking)

MEMBER BANERJEE: That distance, was the terrain relatively flat between --

MR. THORNTON: I've got information on terrain.

MEMBER BANERJEE: I think you showed us one yesterday, right?

MR. THORNTON: Yes, the ridges range from basically 670 to 610 feet elevation, and the ravines range from like 520 to 590 feet elevation. And if you take that into context, the site elevation is 593 feet. So the ridges and valleys range about maybe 10 to 15 feet.

MEMBER BANERJEE: But ALOHA didn't take that into account?

MR. THORNTON: I mean, I'm sorry, 10 to 50 feet in terms of elevation rise and fall. And there's at least two water sheds between the spill location and the site. So you'll see at least two ridges and valleys, of that magnitude.

MEMBER BANERJEE: But there are trees and things in --

MR. THORNTON: There are trees. It is

forested.

MEMBER BANERJEE: Yes.

MEMBER BLEY: Just a related question. It's a lot further, but it seems an obvious question. If your leak occurred up there where 29 crosses the river, does the river channel create a much more direct path to the plant? And did you think about that?

MR. THORNTON: It --

MEMBER BLEY: Because it's almost twice as far on --

(Simultaneous speaking)

MR. THORNTON: It would be a more level path and it is a slight river valley, a little bit more elevated to the west than it is to the east.

MEMBER BLEY: Kind of downhill, but not much?

MR. THORNTON: That's correct. But by the time a cloud -- if it did continue to behave in the heavy gas, the Broad River elevation is significantly below the control room intake in terms of elevation. The Broad River at the plant site is 511 feet elevation, whereas the site elevation is 593. And the control room intake is actually 56

feet above that.

MEMBER SCHULTZ: Jim, you mentioned conservatisms a couple of times here already, and you've got this code transition. What were the conservatisms that you applied in the evaluation of that transition from the ALOHA code to the HABIT code?

MR. THORNTON: We essentially discount that 600-meter distance that it takes for the cloud to initially disperse to where you could begin treating it as a neutrally buoyant vapor cloud. We do re-initiate the spill and add the 4,485-meter location. And we do assume open country terrain where there are actually some terrain features that would inhibit flow directly to the site, or contribute the dispersion that we're not accounting for.

But again, as has been pointed out, at larger distances there is a path down the river that would be similar to the assumptions we used in terms of open country terrain and no dispersion enhancing terrain features. So we think that it's a trade off.

MEMBER BANERJEE: You know, half a

kilometer for a heavy gas release in F or G weather, for neutral density seems fairly short. I mean, who ran the code? Did you run it yourself?

MR. THORNTON: I did not it myself. Ralph Berger, who is on the line listening, ran the code and he --

MEMBER BANERJEE: It wasn't subcontracted out to somebody to do, a consultant or --

MR. THORNTON: Well, it's our COLA support contractor. They do the majority of our --

MEMBER BANERJEE: Calculations?

MR. THORNTON: -- technical support including meteorology and this toxic gas analysis.

MEMBER BANERJEE: So they have good qualifications? They do this routinely, toxic gas --

MR. THORNTON: Yes. Yes, they support the industry on these type of evaluations.

MEMBER BANERJEE: And do you remember who developed ALOHA? Was it an old Dupont code or --

MR. THORNTON: All I know about ALOHA I think is Department of Energy and -- it's a

Department of Energy code.

MEMBER BANERJEE: I think we've used it before, right?

MEMBER BLEY: Yes.

MEMBER BANERJEE: So we've heard about it before.

MEMBER BLEY: We heard about it for another -- that was more of a channeled approach.

MR. THORNTON: EPA and Department of Energy.

Okay. Moving onto the next slide and the results, the evaluation concluded that the peak chlorine concentration in the main control room would not exceed the established toxicity limit for chlorine, which in Reg Guide 1.78 it's established at 10 ppm. And that assumed no protective action was taken by the control room habitability system, no automatic actuations and no actions by the control room operators to mitigate intrusion of chlorine.

And that's really all I had on the offsite analysis. Are we prepared to move on to the onsite chemicals?

MEMBER SCHULTZ: Jim, what margin did

you determine? What value did you calculate or was calculated in the analysis? The staff's going to present something in their review.

MR. THORNTON: Well, they've got the slide for the build-up, the core concentrations at the intake and for the build-up in the control room. It was less than 10.

MEMBER SCHULTZ: So that's representative of what --

MR. THORNTON: It was on the order of eight, I think, eight ppm.

MEMBER SCHULTZ: That's representative of what you achieved?

MR. THORNTON: That is correct.

MEMBER SCHULTZ: Thank you.

MR. THORNTON: Those are our results.

MEMBER SCHULTZ: Okay.

MEMBER BANERJEE: So HABIT takes into account the ventilation and everything in the control room, right?

MR. THORNTON: Right, the intake flow rate and the volume of the control room, and it builds it up over time. And you'll see a little time lag between concentrations at the intake and

concentrations in the control room proper.

MEMBER BLEY: This is a curiosity question. You're below the toxicity limit, but probably not below the sensitivity limit where you can smell it?

MR. THORNTON: That's correct.

MEMBER BLEY: Do you have any thoughts to what happens to a control room crew when they start smelling a heavy dose of chlorine?

MR. THORNTON: Yes, it's kind of described in the basis in Reg Guide 178 for 10 ppm. They do talk about the operators would likely take protective actions and probably use our self-contained breathing apparatus before it -- as soon as they began sensing it and became aware of the accident. But that's not something that we have to credit in accordance with the Regulatory Guidance --

(Simultaneous speaking)

MEMBER BLEY: Yes, I'm just thinking ahead a little bit. Are there any kind of monitors or anything that would let them know how bad it was outside so -- help them do their own planning?

MR. THORNTON: We did not credit anything like that or confirm --

(Simultaneous speaking)

MEMBER BLEY: And they shut down --

MEMBER SCHULTZ: I think our question is not your need to credit something or have automation, but what systems -- do you have systems that are available to detect toxic gas and --

(Simultaneous speaking)

MR. THORNTON: I'd have to defer. I'm not aware of any.

MEMBER SCHULTZ: Okay.

MR. THORNTON: I didn't really check to confirm whether we had the chlorine gas monitors or not. I'd have to look at the standard plant capabilities. I'm certain we don't have any site-specific monitors in the design at present.

Okay. Moving on to the onsite chemical hazards. We did perform a review of --

MEMBER BANERJEE: Before we move from this road, what sort of other chemicals are transported? Is there any HF or HCN or --

MR. THORNTON: Well, it's a public highway. There's a potential for other gases. Chlorine was selected as representative, as I said, due to its high toxicity and commonality I guess in

terms of it's a more common industrial chemical that's transported on highways.

MEMBER BANERJEE: Is there any control or --

MR. THORNTON: But at least within five miles we were not aware of any industrial uses of these chemicals in general. It's just a postulated event to assess the distance between a major public highway and the plant site. It's representative.

MEMBER BANERJEE: Yes, I was telling Robert I think about a chlorine spill in Mississauga in Toronto where they had to evacuate 250,000 people. It's amazing. Just a tank car. So serious things. But I think you're far enough away from the sort of dilutes.

MR. THORNTON: Right.

MEMBER BANERJEE: And I'm a little surprised that it actually gets to neutral density within half a kilometer, which isn't very far. And I'm wondering whether that's an artifact of the -- so that's why I asked you about trees and terrain as mixing, but your code is not taking that into account.

MR. THORNTON: That's correct. Open

country I think is a standard input for ALOHA --

MEMBER BANERJEE: Right, so that's a --

MR. THORNTON: -- which is a grassy-type --

(Simultaneous speaking)

MEMBER BANERJEE: -- more conservative way of looking at it. But if I remember, they did a lot of these tests somewhere. Livermore ran a lot of tests with heavy gases with these types of leaks and things.

MR. THORNTON: Right, right.

MEMBER BANERJEE: And --

(Simultaneous speaking)

MR. THORNTON: -- we're about to discuss for onsite chemicals was actually a Lawrence Livermore --

MEMBER BANERJEE: Okay.

MR. THORNTON: -- heavier-than-gas code that we applied to this analysis.

MEMBER BANERJEE: Oh, that's the SLAB code? Okay.

MR. THORNTON: Yes.

MEMBER BANERJEE: Yes.

MR. THORNTON: Correct. But basically

in Chapter 6 as far as onsite chemicals go, there's a table that itemizes the chemicals expected to be stored and used on the Lee site. Table 6.4-202 includes both standard plant chemicals and the site-specific chemicals to be used at the Lee site, and in particular for pH control.

Two specific chemicals were identified as requiring further evaluation, MPA and DMA. We use up to 330 gallons of these chemicals and store them on site. And a spill involving either of these chemicals could result in the formation of dense gases. The evaluation was performed using the SLAB code and considered a ground level spill and a control room intake height elevation of 56 feet. In both cases the evaluation confirmed that the vapor concentrations in the main control room did not exceed the toxicity limits for those chemicals.

MEMBER BANERJEE: These chemicals are kept at ground level?

MR. THORNTON: Yes, they're in the turbine building. But again, we used ground level release. We did credit the intake height, which is the reason we used the SLAB code. The SLAB code has the capability of determining concentrations with

elevation.

MEMBER BANERJEE: To do a profile?

MR. THORNTON: Right.

MEMBER BANERJEE: Yes.

MR. THORNTON: So we were able to show that the concentrations at the intake height never reached toxicity limits.

MEMBER BANERJEE: And again it's a catastrophic failure of the container of the chemicals?

MR. THORNTON: Right, of a puff release --

MEMBER BANERJEE: Yes.

MR. THORNTON: -- involving a spill and an evolution of a cloud.

CHAIRMAN RAY: Is that it?

MR. THORNTON: Yes, that concludes Chapter 6. Like I said, Chapter 6 is largely standard content, but we did have the chemical hazards evaluation in the main control room.

CHAIRMAN RAY: Understood. Okay. Proceed further.

MR. THORNTON: Okay. That's it for Chapter 6. I think John Thrasher will begin

discussing Chapter 8.

MR. THRASHER: Okay. Good morning. Again, this is John Thrasher with Duke Energy. FSAR Chapter 8 on electric power.

In Chapter 8 the DCD information was incorporated by reference along with standard material. Three particular items we wanted to briefly cover were site-specific information of interest looking in Section 8.2 on offsite power, the handling of NRC Bulletin 2012-01 on open phase condition and also on electrical departure.

So in the onsite power system is obviously site-specific, and at the Lee site we'll have six transmission lines that will connect the site switchyard to Duke Energy's existing transmission system. The backbone of the existing transmission system has 230 kV and 525 kV lines, so out of the Lee site we'll have two 525 kV lines that will head out of the south end of the site and go down and fold into an existing 525 kV line. We'll have four 230 kV line. Each of these lines has sufficient capacity and capability to power the plant safety-related and non-safety-related systems under normal, abnormal and accident conditions.

And kind of an overview of the site again. The switchyard is shown here to the south end of the site and the transmission lines connecting the switchyard will head out in a southward direction down and tie again to the existing backbone 230 kV and 525 kV existing transmission system for Duke Energy Carolinas.

Brief overview of the switchyard one-line diagram for the site. The switchyard scheme that's used is referred to as a breaker-and-a-half scheme. The arrangement is used for reliability and flexibility. It allows for isolation of components and buses while preserving the plant's connection to the grid. So Unit 1 is on the left side. So Unit 1 tying into the switchyard.

(Fire alarm sounds)

CHAIRMAN RAY: We're off the record.

(Whereupon, the above-entitled matter went off the record at 10:00 a.m. and resumed at 10:55 a.m.)

CHAIRMAN RAY: We're back on the record. Our recent experience will be in lieu of the break shown on the schedule, otherwise I think we'll be doing fine. And so I'd ask Duke to resume their

presentation in what's shown on the agenda today as Item 2.

MR. THRASHER: Okay. It's John Thrasher with Duke Energy. Again, I'm on slide 108. We were discussing the switchyard one-line diagram at the Lee site. And we talked about the breaker-and-a-half scheme. I was describing Unit 1. It's tapped to 230 kV and four 230 kV lines showing out of the bottom left side where we'll be tying into the existing 230 kV Duke Energy transmission system. Unit 2 is on the right-hand side of the slide and they're tapped at 525 kV. The switchyard. Two 525 kV lines that head out of the south side of the switchyard and again go in and tie into the existing 525 Duke Energy transmission system. There's redundant auto-bank transformers that tie the two switchyards together to give us more reliability and flexibility in this arrangement.

MEMBER SKILLMAN: John, let me ask this question. On this diagram there's one line you show that Unit 1 will generate at 230 kV and Unit 2 at 525. Curiosity question: Why?

MR. THRASHER: Just so that we can end up tying the units into different main transmission

systems that we have, existing transmission systems that are south of the plant. It was a decision from our transmission planning folks and the --

(Simultaneous speaking)

MEMBER SKILLMAN: Okay.

MR. THRASHER: -- studies that they did.

MEMBER SKILLMAN: Just curiosity. Thank you.

MR. THRASHER: Okay. Speaking of those studies that were done, the grid reliability or grid stability study was performed as part of our transmission interconnection request. And this study confirmed that the Westinghouse AP1000 interface requirements were met. There's an interface requirement that the grid provide and maintain reactor coolant pump voltage for three seconds after a turbine trip, and the grid stability confirmed that that interface requirement was met. Our transmission folks also performed a failure modes and effects analysis for the switchyard and that analysis confirmed that no single initiating event would result in either of failure of more than one of the offsite transmission lines or loss of offsite power to either Unit 1 or Unit 2.

Discussion on the NRC Bulletin 2012-01. Again, this bulletin from the NRC discussed loss of phase events on the CDC General Design Criteria 17 offsite power circuit at Byron Nuclear Plant. That event resulted in unbalanced three-phase voltages on the safety-related buses there. The bulletin was issued in response to that. The AP1000 design does not require AC power to achieve safe shutdown. Duke's review in response to this bulletin, we've decided to add an open phase condition monitoring system on the GDC 17 circuit to address the NRC bulletin. This monitoring system will monitor main step-up transformer high side voltage input power supply. It will also be set up to initiate an alarm in the main control room. And when this was added to the Lee application, we added a new ITAAC to confirm.

MEMBER BLEY: Is this your own design or did you use one of the ones that have been offered by EPRI and some vendors?

MR. THRASHER: We'll look at using one of the designs --

(Simultaneous speaking)

MEMBER BLEY: Oh, you haven't picked it

yet?

MR. THRASHER: Right.

MEMBER BLEY: Okay.

MR. THRASHER: The details of that design. So we're just committing at a high level to install a monitoring system, but we continue to follow the industry and how the operating plants are responding to that.

MEMBER BLEY: Okay.

MR. THRASHER: We also had electrical departure in Chapter 8, and this was really a departure trying to clarify some information in the DCD. The Class 1E voltage regulating transformers do not have active components to limit current. And the way that information was presented in the DCD, it could be read to interpret that there was active components in those transformers limiting current. Our Class 1E voltage regulating transformers have built-in input and output circuit breakers that are provided for protection and isolation. And those circuit breakers are coordinated and periodically tested as part of the Maintenance Rule Program.

MEMBER SKILLMAN: John, just as a matter of clarification, isn't a circuit breaker an active

component?

MR. THRASHER: The circuit breaker would be an active component and provide that protection, but the circuit breaker is not providing -- the types that are being used are limiting current. The current-limiting circuit breaker would require destructive testing and then we'd have to put one in. So we're basically just using normal circuit breakers for input and output breakers. So, yes, they are active components, but those breakers are not current- limiting other than --

(Simultaneous speaking)

MEMBER BLEY: But you have other current protection elsewhere in the distribution system?

MR. THRASHER: Right.

MEMBER BLEY: Yes.

MEMBER SKILLMAN: Okay. Thank you, John.

MR. THRASHER: And that's all of our information on Chapter 8. Do you want me to go ahead and proceed with Chapter 9?

CHAIRMAN RAY: The agenda shows that we would roll over to the staff and have them replicate what you've done on Item 2.

Let me ask, Larry, do you want to do that?

MR. BURKHART: This is Larry Burkhart. We have staff here to address the Chapter 6 and Chapter 8 items, so --

CHAIRMAN RAY: Yes, I think we should do that, follow the agenda. That way staff are here and they can complete their mission and return. So, we'll ask the staff to come forward to cover what agenda Item 2 today shows from the staff and then we'll go back to you folks on Chapter 9.

MR. BURKHART: So, this is Larry Burkhart again. We're going to start with Chapter 8. Our reviewer for Chapter 6 is probably making his way back from the drill.

CHAIRMAN RAY: Okay.

MR. BURKHART: I change my comment before about having staff ready. Sorry.

CHAIRMAN RAY: Well, it's too late now, so let's go forward with Chapter 8 then.

MR. HUGHES: Again, this is Brian Hughes. We're going to start on the staff presentation for Chapter 8, Electrical Power. And we have Sheila Ray, our professional engineer from

our Electrical Engineering Group, will make that presentation.

MS. RAY: Good morning. My name is Sheila Ray. I'm here from NRR. I'm a senior electrical engineer, and I'll be discussing Lee's technical solution to address the open phase condition.

Next slide. So the event occurred in January of 2012, and the bulletin was subsequently issued in July of 2012. The regulatory basis for the bulletin includes GDC 17 for onsite and offsite power systems and 55a(h)(3) for design criteria for protection systems. This event is significant since protective relaying schemes did not detect open phase conditions and this event is a common cause failure potential for offsite and onsite electrical systems that were not able to perform their intended function.

Next slide. So this slide shows the AP1000 one-line diagram. And I wanted to highlight the GDC 17 credited offsite source, which is through their preferred AC power supply. From the main generator there's the main step-up transformer to the preferred AC power supply. And that's on the

left-hand side.

Next slide. This slide shows Lee's switchyard which was discussed in the applicant's presentation, but I wanted to highlight the main step-up transformers. For Unit 1 it connects to the 230 kV switchyard and for Unit 2 connects to the 525 kV switchyard. And the RATs are also shown here that connect to other offsite sources.

Next slide. 8-9 was issued in July of 2015 and delineates the staff position for passive reactor designs. To address the vulnerability identified in Bulletin 2012-01 passive reactor designs should have the following: Automatic detection of loss of phase events under all electrical system configurations and plant loading conditions; an alarm in the control room; procedures and training to specify operator actions to connect a standby diesel generator or restores an offsite source; and lastly, periodic surveillance tests to ensure the reliability of detection and alarm circuits to perform their intended function.

Next slide. Lee provided detection on the high side of the main step-up transformers and an alarm in the control room, and also in addition

relays on their medium-voltage buses to detect high negative sequence currents to protect the motors. They have ITAAC on detection and alarm circuits, and procedures and training will be developed prior to fuel load.

Next slide. This is the ITAAC for the detection and alarm circuits on the main step-up transformer. There is acceptance criteria for the analysis to determine the set points and also testing with simulated signals to verify the detection and alarm circuit.

Next slide. So staff determined that the design was sufficient because it provides features for monitoring and detecting a loss of phase. In addition, procedures will be developed prior to fuel load and ITAAC are in place. Furthermore, the design meets the requirements in GDC 17 and 10 CFR 50.55a(h)(3). And this concludes the staff presentation.

CHAIRMAN RAY: Okay. Are there any questions that members have on this?

(No audible response)

CHAIRMAN RAY: Hearing none, thank you.

MS. RAY: Thank you.

CHAIRMAN RAY: And I'll ask does that conclude Chapter 8?

MS. RAY: Yes.

CHAIRMAN RAY: It does conclude Chapter 8? And, Larry, are we ready for Chapter 6 or not?

MR. BURKHART: Yes, we are. Yes, John Segala will provide some input on that.

MR. HUGHES: Hello again. My name is Brian Hughes. I'm the lead project manager for Lee. We have John Segala, my former branch chief, who is stepping up for this presentation. And this is primarily going to discuss Section 6.4, Control Room Habitability System.

And, John, we go to you.

MR. SEGALA: Hi. As Brian said, I'm John Segala. I'm chief of the Containment and Ventilation Branch. The reviewer who did the review in my branch hasn't made it back up here yet, so I'll go ahead and do his presentation.

We had a Lee-specific COL, site-specific COL item that the applicant discussed earlier regarding the potential for onsite and offsite spills of toxic chemicals in terms of their effect on control room habitability.

Could we go to the next slide, please? The applicant's analysis looked at a tractor-trailer burst-type accident of liquid chlorine, using worst case condition, showed that the main control room intake was above the IDLH values. That was the Chapter 2 review.

CHAIRMAN RAY: Remind us, IDLH is?

MR. SEGALA: That is the --

MR. KITCHEN: John, this is Bob Kitchen. That's immediate danger to life and health.

MR. SEGALA: Yes.

CHAIRMAN RAY: Thank you. I would have never guessed that.

MR. SEGALA: And so, the IDLH value for chlorine is a value of 10. As the applicant discussed earlier that they did an analysis using the ALOHA code with the heavy gas, dense gas model in conjunction with the HABIT dispersion model looking at a Gaussian dispersion. Because of the limitations of the ALOHA code in terms of how long it could run, they went through and modeled the ALOHA code for the beginning of the spill looking at the chlorine gas and dispersion of the gas in terms of getting to a point where it simulated a Gaussian

dispersion model. And then they switched over to the HABIT code and modeled it to the point. The applicant concluded that the concentration inside the main control room is less than the chlorine IDLH limit.

The staff reviewed all that and performed and independent analysis. And the slide actually has an error in it. The staff then used a HABIT code to confirm the applicant's analysis and got very similar results to --

MEMBER BLEY: I'm just curious. I asked them.

MR. SEGALA: Yes.

MEMBER BLEY: I'm an operator in a control room and I start smelling more and more chlorine. The guy next to me says, oh, don't worry, the FSAR said this won't kill us. How do I know that I'm okay? What will the operators due? Have you thought about that? I'd probably move to get the hell out of the control room. It's probably everywhere in the plant.

MR. SEGALA: Yes, and I don't know there's any specific instructions given to an operator in those conditions. I assume --

MR. HUGHES: I can talk to that. I have approximately 20 years in both instruction and operation.

MEMBER BLEY: Do you have any chlorine --

MR. HUGHES: I was also a licensed SRO. I was also a consultant on shift at Byron from pre-construction to 100 percent power to support their licensed operators. So I would tell you that when you start smelling smells, the nose is very sensitive. There's all sorts of smells you smell and you start wondering immediately what to do. And you can either isolate your control room or you can put on self-controlled breathing apparatus. There are procedures that describe what to do and there are also procedures if you need to evacuate the control room. Additionally --

MEMBER BLEY: Yes, the thing I was worried about here is that probably doesn't help you much, because it's probably everywhere in the plant.

MR. HUGHES: Yes, but you would have the self-contained breathing apparatus attached to it. The operators are required to demonstrate that they can use the self-controlled breathing apparatus.

MEMBER BLEY: Is that a routine thing, or just once in a lifetime?

MR. HUGHES: Well, it's periodically. If they have that type of hazard, that would be in their -- they have what's called a systematic approach to training and periodically they would be tested in that or checked out in that. They'd also have every two years a physical for respiratory fitness and a mask fitness to ensure that the mask would not leak.

MEMBER BLEY: I didn't know about that one. That's interesting.

MEMBER BANERJEE: It covers the eyes, right, the mask?

MR. HUGHES: It's a full-face mask.

MEMBER BANERJEE: Yes.

MR. HUGHES: We don't recognize half-face masks in the NRC. And that's been available for quite a while, so the industry is very familiar with that type of situation. And they train on that. They have procedures for that. So, and that's all I have to say.

CHAIRMAN RAY: I'll certainly affirm that having operated a plant right next to a major

highway and railway both within 100 feet or so. And the self-contained breathing apparatus and isolation of the control room and all that is part of the normal training.

MEMBER SCHULTZ: Yes, that was also considered in the control room habitability evaluations that were done in the 2000-2005 time frame. And that included self-contained breathing apparatus considerations.

MEMBER BLEY: Okay. That's good, because it's been probably 10 years since I was out talking to people in plants. We were worried about smoke. And most everybody said we have great confidence in those, but most people said we put them on and we don't practice talking in them. I'm glad to hear that they do now.

CHAIRMAN RAY: But we had debates about shaving, for example, interfering with the operation of the apparatus.

MEMBER BANERJEE: No, I think -- aren't their regular drills that you have to put these facts on --

CHAIRMAN RAY: We did, yes.

MEMBER BANERJEE: Yes.

MR. HUGHES: Yes. And the shaving, that was a big debate at the time. Of course there were some people who their families had never seen them without a beard.

(Laughter)

MR. HUGHES: So they had to actually shave. And they have to be clean-shaven. They have to go into a booth, put on a mask. They put an aerosol in the booth and they measure any leak that would go into the -- yes. And they also have to have a psychological test for like claustrophobia.

MEMBER BLEY: I think this is an improvement since the last time I was talking to --

(Simultaneous speaking)

MR. HUGHES: And they have special eyeglasses that they can put on inside --

(Simultaneous speaking)

MEMBER BLEY: That will fit inside the mask? Okay.

MR. HUGHES: So, they cover it fairly well.

MEMBER BLEY: I hope they're all doing that, yes.

MR. HUGHES: Oh, yes, they're doing it.

MEMBER BANERJEE: So, can I go back to the -- not the measures, which I think are very important, because if the chlorine does get there, our calculations are wrong or whatever, you can usually smell it.

MEMBER BLEY: You can smell it long before --

MEMBER BANERJEE: Yes, with H2S, if you can't smell it, you actually see it. But if you can't, you might be dead. So that's a different problem. But with chlorine you can.

So, I want to go back to the calculations now. So, you didn't actually use the ALOHA code. You just used HABIT?

MR. HUGHES: Yes.

MEMBER BANERJEE: Which if I remember this, we are revisiting something that happened several years in the past.

MEMBER BLEY: In another plant.

MEMBER BANERJEE: Yes, for another plant.

MR. HUGHES: The HABIT has limitations, as you're well aware.

MEMBER BANERJEE: Yes.

MR. HUGHES: And research is currently working on revising and updating the HABIT code. That's an ongoing -- and basically what they did -- the problem is when you have a heavy gas and it -- the only thing that would really work well is Mustard Gas software, which we don't use. So as a heavy gas -- I forget. I believe it's ALOHA, but that only works for a certain period of time. So what they assumed was the gas is fairly heavy. It disperses over a period of time. And at that point, when it's fairly dispersed and it's lighter, then you can use the HABIT code or what -- I forget which one -- and it's much more accurate and you don't run into those time lines because it's basically a two-hour or beyond the normal run times for the actual design of the code.

MEMBER BANERJEE: Yes, I think we wrote something --

MEMBER BLEY: We did. We did.

MEMBER BANERJEE: -- way back.

MEMBER BLEY: It was two or three years ago.

MR. HUGHES: And that's why I was sure I'd have that ready for somebody.

(Laughter)

MR. SEGALA: Well, actually for that. For the HABIT code update we're adding two dense gas models, the SLAB and DEGADIS. And so that will then allow the option for the reviewer of the future when they're using that code to run the different dense gas models and compare them against each other as well as against the Gaussian dispersion model.

MEMBER BLEY: Is DEGADIS the one from the Army?

MEMBER BANERJEE: No, DEGADIS comes out of actually -- it comes from HEGADIS, which was a shellcode.

MEMBER BLEY: Oh, shell -- okay.

MEMBER BANERJEE: Originally. Colin Branda wrote it.

MEMBER BLEY: You said you don't use the Mustard Gas code. It's publicly available.

MR. HUGHES: I know, but we didn't want to go there.

MEMBER BLEY: You just didn't want to have the name on your --

(Laughter)

MR. HUGHES: No, we did not think that

would --

MEMBER BLEY: But it works.

MEMBER BANERJEE: But DEGADIS is fine. It's been well-vetted. It was actually a guy in University of Arkansas, I think. Jim Panthavens did a lot of work on that. Anyway. So they were prepared on this. Okay.

(Laughter)

MEMBER SCHULTZ: So, John, what you said, the staff did the HABIT portion of the calculation, or they just made a conservative assumption that the whole event would be modeled with that?

MR. SEGALA: We modeled what they did and got similar results.

MEMBER BLEY: On the part they did with HABIT?

MEMBER SCHULTZ: With the HABIT side of it. Okay.

MEMBER BLEY: When are you going to have the new code ready for use?

MR. SEGALA: It's in 2016 is what we're looking for.

MEMBER BLEY: Okay. So not too far.

Okay.

MEMBER BANERJEE: And they are validating it against experiments and we'd have a complete --

MR. SEGALA: I think what we're doing is we're going to run the HABIT code with the new models and compare it to running the models separately by themselves and making sure that in different scenarios we get the same results. I think that's what the contractor is going to do to validate the code.

MEMBER BANERJEE: Okay. I think we have time.

MR. SEGALA: Yes.

MR. HUGHES: And that was in response to the concern of the Committee.

MR. SEGALA: Yes. The first thing we had to do was update HABIT so that it runs with a 64-bit architecture, so we've already upgraded it for that. We're adding it to run longer. We're modifying it so it will run for a longer period of time. We created a modern graphical user interface to it. So we've completed -- that's kind of Phase 1.

MEMBER BANERJEE: Working on this in RES, is it --

MR. SEGALA: We have a contractor.

MEMBER BANERJEE: Okay.

MR. SEGALA: Lockheed Martin --

MEMBER BANERJEE: Okay.

MR. SEGALA: -- is actually doing the work for research, and NRO is working with research on the development.

MEMBER BANERJEE: Okay. Thank you.

MR. SEGALA: Thank you.

CHAIRMAN RAY: Yes, I didn't realize we'd completed that quickly. The next topic is Chapter 9, Auxiliary Systems. And it's followed by Chapter 12.3, Radiation Protection Design Features. And then we're supposed to have lunch. We'll probably have lunch before that, but I'm thinking, Larry, unless you have some reason otherwise, that we can just let those two things run together with Duke and then staff instead of going back and forth.

So, Bob, if you'll have taken Items 4 and 5 on today's agenda and just go ahead and so those. That's Chapter 9, Auxiliary Systems, and Chapter 12.3, Radiation Protection Design Features.

MR. KITCHEN: Mr. Ray, they were actually integrated, so they're really -- we'll do that.

CHAIRMAN RAY: All right.

MR. THRASHER: This is John Thrasher again with Duke Energy. We covered some items in FSAR Chapter 9, Auxiliary Systems. And also part of this touches on Chapters 11 and 12.

So in FSAR Chapter 9 the DCD is incorporated by reference, standard materials incorporated, but two site-specific items of interest that we wanted to cover with you was a brief overview of the waste water system, site-specific portions of that system, and also the site-specific portions of the liquid radwaste system. Again, the liquid radwaste system is really covered in Chapters 11 and 12, but there's an interface with the waste water system that's in Chapter 9, so we'll just go ahead and cover both of those.

So with the waste water system there's a --

MEMBER BLEY: I'm sorry to interrupt, but I think I misread something. Fire water is not part of this chapter, is it?

MR. THRASHER: Fire protection is in Chapter 9. We just didn't have any specific items that we --

MEMBER BLEY: Okay. I guess -- okay. Go ahead.

MR. THRASHER: So, well water systems, fire protection and some others.

The waste water system has a blowdown sump; and we'll look at an overview in a moment, that the blowdown sump receives inputs from cooling tower blowdown. There's also the cooling tower circulated water system is out of service. There's an alternate dilution source from raw water system and also releases from onsite waste water retention basins. The liquid radwaste system ties into the waste water system very close to the Broad River.

And, Bob, why don't we go ahead to the next slide where we kind of point out -- on this overview of the slides the green lines that are shown here is the waste water system piping, and the red line are the liquid radwaste system. So again, we mentioned that the blowdown sump basically receives cooling tower blowdown so that we can keep from having mineral constituents increasing

concentration in the cooling tower basin. So we blowdown part of that water. And so, you can see some green lines that are shown on here that come from both of -- the area of the cooling towers and then eventually end up coming together.

The blowdown sump will be located down further over towards the right right below there. And waste water retention basins are just north of the unit, so if we have to drain non-radwaste system, secondary site systems to do plant maintenance and everything, that water would be drained into the waste water retention basins and then released when there's dilution water and/or could be used as a dilution source.

MEMBER SKILLMAN: John, are you running constant cooling tower blowdown?

MR. THRASHER: Yes, if the cooling towers are in service there's constant cooling tower blowdown.

MEMBER SKILLMAN: Okay. Are there any chemicals added to that water, or is that just raw water that's becoming more and more concentrated with what is left from the evaporation?

MR. THRASHER: Okay. I guess I misspoke

there a little bit. It's pretty much constant cooling tower blowdown, but at times there will be chemicals that are anticipated that need to be added. Our Catawba Nuclear Station has similar type cooling towers. So then the blowdown would be shut off while that chlorination is -- typically there's chlorination to prevent algae growth and build-up or to manage that. And then, so cooling tower blowdown would be isolated. Those chemicals would be added and then the concentrations would be checked to make sure that that was acceptable for putting the blowdown back in service.

MEMBER SKILLMAN: Thank you, John.

MEMBER BLEY: Well, back to what we heard yesterday, if I may, about the three ponds and in times of drought. In times of drought would you cut back that blowdown? That's probably a lot of water. When you're figuring you'll have to live off the ponds for six months, if you're in one of those droughts, do you keep the same process going and can it supply enough water?

MR. THRASHER: Pretty much keep that same process going. Our evaluation is to basically keep that system in good health. And then also

there are evaluations for the makeup water that we need to consider to keeping the blowdown system in service.

MEMBER BLEY: Okay. So that six months you told us --

MR. THRASHER: Right.

MEMBER BLEY: -- includes this?

MR. THRASHER: Right.

MEMBER BLEY: Okay.

MR. THRASHER: Okay. So each unit has a site-specific liquid radwaste system that ties in on the north side of the units to the standard plant liquid radwaste systems. And those red lines come from the north side of the units there. There will be separate lines, and those travel down. And that process piping will be guard piped with high-density polyethylene pipe, so we've got a three -- I think it's three-inch, but it's a stainless steel process pipe for the liquid radwaste pipe. And then it will be in a guard pipe of high-density polyethylene pipe around it for the ability to contain any leakage. And there will be leak detection along that pipe.

But those pipes are routed along the same routing down towards the blowdown sump but do

not tie into the waste water at that location. They actually tie in -- you can see those red lines run all the way over right close to the river bank and there's a tie-in location there where a liquid radwaste line for Unit 1 and Unit 2 tie in with one waste water line from the blowdown sump. And so they tie in at that location. And then the water; it's basically a waste water system, is discharged. And that waste water line will be 10 feet under a full pond elevation with a sparger on the end of it and attached to the upstream face of the Ninety Nine Islands Dam.

And those are the evaluations for thermal impacts and obviously the cooling tower blowdown provides a dilution. If you're intermittently releasing liquid radwaste there, you've got dilution. But for thermal discharge evaluations there -- and everything have been evaluated. And Duke has received their NPDES operating permit governing the discharges there.

As we continue you can leave that slide up and I'll cover the liquid radwaste system, but just so that you can see the visual aid here. Again, the liquid radwaste system piping of

stainless steel process piping enclosed in a high-density polyethylene guard pipe. There will be no valves or vacuum breakers in that process piping outside of monitored structures. That further minimizes the potential for leaks. The space between the process piping and the guard piping is monitored for leakage at low points. Those monitoring points will facilitate manual sampling for leakage consistent with NEI 08-008A and also regulation 10 CFR 20.1406, which covers contamination minimization requirements.

The leakage monitoring program will be implemented as part of the Radiation Protection Program, which is basically covered in Chapter 12. So the liquid radwaste system is described in FSAR Chapter 11 and then the leakage monitoring is part of the Radiation Protection Program that's described in FSAR Chapter 12.

MEMBER BLEY: Two quick questions.

MR. THRASHER: Okay.

MEMBER BLEY: If I read things right, makeup pond A and B are linked to plant systems. Pond C will be used to replenish the water in ponds A or B as you need it rather than directly feeding

into the plant.

MR. THRASHER: Right.

MEMBER BLEY: That's correct?

MR. THRASHER: Well, actually all the feeding to the plant systems are -- the current design, even though it's not complete, shows that we would end up moving -- if we needed water to support drought conditions, we'd move water from B into A.

MEMBER BLEY: Into A?

MR. THRASHER: So basically the plant systems are fed out A.

MEMBER BLEY: Oh, out of A?

MR. THRASHER: And then if we needed water out of C, we'd move from C to B to A.

MEMBER BLEY: Okay. I thought I read something about something is coming right out of B, but maybe not. And the fire system water is taken from the raw water system? There's a storage tank that leads to it, I assume.

MR. THRASHER: Yes.

MEMBER BLEY: Okay.

MR. THRASHER: So the raw water system, water will be pulled in out of makeup pond A and feed directly into the circulating water system, but

then there will be some additional cleanup that will be done to support other systems such as fire protection and demineralized water.

MEMBER BLEY: Okay. Thank you.

MR. THRASHER: And that's all the information we had in this area.

CHAIRMAN RAY: Okay. Any other questions for the applicant?

(No audible response)

MR. THRASHER: Thank you.

CHAIRMAN RAY: Thank you. All right. I think, Larry, we have time to get the staff's corresponding presentations done before lunch, if you're ready.

MR. HUGHES: Good afternoon. This is Brian Hughes with the -- senior project manager.

CHAIRMAN RAY: You going to do this on your own, Brian?

MR. HUGHES: Yes. I don't have any slides for this presentation, however. One of the things about the radwaste system that is unique to this AP1000 is that the radwaste discharge pipe is guarded from the actual discharge block inside the station itself. All that pipe that goes all the way

down to the river, it's all guarded with this. This is a sample of my high-density polyethylene piping. So you would have this. It's pretty robust. And they would have a stainless steel pipe in the center of this. And one of the reasons they wanted to do the entire run is to ensure they would minimize any possibility of having leakage of tritium or any leakage at all. So, that's why that is.

And then, when the radwaste line goes into that mixing box, basically where it connects -- when it does go, it goes on the upstream side of the Ninety Nine Islands Dam, but there's also a diffuser in that line. That is so it doesn't all just dump out at one spot. It goes into a diffuser and it comes out kind of evenly about. And there's also the -- I guess you would call it the generators, the hydro generators that turn. And that water would also assist in the mixing of it downstream. So I did want to say that.

The other thing is --

MEMBER BLEY: I'm glad you showed us that, but I have a question about it. That's a stainless steel pipe with a poly pipe around it.

MR. HUGHES: No. No, it's two separate

pipes.

MEMBER BLEY: Oh, I misunderstood what you said.

MR. HUGHES: A guard is two separate pipes.

MEMBER BLEY: Oh, inside?

MR. HUGHES: The stainless steel will be inside.

MEMBER BLEY: Yes.

MR. HUGHES: And then there's a space in between.

MEMBER BLEY: Okay.

MR. HUGHES: Then you have this.

MEMBER BLEY: So it's actually like a coax cable, an --

(Simultaneous speaking)

MR. HUGHES: It's a pipe in a pipe.

MEMBER BLEY: And some kind of support to keep it apart.

MR. HUGHES: Right.

MEMBER BLEY: And they monitor for tritium in that?

MR. HUGHES: That's correct. They will go inside the guard pipe --

MEMBER BLEY: Yes.

MR. HUGHES: -- and then they will periodically take samples. Now, there's an NEI-type guidance that talks about all that, and they're committed to follow that process.

MEMBER BLEY: So if they have any minor leakage, though, it will be in the guard pipe and shouldn't be touching the metal pipe?

MR. HUGHES: Well, it depends how high the leak is.

MEMBER BLEY: Well, I mean, if there's a lot of leakage, it will fill it up, yes.

MR. HUGHES: But, yes, if you have a couple of pin drops, it'll be in there.

MEMBER BLEY: You don't have a corrosion worry --

MR. HUGHES: But if you have --

MEMBER BLEY: -- about having a small space with --

MR. HUGHES: But regardless of the leakage, it would be contained --

MEMBER BLEY: In the guard pipe, yes.

MR. HUGHES: -- in this pipe, in the guard pipe. And that's the whole idea.

And this came about after that -- I guess it was -- was it where we had the vacuum breakers going. And so, this is really --

MEMBER BLEY: Somewhere in Illinois.

MR. HUGHES: Yes, I think it was Braidwood, if I remember. But this is unique to Lee. It's a little more that Lee is doing. So I just wanted to make sure that that came out and we got that on the record.

CHAIRMAN RAY: Okay. That's clear enough. Anything else on these topics that you have to share with us?

MR. HUGHES: Just as I stated, makeup pond A is basically a settling pond. It comes out of makeup pond A. It has a treatment to clean up some of the water and whatnot. But there is going to be pipes that come from both the inlet, from pond C, pond B. So the primary is from pond A. When pond A gets a little low, they'll pump it from pond B to pond A. And then they still have pond C. And they have a lot of flexibility in their system where you can get from pond B and C and from the Broad River. So that's part of the raw water system.

The other thing is that there is a -- in

their sumps in the turbine building there is radioactive monitors that will shut off the sump pumps. That's part of the thing. So with a PWR you have that. Sometimes you can get a tube leak or you can get some other thing. And if something of that order would happen, or a spill of some kind, it is monitored there also. And that concludes my presentation on this.

CHAIRMAN RAY: Okay. Any other questions for Brian?

(No audible response)

CHAIRMAN RAY: Thank you, Brian. Bill, are you still with us?

(No audible response)

CHAIRMAN RAY: Hearing nothing, I will assume he's not. Topics have kind of left the areas of his interest, I believe. But I was going to ask him if he had any concluding remarks now rather than expect him to hang around for this afternoon.

We have folks who I'm sure would like us to move forward. Do you have a problem, Dennis, if we start at a quarter to 1:00 rather than 1:00? I know you've got something --

(Simultaneous speaking)

MEMBER BLEY: I'll probably be a little later, but that's okay.

CHAIRMAN RAY: Is that okay with you?

MEMBER BLEY: Yes, that's fine.

CHAIRMAN RAY: Yes.

MEMBER BLEY: I've been for the ones I -- well --

CHAIRMAN RAY: I mean, you might --

MEMBER BLEY: -- to see the Fukushima stuff, but there's enough people here to cover, so I'm fine.

CHAIRMAN RAY: Well, I'd say we can wait until 1:00.

MEMBER BLEY: Yes.

CHAIRMAN RAY: I just don't want to ask people to hang around unnecessarily.

Okay. Then with that, we'll pick up in accordance with the agenda at 12:45.

(Whereupon, the above-entitled matter went off the record at 11:39 a.m. to reconvene at 12:45 p.m. this same day.)

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

12:47 p.m.

CHAIRMAN RAY: We'll begin the concluding portion of this meeting here with a presentation from Duke on Chapter 13, and we'll continue it into 20 before we hear from the staff.

MR. TAYLOR: Okay. My name is Larry Taylor. I'm in operational readiness at Duke in Nuclear Development. And we are going to start off with talking about emergency preparedness, so in the overview we'll talk about the standard items on whether the DCD is incorporated, standard material incorporated, and then for site-specific information our plans were to discuss a summary of the emergency plan, talk about DCD departure associated with the facilities, an exception we are going to take for the EOF, and then I've got just a graphic to show a little bit about site layout or where some of those facilities are, and then we'll transition right into post-Fukushima actions we have taken, the non-seismic area, meaning that we have already talked quite a bit on the seismic area.

So I know you guys are glad to see me, since I'm presenting the last two topics for today from Duke.

CHAIRMAN RAY: Indeed.

MR. TAYLOR: So, in 13.3, the DCD is incorporated by reference, standard material is incorporated. As I alluded to earlier, we will talk about Departure 18.8-1, which is relocation of the

TSC and OSC, and that should sound somewhat familiar, being there is other utilities that have also done this. And then we will talk about our corporate EOF we are planning on using for the Lee facility.

Okay. So the Lee emergency plan is a single plan for both units. We are a greenfield site, so it just covers those two units. It is modeled by a nearby Duke station, Catawba. It is developed in accordance with NUREG-0654, FEMA Rev 1, 10 CFR 50.47, and 10 CFR Appendix Echo.

We will start first with discussion on relocation of the TSC. We are planning on, rather than a standard TSC, which there would be one for each unit located adjacent to the control room, we are planning on a common TSC for both units. It would be located below grade elevation in the maintenance support building.

One thing that is a little different, we're a greenfield site, so we have both units in the same protected area and no additional units onsite. So the TSC will remain within the protected area. This is identified by D.C. Departure 18.8-1 in Lee application.

CHAIRMAN RAY: Excuse me.

MR. TAYLOR: Yes.

CHAIRMAN RAY: Excuse me. I'm not familiar with the TSC supporting two separate units. I'm familiar with it supporting two, a dual unit. How is the communication between the TSC and the two separate control rooms handled? Is there any visual communication?

MR. TAYLOR: As far as data or communications? I mean, the phones would identify, you know, now, with the Smartphones, it would identify who is calling you.

CHAIRMAN RAY: But you don't have any video of the control room, for example, in the TSC.

MR. TAYLOR: No.

CHAIRMAN RAY: Okay.

MR. TAYLOR: The TSC will meet the requirements of NUREG-0696, with the exception that the control room will no longer be two minutes' travel time from the TSC. For Lee, that time is estimated to be approximately five minutes. But we do have data and communication links provided between the control rooms, OSCs, and the EOF from the TSC. With all of the advances in technology,

the information will be available, and it is very unlikely you would actually need to transport people back and forth, transfer people between the control room and the TSC.

CHAIRMAN RAY: Well, we will ask the staff how they evaluated this. What would be too long an extension? It's not two minutes. Five minutes, obviously, I think that's acceptable, but --

MR. TAYLOR: There is not really -- I'm not aware of a standard of what is too long. I guess that would be evaluation for some of the other utilities. Since their TSC is outside the protected area, they are looking at 15 or 20 minutes. So Lee is shorter than some of the other utilities, but I'm not sure what would be too long.

CHAIRMAN RAY: This is the first time I have encountered this particular issue, and I just wondered if you guys --

MR. TAYLOR: Well, this departure was also taken by Vogtle and Summer for their AP1000 units. So it was presented several years ago.

CHAIRMAN RAY: Yes, right. I had forgotten. I probably didn't realize it then, but I

didn't recall it now.

MEMBER SCHULTZ: Are those in the same relative location on their sites? That is, in a different building about the same distance from the control room.

MR. TAYLOR: Theirs is farther away and outside the protected area.

MEMBER SCHULTZ: It is outside. Okay.

CHAIRMAN RAY: Yes, that's the key. Time delay is outside the protected area.

MEMBER SKILLMAN: Larry, let me ask this. Five minutes, 300 seconds, doesn't sound like a whole lot of time. But is that five minutes for a young individual that has been running marathons or half-marathons for the last six or eight years, is under 155 pounds, is able to jump over --

MR. TAYLOR: I would say --

MEMBER SKILLMAN: -- a razor fence?

MR. TAYLOR: -- five minutes is a pretty conservative number. It's about a tenth of a mile is the distance, straight line. You know, there is a couple of flights of stairs to go up maybe or something, you know, but five minutes is probably a pretty conservative number.

MEMBER SKILLMAN: Are there gates or security challenges through which those individuals must pass --

MR. TAYLOR: No.

MEMBER SKILLMAN: -- to get to that location?

MR. TAYLOR: I mean, it would be no different -- you don't have to transition from outside the protected area to inside. You may have a card reader door you need to go through --

MEMBER SKILLMAN: So you may go from --

MR. TAYLOR: -- just to scan your badge.

MEMBER SKILLMAN: -- vital to not vital? Or is this also vital?

MR. TAYLOR: This wouldn't be in a vital area.

MEMBER SKILLMAN: But you may have to scan in and out, respectively.

MR. TAYLOR: You may be leaving a vital area, if you were coming from the control room or somewhere like that, but this is not a vital area. This is in an annex -- or, I'm sorry, this is in the maintenance building. So there would be no -- it would be commercial security essentially.

MEMBER SKILLMAN: Thank you, Larry.

MR. TAYLOR: The operational support center is also relocated as a function of the same departure. It is moved into where the TSC would have been or the standard TSC for the AP1000. This location is a little bit closer to the main control room, so it's on the same elevation now.

The standard OSC would be an elevation lower, a little farther down the hall. So this just puts the facility a little closer to the control room.

MEMBER SCHULTZ: This is beginning to sound like it is being done this way, because it makes more sense than the original design. Is that right? Or let me ask you, why are you making these changes?

MR. TAYLOR: Right. You are correct. You know, when you talk about use of resources and having people in a common TSC, it's more efficient. You're probably aware of some of the state-of-the-art things and the size you may want the TSC to be. So the space allocated in the AP1000, you know, meets the requirements, but there is really no room to grow, because it's a confined space.

CHAIRMAN RAY: It is what it is as a single unit. It's not --

MR. TAYLOR: Right.

CHAIRMAN RAY: This is a two -- you don't want to call it a dual unit, this is a two-unit site. And so that is a change in and of itself.

MR. TAYLOR: Yes.

MEMBER SCHULTZ: Where was the OSC in the original design?

MR. TAYLOR: So the TSC and the OSC are in the annex building.

MEMBER SCHULTZ: Same. Okay.

MR. TAYLOR: The standard TSC was on the same elevation as the main control room, and right across the wall, if you can -- you can almost touch the TSC from right outside the control room, except you've got the aux building and the annex building wall.

The OSC was in the annex building, a level below and down the hall from where the standard TSC is. So that's not much of a move, one up, a floor elevation higher and a little closer to the control room.

All right. So the last response facility that there is a slight difference from NUREG-0696 requirements, Duke Energy already has a standard -- or, sorry, a common EOF that is in Charlotte, North Carolina, in a corporate facility. That is currently in use by Catawba, McGuire, and Oconee. Our plans are to incorporate the Lee facility into that EOF.

In addition to the EOF being in this facility, the joint information center is also located there. This common EOF, obviously, with these three facilities supported, has already supported multi-site exercises.

If you do move your TSC outside 25 miles, you are required to have a near site assembly.

CHAIRMAN RAY: You said TSC. Is that what you meant?

MR. TAYLOR: EOF is 25 miles from the TSC.

CHAIRMAN RAY: Okay.

MR. TAYLOR: If the EOF is greater than 25 miles from the TSC, you are required to have a near site assembly that is within 25 miles. That

area is provided at Kings Mountain Generation Support Facility. It supports NRC staff and other individuals coming to a facility that is provided closer to the site. And the Kings Mountain facility is approximately 15-1/2 miles from the Lee site.

MEMBER SKILLMAN: Larry, let me ask this.

MR. TAYLOR: Okay.

MEMBER SKILLMAN: Some years ago, I believe it was Catawba had a tube rupture. Was it McGuire? Was this EOF -- common EOF in business at the time?

MR. TAYLOR: I just read the date. Mid-2000s, I think, mid-to-late 2000s, I believe is when this went into effect. I don't know the date of the tube rupture at McGuire. This is fairly recently. I think within about the last 10 years.

MEMBER SKILLMAN: So the answer would be no, it wasn't there when it was brought up. The reason I was asking is, what success have you had in transporting key people from the site to the EOF? Particularly from a distant location, most specifically Oconee, because that's a haul.

MR. TAYLOR: Right. Well, there would

be -- there would rarely be a need to do that. So, in other words, the EOF, you know, their function is really providing communications with offsite protective action recommendations, all that, and coordinating, you know, some of the dose projection teams, and that type of thing, or the field monitoring teams. That communication -- you know, remote communication would be required whether it was closer to the site or not. They communicate via radio.

So I don't -- nothing comes to mind as really a need to make sure you can transport people back and forth from the EOF to the site. There could be a possibility, as you can see, that the NRC has really wanted the ability to have a staging area that's for their personnel to be closer to the site.

MEMBER SKILLMAN: Let me ask my question differently. Is there a requirement for site personnel to be part of the staffing of the EOF?

MR. TAYLOR: No. And there would be people required to have knowledge of that technology. So potentially you could have people from the site that are on the staff at the EOF, but, you know, I can give you examples. So for some time

I work out of an office in Raleigh. I was a member of the ERO for the Harris Nuclear Plant, which is probably 25, 30 miles away. In this case, the EOF is about 40 miles away.

So, generally, there will be different response times for Lee. Most response times are 75 minutes. So you would have a transition time of 75 minutes.

MEMBER SKILLMAN: Well, let's see, the TSC is 40 miles from the EOF. The EOF is up in Charlotte, correct?

MR. TAYLOR: Correct.

MEMBER SKILLMAN: The only point I'm trying to get to is, do site personnel have to man EOF locations? And I think you just said no.

MR. TAYLOR: It's not -- it would not have to be site personnel. It would have to be personnel with the appropriate knowledge of the facility.

In other words, for example, Oconee. I would assume there's not someone from Oconee who, when an alert is declared, has to transition to the EOF in Charlotte.

MEMBER SKILLMAN: I'm asking the

question because, in my experience, when AmerGen bought TMI1, the TMI1 directors needed to respond to the EOF that was in Coatesville. And catching a run to Coatesville at the wrong time of the day, either on Route 30 in Pennsylvania or down the Turnpike into Coatesville, was a lose-lose. You couldn't get there from here. And so the transportation, when that change was mandated, became an impossible riddle.

MR. TAYLOR: And there are routine drills associated with any plant. There will be staffing drills, and they will validate -- have to validate that personnel can meet the time requirements.

MEMBER SKILLMAN: But I hear you really say at this point there is -- the ERO staffing is really not requiring site responders to the EOF.

MR. TAYLOR: That's right.

MEMBER SKILLMAN: Thank you. That was my concern.

MR. TAYLOR: Okay.

MEMBER SKILLMAN: Appreciate that.

MEMBER SCHULTZ: No. I think, Dick, at one point the EOFs were located generally --

MEMBER SKILLMAN: Close.

MEMBER SCHULTZ: -- closer to the facility.

MEMBER SKILLMAN: Very close.

MEMBER SCHULTZ: And the plant personnel sometimes would show up at the EOF.

MEMBER SKILLMAN: Or had roles on the ERO that required them --

MEMBER SCHULTZ: But things -- yes. But the approach has changed over the -- I guess I would say over the decades, the approach has changed, so that the EOF is intended to be independent of site personnel. And I'm sure that Oconee personnel or Catawba or McGuire personnel are not expected to be at the EOF here.

MEMBER SKILLMAN: Yes. Thank you.

MEMBER SCHULTZ: Okay?

MEMBER SKILLMAN: Thank you.

MEMBER SCHULTZ: You're welcome.

MR. TAYLOR: All right. I put a graphic in just to give you an idea of where the OSCs are located, and where the TSC is located, and we talked about relocating these facilities. So, again, the edge of the annex building across from the aux

building where the Unit 1 and Unit 2 OSCs would be, the TSC sits pretty much right in the middle of the two facilities.

The orange border you can see there is where the protected area is, and, like I said, that straight line distance from the TSC to the OSC is just probably approximately about a tenth of a mile.

CHAIRMAN RAY: The protected area goes off there to the -- off the chart on the north. What does it extend up to?

MR. TAYLOR: I'm not sure. John?

MR. THRASHER: This is John Thrasher. Up to the north there is some warehouse, some receiving, so there is another entry in there. And then there's -- up to the northeast there is some areas that will be used during construction and maintained as like maintenance shops. And some area for future anticipated dry cask storage.

CHAIRMAN RAY: Thank you.

MEMBER SCHULTZ: What you do see here, then, Larry, is that the communication systems that you have in place between all of the facilities become somewhat more important than if you had the TSC and the OSC and the control room essentially

side by side, because I know in some facilities where -- the TSC and the OSC are very close, so that runners could go back and forth, if necessary, to provide information to the OSC about actions to be taken, if necessary.

MR. TAYLOR: Right.

MEMBER SCHULTZ: So I'm just presuming you've got plans to have ample communication systems. Well, you've already got the experience with the other --

MR. TAYLOR: Right. And we have, you know, even -- you know, the plants I have been at before, there is methods to put in place, say their computer system is --

MEMBER SCHULTZ: Right.

MR. TAYLOR: -- is not available to have an operator transcribe plant data from the control room and fax it over to the DSC, so there is various ways to get information back and forth, if you have some of your systems that are not available.

MEMBER SCHULTZ: And communicating direction to the operational support center.

MR. TAYLOR: Yes.

MEMBER SCHULTZ: Thank you.

MEMBER SKILLMAN: It appears as though there is one particular enhancement. By having the TSC closer to parking, I presume, you can get your 75-minute offsite responders into the TSC sooner.

MR. TAYLOR: Yes. That is very close to entrance into the protected area. So --

All right. From there, I am transitioning to Fukushima at this point. Any other questions on emergency preparedness before we change gears?

CHAIRMAN RAY: Not that we can think of right now, but --

MR. TAYLOR: Okay. All right. And you will have another chance, because kind of the segue in, the first thing I am picking to talk about for Fukushima is the recommendation from the near-term task force associated with emergency preparedness, 9.3.

I will also talk about Recommendation 4.2 for mitigation strategies, and Recommendation 7.1 for spent fuel pool instrumentation. Lee received RAI post-Fukushima that asked us to address the items that were covered in the orders and the 50.54(f) letter that the licensees receive. So that

was essentially these three areas I just mentioned.

So, kind of staying on a theme of EP, I picked Recommendation 9.3 first. Licensees at the time that Fukushima had occurred, once the near-term task force came out with their recommendation for 9.3 on EP staffing and communications, that was put out to the industry in a 50.54(f) letter for licensees who were licensees at the time.

As I said, Lee responded to this item via an RAI and, really, based our response to requirements similar to what was contained in the 50.54(f) letter. Lee has proposed license condition to address the staffing and communication assessments in a very similar manner to that as required by the 50.54(f) letter.

MEMBER SCHULTZ: In a very similar way -- could you explain the qualification?

MR. TAYLOR: The main difference is really the timing. So if you think about it, when the 50.54(f) letter was sent out to the current licensees, they had a certain timeline to respond to that that would not be appropriate for someone who is not a licensee yet.

So pretty much standard for both

assessments, the communication and the staffing, approximately two years prior to fuel load, it has been arranged to gear with basically the schedule completion of ITAAC. The assessments will need to be complete, both the staffing and communication, and then 180 days prior to fuel load or completion of ITAAC, corrective actions based from the assessments will need to be in place.

MEMBER SCHULTZ: Thanks for the clarification. That's just fine. Thank you.

MR. TAYLOR: All right. And then, Recommendation 4.2 for mitigating strategies. That resulted in an order issued to licensees at the time. Lee responded to the RAI, again, in a manner similar to Attachment 3 of EA-12-049.

We will have a license condition. Some things have changed between then and now. So unlike mentioning that our response would be similar to those in the order, there are things kind of in flux right now. The license condition will be molded to be more like the requirements are going to be in the new rule, 10 CFR 50.155.

Right now, that draft rule is not out yet. There has been a SECY that has been put out

that contains mainly what the rule will look like, with some changes expected to occur. So the most recent submittal of the application from Lee has a license condition similar to what was in the order. Now it will be modified and what's in the SER will be more like what is going to be in 10 CFR 50.155.

Okay. Last but not least, on strategies, I've got a header up at the top that didn't get changed. Sorry. Near-Term Task Force Recommendation 7.1 associated with spent fuel pool instrumentation, again, resulted in an order to licensees at the time. Lee, again, was given an RAI and reference Attachment 3 to Order EA-12-049.

This one is a little bit different. So in the requirements of this order, there were some design features that were necessary to have for spent fuel pool instrumentation. And then, there was a piece of the order that addressed training necessary to connect alternate power supplies and such.

It turns out that for AP1000 the plant design already accommodated all of the design requirements that were listed in the order. The difficult part for us as applicants was not all that

information was spelled out in the application somewhere. Most of it was there, not quite all of it.

So we did mainly one thing, but I'll describe why we had to do two. So we added supplemental information into 9.1.3.7 Delta in our FSAR for Lee to supplement descriptions of the instrumentation that was already contained in the DCD, to fill in some of the gaps, so we didn't make plant changes. We just needed to get that information into the FSAR so we could have credit for it.

In doing that, one of the things that was needed was to identify this instrumentation was not on the fuel handling operating deck for an AP1000. So it would be shielded from missiles and not be in the environment that would exist. For an AP1000, the spent fuel pool level instruments are actually below the operating deck. That is unlike most of your plants currently in operation.

So, in our research to see if there was something that could help us identify the location, we did find an inconsistency in DCD Table 3.1-11, Sheet 14 of 51. So DCD Table 3.11-1, is a list of

all of the instrumentation for AP1000 that needs to be environmentally qualified.

And rather than break things down by this room/that room, there are 11 zones, environmental zones, that are identified. And rooms are matched to consistent temperature, pressure, humidity requirements for that instrumentation.

It turns out that the environmental zone that was listed for the spent fuel pool instrumentation was the fuel handling operating deck, which, in reality, it is not on the fuel handling operating deck, and we were supplementing text into Chapter 9 to state as such.

So we felt obligated to go ahead and make corrections to this inconsistency in the DCD table at this point in time. It will eventually be a standard departure, and it has been identified requiring correction by Westinghouse. But just to make sure everything was consistent, we felt it was appropriate to go ahead and make that change as a site-specific departure now rather than wait until later.

CHAIRMAN RAY: Okay. But it is just the correction of an error. It's not really --

MR. TAYLOR: Correct. So we didn't physically move the instrumentation anywhere. We just found it sang where it would normally be for existing plants. AP1000 is different. So exactly how the error came about, I don't know, but it didn't list the correct location.

All right. That finished everything I had planned to discuss, so I can certainly take additional questions.

CHAIRMAN RAY: All right. Let's see if there are any. It appears there's not. Thank you.

Okay. We'll probably be able to conclude here early, then, with the staff coming up to do their presentation on the same topics.

MR. HUGHES: Good afternoon, Chairman Ray and Commissioner -- or, rather, the panel, ACRS members. I'm getting a little worn out here. I'm sorry.

Today, we are going to discuss Chapter 13 and conduct of operations; 13.3, which is emergency planning; and that is going to be presented by Kenneth Thomas. He is with NSIR.

And I also asked Kenneth to describe basically the function of the EOF, if you will

indulge us. I think --

MR. KENNETH THOMAS: All right. Good afternoon, gentlemen.

CHAIRMAN RAY: Good afternoon.

MR. KENNETH THOMAS: We -- the staff has reviewed the Lee COL emergency plan that is contained within Part 5 of the COL application as well as the ITAAC. Our evaluation of both the E-Plan and the ITAAC are contained within Chapter 13.3 of the staff's SER.

Next slide, please.

So one of the first things I want to describe is the emergency planning zone, essentially known as the 10-mile emergency planning zone surrounding the site. It's the same distance as we have given all the large light water reactors.

The applicant proposed a 10-mile site, emergency planning zone, encompassing three counties within the state of South Carolina, part of the territory within the state of North Carolina, and one county there, or two counties in South Carolina, one county in North Carolina.

We have also engaged FEMA to conduct an interim finding report, and they submitted that to

us as well on the status of the emergency planning for offsite communities.

Next slide, please.

This is a picture of the site and the surrounding 10-mile EPZ. Within the state of South Carolina, you have Cherokee and York County. Within the state of North Carolina, you have Cleveland County.

Next slide.

Again, as the gentleman from Duke has described, the technical support center is a single location that is going to serve both of the units at Lee. It is in the basement of the maintenance building, approximately a five-minute walk from the main control room.

There is a sophisticated communications system, including both data and voice, that would be able to have a rapid transfer of information in consultation between the TSC leader and the control room shift manager, if the need arises.

Also, it gives adequate capability within the TSC, and that would be demonstrated during the EP drill that would be run prior to fuel load as part of the EP-ITAAC.

CHAIRMAN RAY: What do you think of this two-minute guideline? Is it out of date, or what's your judgment?

MR. KENNETH THOMAS: Well, that's a good question. The two-minute rule, or as -- the guidance that came into play was actually drafted in NUREG-0696 in the heels or months following the TMI accident. And at that time, in the late '70s, the sophistication data equipment was your dial-up, rotary dial phone, and be able to talk to them. So there was a certain need for having the engineering staff, the TSC, emergency director to be able to communicate rapidly with the shift manager.

Fast forward 35 years later, with a sophisticated communications, both data, being able to transfer gobs of information over a very short period of time, data-wise, sophisticated communication channels engineer to engineer or shift manager to ED, they will be able to see/hear what is going on at the control room.

So as far as my personal opinion is that information out of date is still -- is valuable for us to have a good baseline for the existing plants. And, again, when we evaluate the plans for new

models, that is what we are going to be looking at towards 0696, to make sure that there is sufficient defense-in-depth and margin for that.

MEMBER SKILLMAN: Kenneth, when you say 0696, do you mean 0737? Do you mean 0696?

MR. KENNETH THOMAS: I believe NUREG-0696, sir.

MEMBER SKILLMAN: Okay. I'd like the record to show that we did upgrade from rotary phones to pushbutton phones.

MR. KENNETH THOMAS: Yes, sir. And now we have Smartphones as well now, sir.

MEMBER SKILLMAN: Just making sure.

MR. KENNETH THOMAS: Copper wire to now we've got fiber optics and satellite communications, so --

MEMBER SCHULTZ: Just one comment, Kenneth. You mentioned communications between the TSC and the shift supervisor. The TSC still has responsibilities to communicate directly with the operations support center, correct?

MR. KENNETH THOMAS: That's correct, sir.

MEMBER SCHULTZ: Yes. So those links

are also in place.

MR. KENNETH THOMAS: Yes, sir.

MEMBER SCHULTZ: Thank you.

MR. KENNETH THOMAS: Speaking of the OSC, nice segue, next slide, please.

Again, the OSC is going to be located in the previous spots for the TSC and the AP1000 design. There is going to be one for each unit immediately or in the vicinity -- or it now, in this case, immediately adjacent to the control room.

Again, there is sufficient communication capability between the OSC, TSC, and the main control room in order to have the operators and the responders in the OSC perform their required actions for an emergency.

Next slide, please? Thank you.

The EOF, the emergency operating facility -- again, there was some discussion about the TSC and the EOF being separated by about 40 miles straight line distance. The EOF's main purpose during an emergency is to be able to be the liaison from offsite communities and responders to the onsite.

They will be the ones that will be able

to communicate, conduct notifications to the states and the responding communities, be able to brief the senior management of Duke Energy, and be able to, since the joint information center is collocated with the EOF in this particular case, be able to make those communications.

There is no requirement that the site staff be located at the EOF. Again, having a good familiarity and some information about the plant would be there.

The EOF does have comprehensive communication and data links with the TSC, the control room. They will be able to get the same amount of information as the TSC.

The emergency operating facility currently serves as the corporate or common EOF for the existing three sites -- McGuire, Catawba, and Oconee plants. They have been doing this since approximately 2005 when they did that in their new location. Prior to that, for both McGuire and Catawba, they have had a common EOF since 1987.

We have evaluated the proposed request to have the EOF -- Duke's description of the EOF and their basis for requesting an exemption as part of

Appendix 9 of their emergency plan, part of Part 5 of the COL application.

Next slide, please.

In accordance with the guidance, if the EOF is located more than 25 miles from the TSC, Duke has proposed a near site facility for the NRC as a staging area. And, again, it is proposed to be at Kings Mountain Generation Support Facility, approximately 15-1/2 miles away from the TSC.

Within this facility, it is accommodating space for the NRC, offsite responders, and will have sufficient space for federal, state, and local responders, and includes an area for briefing emergency response personnel, sufficient communication capabilities with other licensees and offsite response facilities, and access to plant data, radiological and information and plant data operating information will be there, as well as various administrative support at the Kings Mountain facility.

Next slide, please.

MEMBER SCHULTZ: Kenneth, a question I didn't ask earlier of the applicant, but I'll ask it of you. With Fukushima experience, we do have more

of a focus now for multi-unit events. So, you know, there is aspects of the plan that is being developed here that focus on both units simultaneously.

What about the staffing expectations now? There's two OSCs. They are close together. The TSC is one. The EOF is one. I did note on the applicant's slides that they have done drills where there is more than one facility that is being affected, and the EOF is expected to respond to that circumstance.

But just, in particular, I was wondering about TSC staffing. Is there any expected reduction in the TSC staffing, given that it is serving both units? And given that there is more of an emphasis on dual unit events in this case?

MR. KENNETH THOMAS: Is there a reduction on TSC staffing, given the fact that there is a single unit --

MEMBER SCHULTZ: Yes.

MR. KENNETH THOMAS: -- going to be servicing two units. Is that --

MEMBER SCHULTZ: That's the question, yes.

MR. KENNETH THOMAS: The staffing

requirements comes from -- directly from the regulations, and the staffing analysis that is required under -- or will be required under the Fukushima in Near-Term Task Force Recommendation 9.3, and there is a license condition for the site to analyze the staffing and make the appropriate changes to their staffing table, their emergency plan, and have the corrective actions. That's when they would necessarily address that.

MEMBER SCHULTZ: And they have already indicated that that's happening down the road, given that they --

MR. KENNETH THOMAS: Yes, sir.

MEMBER SCHULTZ: -- haven't gotten that close to operation.

MR. KENNETH THOMAS: Yes, sir.

MEMBER SCHULTZ: Okay. That's satisfactory. Thank you.

MR. KENNETH THOMAS: You're welcome, sir.

CHAIRMAN RAY: Is this term "in-processing facility" used any place else? I'm just pondering it.

MR. KENNETH THOMAS: I'm not quite sure.

Are you talking about --

CHAIRMAN RAY: Duke Energy in-processing facility came out, and I'm just asking about the terminology of an in-processing facility, since that is -- is that unique to this case?

MEMBER SCHULTZ: Do they have something like that at Oconee?

MR. KENNETH THOMAS: I'm not sure if Duke has that. I know --

MR. HUGHES: This is an existing facility that they have.

CHAIRMAN RAY: Well, I know, but it's designated as an in-processing facility. I'm just trying to understand if that's the first time that such a facility has been --

MR. HUGHES: I've that term for -- at the site for --

MR. THRASHER: This is John Thrasher. It would be -- with Duke Energy. And what Duke does, this facility is basically for in-processing of extra craft supplemental workers for outages. And so what Duke has done, rather than in-processing those craft at each of our nuclear sites, is we built a central facility to serve Catawba -- McGuire

and Catawba. So it's an in-processing training facility to get supplemental craft workers, mostly for outages, plus --

CHAIRMAN RAY: So it's not --

MR. THRASHER: So that's what the in-processing --

CHAIRMAN RAY: -- designated that because it's part of the emergency plan.

MR. THRASHER: No. It is a totally unassociated term with emergency planning.

CHAIRMAN RAY: Okay.

MR. THRASHER: That's for other means of trying to consolidate one building to serve multiple needs.

MEMBER SCHULTZ: But is the near site facility concept something that Duke uses for Oconee because it's far away from the current EOF?

MR. THRASHER: Well, Oconee is a near site, a different facility. I think it was their former EOF who used --

MEMBER SCHULTZ: Used as a near site facility.

MR. THRASHER: -- as a near site facility. So we are just proposing, since this is

an existing facility that has plenty of rooms and communication capability and everything, that we would use this as a near site, this already existing in-processing facility, as the near site. So its association with the emergency plan is proposing to use it as the near site facility for Lee.

CHAIRMAN RAY: Okay. Then, it happens for other reasons to be called an in-processing facility.

MR. THRASHER: That's correct.

CHAIRMAN RAY: I was trying to figure out if that had something to do with emergency planning.

MR. THRASHER: No. It's all associated with in-processing supplemental craft workers for outages. So that's where the in-processing, basically getting them -- getting all of their training quals and health physics, radiation protection requirements, and everything, up to date.

MR. KENNETH THOMAS: Mr. Ray, to answer your question, we don't typically see in-processing terminology used within the EP world. We have specific names that are standardized across the industry -- control room, TSC, OSC, and EOF.

MEMBER SCHULTZ: Kenneth, since we're talking about terminology, one of your slides said "risk counties."

MR. KENNETH THOMAS: Yes, sir.

MEMBER SCHULTZ: Is that an EP term now, risk counties?

MR. KENNETH THOMAS: I believe that's one that we use more frequently when we are referring to offsite host counties and risk counties. Mr. Barss is here as well to --

MR. BARSS: This is Dan Barss. I'm the team leader in NSIR responsible for emergency planning. We've met many times.

The term "risk county" is more a term used by FEMA for offsite things, and what county is at risk of the event, and then the host county would be the county where people would relocate to. So it's more of an offsite term primarily used by FEMA.

MEMBER SCHULTZ: All right. Thank you.

CHAIRMAN RAY: Anything else for the staff folks? Okay. That having been said, then, Brian, are you completed, or do you have more to --

MR. HUGHES: We're done, as far as emergency plan. We would like to go to the next

topic --

CHAIRMAN RAY: Yes, surely.

MR. HUGHES: -- Chapter 20.

CHAIRMAN RAY: Yes.

MR. HUGHES: Okay. We'll go to -- again, we're going to go to discuss the requirements resulting from the Fukushima Near-Term Task Force recommendations.

There were approximately seven recommendations, primarily the seismic and flood hazard reevaluations. That was covered already in the current seismic and flood hazard, which is the latest and up to date.

The seismic and flood walkdowns will not be done, because there is no plant to walkdown. And then, what we will cover is recommendation -- we have three that will be covered in this presentation. It is Recommendation 4.2, equipment covered under 10 CFR 50.54(hh)(2), which ordered licensees to provide a reasonable protection for equipment currently provided pursuant to the 10 CFR 50.54(hh)(2) rule from the effects of design basis, external events, and to add equipment, as necessary, to address multi-unit events while other

requirements are being revised and implemented.

The next recommendation will be 7.1, spent fuel pool instrumentation, which required reliable spent fuel pool level instrumentation. And then, we have Recommendation 9.3, emergency preparedness regulatory action, staffing, and communications.

So we'd like to go into this.

Next slide, please.

We already discussed what was not applicable. Let's go to what is applicable.

Okay. Prior to fuel loads, reliable spent fuel level instrumentation. The spent fuel pool instrumentation shall be maintained available and reliable for the development and implementation of the training program. "The training program shall include provisions to ensure trained personnel can route the temporary power lines from the alternate power source to the appropriate connection points and connect the alternate power source to the safety relay level instruments.

As we already discussed, there was an administrative departure, because the spent fuel pool level instrumentation was erroneously put on

the wrong chart, and that was corrected.

The provisions of the spent fuel pool instrumentation, as described, concludes that the arrangement, the qualification, the power sources, the accuracy, and display are consistent with the recommendations described in SECY-12-0025 and Commission Order EA-12-051.

One of the requirements not listed is that when the power goes out and the power is restored, it remains operable. It does not need to be recalibrated or anything of that nature.

The proposed license condition is acceptable, because it provides that, prior to fuel load, the licensee will have in place procedures, maintenance, for proper maintenance of the instruments, and for the connection and use of alternate power source in order to power the level instruments. For practicality, this has to be done after everything is installed.

If you're going to have temporary power and bring it, you can't do it -- you can do it on a bold print, but the reality is you have to physically go out and do it, make sure you have enough cables and the proper connections. So that

would be done much later on during the construction.

The emergency preparedness -- I'm sorry. Are there any questions on the spent fuel pool instrument?

CHAIRMAN RAY: Not yet.

MR. HUGHES: Okay. Recommendation 9.3. That's the emergency preparedness. Emergency preparedness -- excuse me. Let's go to this page on the -- we skipped something.

CHAIRMAN RAY: 110?

MR. HUGHES: Yes. 110, 111.

We went back and forth on this, and we ended up with a license condition. 111. I'm sorry.

CHAIRMAN RAY: Yes. 111. I've got it.

MR. HUGHES: All right. Again, we went back and forth, you know, how would you estimate the adequate number of -- and which skill sets you need for emergency planning and staffing. We finally came to an agreement that this would best be done after the plant facility is built. You would have a simulator. You would be able to do some additional training and have the links in the phones and whatnot.

Now, what we did, we came up with a

license condition, which is stated on -- let's see. The license condition basically says that 18 months prior to --

CHAIRMAN RAY: It's on 112.

MR. HUGHES: Okay. Yes. It says basically probably about 18 months before the latest date in the schedule for completing the ITAAC. We didn't want to put a date, so we put a condition. That the assessments will be completed for both communications and staffing using approved NEI guidance, the guideline for assessing beyond design response, staffing, communication response.

Now, there will be an evaluation of this, and there will be -- once it is evaluated, it will be critiqued and there will be corrective actions. Then, those corrective actions, at least 180 days prior to fuel load, must be incorporated, and the plan must identify how the augmented staff will be notified given certain things such as degraded communications, how many people, what skill sets, what have you. And, again, that will be six months prior to fuel load.

So that, I feel, is -- staffing is pretty well covered, and that will be covered by an

order.

Are there any questions on the staffing part of it?

MR. BARSS: This is Dan Barss again. Let me just add a little bit here to hopefully make it clear to you. The requirements for Fukushima are not yet in place. There is still rulemaking going on. But in places that the orders were issued to the operating units and the instructions to the staff was to make sure that the COLs address this.

The way this has been handled by the COLs is by proposing these license conditions, and they require, as was mentioned, these two analyses. The licensees or applicants at the point and through NEI came in and said to us, "We can do these, and we'll do them in accordance with NEI 12-01."

There is another one, NEI 10-05, which is another assessment that they have to do. That came out of a previous rulemaking. But in both cases they made the case, and the point was correct, that they really can't do these analyses until they have the staff trained and available, and then they run some basically walkthrough exercises, so they can determine what staff they need where, what

communications they need.

It's really something you have to do when you've got the people, and they couldn't do that because they don't have a plant built. They don't have a TSC. It just couldn't be done. So that's why we have created these license conditions. The license condition is simply that they will do those analyses, and then if they complete the analysis and they find there are things that need correction, that they will make those corrections and implement those things into their plan.

And they can do that under the requirements of the process that are already in our regulations. It is 50.54(q), which requires them to maintain in effect an emergency plan that meets the regulations. And if they find, through the analysis, that there are changes that they need to make, then they would use that 50.54(q) process to make the changes.

So it all fits nicely into a regulatory structure, yet allows them the time to do this analysis, after the fact that the COL is issued, but before they actually start up and load.

And the 18 months, two years was

mentioned, the timing is not really a significant number, as long as it's far enough in advance of the -- when you finally want to load fuel that you've had time to identify and fix the problems. So we changed their two-year proposal to 18 months, because we thought that was a little better fit, and it met up with a few other things.

So that's why there is a little difference in the numbers. But I hope that helps make it clear.

CHAIRMAN RAY: Thank you.

Steve, do you have anything on the post-Fukushima topic that has been addressed here as part of this? I mean, I don't have any reason for asking you to --

MEMBER SCHULTZ: Not on this topic.

CHAIRMAN RAY: Okay.

MEMBER SCHULTZ: We skipped over the mitigating strategies. Did you want to say --

MR. HUGHES: We're doing that right now.

CHAIRMAN RAY: Okay.

MEMBER SCHULTZ: What's that?

CHAIRMAN RAY: He's going to do it now.

MEMBER SCHULTZ: Oh, that's fine.

MR. HUGHES: Okay?

MEMBER SCHULTZ: I'm covered on this one. Thank you.

MR. HUGHES: Okay. You're good? All right. We're going to go to the mitigating strategy.

Okay. Beyond the recommended 4.2 -- Recommendation 4.2, mitigating strategies for beyond design basis external events.

Interim Staff Guidance JLD-ISG-2012-01, Revision 0, compliance with Order EA-12-049, the order modifying licenses with regard to requirements for mitigating strategies for beyond design basis external events. Endorses, with clarifications, the methodologies described in Industry Guidance Document NEI 12-06, diverse and flexible coping strategies, also known as the FLEX Implementation Guide, Rev 0.

This is an acceptable approach for developing strategies for design -- beyond design basis external events, and in accordance with the guidance, which was approved, NEI 12-06.

The staff reviewed the mitigating strategies for the Lee Units 1 and 2 to provide

assurance of core cooling, containment, and spent fuel cooling capabilities in the event of a beyond design basis external event resulting in extended loss of power.

The staff finds the approach for mitigating beyond design basis external events to be used at the Lee site 1 and 2 is consistent with the NRC order in both general and AP1000-specific NRC guidance, including NEI 12.06 Appendix F, as was endorsed by the NRC staff.

Therefore, the staff concludes that the mitigating strategies for beyond design basis external events, as described in -- for the Lee Units and 2 are acceptable.

We will impose a license condition to verify the implementation of the mitigating strategies for beyond design basis external events at the Lee sites 1 and 2, and conditions require completions and integrated plan prior to fuel load, implementation procedures, training that -- required to acquire support equipment, and have in place a preventive maintenance program for the equipment.

And the staff finds the strategy for design basis external events under those

requirements for the Lee units are acceptable.

CHAIRMAN RAY: So, Steve, you're the guru for now on Fukushima. So give us any questions --

MEMBER SCHULTZ: Yes. I think this is satisfactory. The, you know, rulemaking is going to continue. That may or may not affect the new plants. There will be some aspects of it that will.

One question I had is that, you know, some of the Fukushima items have been addressed not by orders and rules but by industry initiatives, where the industry has indicated they will move forward with SAMGs as an example. And so has the staff given consideration to those aspects of the Fukushima-related items as it may apply to the applicant's plants and plans?

MR. HUGHES: We have not. Part of the reason is it's not part of our review plan, so that would be out of scope.

MR. BARSS: This is Dan Barss. Let me step in again. The staff that are doing the safety reviews are also aware of the work that is going on in the licensing arena. So we are trying to stay current with that.

But, obviously, we can't require an applicant to do something that is not a regulatory requirement at this point in time. So we don't -- you know, we don't know. We don't know. We can't hold them to that. But we have made sure that those items that we expect have been addressed through -- you know, they have been made aware, and kind of the blueprint is there that those things can be accomplished, at least in the EP area, without undue concern.

And, certainly, as the rulemaking goes forward, I have had involvement and have reviewed and made comments on parts of it, so that we make sure that we understand how, once the rule is implemented, how it is going to impact someone that is either an applicant still or is now holding a COL. What kind of changes are going to have to be made there? That's kind of built into the rulemaking package, which is not complete, is still an ongoing work.

So the staff is aware of those things. They are in our thoughts and considerations. But, at this point in time, we can't hold this applicant to something that is not yet regulatory requirement.

So --

MEMBER SCHULTZ: In that regard, the question was somewhat rhetorical, because I got the answer that I expected. But I would like to pose it to the applicant as well. That is, in terms of industry initiatives and their activities that are associated with following the industry initiatives that are an outgrowth of the Fukushima action items.

MR. TAYLOR: This is Larry Taylor, Duke, again. Yes. We are -- we actually are working very closely with Southern and SCANA, together with FP&L, to the applicants and the licensees, are following very closely the proposed rule and the things coming up. For example, SAMGs we are monitoring closely. We are hearing from NEI that potentially that may involve commitments from the various utilities, so we will be prepared to move forward with whatever is required for the rest of the industry.

MEMBER SCHULTZ: Okay. Thank you.

MEMBER SKILLMAN: I'd like to ask a question at the risk of sounding foolish. But if I don't ask it, I'll lose my opportunity. After all we have learned on Fukushima, why wouldn't a new passive design ignore FLEX and say, "We've built

into our basic design features that make it unnecessary for FLEX."

It seems as though this slide that you've shown, Brian, it says, "Lee is fine. They meet FLEX and Fukushima order." Why wouldn't a new certified design, knowing all we know of Fukushima, take the position, "We are going to design so that we don't need FLEX."

MR. HUGHES: I can address that partially. In the AP1000 design, there are designs that, you know, can transfer water from one place to another. There are, I would say, flanges and hookups for alternative sources already in the design.

And a lot of those -- a lot of this FLEX plan is Fukushima was after the plant was designed. And I think in the follow-up years that are coming more and more features will be either retrofitted into the design or during construction, when they do the system flushes, when they do certain things they have to do for the testing, they will come up with multiple methods and ways to combat a lot of these issues.

But, at this point, I think it is

perhaps just starting on paper. But the plants are being built, being licensed, and I see it as something in the future, but something that is going to take some time. And that is the way I see it.

Now, I'm not speaking for, you know, regulatory basis for -- that's the practical point at this point. But I think the AP1000, when you look at it as a passive plant, is much -- has a lot of -- a lot of these type of things already designed into it.

MR. STUBBS: Yes. This is Angelo Stubbs of the Plant Systems Branch. I'd just like to try to give a little bit more insight on what -- the question you asked.

The AP1000, the Lee plant, do have passive systems. And in terms of use of FLEX, it's not like a lot of the operating plants. They are not using FLEX to get to -- for a -- to transition from using onsite equipment to the offsite for a temporary period of time to allow the offsite be delivered. It actually relies on the passive systems for the first 72 hours.

The FLEX equipment that is brought in is usually pretty small equipment to maintain the

cooling of the spent fuel pool in the core and the containment integrity over the long term, because the Fukushima requirements call for independent coping.

So the actual pumps and the different generators that are brought in at 72 hours are not because the plant design wouldn't maintain that, but because the requirement for Fukushima is indefinite coping.

MR. HUGHES: See, another thing with Fukushima was the flooding was the primary cause of the damage. And by -- just by requiring a more comprehensive flooding analysis, it really adds a great amount -- a great additional amount more safety, because you are not subject to the -- I don't know if you know or not, but Fukushima was originally higher.

Then, they removed a lot of the material, so they could barge in heavy equipment. So they lowered the site, actually. I think that's probably a good lesson learned. And they did not have an adequate seawall and could not do the type of evaluations that we do in this country.

So I think we do an awful lot to prevent

that from occurring. But there is no way to tell an external event what it could possibly be. But I think we are in very good shape when it comes to flooding, when it comes to seismic. We have the best we have available at this point.

MEMBER SKILLMAN: I was contrasting -- I appreciate your explanation, the gentleman's explanation back here. I was contrasting in my mind how we interact relative to plants that are -- have been built many years ago and are making adjustments based on what we have learned from Fukushima and a plant for which, in this case, dirt has already been scraped, but in some cases these plants are thoroughly conceptual. Not a single shovel of dirt has been overturned.

We have the lessons in front of us from Fukushima. Why not make sure that we don't need the remedies that FLEX provide.

MEMBER BLEY: There's another side to that that I really favor, and that is we -- you know, the whole thing they have come up with in FLEX is, to me, not so much to protect you against exactly what happened at Fukushima. Anything that I think of now, I can design something better. But

for those things that happened that we didn't plan for, having the ability to put water and power to places we never thought we would have offers a great advantage when the thing you never thought of happens. And I --

MEMBER SKILLMAN: I don't argue that at all.

MEMBER BLEY: -- I'm leaning toward that approach. For any specific thing, you can do better. But for the thing you haven't thought of, this gives you a lot of flexibility.

MEMBER SKILLMAN: Thank you.

CHAIRMAN RAY: Okay. You're completed? All right. The applicant is completed. The agenda is almost completed.

What we are going to do now is, as usual, I'm going to ask the telephone line to be opened in case there is anyone in the public domain that is on the line or here in the meeting room who would like to offer a comment to the subcommittee. And then we'll look ahead for a bit before we wrap up.

The line is open, according to Peter. And the question at hand is, is there anyone on the

line who would wish to make a comment to the Committee at this time? Hearing none, we will -- we can close the line again, and that will suffice for that purpose.

I was hoping to keep Brian up there. But, in any event, I guess I can talk to both sides of the room here at the same time. I believe we have accomplished what we set out to do at this Subcommittee meeting.

Bob, if you and Christopher want to go up, let's talk about the next milestones here. As I indicated at the beginning of this two-day meeting, we have dealt with site-specific items, but there are a few other items that are outstanding on a generic basis and which are planned to be addressed on the one of the other subsequent COL dockets, specifically Levy.

My present intention is to not recommend that we go to the full Committee until that has been accomplished. At some point in time, of course, that -- we may have to change that plan, because right now we don't know when we will be able to address ourselves on a generic basis to those AP1000 items, which are still pending and will be taken up

with us and the staff on the Levy docket.

So, for now at least, we can't look forward to a full Committee meeting date. When we do have a full Committee meeting on the materials that we have talked about here in two days, as is always the case, it has to be selectively consolidated down into something that can be presented in two or three hours at the most, and that will be a challenge here.

Although this has been a great learning experience for us, and we appreciate the effort that the staff and the applicant have undergone in order to give us, hopefully, for the first and last time, our acquaintance with seismic exceedance management. We did that a little bit on Summer, but this was a more daunting task.

But, in any event, I think we are ready to go, with a suitable amount of preparation in advance, to the full Committee on that subject. We will find out if there is any reservations about that here in a minute when I ask the other Subcommittee members if they have any comments to add.

But the key thing I wanted to cover here

is that, whereas ordinarily we would go forward from this meeting to the full Committee, and then issue a letter, if we were to do that now, the letter would be incomplete and we'd not be able to do what I think you would want us to do, which is to cover the Lee COLA in a complete manner.

So, right now, anyway, we are not scheduling a full Committee meeting. But I am hedging that a little bit, because I just don't know what the timing will be for the other one you may come to the staff and stay that we need to get on with this, and that there is a need for us to reach a conclusion that has a carve-out on it, I'll call it, or an exception from something left to be done.

Like I say, I'm not recommending that now, but who knows. I just -- it's too hard to tell when we will be able to get the Levy docket before us and behind us.

Duke? Bob, do you, Christopher, have anything you want to say in response?

MR. KITCHEN: Yes. This is Bob Kitchen. I hope you'll keep -- consider that. There are a few things that I think we can work -- certainly, we will work with whatever the ACRS and the NRC need.

But, you know, I think a few advantages -- I mean, first of all, first, you know, from our perspective, if we could go ahead and finish the full Committee, I mean, the scope of what Lee -- they will a review -- is in front of the team today.

And that kind of clears the board for us, because I think the remaining issues that we are going to talk about on Levy are -- will apply just, as you said, to an open letter to close it. And there are other applications, you know, behind, for example, Turkey Point.

So the only thing I would just say, in terms of consideration, I think we -- you know, I don't -- I can't speak to the processes and what they allow, but by being able to move forward, you could go ahead and close Lee in terms of ACRS presentations, and reserve a time that ACRS has available for the Turkey Point reviews and other things, if -- whatever fits for Committee --

CHAIRMAN RAY: Well, again, we try to be aware of what the needs of the applicant are. And we will discuss this at the full Committee meeting in November. When I say "this," I am talking about the circumstances, not your application.

So there may be more following that discussion. I can only speak for myself at this point in time. And, like I say, we'll discuss it among the full Committee and with the staff further and depending on what their interests are. But I just wanted to make the point that right now, anyway, going to full Committee is not on the schedule.

But I do acknowledge that what you and I have just now talked about is a possibility at least, and I understand you to say that that's something you would like us to consider --

MR. KITCHEN: Yes, sir.

CHAIRMAN RAY: -- doing to get it incrementally done on the basis that what was generically discussed on Levy would also be equally applicable --

MR. KITCHEN: Yes, sir.

CHAIRMAN RAY: -- to you.

MR. KITCHEN: The other thing, just to give you a little perspective on where at least I think we're at in terms of resolving generic issues. The Levy -- and these two are tied at the hip. But the Levy ACRS Subcommittee review for condensate

return is currently scheduled for February 3rd.

We have a couple hard spots to work through to meet that. So I would say it's -- there is a bit of risk there. With the other issues that we have, you saw there were four. And, as I understand it, the Subcommittee wants to have the opportunity to discuss all of those.

So as it stands right now, we would have a Subcommittee February 3rd to discuss condensate return, and then a possibly same time review of the other issues, if they're ready, or another Subcommittee review to complete the generic issues on Levy. Both of those required predecessors to get through Lee, so I guess --

CHAIRMAN RAY: Well, let me respond to that this way. And, again, I'm only speaking for myself. But it's not a matter of there is a list, and Lord knows when the list will ever get done, but we want to wait until it's done and then look at everything on the list, regardless of what it is. That's not the case.

MR. KITCHEN: Right.

CHAIRMAN RAY: The issue is, in my view anyway, what is the cause and extent of the

condition that was first associated with condensate return. What caused the problem to exist? And what other things may be affected by that same cause? That is not the same thing as saying everything that is outstanding -- because there is going to be outstanding things emerge constantly over time, and they don't come here to the ACRS all the time.

MR. KITCHEN: Right.

CHAIRMAN RAY: But the issue of, have we looked far enough to ensure that what gave rise to the condensate return problem has been looked at as a condition that may affect other things at the same time, that is really the issue, as I see it anyway. It isn't just that there is a list of different miscellaneous things that keep cropping up, and we want to wait until the list is -- we want all the things on the list to come to us, because many of the things on the list wouldn't normally come to us.

It's only if they are a consequence of the same cause that gave rise to a condensate return problem, because we need to understand that the condensate return issue is an issue that is fairly straightforward and easy to solve. But the real question is: how did it happen, and what else might

be affected by it? Okay? So that's a little different than what you described.

As soon as it is concluded that, yes, there are other things -- and there are always going to be other things -- but we now have defined what gave rise to that problem and what else may be affected by it. Let's see if we all agree on that. It's over and done with, as far as I'm concerned.

Now, I'm only speaking for myself. Keep that in mind. But it's different than the way I heard you say it, which is, well, there's a list of items, and we want to do everything on the list. No, that's not true.

MR. KITCHEN: Okay. Good.

CHAIRMAN RAY: Okay?

MR. KITCHEN: That helps.

CHAIRMAN RAY: So anyway, Brian, you heard what we have talked about here and what my response is. Is there anything you want to add to --

MR. HUGHES: The only thing I'd like to say is I want to thank the members for their time and for their thoughtful questions. And, you know, sometimes a lot of good comes out of these meetings,

and a lot of issues that would not normally come up. So the staff appreciates that.

And just, again, I know what it's like to travel. I've been an inspector traveling an awful lot. I know it's very difficult, and you're away from your homes. And I appreciate that, and I thank you for your time.

CHAIRMAN RAY: All right. Well, thank you, and return as well.

I'm going to go around now and see if there are any comments. You guys should just stay there in case there is something more that comes up from the members. Then, we'll be done.

Pete, do you have anything you want to say?

MEMBER RICCARDELLA: Nothing. Thank you.

CHAIRMAN RAY: Steve?

MEMBER SCHULTZ: I have no further comments on the technical side. I think with regard to the plan that you have proposed, to discuss this with the full Committee in terms of where we go from here, is the appropriate way to move forward.

On the technical side, from what we

heard yesterday and today, I think we have had a very full discussion with the applicant and the staff, and, as a result, have come to some very solid conclusions with regard to the materials that have been presented. And the way that the material has been discussed, I think we are in a good position to bring that to the full Committee whenever that turns out to be the right time.

So I think we have accomplished a lot in the last two days and we can move forward and start doing it.

CHAIRMAN RAY: Dick?

MEMBER SKILLMAN: No. No further comments. Thank you.

CHAIRMAN RAY: Sanjoy?

MEMBER BANERJEE: Harold, I really don't have, other than to thank you for a great presentation and also thank the staff, I wanted a little bit more clarity on what you said right now about bringing it to the full Committee. I don't think I understood quite what needs to get done before it comes to the full Committee, beyond this, you know, so I'm not --

CHAIRMAN RAY: There are two things.

One, squeeze it down into a suitable timeframe, but we always have to do that. That's no big deal. The other thing is there are issues in the material that we have before us, including a couple of departures, that we didn't review here in these two days. And we didn't review them because they are going to be taken up as generic items on the Levy docket. And so --

MEMBER BANERJEE: Typically, what are those items?

CHAIRMAN RAY: Well, it's condensate return, which you know well, and it's the interpretation of indefinite time period, for example, on the period in which the system is self -- passively self-sustaining for heat removal without a LOCA. You can always press the button and make a LOCA, but that's beside the point. So at least those two things.

There are more, and that's the list that he is talking about. Okay? And that's why I said to him, the things that we are interested in aren't just those two things, but it's whatever was -- at least -- there may be something else I'm not aware of, and that's --

MEMBER BANERJEE: Is there a timetable for resolving these?

CHAIRMAN RAY: There is. As Bob said, the current condensate return issue, if I can just lump everything into that, is currently scheduled for February 3rd, but it is in jeopardy because of just what needs to be done by that point in time. So it's tentatively, I would say, set for that point in time.

We can't necessarily get -- expect to get everything on the list done by then, but I just said from my personal standpoint what we are looking for are the things that are affected by what caused the condensate return. And I --

MEMBER BANERJEE: From our point of view, that is the main issue before we come to the -- that needs to be resolved to some reasonable extent before we come to the full Committee.

CHAIRMAN RAY: Well, not necessarily. I'm saying, at least hypothetically, we could write a letter that pointed out that there is stuff in the Lee application that we haven't looked at yet, because we are going to look at it on the Levy. Okay? We could do that, I think. At least in

principle you could do it, I guess would be the way to say it. Whether the Committee wants to take that up or not, I don't know, and I don't want to try and speculate.

I just said to the applicant that we will discuss it in November and see how people feel about it. I think it's also -- we have to look at it from the standpoint of the public and doing things incrementally as opposed to once and forever. That's the wrong term.

All comprehensively at one occasion rather than a piece here and a piece there at the full Committee level. That has a public communication aspect to it, as well as a communication with 18th floor up here, to say, "Here is a letter, except it excludes some stuff that we are going to take up later."

You know, that's something we have to talk about, and I'm not going to try and imagine what the full Committee is going to say about it. Normally, we are able to write a letter that addresses the application.

MEMBER BANERJEE: We have written interim letters before.

CHAIRMAN RAY: Well, we have when things are stretched out over a long period of time. That's right. We write interim letters, because there is too much time that goes on when things stretch out over in some cases many years.

MEMBER BANERJEE: The concern is our memories. We are not getting --

CHAIRMAN RAY: I know.

MEMBER BANERJEE: -- any younger.

CHAIRMAN RAY: Yes.

MEMBER BANERJEE: And --

CHAIRMAN RAY: I do understand that point. Trust me. But, again, I don't want to try and have that discussion here. It's one that we've got to have with the full Committee.

And as has been said, we write interim letters, but we do it because we have reviewed something over, say, the past two years, and we've got another year ahead before all of the rest of it is going to be done. And so that we'll go ahead and write an interim letter, which would be what would take place in this case.

But if we're talking about writing a letter in December that is partial versus a letter

in March that is complete, for example, I think we'd wait until March is my guess. Okay? I'm speculating now, and I said I wasn't going to speculate. But, I mean, that's the kind of -- you don't write an interim letter if in three months you're going to write another letter that is --

MEMBER BANERJEE: I guess we'll know February 3rd.

CHAIRMAN RAY: Well, we'll know what the Committee is thinking in -- sooner than that, but, yes.

MR. BURKHART: And if I may just add that, if we do go the two full Committee route, and I think the staff is willing to be flexible to support that, we just need -- if you can think of that final Levy docket generic design issues letter needs to cover Levy, Lee, and possibly even Turkey Point. So you may want to consider that maybe that's more than just a Levy meeting.

CHAIRMAN RAY: Yes. You're right, Larry. I didn't paint the other side of the picture, which is that writing a letter for a subsequent COLA that applies to several applicants is kind of a new thing for us, as opposed to writing

another -- a final full Committee letter after having written an interim letter. That's a different kettle of fish.

MR. KITCHEN: I can certainly appreciate that. We are struggling with those.

CHAIRMAN RAY: I'm sure you are. And so there are considerations. We will discuss them --

MEMBER BANERJEE: The reason I am sort of bringing this up is there are some unique considerations, like the exceedances and stuff.

CHAIRMAN RAY: Yes.

MEMBER BANERJEE: So which, you know, you can divide it into two sets. There are some generic issues and some which are particularly --

CHAIRMAN RAY: And we've done that.

MEMBER BANERJEE: So I think that -- a letter that deals with the particular issues in this case could be quite useful, and then, you know, a letter which is more generic. But this is just a part history.

CHAIRMAN RAY: You are coming to the November --

MEMBER BANERJEE: No, I have to be --

CHAIRMAN RAY: All right. Well, then, I

will talk to you separately and try and reflect your thoughts in the November full Committee meeting. But that's for just an inspection --

MEMBER BANERJEE: Yes. It's a different discussion, and I shouldn't have brought it up, but --

CHAIRMAN RAY: Okay. But, in any event, it's not quite like an interim letter followed a year later by a final letter. It's a little different for a couple of reasons.

MR. BURKHART: And to make things a little more complicated, Lee and Turkey Point have agreed to supplement their applications 90 days after the fix is complete for Levy. So all of the FSARs may not be -- the FSARs and the COLAs may not be up to date by the time you hear the design fixes for Levy.

So there's a lot of things I think we can talk about, and --

CHAIRMAN RAY: I take that for granted, Larry. I mean, I -- as far as I'm concerned, if we can just get the issues addressed, then updating the dadgum FSAR is something that I'll let you worry about. I'm not going to worry about it.

MR. BURKHART: Okay. But I think the staff -- take the message to be that the staff is willing to support two different full Committee meetings.

CHAIRMAN RAY: All right. But I'm not sure the full Committee is willing to do that, and I'm not sure that's what the Commission would want us to do either. And, again, I understand the reasons -- Sanjoy has given some, Bob has given some -- why we would want to put to bed what we can put to bed as soon as we can, but there are other issues on the other side that have to be taken into consideration.

Okay. Let's see, I've got the public line, I've got the member comments, I've gotten your input. Anything else anybody wants to say? If not, thank you very much. We're adjourned.

(Whereupon, the above-entitled matter went off the record at 2:20 p.m.)

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Protecting People and the Environment

Staff Presentation to ACRS Subcommittee

William States Lee III (WLS) Nuclear Station Units 1 and 2 COL Application

FSER Chapter 3, Design of Structures, Components, Equipment, and Systems

Section 3.7 – Seismic Design

Section 3.8 – Design of Category I Structures

October 21, 2015

Staff Review Team

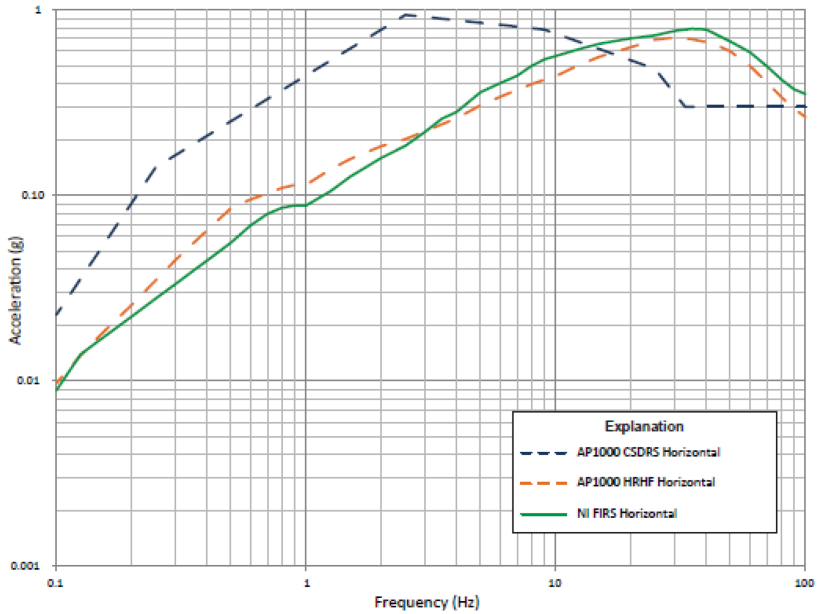
- Technical Staff
  - Robert Roche, Structural Engineering Branch
  - Vaughn Thomas, Structural Engineering Branch
  - Marieliz Vera, Structural Engineering Branch

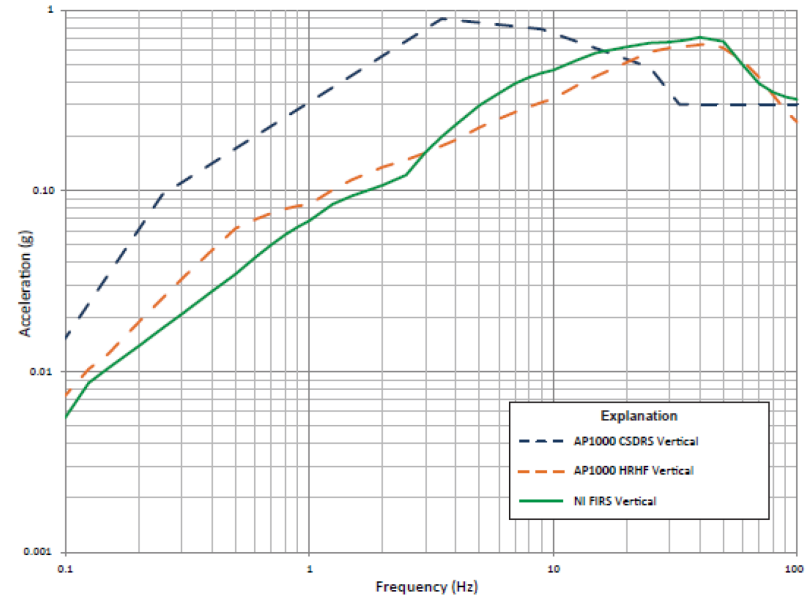
- Project Managers
  - Brian Hughes

Outline

- WLS DEP 2.0-1 (Section 3.7)
  - WLS SUP 3.7-3 – Foundation Input Response Spectra
  - WLS SUP 3.7-4 – Site-specific Analysis of Seismic Category II Building Structures
  - WLS SUP 3.7-5 – Site-specific Analysis of Nuclear Island (NI) Seismic Category I Structures
- WLS DEP 3.8-1 (Section 3.8)

WLS DEP 2.0-1



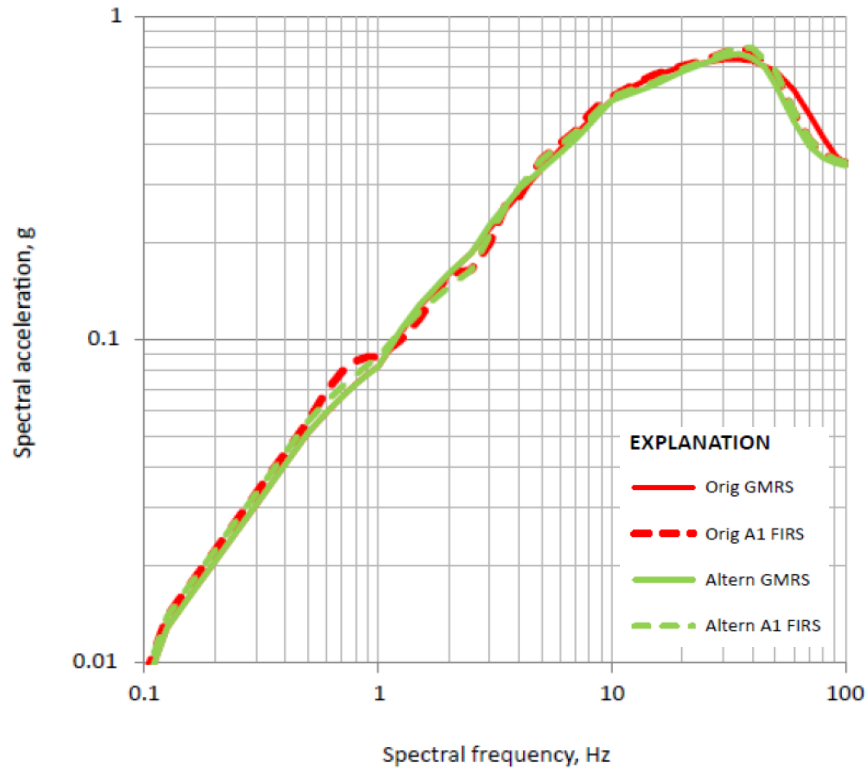


- **<u>Issue:</u>** Site-specific NI FIRS exceeds the AP1000 CSDRS and HRHF Spectra
- **<u>Resolution:</u>** The applicant conducted site-specific analysis to demonstrate the adequacy of the AP1000 design for the WLS site
  - The staff's evaluation of WLS DEP 2.0-1 is accomplished through the evaluation of supplemental information sections WLS SUP 3.7-3, 3.7-4, 3.7-5, and 3.7-6.
  - The staff conducted audit of site-specific analysis (May 2014)

WLS SUP 3.7-3: Foundation Input Response Spectra (FIRS)

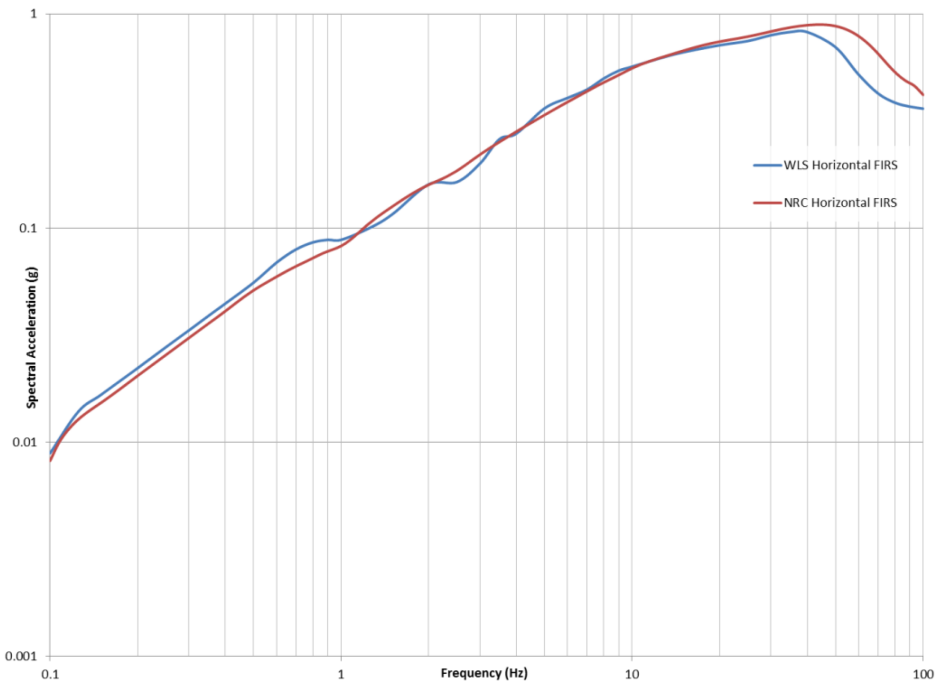
Issue: The staff noted that the WLS FIRS amplification transfer functions show amplification from ~30 to 100 Hz due to the varying fill concrete beneath the WLS structures, such that at those frequencies the FIRS should have larger spectral accelerations than the GMRS. In contrast, the WLS FIRS is less than the WLS GMRS at high frequencies. (RAI 118, Question 03.07.01-6)

Resolution: The applicant conducted a sensitivity study by calculating an alternative horizontal GMRS and FIRS and demonstrated that these differences are the result of application of different interpolation schemes between the frequencies of 25 and 100 Hz for which UHRS is actually calculated.



FIRS Confirmatory Calculations

- Staff conducted independent confirmatory site response calculations to account for the varying fill concrete beneath the WLS structures.
- The staff concludes that the difference in interpolation methods explains the differences between the WLS FIRS and the NRC FIRS.
- Based upon the staff's review of WLS COL FSAR, the applicant's RAI response (RAI 118, Question 03.07.01-6), and the staff's confirmatory analysis, the staff concludes that the applicant's methodology and results for calculations of the site-specific NI FIRS are acceptable.



WLS SUP 3.7-5: Site-specific Analysis of Nuclear Island Seismic Category I (SC-I) Structures

- Resolution: The applicant performed site-specific incoherent HRHF SSI analyses.
  - Modeling Approach:
    - Development of time history set used for analysis is in accordance with SRP Section 3.7.1 (WLS SUP 3.7-6).
    - Unit 1 dynamic profile used for the HRHF evaluation – Staff reviewed comparisons at AP1000 six key locations (RAI 119, Question 03.07.01-7) for Units 1 and 2 dynamic profiles and found to be consistent.
    - Refined NI finite element model (NI20u) – Consistent with DCD Section 3G.2.2.2 the staff verified adequacy of the model based on comparisons with NI10 model.
      - Comparisons demonstrate dynamic equivalence and conservative response of NI20u model relative to NI 10 model.

WLS SUP 3.7-5
Site-specific Analysis of Nuclear Island Seismic Category I (SC-I) Structures (Cont'd)

- Reductions to Coherent Motion (ISRS Reductions)
  - The staff reviewed the site-specific reductions to coherent motion against the respective reductions from the AP1000 HRHF evaluation (RAI 120, Question 03.7.02-3).
    - Staff review found the maximum levels of site-specific reductions to be consistent with those from the AP1000 HRHF evaluation.
  - Resulting ISRS are largely enveloped by AP1000 CSDRS or HRHF ISRS
    - Limited exceedances addressed as part of site-specific HRHF screening evaluation.

WLS SUP 3.7-5
Site-specific Analysis of Nuclear Island Seismic Category I (SC-I) Structures (Cont'd)

- Screening evaluation for Structures – Applicant compared site-specific forces to AP1000 forces at representative locations in building structures.
- Consistent with DCD Appendix 3I and TR-115, these locations include:
  - Auxiliary Building
  - Shield Building
  - Containment Internal Structures
- Staff review found that the site-specific forces are bounded by the AP1000 forces at all locations.
  - On this basis the staff concludes that the design to the AP1000 forces continues to be acceptable.

WLS SUP 3.7-4
Site-specific Analysis of Seismic Category II (SC-II) Building Structures

- Resolution: The applicant performed site-specific SSI analysis
- Minimum Seismic Gap between SC-I and SC-II Structures:
  - Minimum 2 inch and 4 inch seismic gap for foundation and top of structure, respectively, is provided in the AP1000 Design
  - The applicant demonstrated the site-specific maximum relative displacements between the NI and seismic SC-II structures to be significantly lower than the minimum seismic gap provided.
  - Additionally, the staff reviewed the overall global stability of SC-II Structures (RAI 121, Question 03.08.05-7). The site-specific factors of safety against sliding and overturning are greater than the required factors of safety for SC-I structures.
  - Based on the maximum site-specific relative displacements and stability factors of safety, the staff found the minimum seismic gap to be adequate for the WLS site.

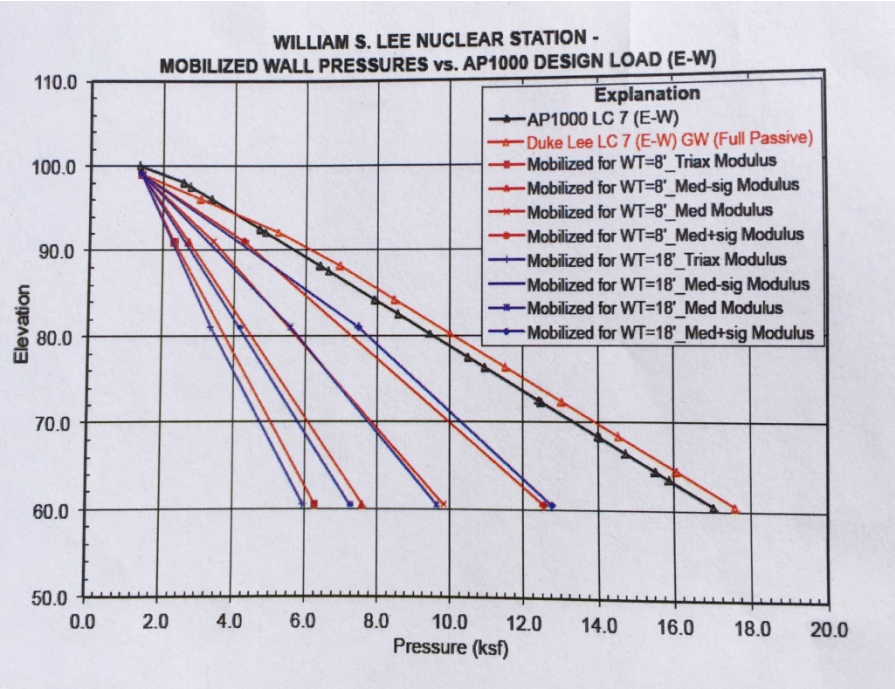
WLS SUP 3.7-4
Site-specific Analysis of Seismic Category II Building Structures (Cont'd)

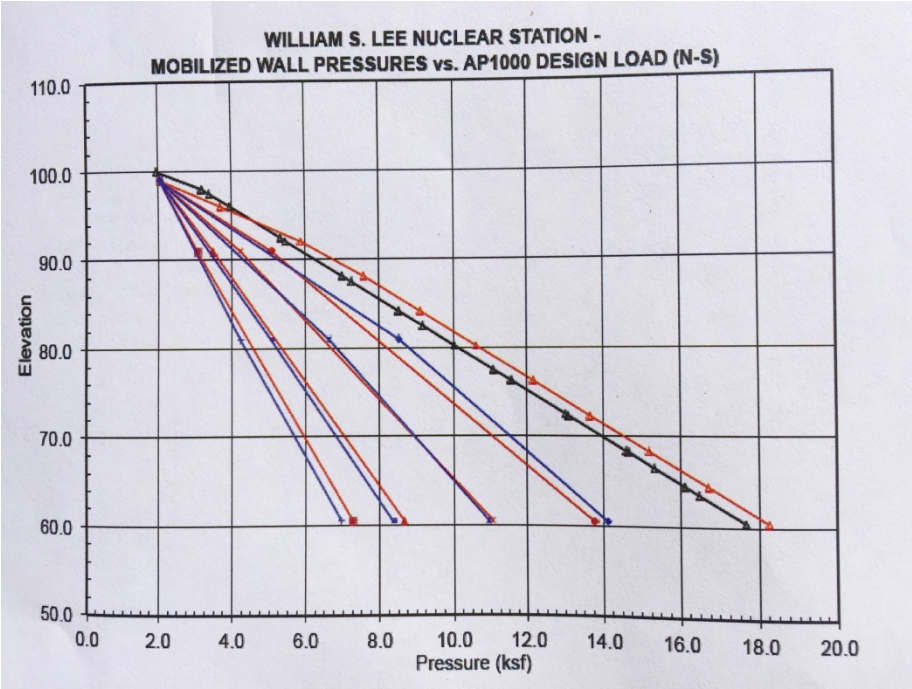
- SC-II Foundation Response Spectra (FRS)
  - Site-specific horizontal FRS is largely enveloped by corresponding AP1000 SC-II design envelop FRS
  - Site-specific vertical FRS exceeds the corresponding AP1000 SC-II design envelop FRS
  - The site-specific relative displacements and stability factors of safety, demonstrate that exceedances have negligible impact on the potential for interaction between the NI and SC-II.
  - The applicant committed to design the SC-II structures to the larger of the demands obtained from AP1000 generic design envelop FRS and the WLS site-specific SC-II FRS.

Seismic Margin Assessment

- The applicant adequately demonstrated that the AP1000 CSDRS controls the design for the WLS site and that no site-specific conditions exist that would affect the AP1000 SMA.
  - The AP1000 SMA is applicable to the WLS site.

WLS DEP 3.8-1
Lateral Earth Pressures





WLS DEP 3.8-1
Lateral Earth Pressures

- Issue
  - Site-specific lateral earth pressures are developed against the below grade exterior walls of the nuclear island (NI) (classified as safety-related) using nine different load combinations
  - The site-specific lateral earth pressures on the below grade NI walls for Load Combination 7 (LC7) exceeds those used in the AP1000 standard
    - NRC staff requested additional information to confirm that the applicant's site-specific lateral earth pressure are bounded by the standard AP1000 design

WLS DEP 3.8-1
Lateral Earth Pressures

- Resolution
  - Groundwater level: WLS groundwater level is 2.4m (8ft), AP1000 groundwater level is 0.6m (2ft) a difference of 1.8m (6ft) of non-buoyant (heavier) soil, resulting in a higher passive earth pressure.
  - Displacement: the maximum lateral displacement at the base of the nuclear island when subjected to the CSDRS is expected to be 0.31cm (0.12in) neglecting buoyancy and 0.48cm (0.19in) considering buoyancy effects. Development of the full passive pressure requires more displacements than the nuclear island will experience during a seismic event and small lateral displacements such as these are not capable of developing the full passive pressure.
  - WLS passive pressure will not be fully developed and the below-grade walls for the AP1000 standard design continue to bound the pressure that will actually occur at the WLS site.

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Staff Presentation to ACRS Subcommittee

William States Lee III (WLS) Nuclear Station Units 1 and 2 COL Application

FSER Chapter 6, Engineered Safety Features Section 6.4 – Control Room Habitability System

Danny Chien, Reactor Systems Engineer, NRO/DSRA/SCVB

October 21, 2015

Section 6.4 - Habitability Systems

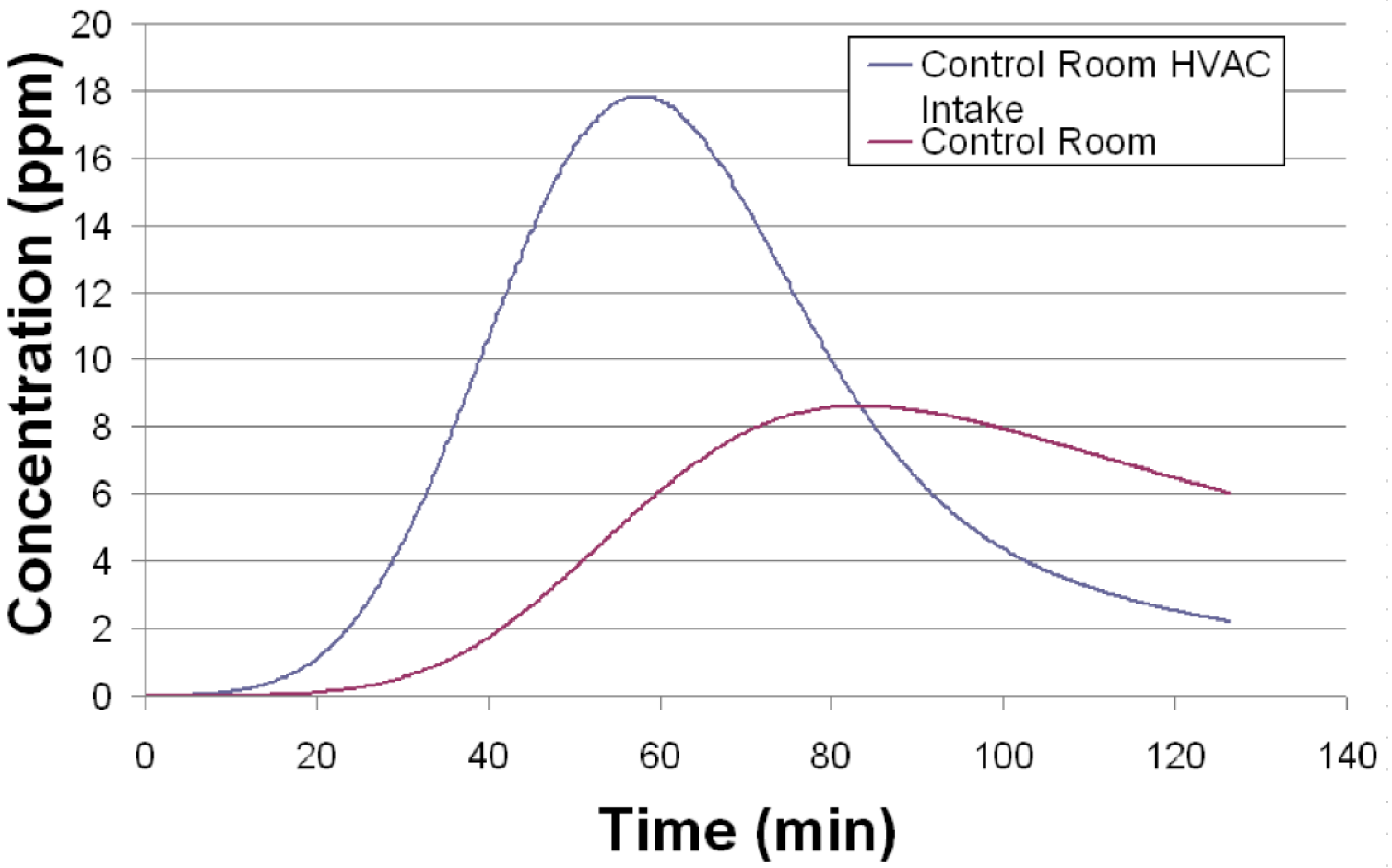
- Site-Specific Evaluations
  - WLS COL 6.4-1, related to main control room (MCR) habitability analysis of plant-specific toxic chemicals

MCR Toxic Chemical Habitability Analysis

- FSAR Section 2.2.3
  - Applicant's analysis of a pressurized liquid chlorine tractor-trailor burst type accident, using worst case conditions, showed MCR intake concentration above the chlorine IDLH value
- FSAR Section 6.4
  - Applicant used the ALOHA code heavy gas model, in conjunction with the HABIT code Gaussian dispersion model
  - Applicant concluded that the concentration inside the MCR is less than the chlorine IDLH value
- SER Section 6.4
  - Staff's independent analysis using ALOHA confirmed the results of the applicant's analysis and confirmed the analysis used conservative assumptions

Backup

Staff's Analysis



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United States Nuclear Regulatory Commission

Protecting People and the Environment

Staff Presentation to ACRS Subcommittee

William States Lee III (WLS) Nuclear Station Units 1 and 2 COL Application

FSER Chapter 8, Electric Power

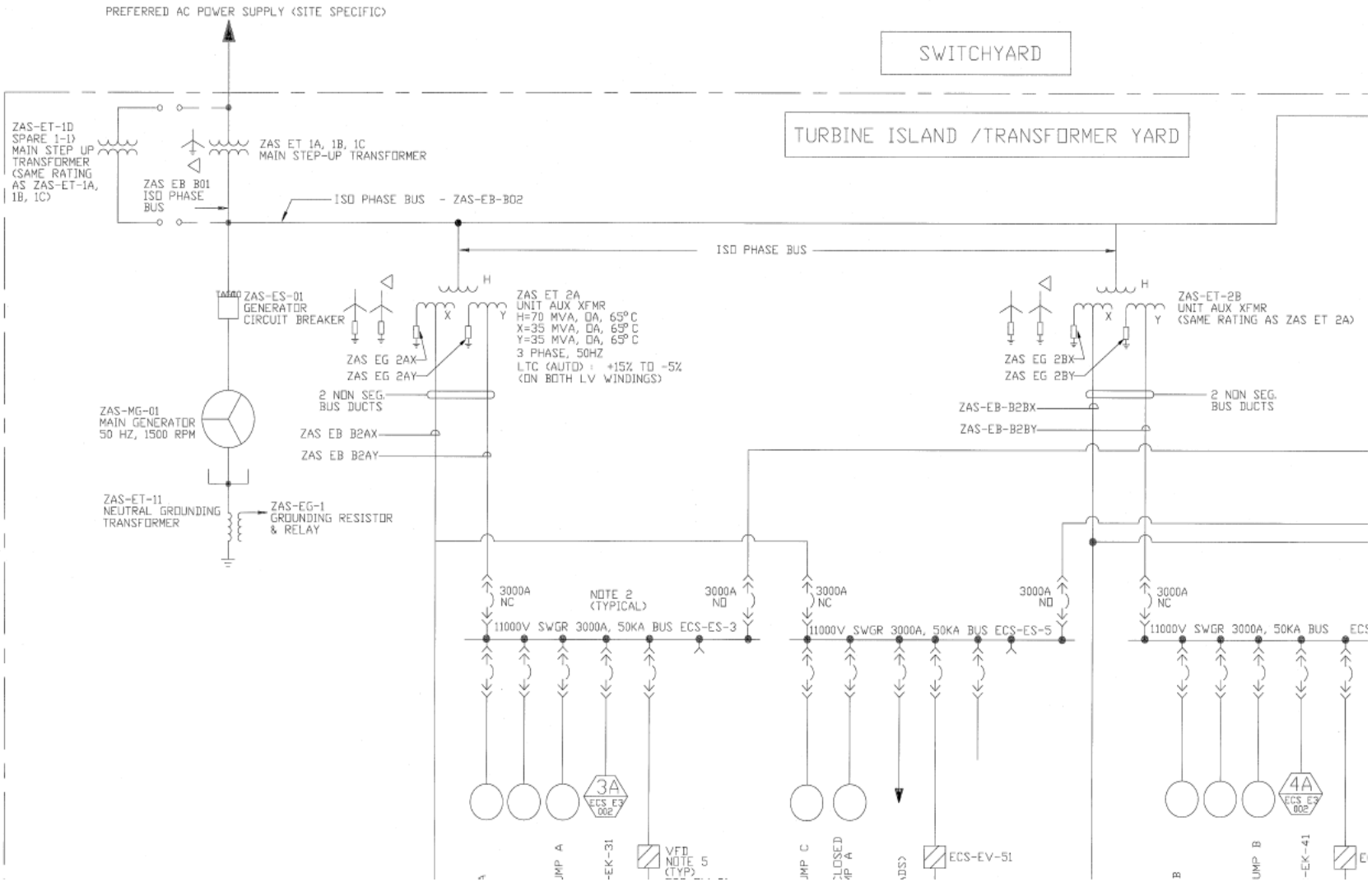
Sheila Ray, P.E., Senior Electrical Engineer, NRR/DE/EEEB

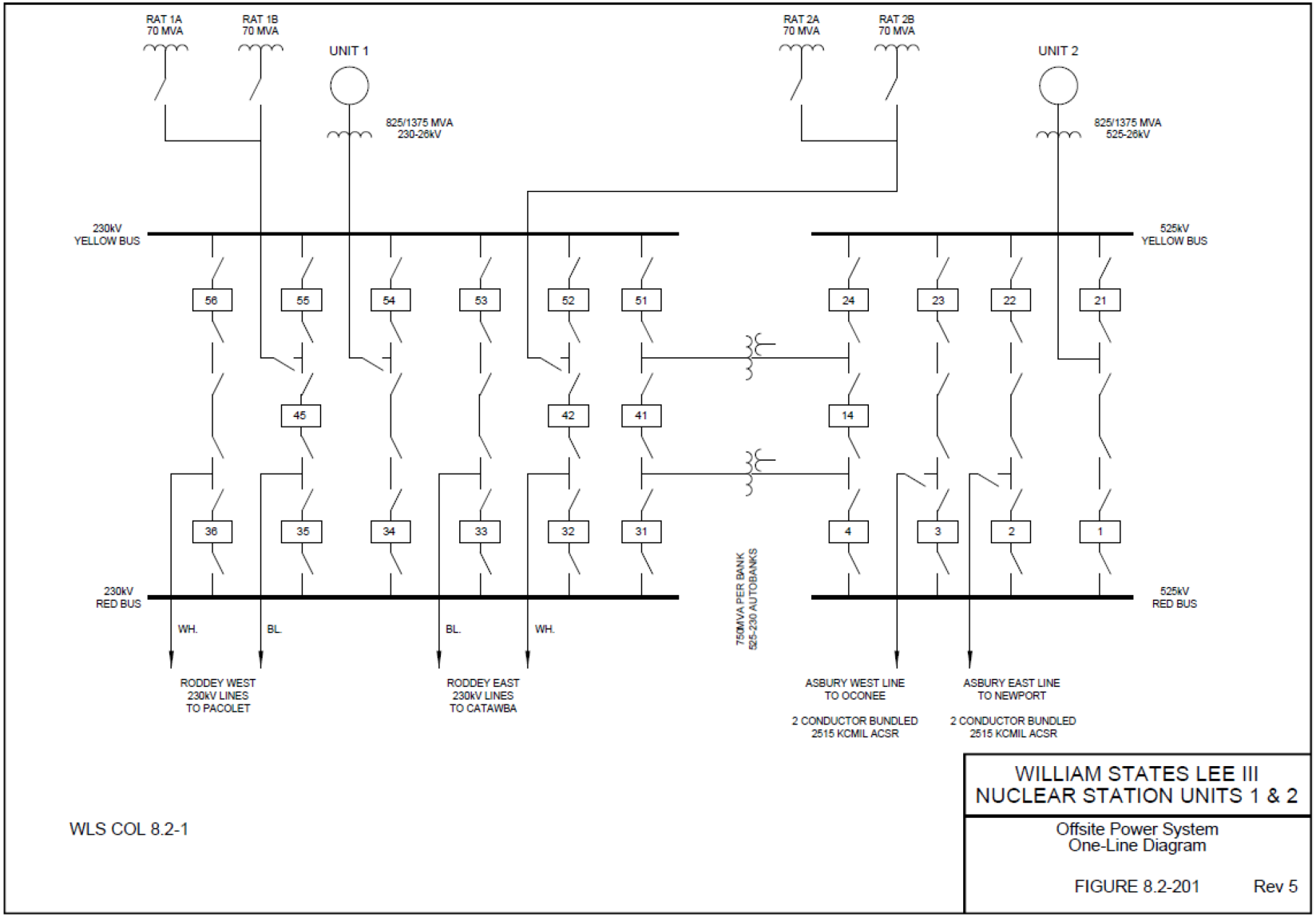
October 21, 2015

Open Phase Condition

- An open phase condition occurred at the Byron plant in 2012. An open phase condition occurs when one or more of the three phases in an offsite power feed is lost
- Regulatory basis: 10 CFR Part 50, Appendix A, General Design Criterion 17 and 10 CFR 50.55a(h)(3).
- This event is significant because it is a potential common cause failure event since both offsite and onsite electrical power systems were not able to perform their intended safety function
- The event highlighted a problem that could occur at other reactors

AP1000 DCD – AC Power Station One Line Diagram




RAT 1A
70 MVA
RAT 1B
70 MVA
UNIT 1
825/1375 MVA
230-26kV
RAT 2A
70 MVA
RAT 2B
70 MVA
UNIT 2
825/1375 MVA
525-26kV
230kV
YELLOW BUS
525kV
YELLOW BUS
56
55
54
53
52
51
24
23
22
21
45
42
41
14
36
35
34
33
32
31
4
3
2
1
230kV
RED BUS
525kV
RED BUS
750MVA PER BANK
525-230 AUTOBANKS
WH.
BL.
BL.
WH.
RODDEY WEST
230kV LINES
TO PACOLET
RODDEY EAST
230kV LINES
TO CATAWBA
ASBURY WEST LINE
TO OCONEE
2 CONDUCTOR BUNDLED
2515 KCMIL ACSR
ASBURY EAST LINE
TO NEWPORT
2 CONDUCTOR BUNDLED
2515 KCMIL ACSR
WILLIAM STATES LEE III
NUCLEAR STATION UNITS 1 & 2
Offsite Power System
One-Line Diagram
FIGURE 8.2-201
Rev 5
WLS COL 8.2-1

Open Phase Condition

- To address the vulnerability identified in Bulletin 2012-01, passive reactor designs, i.e. WLS, should have the following:
  - Automatic detection of loss of phase events
  - Alarm in the control room
  - Procedures/Training
  - Periodic Surveillance Tests

Open Phase Condition

- The WLS site's technical design:
  - Monitoring system on high voltage side of main step-up transformers
  - Alarm in control room
  - Relays to detect high negative sequence currents on medium voltage buses & alarm in control room
  - ITAAC
  - Procedures/Training

Open Phase Condition - ITAAC

Design Commitment	Inspections, Tests, and Analyses	Acceptance Criteria
7. The credited GDC 17 off-site power source is monitored by an open phase condition monitoring system that can detect the following at the high voltage terminals of the transformer connecting to the off-site source, over the full range of transformer loading from no load to full load: (1) loss of one of the three phases of the offsite power source a. with a high impedance ground fault condition, or b. without a high impedance ground fault condition; or (2) loss of two of the three phases of the offsite power source a. with a high impedance ground fault condition, or b. without a high impedance ground fault condition. Upon detection of any condition described above, the system will actuate an alarm in the main control room.	i) Analysis shall be used to determine the required alarm set points for the open phase condition monitoring system to indicate the presence of open phase conditions described in the design commitment. ii) Testing of the credited GDC-17 off-site power source open phase condition monitoring system will be performed using simulated signals to verify that the as-built open phase condition monitoring system detects open phase conditions described in the design commitment and at the established set points actuates an alarm in the main control room.	i) Alarm set points for the open phase condition monitoring system to indicate the presence of open phase conditions as described in the design commitment have been determined by analysis. ii) Testing demonstrates the credited GDC 17 off-site power source open phase condition monitoring system detects open phase conditions described in the design commitment and at the established set points actuates an alarm in the main control room.

Open Phase Condition

- Staff determined that the design was sufficient because it provides features for monitoring and detecting a loss of phase.
- In addition, procedures will be developed prior to fuel load and ITAAC are in place.
- Furthermore, the design meets the requirements in GDC 17 and 10 CFR 50.55a(h)(3).

Backup Slide – other AP1000 COL

- Vogtle – detection and alarm on high voltage side of transformer implemented prior to fuel load
- Summer - detection and alarm on high voltage side of transformer implemented by second refueling outage
- Turkey Point - detection and alarm on high voltage side of transformer implemented prior to fuel load
- Levy - detection and alarm on high voltage side of transformer implemented prior to fuel load

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Protecting People and the Environment

Staff Presentation to ACRS Subcommittee

William States Lee III (WLS) Nuclear Station Units 1 and 2 COL Application

FSER Chapter 13, Conduct of Operations Section 13.3 – Emergency Planning

Kenneth Thomas, NSIR/DPR/NRLB

October 21, 2015

Emergency Planning

- EPZ
  - Applicant proposed a 10-mile EPZ
  - Reviewed and approved by the States of South Carolina and North Carolina the 3 risk counties prior to COL submittal.
  - FEMA Interim Finding Report

EPZ Map

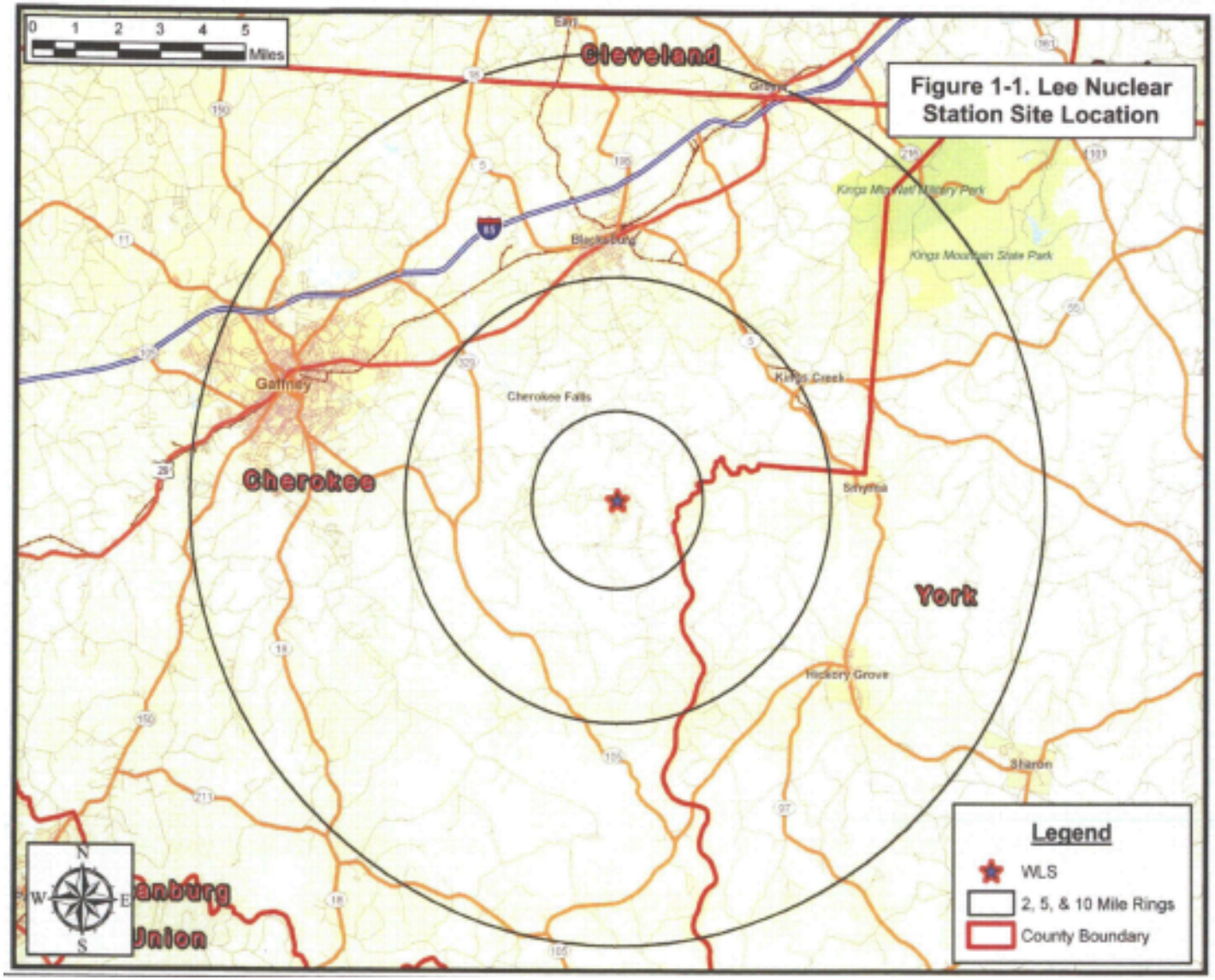
Figure 1-1. Lee Nuclear Station Site Location
0 1 2 3 4 5 Miles
Cleveland
Cherokee
York
Gaffney
Blacksburg
Cherokee Falls
Kings Creek
Sylvia
Hickory Grove
Sharon
Kings Mountain State Park
Legend
WLS
2, 5, & 10 Mile Rings
County Boundary
N
S
E
W

Technical Support Center Location

- A single TSC serves both units
  - Basement of the Maintenance Building
- Distance
  - Transit Time from either MCR is greater than 2 minutes
  - Sophisticated communication and data systems compensate for distance.
  - Adequate Capability
    - Demonstrated capabilities by EP-ITAAC

Operations Support Center

- The OSCs are located in the space designated for the TSC in each unit's Annex Building of the AP1000 Design
- One for each unit

Emergency Operating Facility

- Duke's Energy Center Building in Charlotte,
- Currently serves as the EOF for the McGuire Nuclear Station (MNS), Catawba Nuclear Station (CNS), and Oconee Nuclear Station (ONS)
- MNS and CNS have used a common EOF since 1987.
- This Facility has been used for all three since 2005.

Near-site Facility for NRC

- Duke Energy In-Processing Facility (Kings Mountain Generation Support Facility) located approximately 15.5 miles (straight line distance) from the Lee Facility.

U.S.NRC

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Protecting People and the Environment

Staff Presentation to ACRS Subcommittee

William States Lee III (WLS) Nuclear Station Units 1 and 2 COL Application

FSER Chapter 20, Requirements Resulting from Fukushima Near Term Task Force Recommendations

October 21, 2015

ACRS Subcommittee Presentation
AFSER Chapter 20

Requirements from Fukushima Task Force Recommendations

1. Recommendation 2.1: Seismic and Flood Hazard Reevaluations
2. Recommendation 2.3: Seismic and Flood Walk downs
3. Recommendation 4.1: Station Blackout Regulatory Actions
4. Recommendation 4.2: Equipment covered under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(hh)(2)
5. Recommendation 5.1: Reliable Hardened Vents for Mark I Containments
6. Recommendation 8: Strengthening and Integration of Emergency Operating Procedures, Severe Accidents Management Guidelines, and Extensive Damage Mitigation Guidelines
7. Recommendation 9.3: Emergency Preparedness Regulatory Actions (staffing and communications)

ACRS Subcommittee Presentation
AFSER Chapter 20

Staff determined that the following three recommendations were applicable and should be addressed by the WLS COL applicant:

- Recommendation 4.2: Equipment covered under 10 CFR 50.54(hh)(2) - Order licensees to provide reasonable protection for equipment currently provided pursuant to 10 CFR 50.54(hh)(2) from the effects of design-basis external events and to add equipment as needed to address multiunit events while other requirements are being revised and implemented.
- Recommendation 7.1: Spent fuel pool instrumentation - Order licensees to provide reliable spent fuel pool level instrumentation.
- Recommendation 9.3: Emergency preparedness regulatory actions (staffing and communications) - Order licensees to do the following until rulemaking is complete.

ACRS Subcommittee Presentation
AFSER Chapter 20

- The staff determined that the applicant has already addressed the seismic and flood hazard reevaluation portion of Recommendation 2.1. Therefore, there are no additional requirements left to be addressed in Recommendation 2.1 for seismic and flood hazard reevaluations applicable to the WLS Units 1 and 2 Site COL application.
- Additionally, the staff determined that Recommendation 2.3 was not applicable to the WLS COL because the plant is not yet constructed, and Recommendation 5.1 was not applicable because it applied to boiling water reactor type plant designs with Mark I and Mark II Containments. Recommendations 4.1 and 8 did not need to be further considered because SECY-11-0137 and its associated SRM direct that regulatory action associated with them be initiated through rulemaking.

ACRS Subcommittee Presentation
AFSER Chapter 20

RELIABLE SPENT FUEL POOL LEVEL INSTRUMENTATION

- The proposed license condition states: Prior to Fuel Load
- The spent fuel pool instrumentation shall be maintained available and reliable through the development and implementation of a training program. The training program shall include provisions to insure trained personnel can route the temporary power lines from the alternate power source to the appropriate connection points and connect the alternate power source to the safety-related level instrument channels.

ACRS Subcommittee Presentation
AFSER Chapter 20

Conclusion

- The staff concludes the provisions for SFP instrumentation arrangement, qualification, power sources, accuracy and display are consistent with the recommendations described in SECY-12-0025 and Commission Order EA-12-051.

- The proposed license condition is acceptable because it provides that, prior to fuel load, the licensee will have in place procedures for the proper maintenance of the level instruments and for the connection and use of an alternate power source in order to power the level instruments.

ACRS Subcommittee Presentation
AFSER Chapter 20

- Recommendation 2.1: Seismic and Flood Hazard Reevaluations
- Discussed in the prior presentations 2.4 , 2.5
- Recommendation 9.3: Emergency Preparedness Regulatory Actions (staffing and communications).

ACRS Subcommittee Presentation
AFSER Chapter 20

Recommendation 4.2 Mitigation Strategies for Beyond-Design-Basis External Events

- NRC Interim Staff Guidance (ISG) JLD-ISG-2012-01, Revision 0, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” endorses with clarifications, the methodologies described in the industry guidance document, Nuclear Energy Institute (NEI) 12-06, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” Revision 0. JLD-ISG-2012-01 describes an acceptable approach for developing mitigation strategies for beyond-design-basis external events at nuclear power plants based on the guidance in NEI 12-06.

ACRS Subcommittee Presentation
AFSER Chapter 20

- The NRC staff reviewed the mitigating strategies for WLS Units 1 and 2 to provide assurance of core cooling, containment, and SFP cooling capabilities in the event of a beyond-design-basis external event resulting in an ELAP event. The staff finds that the approach for mitigating beyond-design-basis external events to be used at WLS Units 1 and 2 is consistent with NRC Order EA-12-049 and both general and AP1000-specific NRC guidance (including NEI 12-06, Appendix F, as endorsed by the NRC staff). Therefore, the staff concludes that the mitigating strategies for beyond-design-basis external events described for WLS Units 1 and 2 are acceptable.

ACRS Subcommittee Presentation
AFSER Chapter 20

- The staff will impose a license condition as discussed in this AFSER to verify the implementation of the mitigation strategies for beyond-design-basis external events at WLS Units 1 and 2.
- License Conditions:
  - Requires completion of an integrated plan, prior to fuel load
  - Implement procedures, training, acquire support equipment and have in place a preventive maintenance program.

The staff finds the strategies for beyond-design-basis external events for the WLS Units 1 and 2 acceptable.

9.3 Emergency Planning

- The Emergency Plan describes dedicated and diverse communications capabilities between the control rooms, TSC, OSC, and the EOF. These dedicated communications links include:
  - phone link for the Affected Unit to dispatch OSC teams between the OSC, TSC, and Control Room.
  - phone link for use by the ED, EPM, and Shift Supervisor/EPOS between the Affected Unit Control Room, the TSC, and the EOF.
  - phone link for transmission of technical data between the TSC, Affected Unit Control Room, and the EOF.
  - phone link to discuss mitigating activities and priorities between the TSC and EOF.
  - Station telephone line that is a communication link between activated facilities.
- The phone links in the station have diverse and back-up power supplies

NTTF Recommendation 9.3

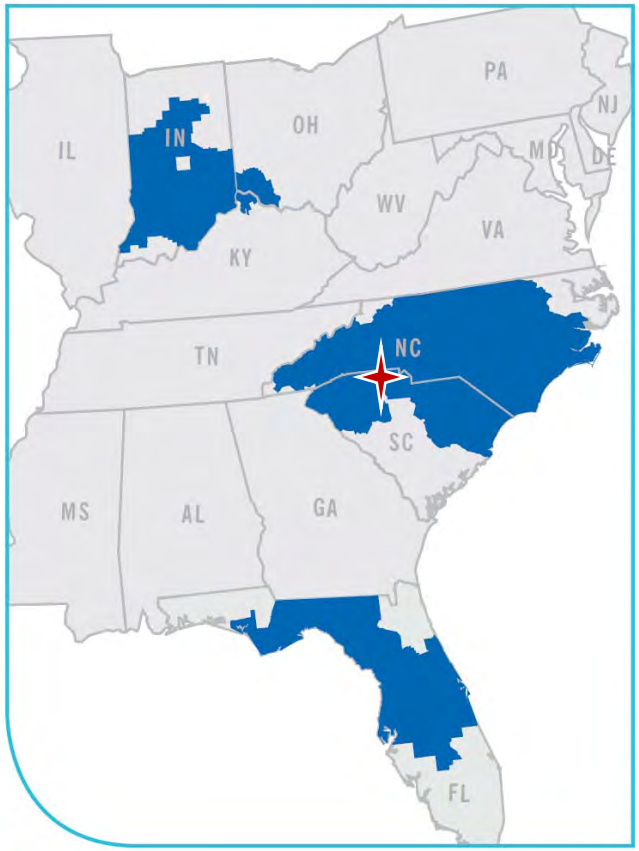
- Communication and Staffing assessments are addressed by license conditions, one for the staffing assessment and another for communication assessment.
- License Condition (20-3) requires at least 18 months before the latest date set forth in the schedule for completing the ITAACs that the assessments will be completed for both communications and staffing using the approved NEI 12-01, (*Guideline for assessing Beyond Designed Basis Accident Response Staffing and Communications Responsibilities.)*
- Also at 180 days prior to fuel load corrective actions identified during the assessment must be incorporated and the plan must identify how the augmented staff will be notified given degraded communications capabilities.

NTTF Recommendation 9.3

- **The staff finds the License condition acceptable because**

It conforms to the guidance provided in SECY-12-0025, NEI –12-01, NUREG-0654/FEMA/REP-1, NURG-0696 and meets the applicable requirements in 10 CFR 50.47(b) and Appendix E to 10 CFR 50.

Lee Nuclear Station FSAR Chapter 6 Engineered Safety Features



Jim Thornton
Lee Licensing Manager
Nuclear Development

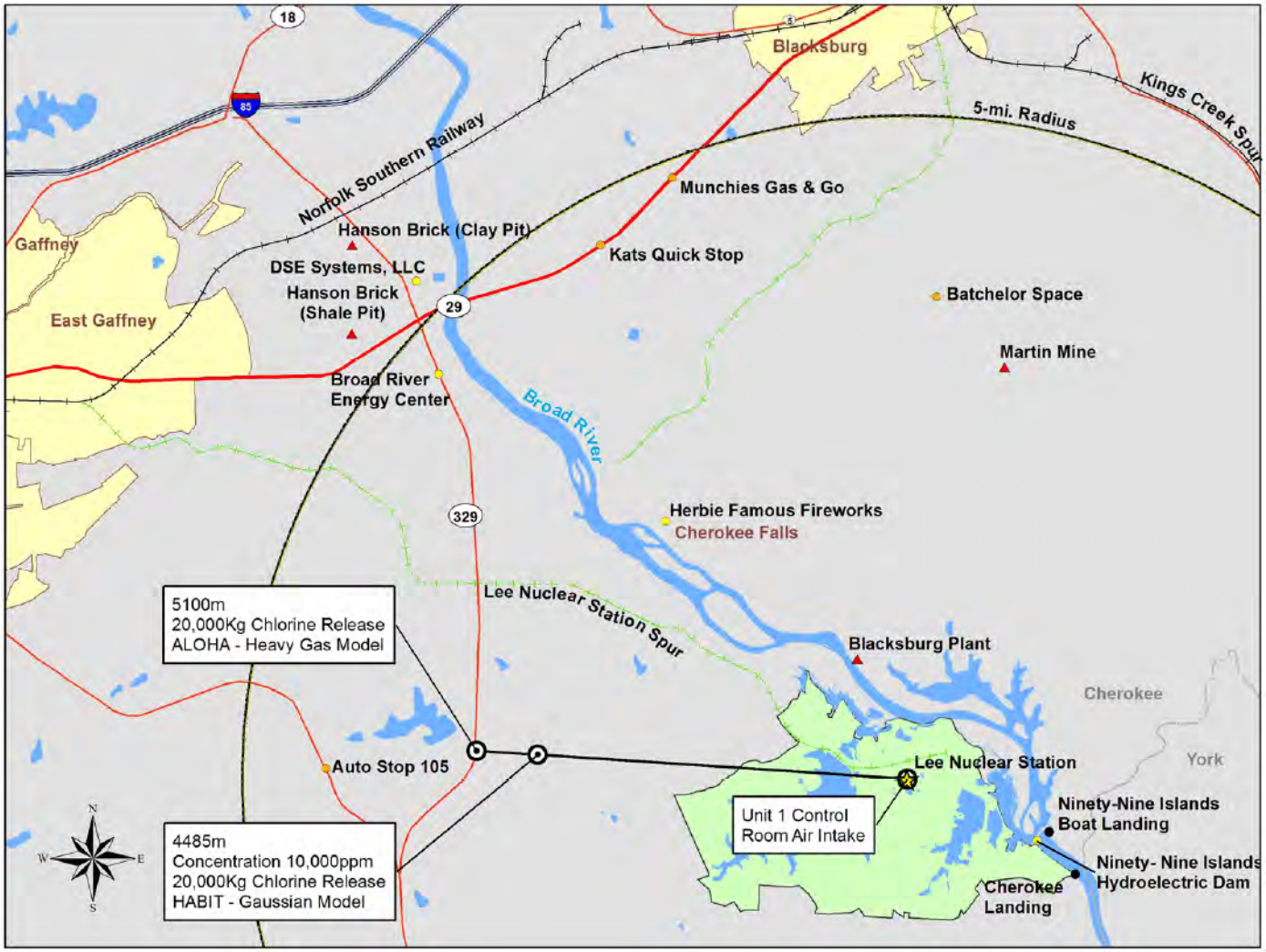
FSAR 6 Overview

- DCD Incorporated by Reference
- Standard material incorporated
- Site specific information of interest
  - Evaluation of offsite chemical spill effects on Main Control Room (MCR)
  - Evaluation of onsite site specific chemical spill effects on MCR

FSAR 6 Offsite Chemical Spill Effects on MCR

- Postulated chlorine tanker spill/release on major roadway at closest approach to the plant site
- A hybrid analysis performed to address heavier-than-air dispersion characteristic of chlorine
  - ALOHA code applied to evaluate chlorine dispersion from spill location to heavier-than-air transition location
  - HABIT code applied to evaluate chlorine dispersion from transition location to MCR intake and evaluate chlorine buildup in MCR

FSAR 6 Illustration of Offsite Chemical Spill Dispersion Modeling



Derived from Lee FSAR Figure 2.2-201.

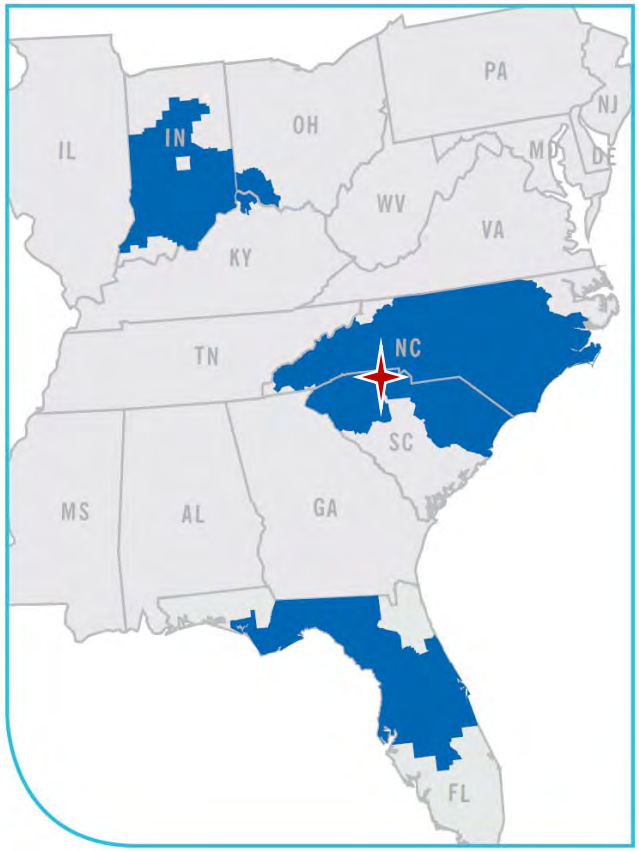
FSAR 6 Offsite Chemical Spill Results

- The concentration of chlorine in the MCR remains below the Regulatory Guide 1.78 toxicity limit of 10 ppm for chlorine
  - No ventilation system alarm or protective actions required to maintain MCR below toxicity limit

FSAR 6 Onsite Site Specific Chemicals Spills

- FSAR Table 6.4-202 summarizes on-site chemicals
- Two site specific (pH control) chemicals screened for further evaluation
  - Methoxypropylamine (MPA)
  - Dimethylamine (DMA)
- Limiting concentrations at MCR elevated air intake location analyzed using SLAB code
- The evaluation confirmed that concentrations at the control room intake do not exceed toxicity limits

LEE NUCLEAR STATION
FSAR CHAPTER 8
Electric Power



John Thrasher
Director Engineering
Nuclear Development

FSAR Chapter 8 Overview

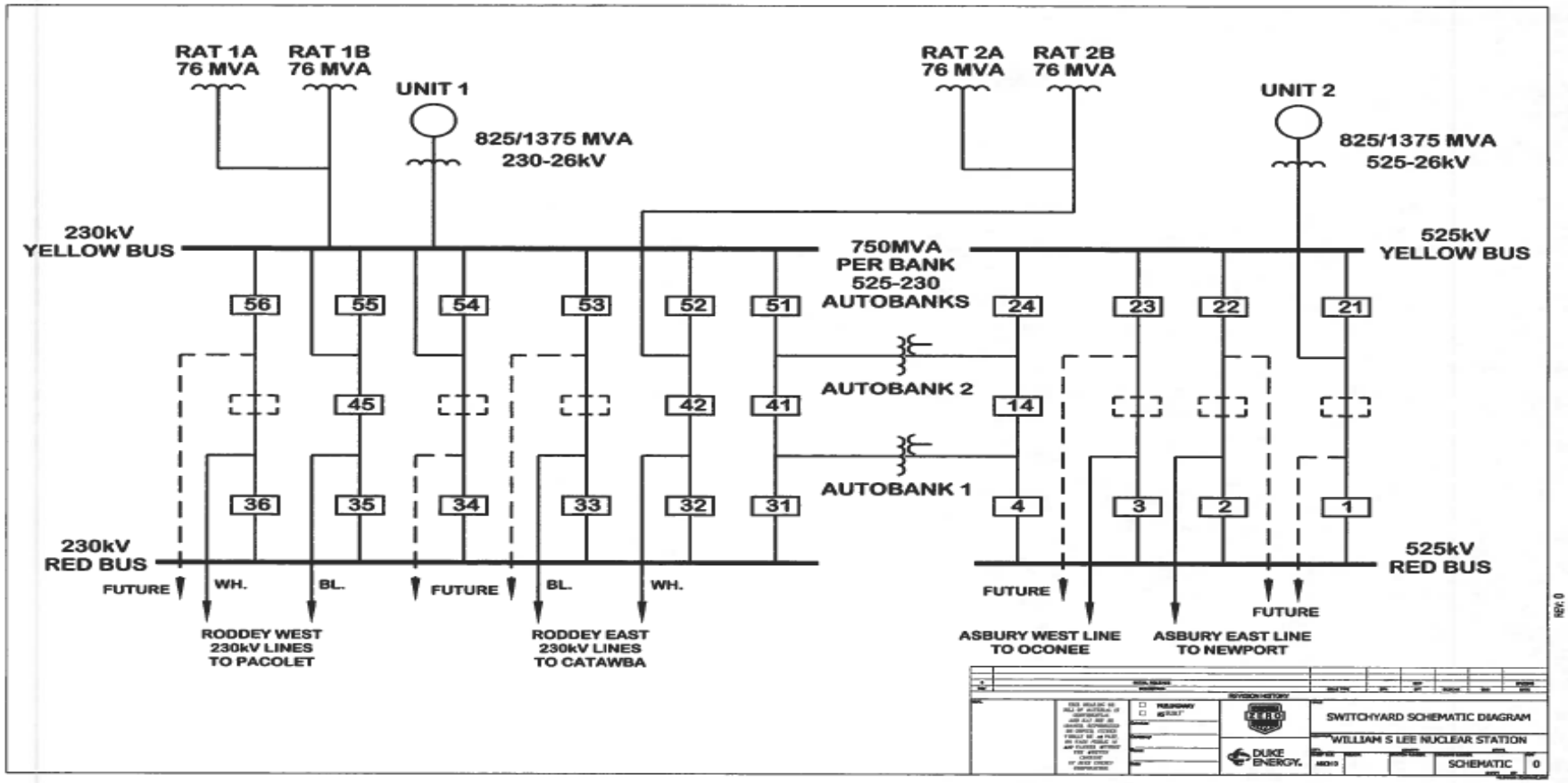
- DCD incorporated by reference
- Standard material incorporated
- Site specific information of interest
  - Section 8.2 – Offsite Power
  - NRC Bulletin 2012-01 – Open Phase Condition
  - Electrical Departure

Section 8.2 – Offsite Power

- Six transmission lines will connect site Switchyard to transmission system
  - Two 525 kV lines
  - Four 230 kV lines
  - Each line has sufficient capacity and capability to power the plant safety related and non-safety related systems under normal, abnormal and accident conditions

Switchyard Location

Switchyard One-Line Diagram



Section 8.2 – Offsite Power

- A Grid Stability study confirmed Westinghouse interface requirements were met
  - Maintain Reactor Coolant Pump voltage for three seconds after a turbine trip
- Failure Modes and Effects Analysis (FMEA) for the switchyard confirmed that **no** single initiating event results in either:
  - The failure of more than one off-site transmission line, **or**
  - The loss of off-site power to either Unit 1 or Unit 2

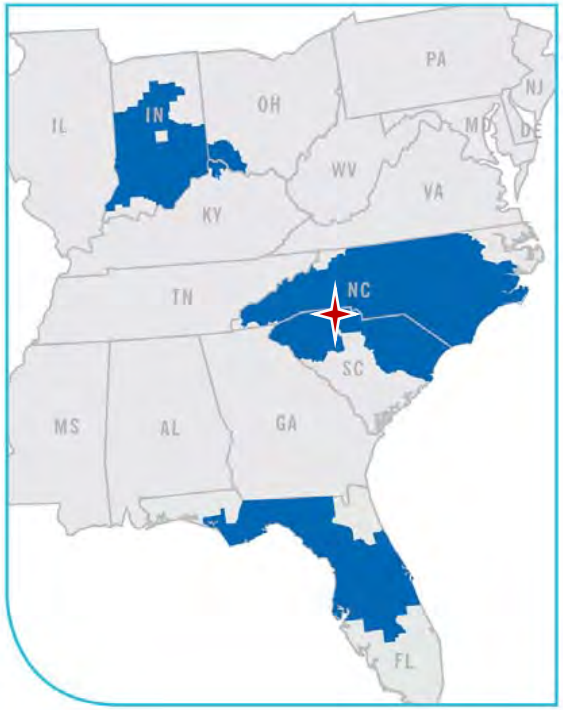
NRC Bulletin 2012-01

- Loss of phase events on GDC 17 offsite power circuit at Byron Nuclear Plant
  - Resulted in unbalanced three phase voltages on safety related busses
  - NRC Bulletin 2012-01 issued in response
- AP1000 does not require AC power to achieve safe shutdown
- Open phase condition (OPC) monitoring system will be provided on GDC 17 circuit to address NRC Bulletin
  - Monitors MSU transformer HV input power supply
  - Initiates an alarm in the main control room
  - New ITAAC

Electrical Departure

- WLS DEP 8.3-1clarifies that:
  - Class 1E voltage regulating transformers (VRTs) do not have active components to limit current
  - Class 1E VRTs have built-in input and output circuit breakers that are provided for protection and isolation
  - Circuit breakers are coordinated and periodically tested as a part of the Maintenance Rule program

LEE NUCLEAR STATION
FSAR CHAPTER 9
Auxiliary Systems



John Thrasher
Director Engineering
Nuclear Development

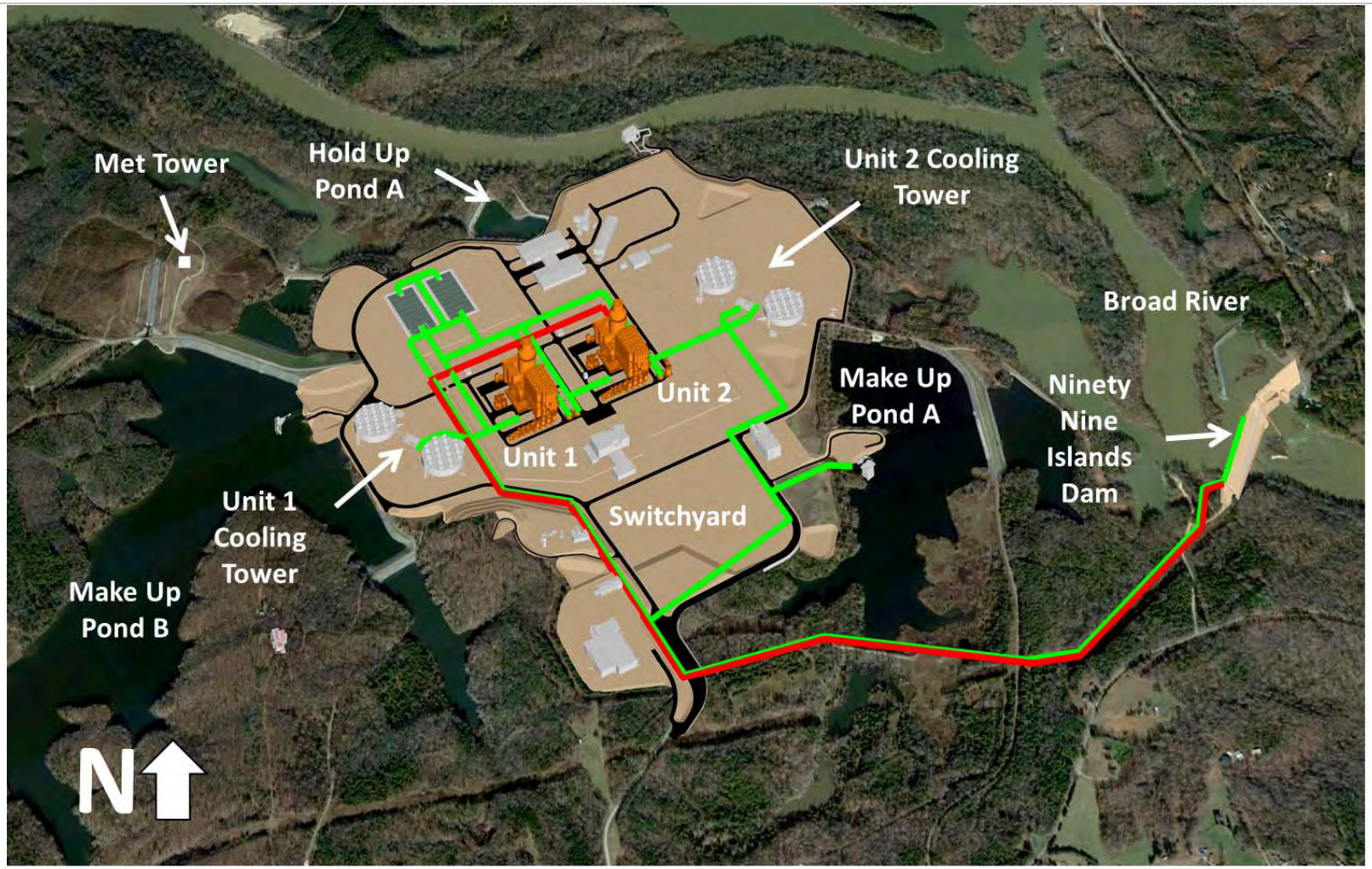
FSAR Chapter 9 Overview

- DCD Incorporated by reference
- Standard material incorporated
- Site specific information of interest
  - Waste Water System (WWS)
    - Site-Specific Portions of System
  - Liquid Radwaste System (WLS)
    - Site-Specific Portions of System

Waste Water System (WWS)

- Blowdown Sump receives inputs from:
  - Cooling Tower Blowdown
  - Raw Water System – alternate dilution if CWS out of service
  - Waste Water Retention Basins (WWRBs)
- Liquid Radwaste System tie-in point with Waste Water System is very close to Broad River
- Effluent discharged through outfall pipe/diffuser into Ninety-Nine Islands Reservoir
- NPDES Operating Permit Governing Discharges Received from SC DHEC on July 17, 2013

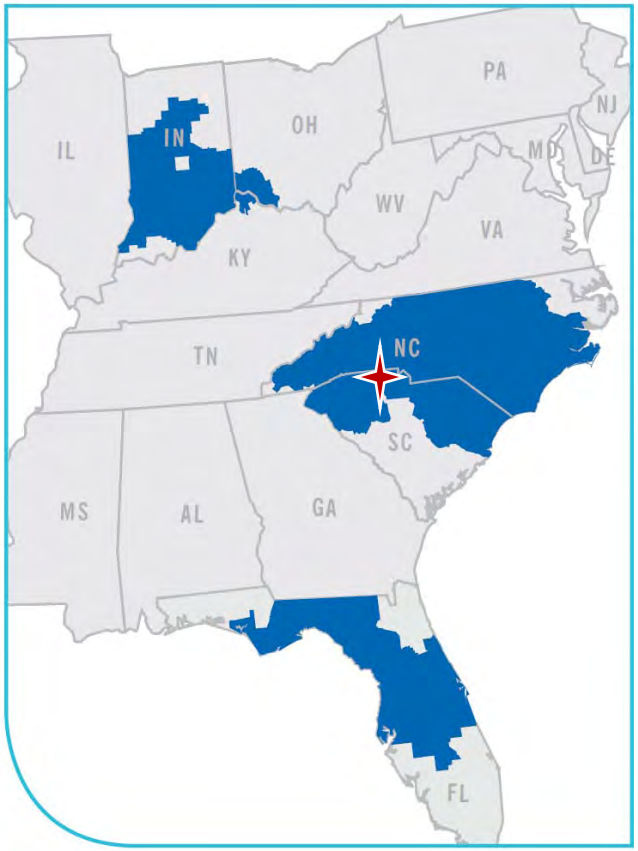
Waste Water and Liquid Radwaste Systems



Liquid Radwaste System (WLS)

- Liquid Radwaste System piping
  - Stainless steel process piping
  - Enclosed in a high density polyethylene (HDPE) guard pipe
- No valves or vacuum breakers in process piping outside of monitored structures
- Annular space between process piping and guard pipe is monitored for leakage at low points
- Monitoring points facilitate manual sampling for leakage consistent with NEI 08-08A and 10 CFR 20.1406 contamination minimization requirements
- Leakage monitoring implemented as part of Radiation Protection Program

LEE NUCLEAR STATION FSAR CHAPTER 13.3 Emergency Planning and Post-Fukushima Non-Seismic Actions



Larry Taylor
Operational Readiness
Nuclear Development

Outline

- Overview
- DCD Incorporated by Reference
- Standard material incorporated
- Site-specific information of interest
  - Emergency Plan Summary
  - DCD Departure
  - Emergency Facilities
  - Site Layout
- Post-Fukushima Non-Seismic Actions

FSAR 13.3 Emergency Planning

- DCD Incorporated by Reference
- Standard material incorporated
- Site-specific topics of interest
  - WLS Departure 18.8-1 Relocation of TSC and OSC
  - EOF location exception requested

Emergency Plan Summary

- Single Plan for both units
- Modelled after Catawba Nuclear Station Emergency Plan
- Developed in accordance with:
  - NUREG-0654/FEMA –REP-1, Rev. 1
  - 10 CFR 50.47
  - 10 CFR 50 Appendix E

Emergency Response Facilities

- Technical Support Center (TSC)
  - Common for both units
  - Located below grade elevation in the Maintenance Support Building, within the Protected Area
  - Identified by DCD Departure 18.8-1
  - Meets requirements of NUREG-0696 with exception of being within two minutes travel of Control Room, estimated travel time at Lee Site will be ~five minutes
  - Data and communications links provided between Control Rooms, OSCs, and EOF

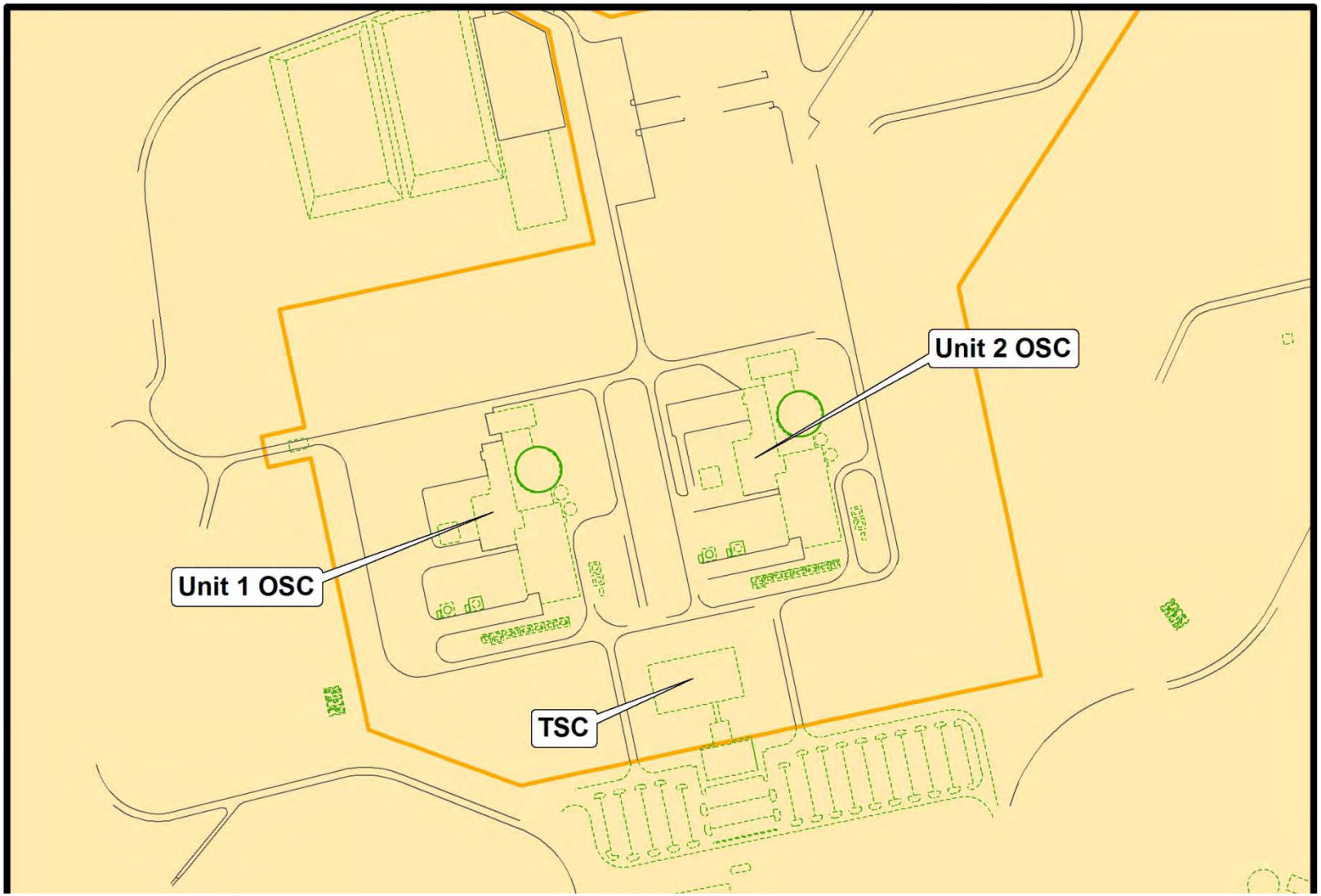
Emergency Response Facilities

- Operational Support Centers (OSC)
  - The OSCs are located in the space designated for the standard TSC in each unit's Annex Building
  - Location is adjacent to the control room
  - Identified by WLS DCD Departure 18.8-1

Emergency Response Facilities

- Emergency Operations Facility
  - EOF location exception requested; EOF is greater than 25 miles from the TSC (NUREG-0696 Guidance).
    - TSC is ~40 air miles from the EOF in Charlotte, NC
    - Common EOF currently supporting Catawba, McGuire and Oconee Nuclear Stations
  - Plan to include Lee Nuclear Station also
  - Includes Joint Information Center
  - Common EOF has supported multi-site exercises
  - A Near Site Assembly Area is provided at Kings Mountain Generations Support Facility if needed by NRC or other Emergency Responders, 15.5 miles from the Lee Site

Emergency Response Facilities



Post-Fukushima Non-Seismic Actions

- Lee Post-Fukushima RAI based on AP1000 Licensee Orders and 50.54(f) letter requirements
  - NTTF Recommendation 9.3, EP Staffing and Communications
  - NTTF Recommendation 4.2, Mitigating Strategies
  - NTTF Recommendation 7.1, SFP Instrumentation

Recommendation 9.3 (EP)

- NRC Fukushima Near-term Task Force (NTTF) Recommendation 9.3 on EP staffing and communications resulted in 50.54(f) letter issuance to current licensees at the time.
  - Lee responded to this item via RAI based on Recommendation 9.3 requirements outlined in Enclosure 5 of the March 12, 2012 50.54(f) letter.
  - Lee has a proposed license condition to address the staffing and communications assessments required by this letter.

Recommendation 4.2 (Mitigating Strategies)

- Fukushima NTTF Recommendation 4.2 on mitigating strategies resulted in order issuance to current licensees at the time.
  - Lee responded to an RAI referencing Attachment 3 to Order EA-12-049.
  - Lee will have a license condition to address the actions required for this recommendation similar to the requirements in the Mitigation of Beyond-Design-Basis Events (MBDBE) proposed rule (10 CFR 50.155).

Recommendation 4.2 (Mitigating Strategies)

- Fukushima NTTF Recommendation 7.1 on spent fuel pool (SFP) instrumentation resulted in order issuance to current licensees at the time.
  - Lee responded to an RAI referencing Attachment 3 to Order EA-12-049.
  - Lee has a proposed license condition to address the training portion of the actions required for this recommendation. All other portions of the recommendation are satisfied by the AP1000 plant design.
    - DCD Chapter 9 text was supplemented with additional information on SFP level instrumentation in Lee FSAR Chapter 9.
    - A departure was taken to correct an inconsistency in DCD Table 3.11-1, Sheet 14 of 51relative to SFP level instrument “Envir Zone” number.

Emergency Plan

Questions?