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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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US-APWR SUBCOMMITTEE

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MONDAY

JUNE 7, 2010

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ROCKVILLE, MARYLAND

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The Subcommittee convened at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Dr. John Stetkar, Chairman, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

JOHN W. STETKAR, Chair

DENNIS C. BLEY

MARIO V. BONACA

WILLIAM J. SHACK

NRC STAFF PRESENT:

NEIL COLEMAN, Designated Federal Official

HOSSEIN HAMZEHEE

BRAD HARVEY

JEFF CIOCCO

SESHAGIRI TAMMARA

NEBIYU TIRUNEH

YONG LI

SARAH TABATABAI

BOB TJADER

JOE DeMARSHALL

HIEN LE

ALSO PRESENT:

ATSUSHI KUMAKI

RYAN SPRENGEL

KAZUKI OKABAYSHI

FUTOSHI TANAKA

KEN SCAROLA

ETSURO SAJI

MAKOTO TAKASHIMA

HIROSHI HAMAMOTO

T-A-B-L-E O-F C-O-N-T-E-N-T-S

Opening Remarks....................................4
NRC Staff Introduction..............................6
US-APWR Design Certification Application, Tier 2, Ch. 2, Site Characteristics, MHI.......................7
SER with Open Items, US-APWR, NRC staff...........37
US-APWR Design Certification Application, Tier 2, Ch. 16 Site Characteristics, MHI......................88
SER with Open Items, NRC Staff...................159
Subcommittee Discussion..........................202

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

8:30 a.m.

CHAIRMAN STETKAR: The meeting will now come to order.

This is a meeting of the ACRS US-APWR Subcommittee. I'm John Stetkar, Chairman of the Subcommittee. Other ACRS members in attendance are William Shack, Dennis Bley and Mario Bonaca.

Neil Coleman of the ACRS staff is the Designated Federal Official for this meeting.

The purpose of our meeting is for the Subcommittee to review Chapters 2 and 16 of the NRC Safety Evaluation with open items for the US-APWR designed rollout. Chapter 2 is site characteristics and Chapter 16 is technical specifications.

Chapter 2 of the Design Control document focuses on the geography and demography, nearby facilities and postulated site parameters for the design, including meteorology and climatology geology, seismology and geotechnical parameters.

Chapter 16 includes required technical specifications that set forth the safety limits, limiting safety system settings, limiting conditions for operation and other limitation on facility operation deemed necessary to protect the public's health and safety.

The Subcommittee will gather information, analyze relevant issues and facts and will formulate proposed positions and actions as appropriate for the full the Committee to deliberate.

The rules for participation in today's meeting have been announced in the notice of this meeting previously published in the *Federal Register*. Later today there will be an opportunity for stakeholder comments. We've received no additional written comments or requests for time to make oral statements from members of the public regarding today's meeting. We have received no requests for people to participate via a bridge phone line regarding today's meeting.

A transcript of the meeting is being kept and will be made available as stated in the *Federal Register* notice. Therefore, we request that participants in this meeting use the microphones located throughout the meeting room when addressing the Subcommittee.

Participants should first identify themselves and speak with sufficient clarity and volume so they may be readily heard.

We will now proceed with the meeting and the presentations by the NRC staff and Mitsubishi Heavy Industries.

And I'll turn it over to Mr. Hossein Hamzehee from the staff. Hossein?

MR. HAMZEHEE: Yes, thank you. Good morning. I am Hossein Hamzehee, the Branch Chief for the US-APWR Projects.

As you mentioned, we're today to present to you the results of the staff's review of Phase 2 Safety Evaluations with open items.

And as you mentioned earlier, we are going to present the results of Chapter 2 Site Characteristics and Chapter 16 Technical Specification.

Chapter 2 will be presented this morning and Chapter 16 will be covered in the afternoon. The presentation will be made by our key members from technical branches and projects. And we also have the key members from Mitsubishi Heavy Industries that are going to make their presentation for us. And, as you know, usually they're going to be first made by MHI and then followed by the staff's presentation.

And I would also like to thank you, the Members, for your time today.

And with that, I would like to turn it to

Neil and maybe MHI.

Anything else, Neil, you would like to add?

DESIGNATED FEDERAL OFFICIAL COLEMAN: Nothing for me.

MR. HAMZEHEE: All right. So if you don't have any questions for me, I'm going to turn it to MHI.

CHAIRMAN STETKAR: Great. Thank you.

Make sure you have your name tag.

MR. KUMAKI: Okay. Shall I start.

MR. HAMZEHEE: Yes, please.

MR. KUMAKI: Good morning. My name is Atsushi Kumaki from Mitsubishi Heavy Industries.

And I would like to present about the Chapter 2 US-APWR CD.

Today's contents of my presentation includes overview of the chapter and I will introduce our site's characteristics for US-APWR, the design.

And number 3 is the major RAIs which we exchanged with NRC and MHI for a long time.

And lastly, I will summarize my presentation.

The first item is overview of chapter. Title of the chapter is Site Characteristics. And we had some discussion with NRC using the term of "characteristics" or "parameters." Site characteristics means the actual features of US-APWR design and the site parameter means postulated features for the design. And we referred to 10 CFR Part 52 description and we understand the difference as to the term. So we collected some parts of using this term "characteristics" or "parameters." And we agreed with NRC, and then final our DCD Revision 2 is agreed by both of us.

And the scope of chapter. This chapter includes geological, seismological, hydrological and the meteorological characteristics. And these parameters, you know these characteristics is applied for the standard design only. But most COL applicant will confirm our site characteristics defined in DCD. And if it's not bounded compared with on-site conditions, COL applicant will provide their site-specific qualification or evaluation.

And I'd like to explain about the key site parameters. When we developed our DCD of the US-APWR we leave out the UTT requirement documents which is provided by Electric Power Research Institute. We have no experience in the U.S. power plant. We only have our Japanese plant only. So we researched and we researched what kind of condition is good for the U.S. people or U.S. utilities. So we leave out the EPRI document.

And our parameters bounds estimated is 75 percent to 80 percent of U.S. landmass.

And our site is defined as contiguous real estate with legal right to control access by individuals and to restrict land use.

Table 2.0-1 on our DCD Chapter 2 is a summary identifying specific site parameters for the US-APWR.

From this slide I would like to explain our site characteristics, just to outline of subsections.

And on the presentation of major RAIs, at that time I will explain more detail. Right now I would like to introduce each items only.

On Section 2.1 geography and demography and 2.2 is nearby industrial, transportation and military facilities. Those items is the exact site specific characteristics, so we didn't define anything under DCD standard design. That will come to COL applicant.

And Section 2.3 meteorology we set some conditions as: Winter precipitation and tornado wind speed right from that.

Next slide is continuing of Section 2.3 meteorology, we set some values for the tornado like radius of maximum rotational speed or rate of pressure drop, maximum tornado pressure drop, like from that. And those we reset atmospheric distortion factors.

And also we set the extreme wind speed for US-APWR on the standard design.

Next section is 2.4, describe above the hydrologic engineering. We set groundwater elevation level for flood or tsunami, and also we set the rainfall rate.

Under Section 2.5 --

CHAIRMAN STETKAR: Can I stop you on --

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: -- you on hydrologic engineering.

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: Groundwater elevation 1 foot below plant grade is a relatively high groundwater level.

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: Do any of the buildings in the US-APWR design have safety related equipment located more than 1 foot below grade level?

MR. KUMAKI: Actually, we facing that COL application for Comanche Peak. And at that site the groundwater level -- I'm sorry. I don't remember in detail. But our design of building is applicable to the ground.

CHAIRMAN STETKAR: But at this stage we're talking about the design certification. And the design certification specifies groundwater elevation minimum of one foot below plant grade. So my question is does the certified design contain any safety related equipment that's located more than 1 foot below grade? For the certified side of it. We'll discuss Comanche Peak when we get to the COL for their site specific characteristics.

So I'm curious for the certified design do you have any safety related equipment located more than 1 foot below grade level?

MR. KUMAKI: No.

CHAIRMAN STETKAR: Nothing? Everything--

MR. KUMAKI: Over.

CHAIRMAN STETKAR: --is above ground?

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: Are there any cables

routed through underground cable ducts.

MR. KUMAKI: It's all -- it's also no.

CHAIRMAN STETKAR: No underground cable ducts?

MR. KUMAKI: Let me --

CHAIRMAN STETKAR: Below ground level.

MR. KUMAKI: Below 1 foot?

CHAIRMAN STETKAR: If it was a cable duct, it would be more than 1 foot below ground.

MR. KUMAKI: I'm sorry. I don't know any details.

CHAIRMAN STETKAR: Okay. Well, I'd like to know that.

MR. KUMAKI: Okay.

CHAIRMAN STETKAR: Because there are many sites in the United States that have groundwater levels that are relatively high and you're allowing a groundwater level to be only 1 foot below surface.

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: Which is rather high. And in those types of designs it's been necessary to install continuous dewatering facilities to keep the groundwater from coming in through building walls and such. That's the concern about locations of safety related equipment inside the buildings and if you have any underground cable ducts that have safety related or cables that are important to safety. I'd be interested to know about that.

DESIGNATED FEDERAL OFFICIAL COLEMAN: May I suggest we get clarification on what plant grade means?

MR. KUMAKI: Yes, sir.

DESIGNATED FEDERAL OFFICIAL COLEMAN: Whether that's surface or, say, base of containment.

CHAIRMAN STETKAR: That's a good question, Neil. Thanks for bringing that up.

I thought that I read somewhere in the DCD that plant grade, indeed, was surface elevation. But we should get that clarified because there may be a misunderstanding whether it's basemat level or actual ground surface.

MR. KUMAKI: Yes. My understanding that plant grade means the level of a basemat.

CHAIRMAN STETKAR: Okay. Well, okay. I hope that's clarified. Because I tried to read through the DCD and I thought I found someplace where plant grade was defined as surface level, in other words ground surface.

MR. KUMAKI: And also, we are not considering about the dewatering system for our design.

CHAIRMAN STETKAR: Well, that was going to be my second question, but I first wanted to understand where the equipment and cables were located.

Okay. Maybe we can get some clarification on that.

MR. KUMAKI: Right. Understand.

CHAIRMAN STETKAR: Thank you.

MR. KUMAKI: You're welcome.

And so next Section 2.5, it's geology, seismology, and geotechnical engineering. We set SSE peak ground acceleration is 0.3g. This value is taken from the Utility Requirement Document of EPRI.

And also we set certified seismic design response spectra, it according to the Regulatory Guide 1.60.

And the slope of stratum or surface tectonic deformation.

MEMBER SHACK: Did you give any consideration to using Regulatory Guide 1.208 to define the spectra?

MR. KUMAKI: Pardon?

MEMBER SHACK: The performance-based approach rather than the 1.60, the uniform hazard approach?

MR. KUMAKI: I'm sorry.

Yes, we know the Regulatory Guide 1.208 and also we compare -- we refer both Regulatory Guide. And we took the --

MEMBER SHACK: The 1.60?

MR. KUMAKI: Yes.

Okay. Next is a continuing of 2.5. We said the subsurface stability, like, bearing capacity and shear wave velocity. And we don't consider about the liquefaction on our standard design.

And also next be the 2.5. We set the settlement of the foundation and also tilt of the foundation for the seismic Category 1 structures.

From this slide I will explain about the major RAIs exchanging with NRC and MHI.

And these values and description of site parameters are revised and added based on those RAIs.

The first point is Section 2.3 meteorology. We discussed about winter precipitation, its normal and for extreme. And under our DCD less than zero there are some confusing description. So we examine our DCD on Chapter 2 and finally we set the normal precipitation roof load is 50 pounds per square feet. And the extreme winter precipitation roof load is 75 pounds per square feet. This raises some confusing information, but finally we set a normal 50 psf for normal and the 75 psf for extreme.

And number 3 item. Forty-eight hour probable maximum winter precipitation, we didn't set any information on our Chapter 2 DCD Legend zero. But we already considered for the design of this 36 inches. And so we discussed with NRC, and NRC request us to clarify this design. And so we put this 36 inches on this too.

And the fourth line is maximum tornado line speed. Maximum rotational is 184 miles per hour and the maximum translational 46 miles per hour. We also didn't set those values on our DCD legend zero on Chapter two. But we put those values on Chapter 3 of the DCD. And so NRC request us to put those values taking from Chapter 3 and also put the Chapter 2.

Next 5 and 6 radius of maximum --

CHAIRMAN STETKAR: Just be careful when you turn the paper with the microphone there. It makes noises for our reporter.

MR. KUMAKI: I'm sorry.

This continuous 5 radius of maximum

rotational speed, and 6 is rate of pressure drop. We also didn't set those values 150 feet and 0.5 psi/s on our DCD Chapter 2. But those values are under Chapter 3. So those values taken from Chapter 3 and Chapter 2.

And number 7 is extreme wind speed. Our characteristics is 155 mile per hour for 3 second gusts at 33 feet above ground level. And NRC recommend us to clarify our scope of these values and parameters. Then we added the supplemental information as we added those terms were based on 100 hour year return period was importance factor 1.15 for seismic Category I/II.

CHAIRMAN STETKAR: I'm going to ask the staff about this also. I looked up hurricane ratings and a Category IV hurricane has a sustained wind speed between 131 miles per hour and 155 miles per hour, a sustained wind speed. And I suspect that gusts within a Category IV hurricane would probably exceed 155 miles an hour. It's not clear. I'm not a meteorologist. I don't know whether gusts within a Category III hurricane would exceed 155 mils per hour.

I'm curious how you arrived at a 155 mile per hour 3 second gust as having a 100 year return period. It seems that the return period for several locations, especially in the south and southeast and eastern coastal portions of the United States might be considerably less than 100 years for that type of gust.

What's your basis for that 100 year return period for that magnitude of a wind gust?

MR. KUMAKI: We refer the several information of the United States Meteorology database. And, I'm sorry, I don't know in detail. But we have some base data source for this identification.

CHAIRMAN STETKAR: Okay. I guess if you can find that data source, I'd appreciate it.

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: Thanks.

MR. KUMAKI: I will provide later.

MR. HARVEY: This is Brad Harvey from the staff.

Is this an appropriate time to answer your question now?

CHAIRMAN STETKAR: Why don't we wait until you guys come up.

MR. HARVEY: Understood.

CHAIRMAN STETKAR: We'll run through the

issues then.

MR. KUMAKI: Okay. This slide is describing about the chi/Q for main control room and the technical support center.

We provided our presentation slide later regarding this chi/Q discussion. So I'd like to skip this slide now.

CHAIRMAN STETKAR: Okay.

MR. KUMAKI: Next section is 2.4 hydrologic engineering. We said the maximum rainfall rate is 19.4 inches per hour and also 6.3 inches for five minutes for short-term.

We discussed about those values with NRC, and we set some erroneous information on our DCD legend zero like 19.4 inch per hour with importance factor of 1.2 and also for the short-term we said the same words, was importance factor of 1.2. And then NRC recommended us what's the information or what's the meaning of this importance factor of 1.2. So we reconsider and re-examine our description or our design. And so finally we removed those importance factor of 1.2 from the DCD. So actually we set the 19.4 inch per hour for rainfall rate and also the 6.3 for short-term.

And then next these are Section 2.5

regarding subsurface stability. We set bearing capacity for static dynamic, and also we set the shear wave velocity. The discussion in RAIs for those parameters is using the average or minimum, or an average or a mean, or those using term.

For the static bearing capacity and the dynamic bearing capacity we said the word "average" on the DCD legend zero. But NRC request us or comment us, we have to limit or qualify the limiting condition. So we changed our words from "average" to "minimum" for both static bearing capacity and dynamic bearing capacity.

And also, we changed the number of dynamic bearing capacity from 95,000 to 60,000. And 95,000 includes some conservatisms. And also we analyzed our seismic design and finally we set the 60,000 for the minimum allowable bearing capacity.

And Item C is shear wave velocity. We pull on the word of "mean," and also the mark of mean before the 1,000 foot per second the mark. Okay. We said that those are minimum shear wave velocity.

MEMBER BLEY: There is a little thing bothering me and it goes from the slide before and this one. When you get asked a question, you come back and change language. Were these language problems or -- you know, I'm a little concerned --

MR. KUMAKI: Yes.

MEMBER BLEY: -- that you're saying "Oh, okay, whatever you want, we'll tell you."

Isn't the thing on the left the thing had originally, or did you make a mistake, or was it a matter of English language interpretation?

Can you, for this whole group, explain a little of that?

MR. KUMAKI: The first one for static is just a using of word.

MEMBER BLEY: Okay.

MR. KUMAKI: English program for our Japanese.

And also we didn't limit any values. At that time our design is -- I'm sorry. I say again.

For the dynamic bearing capacity, that includes the program for using English and also the values, analyzing the values.

And items C and A, the program of using word.

MEMBER BLEY: And on the previous page you have the importance factor. Did you have an importance factor of 1.2, or didn't you? You know, I mean suddenly this disappears and the numbers stay the same. So I'm a little confused.

MR. KUMAKI: This is just a mistake of us.

MEMBER BLEY: Okay.

MR. KUMAKI: We didn't consider about the importance factor.

MEMBER BLEY: Okay. But out of habit or something you wrote it down that way?

MR. KUMAKI: Yes.

MEMBER BLEY: Go ahead.

MR. KUMAKI: Thank you.

So next the continuance of Section 2.5. It's also talking about the shear wave velocity. Yes, it is -- the program for the using of word, English word and mean and also those marks. And so we removed the word "mean" based on the RAI.

And the bottom one, too, is a discussion about the settlement or differential settlement. Those two values 6 inches and also 2 inches we considered under our Chapter 3 DCD, but we didn't set any information under Chapter 2. So we set those values on the Chapter 2, the same as Chapter 3.

This a continuing of 2.5. These value the 0.5 inches and also 1/2000 we set those values under Chapter 3, but we didn't on Chapter 2. So we put those on Chapter 2.

MEMBER BLEY: My colleague and I just had a little discussion.

It's surprising to me that one can claim over the life of the plant you're going to have less settlement differential than half an inch; that that's not much. That just doesn't seem achievable to me, but I'm not a civil engineer. It sounds remarkable.

MR. KUMAKI: You're talking about 2?

MEMBER BLEY: J. J. Maximum differential of settlement between buildings. And so over time the buildings settle some and that you can guarantee it's never going to be more than a half inch, that much differential between two is surprising to me. So, can you tell me a little about the basis for that?

MEMBER BONACA: How did you get up to that number?

MEMBER BLEY: When you claim that, then you can have fairly rigid pipe connections between buildings and assume there'll never be a problem there.

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: But the question is

can anyone actually ever build a facility at an actual site that will meet that specification?

MR. KUMAKI: Okay. I'm sorry. Let me ask our engineer.

MEMBER BLEY: Yes. Yes. Okay. It's just what do you do with it? If you can do that, you design the connections one way. If you can't, you design them with a little more flexibility.

MR. KUMAKI: Yes. Yes.

MEMBER BLEY: And it's troublesome to me.

MR. KUMAKI: Okay. I will go on.

MEMBER BLEY: Thanks.

MR. KUMAKI: You're welcome.

MR. SPRENGEL: I will point out that it is the differential settlement, too. So, it's not allowing any settlement, but it's --

MEMBER BLEY: Right.

MR. SPRENGEL: -- the two buildings settle differently.

MEMBER BLEY: That's right. I think the specification settlement of the site, which is fine, as long as everything settles equally. But our problem is none of the four of us who are in attendance today are civil structural engineers. So it just seems like a rather small value.

MR. KUMAKI: I understand. Okay.

And from this slide we are discussing about chi/Q so I'd like to turn the mic to Mr. Okabayshi.

MR. OKABAYSHI: My name is Okabayshi.

I'm going to talk about the atmosphere dispersion factor chi/Q. We talked three main major items during the discussions between the MHI and NRC. So three major change from the original DCD as based on the following RAIs.

First change is regarding the change of chi/Q for 4-to-30 days. The second one, with having change of source locations.

And third, description of additional information.

So I will explain the detail for each items.

This items is first item, change of chi/Q for 4-to-30 days based on this RAI number.

This question is for staff finds that 4-to-30 days chi/Q value for the MCR and the TSC were not bounding for three out of the four sites; North Anna, Clinton, Grand Gulf and Vogtle. And they are not representation of the U.S. The staff suggested that 4-to-30 days chi/Q value increase to ensure they bound a reasonable number of sites.

Well, we agreed with that. So chi/Q for 4-to-30 days is be raised up to 1.5 times of the prevent value of the DCD. So this graph shows the relation between chi/Q over the distance between source and receptor. So these symbols indicated chi/Q at Grand Gulf and Clinton and North Anna and Vogtle. So dense line is indicated present value of DCD.

So we can suggest present value of DCD doesn't bound chi/Q over the full sites. So we have to increase the chi/Q to the 1.5 times over the present value. This line is this.

So we can see new value bounded chi/Q of the four sites.

Number 2 items is change of source locations. Open item 02.03.04-1.

This question is posed some pathways where the source location is inside the building, imply indoor transport and dispersion. The ARCON96 are not appropriate for modeling indoor transport and dispersion. If the reactivity in the spilled reactor coolant is assumed to be discharged to the atmosphere from the plant vent stack for the purposes of modeling the MCR dose, then the plant vent should be identified as the release pathway. That's right. We agreed.

So, we change the source locations, number one.

Number two, to change to the plant vents.

So two accidents assumed here occurred inside a building at location 1 and 2. But the radioactive materials goes through inside building to the plant vent and then it's discharged to the atmosphere from the plant vent. So source location should be plant vent. This is the realistic situation.

CHAIRMAN STETKAR: Sir, before you change that slide, where is the technical support center located in these buildings?

MR. KUMAKI: About here, auxiliary building.

CHAIRMAN STETKAR: It's inside the auxiliary building?

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: Oh, I didn't even know that.

I went through the RAI and your responses. And I think one of the concerns was regarding a pipe break in the auxiliary building that caused a release inside the auxiliary building that could transfer to the technical support center. And the original analysis, I believe, spoke about a single door that separated the auxiliary building from the technical support center. The revised analysis says that all of those releases will be selectively drawn out the plant stack. And the only way that they can enter the technical support center is through the technical support center ventilation intake. IS that correct?

MR. KUMAKI: I am sorry. I have to change.

Technical support center is this building.

CHAIRMAN STETKAR: So I understood it was in the control building?

MR. KUMAKI: Access corridor.

CHAIRMAN STETKAR: Access hall. Is there a single door that separates the auxiliary building from --

MR. KUMAKI: Single door.

CHAIRMAN STETKAR: Single door?

MR. KUMAKI: Yes.

CHAIRMAN STETKAR: What is the basis for saying that all of the releases will be removed through the auxiliary building ventilation system and that no releases can go through that door?

MR. KUMAKI: The accidental rupture in the auxiliary building.

CHAIRMAN STETKAR: Because as I understand it, the first analysis said there's a potential propagation pathway from the auxiliary building to the technical support center through a door. And an analysis was done to evaluate the potential dose via that pathway.

The revised analysis seems to say that all of the releases in the auxiliary building will be removed through the auxiliary building ventilation system, distributed out through the plant stack and the only pathway is then from the plant stack, diluted in the atmosphere into the ventilation intake for the technical support center. So I was curious why that potential pathway through that door has been eliminated in the revised analysis, if there is only one door.

MR. KUMAKI: Yes. I will confirm the design of our ventilation system of our technical support centers.

CHAIRMAN STETKAR: Thank you.

MR. OKABAYSHI: I'm going to the next.

The last change is this additional information based on open item 02.03.04-6.

This question is DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1 identify inleakage locations for some, but not all, of the postulated accidents and anticipated operational occurrences. COL applicant should be directed to evaluate chi/Q value for each inleakage location for each accident release point and compare the resulting bounding chi/Q value with the corresponding key site parameter values.

That means that MHI is requested to provide the information or all combinations of the sources and receptors. So we agreed with that. So the following information is described to DCD for COL applicant. It's all combination of the source and receptors for MCR or TSC as well as the shortest distance combination used in the dose calculation.

We described in the DCD only the short distance combination of chi/Q. And so we changed, we changed all combinations of source and receptors.

So, to explain the detail of this. So source location for each accident and location of source and receptor showing in Table 1 and Figure 1 respectively.

The next slide is Figure 1. This is layout of all locations of source and receptors. So symbol of the circles indicated the source location. And the triangle symbol indicated the receptor locations.

So if we take according to the triangle symbol is missing to in here. So mistakes. So better where we can know which receptor is essentially intake or inleak from this table.

So MCR intake is the location of A, this one and the MCR inleak location is B, C and D.

And TSC intakes C and inleak same point of C.

So the nearest receptor to each source is chosen for each of the MCR intake and MRC inleak and TSC intake and inleak.

So the chi/Q of the nearest receptor to each location is set to the old receptor in the same group receptor. So we can determine chi/Q of all combination of source and receptor.

Now next slide shows a source location of accident releases. This shows a source and source location for each accident.

So this number is source location in Figure 1 of previous slide. And same table. This is also for other accident.

So this Table and Figure 1 of previous slide provides the necessary information of all combination of source and receptor. So from this information DCD was revised as Revision 2.

Lastly, this slide is a summary of Chapter 2. Three point summarize it here.

Chapter 2 defines site parameters of the US-APWR standard plant and also identified important site parameters.

COL applicant is to confirm that DCD site parameters envelope site-specific parameters.

Table 2.0-1 is a summary identifying specific site parameters for the US-APWR.

Thank you for your attention.

CHAIRMAN STETKAR: Thank you.

Do members have anymore comments or questions for MHI?

MR. SPRENGEL: Let me run through real quick what we're going to get for you.

CHAIRMAN STETKAR: Good deal.

MR. SPRENGEL: Clarification on plant grade.

CHAIRMAN STETKAR: And clarification on what is plant grade and whatever that is.

MR. SPRENGEL: Agreed. Agreed.

CHAIRMAN STETKAR: Include cable ducts. Don't forget the cables.

MR. SPRENGEL: And safety-related equipment.

CHAIRMAN STETKAR: Safety-related equipment.

MR. SPRENGEL: If we can get any more detail for you on using Regulatory Guide 1.6, see what we can find.

John, again, on the 100 year?

CHAIRMAN STETKAR: 100 year 155 mile per hour three second gusts exceedance frequency.

MR. SPRENGEL: Dennis, if we can find anymore detail on communication, just what were language issues and what were the reasons for those changes.

And then I think we had lots of questions on the 2.5 settlement differential.

CHAIRMAN STETKAR: Yes.

MR. SPRENGEL: And then the single door for the technical support center.

CHAIRMAN STETKAR: Yes, the basis for what that potential internal pathway might be.

MEMBER BONACA: I would have liked to

hear some more explanation regarding why these values chosen are bounding in your judgment. I wasn't clear that I got a message clearly.

One observation this Committee has made in the past is that in many respects these kind of parameters come from past experience, limiting past experience and the question is if in fact we're going to have global warming and changes in the future, to what extent will these parameters be, in fact, acceptable or be a problem? I mean is there any attempt on the part of Mitsubishi to build in a little bit of margin or something that will call for this database to be in fact bounding in the future?

MR. SPRENGEL: I understand.

CHAIRMAN STETKAR: Are you speaking, Mario, primarily are you concerned about meteorological parameters?

MEMBER BONACA: Yes.

CHAIRMAN STETKAR: Rainfalls, wind speeds, things like that.

MEMBER BONACA: Yes. Those parameters which are affected very much by --

CHAIRMAN STETKAR: Yes. Again, basically, is there any consideration of changing climatological effects been considered.

Anything else?

Well, good. Thank you very, very much. We are ahead of schedule.

Is the staff prepared? We'll just charge through --

MR. HAMZEHEE: Yes.

CHAIRMAN STETKAR: -- doing this Chapter 2.

MR. HAMZEHEE: Okay.

CHAIRMAN STETKAR: We are constrained, I believe, this is a *Federal Register* meeting that we cannot begin Chapter 16 until after lunch. So we may finish early this morning, but let's proceed with Chapter 2 and see how far we get.

MEMBER BLEY: Is that true for a Subcommittee meeting.

MR. HAMZEHEE: For a Subcommittee we can keep going if everyone is available.

CHAIRMAN STETKAR: If everyone is -- yes. And I guess because we haven't received any requests for -- there's no one on the line. So maybe we can --

MR. CIOCCO: But if that's the case, we need to know so that we can inform --

CHAIRMAN STETKAR: Yes. Let's see where

we are. I suspect that we probably will get to at least MHI's presentation on 16 before lunch.

MR. HAMZEHEE: Okay. We'll notify the staff to come down as well.

CHAIRMAN STETKAR: Yes, you may want to listen in. I doubt that we'll get to the staff's presentation on 16 before lunch.

MR. SPRENGEL: And we're not prepared to facilitate that. I think we can maybe start the afternoon session earlier.

CHAIRMAN STETKAR: We have a problem because I have a meeting over the lunch hour, so I can't really reorganize the lunch.

MR. SPRENGEL: Okay. But I'll follow-up on when they will --

CHAIRMAN STETKAR: Okay. Okay.

MR. SPRENGEL: When they will be here.

CHAIRMAN STETKAR: That's fine.

MR. CIOCCO: Okay. Are we ready? Okay.

Good morning. My name is Jeff Ciocco. I'm the Lead Project Manager for the US-APWR Design Certification. I'm clueing in today as well for the Chapter 2 Lead Project Manager for Chapter 2 and for Chapter 16.

We're going to present to you our Safety

Evaluation Report with open items for Chapter 2 this morning.

Okay. What we're going to talk about is I'll go through, as you can see our staff review team.

I have a brief overview of the design certification application, which is really just Chapter 2, not the entire application.

A brief discussion of the open items that we found in our review.

And then we're going to go through each of the specific sections, each of the five sections and we're going to specifically cover the open items. We have a list of the acronyms for you there.

Let me introduce to you our staff review team.

For Sections 2.1 and 2.2 is Seshagiri.

Brad Harvey is going to cover Section 2.3 meteorology.

Nebiyu is going to cover hydrology.

And Yong Li is going to cover the geology and seismology in 2.5

I'm the lead Project Manager, and Mike Magee is on leave. He's our Chapter 2 Lead for the design certification as well as the Reference COLA application.

This is just the overview of what the staff found in our review of Chapter 2. And they're going to cover these specifically, but these are the sections in Chapter 2.

What we have in this column is a total of the number of questions, we call them the RAIs, request for additional information, that we asked. And we have a total of 52. And you'll see the unique numbers, and you saw it during Mitsubishi's presentation. There was very unique numbers that they used. So those totaled 52, with the majority being in the meteorology area. And of those what the Safety Evaluation Report that we provided to you, we have five open items which we're close. Actually, MHI has responded to these and we're going to be evaluating those responses after this meeting in Phase 4. And then we'll come back to you in what we call our Phase 5 with a complete SE and no open items.

This is a summary. I don't want to go into detail because each of our reviewers is going to cover them. But you can see, these are the four open items that came out of meteorology as far as the containment release, the inleakage receptors, chi/Q and then one on the bearing capacity values in Section 2.5

And so of the reviewers, we're going to cover each of these areas.

We're going to cover each of these areas. MHI has covered these already, how they responded to them. And we're going to let our technical staff cover those as well.

So I'm going to turn for Section 2.1 and Section 2.2

MR. TAMMARA: My name is Seshagiri Tammara. I am with the Office of New Reactors with the Division of Environmental and Accidents Group.

I reviewed the Section 2.1 and 2.2.

2.1 covers the geography and demography. Usually these are the site-specific information where after the selection of the design they will furnish all the information with respect to where the site is located. They give you the description of the area and also they will contain what is the restricted area, allows for the exclusion area and with authorities they have and what they want, and what mineral rights they have.

And in relation to that one they will provide the population distribution within 50 miles of the site taking the latest population available and projecting to the life of the plant. And they will address mainly the density and where the solid site is permissible for the application.

And leaving out the design-specific, therefore the COL applicant will provide all the information in the COL application.

In Chapter 2 all the nearby industrial, transportation and military facilities are addressed with respect to potential leaks or accidents that may potentially affect the operation of the plant. And those are mainly addressed to what are primary radius, all the roadways, airways and also waterways that they have and what they carry potential hazardous materials and what are the potential accidents, and what will be the impact on the operation of the plant.

In addition to that one, they will evaluate the aircraft accidents also, I mean the airports. But it will be provided in 3.6.

So these are also very site-specific information and not the design information, therefore the COL applicant will address the site-specific information in their COL application. So these are not dependent on the design of DCD.

MEMBER BLEY: Let me ask just one question about this.

MR. TAMMARA: Yes.

MEMBER BLEY: Because it doesn't make sense.

When you review at this stage, do you look for some basic hardening of areas of the site that would cover most of these local things that might happen, or is that just -- you don't think about it at all until you see it all.

MR. TAMMARA: No. Because we do not know what the site is.

MEMBER BLEY: Okay.

MR. TAMMARA: And the description will be valued. But we are know that the applicant's statement and the designer's statement, these all will be addressed by COL applicant because we have to say, yes, okay we agree to that.

So that is my presentation.

MR. HARVEY: Good morning. My name is Brad Harvey. I am a meteorologist in the Siting and Accident Consequence Branch with the Division of Site and Environmental Reviews. And now we're discussing SER Section 2.3 meteorology.

Section 2.3 typically involves site-specific information such as regional climatology, local meteorology, on site meteorological measurements program, short-term atmospheric dispersion estimates for design-basis accident releases and long-term atmospheric dispersion estimates for routine releases.

The US-APWR DCD states the COL applicant is to provide this information as part of the COL application. The staff finds this to be acceptable.

Meteorological site parameters. Tier 1 Table 2.1-1 and Tier 2 Table 2.0-1 of the US-APWR DCD identifies climatic and atmospheric dispersion site parameters. These site parameters are the postulated meteorological features assumed for the site which the applicant used to design its facility.

The climatic site parameters were selected to ensure the facility is being designed such that potential threats from the physical characteristics of a potential site, such as a regional climatic extremes and severe weather will not pose an undue risk to the facility in accordance with GDC-2.

The accident atmospheric dispersion site parameters were selected to help demonstrate that the radiological consequences of design-basis accident off-site and in the control room and technical support center meet radiation dose criteria specified in 10 CFR 52.47 and CDC-19. The continual release atmospheric dispersion site parameters were selected to help demonstrate that calculated off-site concentrations and dose consequences of routine airborne radioactive releases meet criteria specified in 10 CFR Part 20 and Appendix R to 10 CFR Part 50 respectively.

CHAIRMAN STETKAR: Brad, can I interrupt you for just a second. And I have to apologize. I'm reading through notes here that are not organized very well.

Actually, I had a question for Seshagiri. Is he still here? It derived out of Section 2.2 of the SER, but it's actually a more generic question.

In Section 2.2.3 of the DCD there's a statement that says "The determination of design-basis events followed the probabilistic and predictable approach to identify ten to the minus seven per year or greater occurrence rate with potential consequences serious enough to affect the safety of the plant. Where data may not be available to permit accurate calculations, a ten to the minus six per year occurrence rate can be utilized when combined with reasonable qualitative arguments."

That's a basis for screening out potential near-site events. And it will apply to all of the sections, but it actually appears in Section 2.2. That's why I wanted to ask the question in that context.

Does the staff accept those screening criteria? Because they're not consistent with guidance in Regulatory Guide 1.200 which states that it's recognized for those new reactor designs with substantially lower risk profiles, for example internal events, core damage frequency below ten to the minus six per year the quantitative screening value should be adjusted according to the relative baseline risk value. In other words, if your total core damage is on the order of ten to the minus six per year, it makes absolutely no sense whatsoever to screen out events whose frequency could be comparable to the total core damage frequency.

So I was curious why the staff has not commented on those screening criteria in Section 2.2. of the DCD. In fact, the staff has disallowed the use of those screening criteria for at least one other new plant design that we've reviewed, or that we're in the process of reviewing.

MR. TAMMARA: This is Seshagiri Tammara for Chapter 2 review.

Whenever we evaluate the site hazards within five miles, we look at what are the potential accidents for that one. And if data shows that the frequency of transportation of hazardous material on the roadways, if they are provided, is lower than ten to the four minus seven. That is acceptable.

CHAIRMAN STETKAR: Why is that acceptable? I don't know --

MR. TAMMARA: I mean, that is the --

CHAIRMAN STETKAR: That's the traditional -- let me interrupt here.

MR. TAMMARA: Yes.

CHAIRMAN STETKAR: That is the traditional value for operating plants in the United States that generally have core damage frequencies in the order of ten to the minus five per year. That would be less than one percent of the approximate total core damage frequency.

If the total core damage frequency for a new plant design is on the order of ten to the minus seven, and I don't know what the projected core damage frequency for the US-APWR, but we have indeed seen several new plants come in with projected core damage frequencies considerably lower than ten to the minus seven.

If the total core damage frequency is on the order of ten to the minus seven, does it make sense to screen out something that could be as large as everything else -- everything else in total? LOCAs, transients, internal fires; everything else, does it make sense to screen that out?

MR. TAMMARA: That will be summarized in Chapter 19. But whenever the individual facilities are concerned in Chapter 2, we are looking at that particular external hazard and if that frequency is greater than ten to the power minus six, then that evaluation goes into the core damage frequency, that accident will be covered in evaluating the total frequency.

So -- but if the individual hazard is less than ten to the four minus seven, it is not -- I mean I'm not saying required, but it is acceptable not to consider for the total probability.

CHAIRMAN STETKAR: I'm asking the staff now why is that acceptable, especially in light of the fact that the staff already for another new plant design center is on record saying that that is not acceptable? The staff is on record saying that that screening is not acceptable in the licensing process for at least one other new design center. And I'm not going to name that design center because it's not relevant to this particular proceeding. You can find it out, or I'll tell you which one off-line.

MEMBER BONACA: The elimination of that contributor, really, changes the whole risk profile of the plant.

CHAIRMAN STETKAR: That's right. And the staff, indeed, in the screening analysis that are in progress for at least one other new design center, has explicitly said that those numerical values that are cited in this DCD are not acceptable. That the screening values should, indeed, account for the published core damage frequency and there be some confidence that the screening has been performed as a small fraction of that published core damage frequency.

So there seems to be an internal discrepancy here within the staff as far as what acceptable screening will be applied from design center to design center.

Maybe we should just leave it at that unless Hossein or Jeff has something to add.

MR. HAMZEHEE: John, this is Hossein

Hamzehee from the staff.

I think this is not the right audience for the discussion that you have. Because you're right, you have some valid concern.

CHAIRMAN STETKAR: Okay.

MR. HAMZEHEE: It depends on the risk profile of a given design. You got to be careful what the other contributors are. But what we need to do is to go back and when we are looking at Chapter 19, the PRA and risk assessment to see how they have incorporated this portion of the risk. And then try to follow-up on that.

CHAIRMAN STETKAR: Well, except you can't necessarily divorce the two that easily, Hossein. Because what we're doing now is we're running a Safety Evaluation on Chapter 2 of this design control document. And Chapter 2 explicitly has those numbers in there as basically acceptance criteria. So it's difficult to say well we'll accept those numbers in Chapter 2 and somehow later work it out in the context of Chapter 19. Because Chapter 19 is really an evaluation of all the potential contributors. Chapter 2 is setting the grounds by which you could potentially screen out some of those contributors.

MR. HAMZEHEE: Yes.

CHAIRMAN STETKAR: And if I were an applicant and I screened out something as less than ten to the minus seven and then in Chapter 19 you come back and say well why didn't you evaluate this? You said well I was allowed to screen it out according to the accepted criteria in Chapter 2.

So, I think we do need to address it in the context of Chapter 2.

MR. HAMZEHEE: Yes. And let us get back to you.

CHAIRMAN STETKAR: Okay.

MR. HAMZEHEE: But again, sometimes from the design prospective something could be acceptable, but then when you do the risk assessment, that could become a risk contributor or it could be one of your risk significant contributor.

CHAIRMAN STETKAR: That's what we're saying.

MR. HAMZEHEE: Yes.

CHAIRMAN STETKAR: The only thing that I'm bringing to the forefront is that there are two specific numbers --

MR. HAMZEHEE: Yes.

CHAIRMAN STETKAR: -- cited in Section 2.2.3 of the DCD. And if the staff accepts Chapter 2 of the DCD, those are staff approved accepted numbers. And if we, the agency, do not agree that those numbers should apply, we should indeed do something about it within the context of Chapter 2.

MR. HAMZEHEE: Yes.

CHAIRMAN STETKAR: Because otherwise they will be accepted.

MR. HARVEY: Mr. Chairman, in defense of the applicant, I'd like to point out that those numbers are in the staff's Standard Review Plan for Section 2.2.3.

CHAIRMAN STETKAR: Yes. Good thanks. It's good to have on the record.

MR. HARVEY: All right. So essentially we've already accepted that because it's in our Standard Review Plan. And maybe it's the Standard Review Plan that needs to --

CHAIRMAN STETKAR: That's probably true, Brad, although I'll tell you from our experience with at least one of the other new design centers the staff indeed has taken the position that those numbers should be changed in the Standard Review Plan for consistency with the guidance in the current revision of Regulatory Guide 1.200, which is more of a relative risk rather than an absolute numerical value type guidance. And indeed, the staff has already taken that position and is applying it to their review of one of the other new design centers. So --

MEMBER SHACK: Now, in all fairness, since they don't have risk metrics yet for the new reactors, it's a little difficult to come up with those answers. But I think John's point is you could at least take the numbers out of here and then we'll settle it at the COL basis --

CHAIRMAN STETKAR: Right. Settle at the COL basis consistently across all of the design centers.

MEMBER SHACK: Right.

CHAIRMAN STETKAR: One of the things I'm looking for, obviously is I'm not trying to penalize US-APWR because they have these particular numbers at the moment in their design control document. I know where they came from. I want to make sure that we as an agency are applying consistent review and acceptance criteria across the whole fleet of new reactors. That just because one design center has applied one set of acceptance criteria, I don't want to see another design center use a different set of acceptance criteria. That isn't quite fair.

Okay? Thanks. As I said, I brought it up in the context of Section 2.2 but applies equally well to screening of meteorological events or any other type of hazards.

Sorry to interrupt you, Brad. Go on. Continue.

MR. HARVEY: Okay. A COL applicant needs to demonstrate that its meteorological site characteristics fall within the US-APWR meteorology site parameters pursuant to 10 CFR 52.79(d)(1). Should the meteorological site characteristics not fall with the US-APWR meteorological site parameters the COL applicant must provide supporting justification that the proposed facility is still acceptable at the proposed site.

The staff evaluated the US-APWR meteorological site parameters in accordance with the Standard Review Plan to ensure they're representative of a reasonable number of sites that have been or may be considered within a COL applications. Details regarding this evaluation will be presented during the next several slides.

Climatic Site Parameters. The US-APWR DCD presents climatic site parameters related to winter precipitation for roof load design, tornados, extreme wind speed other than in tornado, and ambient design air temperature.

The applicant's winter precipitation site parameters are used to determine a winter precipitation live loads on the roofs of seismic Category I structures as discussed in the DCD Chapter 3. The staff compared the applicant's winter precipitation site parameter values against snowfall data recorded at weather stations located throughout the contiguous United States and found that the applicant's site parameters bounded most weather stations. The staff therefore concluded that their is reasonable assurance that the applicant's winter precipitation site parameters values can be expected to be representative of a reasonable number of potential COL sites. The staff finds this acceptable.

The staff reviewed the applicant's tornado site parameter values by comparing them to design-basis tornado characteristics specified in Revision to Regulatory Guide 1.76. The staff found that the tornado site parameter values chosen by the applicant are the same as the tornado intensity Region I design-basis tornado characteristics specified in Regulatory Guide 1.76 where Region I represents the central portion of the United States where the most severe tornados typically occur. The staff finds this acceptable.

CHAIRMAN STETKAR: Brad?

MR. HARVEY: Yes?

CHAIRMAN STETKAR: Move Seshagiri's thing over there. I mean when you hit it hits the microphone.

MR. HARVEY: Okay. The staff reviewed the applicant's extreme wind speed site parameter value by comparing to wind loading design criteria presented in ASCE 07-05, which is the American Society of Civil Engineers Standard for the minimum design load for buildings and other structures. The staff found that US-APWR extreme wind speed site parameter value bounds the ASCE 07-05 wind loading design criteria for the continental United States.

CHAIRMAN STETKAR: Now is the time to talk about that 155 mile gust.

MR. HARVEY: Yes. Yes. That comes from this ASCE 07-05 standard, which is a contour of wind speed plots against the continental United States. And what they've chosen was a 100 year return period. And hurricanes are included in the drawing of those wind plots.

CHAIRMAN STETKAR: And those plots actually do -- I guess if you take the entire contiguous continental United States and say that if you're extruding for something like 80 percent of the land mass, that's probably true. It just might be that you can't build one of these plants anywhere near the southeast coast of the United States.

MR. HARVEY: Well, I do think the 155 miles an hour that they've chosen, I think pretty much does envelop the entire --

CHAIRMAN STETKAR: Southeast coast also?

MR. HARVEY: Including the southeast, yes.

CHAIRMAN STETKAR: How many year return period --

MR. HARVEY: A 100 year.

CHAIRMAN STETKAR: -- on Category IV -- Category III to Category IV hurricanes?

MR. HARVEY: It depends where you're located, but yes.

CHAIRMAN STETKAR: Okay. And what was that reference?

MR. HARVEY: ASCE 07-05.

CHAIRMAN STETKAR: 07-05. Thank you.

MEMBER BLEY: There's the piece of the

way we handle extreme events, not just these but others, where we tend to rely on 100 year return periods which doesn't seem consistent with the way we deal with other low probability events. And that's the chance of ten to the minus two per year. And we don't say what happens if you go beyond that where most other things, and you heard the discussion before we're talking events of ten to the minus six, ten to minus seven per year are less. How do we reconcile that?

MR. HARVEY: If you look at the tornado. The tornado design- basis is ten to the minus seven year event. Okay. So the tornado will envelope the extreme wind speed.

Now, the extreme wind speed there's different subsequent -- what's the right word? Other loads combine differently for the 100 year return wind speed as opposed to the tornado, and it's different load factors.

MEMBER BLEY: Yes.

MR. HARVEY: But the wind is basically a plant design for a ten minus 7, or intended to be.

MEMBER BLEY: So in a sense to you that is a sound --

MR. HARVEY: Yes. The winter

precipitation we talked about the normal and the extreme.

MEMBER BLEY: Yes.

MR. HARVEY: The normal is, again, a 100 year return. The extreme is not to calculated to be ten to the minus seven, but it's some additional margin above the 100 year return period for that. But the ambient design temperature, those are based on 100 year return period.

MEMBER BLEY: Thanks.

CHAIRMAN STETKAR: Go ahead.

MR. HARVEY: Consequently, staff concluded that the applicant's maximum wind spend site parameter values represented a reasonable number of sites that may be considered with COL applications. Staff finds this acceptable.

CHAIRMAN STETKAR: Brad?

MR. HARVEY: Yes?

CHAIRMAN STETKAR: Did you get air temperature?

MR. HARVEY: I'm doing this next.

CHAIRMAN STETKAR: Okay. Sorry. I was mumbling.

MR. HARVEY: Okay. The applicant provided zero percent exceedance or 100 percent exceedance air temperature site parameters values for use in the design and seizing of plant cooling equipment and for evaluating plant structures under severe environmental conditions. The zero percent exceedance values are historic high and low values, whereas the one percent exceedance value are values that are expected to be exceeded on average 88 hour per hour since there are 8,768 years in a typical non-leap year.

The staff reviewed the applicant's zero percent and one percent exceedance air temperature site parameter values by comparing them against temperature data compiled by the American Society of Heating Refrigeration and Air Conditioning Engineers or ASHRAE, for over 600 weather stations scattered throughout the continental United States. The staff found that the applicant's zero percent and one percent exceedance air temperature site parameter values found in most of the weather stations listed in the ASHRAE database. The staff, therefore, concluded that there is reasonable assurance that the applicant's ambient design air temperature site parameter values can be expected to be representative of a reasonable number of potential COL sites. The staff finds this acceptable.

CHAIRMAN STETKAR: Brad, let me ask you, I read through this section and I got confused, I think.

When you discuss in Section 2.3.4 the zero percent exceedance non-coincident wetbulb temperature, you report the results from your independent survey from all of the weather stations.

MR. HARVEY: Yes.

CHAIRMAN STETKAR: And in the SER it says: "The staff found the applicant's proposed zero percent exceedance non-coincident wetbulb temperature site parameter value of 30 degrees C, 86 degrees Fahrenheit was exceeded at approximately 21 percent of the weather stations, primarily in the southeast."

MR. HARVEY: Yes.

CHAIRMAN STETKAR: "Nonetheless, because the applicant's zero percent has not been exceeded at 79 percent of the stations throughout the contiguous U.S., the staff accepts the applicant's" value, basically.

It's surprising to me that 21 percent of the weather stations in the United States report a wetbulb temperature of 86 degrees are higher. That's pretty humid. And the reason I got confused is that later it says the one percent exceedance non-coincidence maximum wetbulb temperature of 27.2 degrees C, 81 degrees Fahrenheit was exceeded at only one percent of the weather stations throughout the contiguous U.S.

Well, if the zero percent exceedance of 86 degrees was exceeded at 21 percent of the weather stations, it would seem that a much higher percentage would have exceeded 81 degrees less humid conditions.

MR. HARVEY: Well, the 81 degrees will occur up to 88 hours per year. That's the definition of the one percent.

The zero percent is supposed to be historic maximums.

CHAIRMAN STETKAR: Yes. But you would expect a larger number of weather stations to exceed the less humid conditions compared to the more humid conditions, wouldn't you?

MR. HARVEY: No. You're comparing historic versus occurs 88 hours in a given year. So it's hard to --

CHAIRMAN STETKAR: I guess maybe I don't understand how those calculations are done.

MR. HARVEY: The 88 is basically the highest number that's been recorded in this database over the last 25 years.

CHAIRMAN STETKAR: Okay.

MR. HARVEY: And that's been exceeded at 21 percent. But the 81 that can be recorded up to 70/80 hours in a given year, year after year after year and still meet that criteria.

CHAIRMAN STETKAR: So it actually means kind of different things. Okay.

MR. HARVEY: Yes, they are very different.

CHAIRMAN STETKAR: Okay. Okay.

MR. HARVEY: And it's very easily confused.

CHAIRMAN STETKAR: Okay. Thanks. That helps me because I apparently was confused about what they meant.

Can you explain in the DCD for the zero percent exceedance, the 86 degrees there's a qualifier in there. It says: "86 degree non-coincidence wetbulb historical limit excluding peaks less than two hours." What does that mean? If it's never been --

MR. HARVEY: Now, meaning that they could withstand a short duration exceedance of that 88.

CHAIRMAN STETKAR: What's the basis for that? And I was going to ask Mitsubishi, but I thought I'd ask you first because I knew I probably wasn't understanding the criteria?

MR. HARVEY: Yes. In fact, that's another reason why the 21, because we only looked at the highest --

CHAIRMAN STETKAR: Yes.

MR. HARVEY: -- as opposed to the two hour values. If you assume that's a two hour average, it needs to exceed the 88, then you're going to get --

CHAIRMAN STETKAR: That's right. Well what I hung up on was that I thought I understood the 86, and apparently I understood that one correctly. But my curiosity is what the criteria -- why is this 2 hour exceedance of even --

MR. HARVEY: That came out of the EPRI URD has that criteria in it.

CHAIRMAN STETKAR: It's funny, I haven't seen it in any of the other --

MR. HARVEY: It is in some of the others.

CHAIRMAN STETKAR: Some of the others? Okay. I checked two of them and I couldn't find it there.

MR. HARVEY: Yes, it is in some of the others. Honestly, I'm trying to give a good answers.

CHAIRMAN STETKAR: Yes.

MR. HARVEY: The engineers are the ones who choose the statistics they want to design to. And I just -- my job is to make sure that they're reasonably bound.

CHAIRMAN STETKAR: No, I understand that.

MR. HARVEY: So I don't have a good answer for you.

CHAIRMAN STETKAR: I have a question for Mitsubishi then. This implies that the plant can withstand a wetbulb temperature of greater than 86 degree Fahrenheit for two hours without any detrimental effects from ventilation. Well, that sounds to me like a design criterion for the ventilation systems or environmental qualifications of equipment. It's probably not appropriate to discuss that in regards to Chapter 2, but it certainly seems to apply to the review of Chapter 9 where we do talk about the ventilation systems and the environmental control systems.

So if you could, just put it in your notes that when we get to Chapter 9 I'm going to be curious about what that two hours really means because it does sound like it's, as Brad mentioned, related to design criteria for the ventilation systems.

Thanks, Brad.

MR. HARVEY: Thank you.

Next slide, please.

Short-term dispersion site parameters for design-basis accident releases. Exclusion area boundary or EAB and the outer boundary or low population zone, or LPZ, atmospheric dispersion for chi/Q site parameters are used in DCD Chapter 15 to help demonstrate that the off-site radiological consequences of accidents meets specified radiation dose guidelines as specified in 10 CFR 52.47.

The staff reviewed the applicant's EAB and LPZ chi/Q site parameter values by comparing them with corresponding site characteristic values identified in the four approved early site permit applications which are Clinton, Grand Gulf, North Anna and Vogtle. The staff found that the applicant's EAB and LPZ chi/Q site parameter values bound the corresponding site characteristics for three of the four ESP sites. Consequently, the staff finds that the applicant's EAB and LPZ chi/Q site parameter values should bound a reasonable number of sites that may be considered within a COL application. Staff finds this acceptable.

CHAIRMAN STETKAR: I know you looked at the four sites that submitted early site permit applications. Did you look at all at the reference COLA site, the Comanche Peak site for which you should have that information from the operating unit there.

MR. HARVEY: I probably did at one time. I can't give you definitive answer on that one.

CHAIRMAN STETKAR: Okay. It popped -- that comparison between the four early site permit sites --

MR. HARVEY: Yes.

CHAIRMAN STETKAR: -- popped up, but they're really not relevant --

MR. HARVEY: The reason why they were -- you know, that's a good very point. The reason why I picked the four early site permits because those are fully vetted values.

CHAIRMAN STETKAR: Yes.

MR. HARVEY: And in some of the COLAs, including in our COLAs that I'm reviewing we're still negotiating --

CHAIRMAN STETKAR: Okay.

MR. HARVEY: -- what some of those values are between defining where the EAB and LPZ is and making sure that we're happy with the quality meteorological database they use, so forth and so on.

CHAIRMAN STETKAR: I'm just curious. I mean, you discovered the fact that they were in some sense originally nonconservative relative to three out of four of those sites. Well, it would be probably disappointing to the Comanche Peak folks--

MR. HARVEY: Yes. There's a different staff reviewer who is doing it now, actually. And it would have to be a deviation or a departure, if that was the case.

CHAIRMAN STETKAR: Yes. Yes.

MR. HARVEY: Which I don't recall it being the case, but I can't say that definitively.

CHAIRMAN STETKAR: Okay. I was just curious whether you just in passing had taken a look at that.

MR. HARVEY: I can't answer that.

CHAIRMAN STETKAR: Thanks.

MR. HARVEY: The control room and technical report center chi/Q value, site parameter values are used in DCD Chapter 15 to help demonstrate that the radiological consequences of design-basis accidents in the control room and technical support center meet radiation dose guidelines specified in GDC-19.

In order to confirm that the US-APWR control room and technical support center chi/Q values listed as these site parameters are representative of a reasonable number of sites that have been or may be considered for a COL application, the staff generated a set of site-specific control room and technical support center chi/Q values using hourly meteorological data provided in support of the four approved ESP applications. Again, North Anna, Clinton, Grand Gulf and Vogtle. The staff executed the ARCON96 atmospheric dispersion code assuming the US-APWR plant aligned to true north at each site. The staff found that the US-APWR is zero-to-eight hour, eight- to-24 hour, and one-to-four day chi/Q values were bounding in all cases, but the US-APWR four-to-30 day chi/Q value were not bounding for three out of four ESP sites. The staff consequentially issued open item 02.03.04-11 asking the applicant to consider increasing the 4-to-30 day control room and technical support center chi/Q values so they bound a reasonable number of sites that have been or may be considered for a COL application. And the applicant already discussed that they've did that.

MEMBER BLEY: They did. And I didn't them this question, but since you're the meteorologist let me ask you.

When they showed the new curve with the new chi/Q values, some of the plants come very, very close to that curve. What kind of uncertainty is there in those chi/Q values?

MR. HARVEY: Probably some. But there's a lot of other uncertainty in the entire calculation that we're doing. And I would say the uncertainty in atmospheric dispersion is no less or no more than some of the other uncertainties.

MEMBER BLEY: Are these kind of maximum values or just kind of middle --

MR. HARVEY: They tend to be values that are exceeded no more than 95 percent of the time.

MEMBER BLEY: Okay. So there is a bit of a bound to them?

MR. HARVEY: There is intended to be conservative.

MEMBER BLEY: Okay. Because some are real close to that line.

MR. HARVEY: Yes.

MEMBER BLEY: I was wondering why you

wouldn't want to see the line a little further away if there's uncertainty to that?

MR. HARVEY: Well, we got this regulatory criterion. As long as they meet it.

MEMBER BLEY: Okay.

MR. HARVEY: That's the name of the game.

MEMBER BLEY: Okay. Go ahead.

MR. HARVEY: The staff identified three other open items in the SER when it reviewed the applicant's control room and technical support center chi/Q site parameters. First is the list of chi/Q site parameter values includes containment release to the Class IE electrical room HVAC intake for control room inleakage. The staff has asked the applicant to explain why there are no chi/Q site parameter values provided for containment releases to the control room and leakage locations, such as the reactor building door and auxiliary building intake.

In the SER this is identified as open item 02.03.04-8.

Secondly, the plant configuration information needed by COL applicants to calculate site-specific control room and technical support center chi/Q values is presented in both DCD Chapter 2 and Chapter 15. The staff asked the applicant to move all this information into Chapter 2 of the DCD of the SER. This is identified as open item 02.03.04-9.

And third, Table 2.3-3 in Chapter 2 of the DCD presents above ground heights for control room and technical support center intake and inleakage locations. This information is presented for use for COL applicants in calculating site-specific control room and technical support center chi/Q values. The staff has asked the applicant to correct apparently conflicting information in this table.

In the SER this is identified as open item 02.03.04-10.

Because of the open items that remain, the staff could not in the SER finalize its conclusions regarding the acceptability of the control room and technical support center chi/Q values.

Next slide.

Long-term dispersion site parameters for routine releases. The US-APWR DCD utilizes routine release for annual average atmospheric dispersion chi/Q in deposition or D/Q factors in DCD Chapter 11 to calculate off-site concentrations dose consequences from normal operations to demonstrate compliance with the off-site radionuclide concentration criteria in 10 CFR Part 20 and the dose criteria in Appendix I of 10 CFR Part 50.

The staff reviewed the applicant's routine release chi/Q and D/Q values by comparing them to the corresponding site characteristic values identified in the Clinton, Grand Gulf, North Anna and Vogtle early site permits. The staff found that the applicant's routine release chi/Q and D/Q values bound the corresponding site characteristics for the four ESP sites. Consequently, the staff finds that the applicant's routine release chi/Q and D/Q values should bound a reasonable number of sites and may be considered with a COL application. The staff finds this acceptable.

Meteorology COL information items.

The US-APWR DCD contains three meteorology-related COL information items which read as follows:

COL Information Item 2.3(1). A COL applicant is to provide site-specific pre-operational and operational programs for meteorological measurements. It is to verify the site-specific regional climatology and local meteorology are bounded by the site parameters for the standard US-APWR design or demonstrate by some other means that the proposed facility and associated site-specific characteristics are acceptable at the proposed site.

COL information item 2.3(2). The COL applicant is to provide conservative factors as described in Section 2.3.4 of NUREG-0800 that a selected site will cause excess to the bounding chi/Q values then the COL applicant is to demonstrate how the dose referenced values in 10 CFR 52.79 and the control dose limits in 10 CFR Part 50 are met using the site-specific chi/Q values.

And the third information item 2.3(3) the COL applicant is to characterize the atmospheric transport and diffusion conditions necessary for estimating radioactive consequence of the routine release of radioactive materials to the atmosphere and provide realistic estimates of annual chi/Q and D/Q values as described in Section 2.3.5 of NUREG-0800.

The staff finds the scope of the applicant's COL information items to be appropriate.

Conclusion. Pending the resolution of meteorologically-related open items, the staff hopes to be able to eventually conclude that the applicant has identified an appropriate list of site parameters and the values assigned to each of the site parameters are expected to be representative of a reasonable number of sites that may be considered for a COL application.

And that concludes my presentation.

CHAIRMAN STETKAR: Thank you.

I think with that what we'll do is take a break before we come to the hydrology and seismology discussions. We're well ahead of schedule. I'm sure everybody would appreciate a break.

Let's break until 10:35. I'm generous with the breaks.

(Whereupon, at 10:30 a.m. off the record until 10:34 a.m)

CHAIRMAN STETKAR: Okay. We'll come back into session and pick up with hydrologic engineering.

MR. TIRUNEH: Okay. My name is Nebiyu Tiruneh and I'm the Technical Reviewer for Section 2.4

CHAIRMAN STETKAR: Just speak up a little bit. Make sure the mic catches you. It helps our reporter.

MR. TIRUNEH: Good morning. My name is

Nebiyu Tiruneh and I'm the Technical Reviewer for Section 2.4.

The review of US-APWR Design Certification SER Section 2.4 was performed in accordance with the Standard Review Plan. And the following areas were reviewed.

DCD Section 2.4.1 strives to set specific hydrologic information that a COL applicant must consider for safe operation of the plant and the plant-specific enveloping hydrologic design parameters of maximum flood level, hourly maximum rainfall rate, short-term maximum rainfall rate and maximum groundstream level are provided in Table 2.0-1 of DCD Tier 1 and Table 2.1-1 of DCD Tier 2.

In Section 2.4.2 the applicant had described the flooding information to be collected and analyzed by a COL applicant at the proposed site on the region of the site.

In Section 2.4.3 the applicant had to describe the set specific flooding analysis that needs to be performed to determine PMF level on streams and rivers.

And in Section 2.4.4 the applicant had to describe what a COL applicant must provide from first potential hazards to plant safety and separate facilities as a result of plausible of plausible failures of on-site upstream and downstream water control structures.

In Section 2.4.5 the DCD applicant has to design the hydrological meteorological design basis to developed by a COL applicant to ensure that potential hazard to the safety-related facilities due to the effects of probable maximum surge and seiche are considered.

In Section 2.4.6 the applicant again has identified the geohydrologic design basis to be developed by a COL applicant to ensure that any potential hazard to the structures, systems and components important to safety due to the effects of probable maximum tsunami are considered.

In Section 2.4.7 The DCD applicant has identified the hydrologic design basis to be developed by a COL applicant to ensure that safety-related facilities and water supplies are not effected by ice induced hazards.

In Section 2.4.8 the applicant again has identified the hydrologic design basis to be developed by a COL applicant for such specific channels and reservoirs used to transport and impound water supply to SSEs important to safety.

In 2.4.9, again, the applicant has described the set specific evaluation that needs to be done with respect to seismic topographical geologic and thermal evidence in the region and related to the potential for upstream diversion or rerouting source of cooling water.

In 2.4.10 the applicant has designed site specific locations and evaluations of safety-related facilities and also of structures and components required for protection of those safety-related facilities. And the information is then to be compared to design basis flood conditions to determine of flood effects need to be considered in the emergency procedures analysis.

In 2.4.11 the applicant, the COL applicant is to ensure that an adequate water supply will still exist to shutdown the plant under SSE conditions.

In 2.4.12 the COL applicant will have to describe and analyze hydrogeological characteristics of the site to determine the effects of groundwater on plant foundations and also describe the reliability of safety-related water supplies and the dewatering systems and critical downwater pathways.

In 2.4.13 the COL applicant will describe the hydrogeological characteristics of the site to determine if there's accidental releases of radioactive liquid effluents in ground and surface waters when using existing uses and known likely future uses.

In 2.4.14, again the COL applicant is required to describe the basis for technical specifications and emergency procedures that are required to implement protection against floods for safety-related plant facilities.

And then 2.4.15, of course, the combined license information item is provided which basically directs the COL applicant to provide the technical information.

And next slide, please.

And the applicant has provided the Tier 2 plant-specific design parameters and clearly identified the information to be provided by the perspective COL applicant.

And the hydrologic parameters provided by the applicant are:

Maximum groundwater level of 1 foot below finished grade;

Maximum flood of 1 foot below the finished grade level, and then;

Maximum hourly rainfall rate of 19.4 inches per hour, and;

Short-term rainfall rate of 6.3 inches per five minutes.

Staff performed a review to determine whether the values are appropriate and to compare the parameter values with that of applicable technical documents and other previously reviewed DCDs. The general hydrogeologic description required stated in Section 2.4.1 of the DCD are also in agreement with EPRI Advance Light Water Reactor Utility Requirement Document and HMR 52.

And also staff compared the previously submitted and reviewed DCDs. And these values are found to be consistent.

Next slide, please.

The applicant therefore has correctly identified one COL information item which states the COL applicant is to provide sufficient information to verify that hydrologic-related events will not affect the safety-basis for the US-APWR.

And next slide, please.

As part of the review process, staff issues 13 RAIs which were eventually resolved by the applicant's response. And as a result, there are no open items at this stage. And staff acknowledged that the plant-specific hydrological site parameters are acceptable and that the applicant has properly identified the site specific information to be provided as part of the COL application.

And this concludes my presentation. Questions?

MR. CIOCCO: Any questions, anything on 2.4?

CHAIRMAN STETKAR: I guess not. Let's continue. Thank you.

MR. CIOCCO: Thank you.

And I will turn it over to Yong Li and Sarah Tabatabai.

MR. LI: Hi. My name is Yong Li. And my partner Sarah Tabatabai and I will present Section 2.5, which is the geology, seismology and geotechnical section.

And Sarah is going to focus in on Section 2.5.2, which is the vibratory ground motion. I will cover the rest.

So this review involves the following subjects:

First, is the basic geology and the seismic information which provide the background for the seismicity and the faults.

And then there's another section talking about the vibratory ground motion, which is a seismic section provide the GMRS, ground motion response spectra.

And the third section is surface faulting, which is focuses on the fault or site.

And the fourth section is stability of subsurface materials and the foundations.

And the fifth section is stability of slopes.

And the last section talks about the combined license information.

And the COL applicant is to provide this information as part of the COL application to complete their whole FSAR.

Next please.

So Section 2.5.4 focus on the site, so there are a lot of primary relate to this particular section. So this slide addressing the basic geotechnical parameters for a candidate site, such as minimum bearing capacity, minimum shear wave velocity, total settlement and the differential settlement. And the maximum tilt of a reactor building complex foundation during the plant's operational life. And the maximum slip for the foundation bearing stratum. Basically the subsurface layers cannot be titled more than 20 degrees at the site.

So those parameters are expected to be representative for a responsible number of COL or ESP sites in the U.S.

Next please.

MEMBER SHACK: So you don't have any problems with the half-inch differential settlement that seems kind of small to some of the members?

MR. LI: Good question. I think about this question when you asked the applicant. Generally, we like the smallest of parameter there for the staff, because it's more conservative. But if you look carefully at the applicant's presentation. I mean, their parameter table, there's a footnote there indicates if the differential settlement is less than this one, you don't need to do additional work.

MEMBER SHACK: Right.

MR. LI: So that means if you exceed the .5 inches, it doesn't mean the site is not qualified at all. You still can do additional work to verify that, to prove that site is still okay.

CHAIRMAN STETKAR: The site is okay or you need to additional work on things like piping connections between buildings? That's different.

MR. LI: Yes. At least from the settlement side, you need to do additional work to verify all the SSE can be functional without any problem, basically. Yes.

MEMBER BLEY: I am just curious because I haven't thought about this before. Suppose there's good basis for it, you accept it, they go to plant. And how --is this monitored over time, the differently settlement and if it gets more than that, I know that's not your part of this process, but has that ever happened and what do we do with it if they start getting more settlement than they sought in the submittal and designed to?

MR. LI: Yes. A long-term observation for settlement does exist for some of the power plants. They do keep observing the long-term settlement. But most settlement will be finished after the structure is there. So the bigger portion of the settlement is done when you put the load there.

MEMBER BLEY: Sure.

MR. LI: Yes. So that's the kind of

situation. Yes.

MEMBER BLEY: So basically we'd find out sometime later if we start having problems?

Okay. Go ahead.

MR. LI: Yes. Different question.

MEMBER BLEY: Have to think about that a bit.

MR. LI: This one talks about the other site parameters for potential site.

First is a no liquefaction potential for seismic Category I structures and also no surface tectonic deformation, basically a capable fault within the exclusion area boundary.

And also those parameters are expected to be representative at quite a number of the potential COL and ESP sites.

Next please. Sarah?

MS. TABATABAI: The US-APWR DCD establishes certified design response spectra for a candidate site.

The CSDRS are based on Reg. Guide 1.60, and they're also anchored at a peak ground acceleration of .30g and enhanced in the high frequency range.

And the CSDRS also are considered to be

representative of general power plant conditions in the United States.

And the next slide, please.

This figure just shows the US-APWR horizontal CSDRS. COL applicants need to make sure that their site-specific ground motion response spectra at the foundation level are enveloped by the CSDRS.

Next slide. It's back to Yong.

MR. LI: Yes. Through the interactions of applicant a lot of RAIs are resolved, but we still have one open item, which is 2.05.04-1. We asked the applicant to explain on the different between the original proposed bearing capacity values and the revised minimum allowable bearing capacity value. Yes. That's the one pending to be finished in the future. To be addressed by the applicant in the future.

And we have COL information item for this particular section, which requires the future COL applicant provide sufficient information regarding the site-specific geology, seismology and geotechnical engineering characteristics surrounding the site.

And except for those pending open items, we conclude the following basically:

The applicant has appropriate list of geologic, seismological and geotechnical engineering site parameters;

And applicant also identified the site-specific information to be provided as part of the COL applicant, and also the last one is;

That those values assigned to each of the site parameters are expected to be representative for a reasonable number of prospective COL and also ESP sites.

And that concludes our presentation for Section 2.5

MR. CIOCCO: And I think that's our conclusion for all of the Chapter 2 of the open items.

CHAIRMAN STETKAR: Any Members have additional questions, comments on Chapter 2?

Okay. That finishes up Chapter 2.

MHI, where are you terms of presentation for Chapter 16.

MR. SPRENGEL: We're not ready to start.

CHAIRMAN STETKAR: You're not ready?

MR. SPRENGEL: Yes, we could do earlier, but because of the --

COURT REPORTER: Please use the mic.

MR. SPRENGEL: Sorry. We could earlier, but --

CHAIRMAN STETKAR: Yes, I have a conflict over the noontime hour for another meeting. And I can't move that around.

I'd really like to hear from Mitsubishi, I think, before we hear from the staff. That's usually much more effective.

So, I guess given our stellar performance this morning, our only practical option is to adjourn and come back at 1:00.

I'm sorry. Recess. I would love to adjourn, but apparently we can't.

Recess until 1:00 and we'll come back and start Chapter 16 then.

(Whereupon, at 10:41 a.m. the meeting was recessed, to convene at 1:02 p.m.)

MS. TORENE: A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

1:02 p.m.

CHAIRMAN STETKAR: Let's reconvene, then, and this afternoon's topic is Chapter 16 for the technical specifications. And I guess we'll hear from Mitsubishi first. I don't know who is going to introduce it. Ken or Tanaka.

MR. TANAKA: Yes. I'm Futoshi Tanaka. I'd like to start the presentation from MHI. Okay.

Here we have the content of this presentation.

First number 1 is overview of the chapter. We will describe the title and the scope of this chapter, Chapter 16.

And number 2 we will discuss the features of the technical specifications.

And the third, the major RAIs.

And finally, the summary.

And number 1, overview of the Chapter.

The title of the chapter is Chapter 16 is Technical Specifications. This chapter includes the information as required by 10 CFR 50.36 and 10 CFR 50.36(a).

Next slide.

This slides shows the features of the technical specifications of a US-APWR DCD. That's the features of the US-APWR.

The plant concept and the basic configuration of the main components is the same as the current PWRs in the United States and also the same with the PWRs in Japan. There are some differences such as the four-train safety systems and the digital platform.

The US-APWR consists of four-train safety systems, a combination of active and passive systems are used for the accident mitigations.

Next, the features of the US-APWR technical specifications.

First of all, the tech specs for the US-APWR it basically follows the standard technical specifications for Westinghouse PWRs.

The US-APWR has four-train safety systems. The high redundancy is used to maximize the benefits of the on-line maintenance. And the US-APWR tech specs adopted risk-management technical specifications and a surveillance frequency control program.

Next, the utilization of the standard tech specs.

The basic design concept of the US-APWR design is similar with the current PWRs. This makes possible the tech specs differ from the standard tech spec with modifications. Therefore, the US-APWR technical specifications are almost the same as the standard technical specifications NUREG-1431, which we're already familiar with. The major portions that is new to the US-APWR technical specifications are the treatment of the four-train safety systems, application of risk-informed initiatives and the digital platform. So today at this presentation we focuses mainly on the differences: The safety systems and risk-informed initiatives and a digital platform.

Justification of a deviation between the standard technical specifications and the US-APWR technical specifications has been submitted to the NRC staff as a technical report.

This slide here shows the safety benefits of a four-train system. The US-APWR has four-train safety systems. And due to this redundancy the capability is beyond a single failure criteria. The high redundancy design can maximize the benefits of on-line maintenance. And the technical specifications limited condition for operation only require three operable trains. However, none of the trains are allowed to be out of maintenance for more than 90 days in accordance with the 10 CFR 50.59 and the NEI Guideline.

CHAIRMAN STETKAR: I guess I didn't read 90 day limit in the technical specifications. Where?

MR. TANAKA: It's not TS. Written in the--

CHAIRMAN STETKAR: It's not --

MR. TANAKA: We haven't added it.

CHAIRMAN STETKAR: Why is it not specified in the technical specifications then? If I read the technical specifications the interpretation is that I can leave one train out indefinitely.

MR. TANAKA: Yes. Our understanding is that -- our point is that that 90 days is not controlled the technical specifications. It is controlled it --

CHAIRMAN STETKAR: I guess --

MEMBER BLEY: How is it controlled?

CHAIRMAN STETKAR: How is it controlled.

MR. TANAKA: Okay.

CHAIRMAN STETKAR: That's an NEI document which, by the way, has no legal bearing in terms of licensing.

MR. TANAKA: Yes, we know.

MR. TJADER: This is Bob Tjader, Technical Specifications Branch.

It's a guideline is what it is. And the 90 days is not a guideline for equipment being out of service. The guidelines, it's based upon the 90 days as a guidelines for the amount of time that you can have a temporary alteration or a temporary change to a plant. The idea being that if you keep a train out or equipment out for more than 90 days, i.e, more it is a non-temporary change to the plant. And therefore, you shouldn't do it. But it's a guideline within the --

CHAIRMAN STETKAR: It's a guideline, though?

MR. TJADER: Yes.

CHAIRMAN STETKAR: It's not part of the licensing basis of the plant?

MR. TJADER: No. That's right.

CHAIRMAN STETKAR: So my question is on this slide it says "One train out of service is not allowed for more than 90 days in accordance with 10 CFR 50.59 and its guideline." Well, 10 CFR 50.59 doesn't really specify a 90 day limit for anything.

And I'm really curious if you're saying

that one train cannot be out of service for more than 90 days, why that 90 days it not actually specified in the technical specifications, which indeed governs the operation and licensing basis for the plant?

MR. TANAKA: Yes.

CHAIRMAN STETKAR: Well, let me put it another way: If your intention is that no train of safety systems shall be removed for longer than 90 days, why would you not specify that in the technical specifications, that limit?

MEMBER BONACA: Why does that maximizes the benefit of on-line maintenance?

MR. TANAKA: Why this 90 days? We have one train that can be out of maintenance for 90 days. We also have another train that can be out of maintenance as restricted by the technical specifications LCO.

MEMBER BONACA: Okay.

MR. TANAKA: So it maximize of the four-train safety system.

Yes, I understand the question of why it's not --

CHAIRMAN STETKAR: It's a fundamental question because as the technical specifications are currently written and if I'm operating the nuclear power plant, I operate the nuclear power plant according to the technical specifications I am allowed according to the technical specifications the way they're written to have a train of safety equipment unavailable, inoperable without any time limit whatsoever.

MEMBER BLEY: You could use it for spare parts?

CHAIRMAN STETKAR: I could use it for spare parts.

The reason I bring this up is I operated at a plant a long time ago that had technical specifications that allowed because of the particular plant's configuration one train of equipment to be inoperable without a time limit. And indeed, one of our trains of equipment was inoperable for on the order of 15 months, a year and a quarter, because there was no priority to get spare parts for a failed piece of equipment. And, indeed, I was operating fully within the law. I wasn't operating prudently, but I was operating fully within the law.

This having no specified backstop on that single train unavailability in the technical specifications is effectively legal carte blanche to as Dr. Bley said, have something that I can use for spare parts.

Now in your presentation this afternoon you've indicated that, indeed 90 days might be a operable limit, and people can argue why should it be 90 days versus 60 days, versus 120 days, versus some other perhaps risk optimized number, but at least it's a number. It's not an infinite time limit.

And so this question is really geared not so much to 90 days, it's a specified limit versus no specified limit.

MR. SCAROLA: It's my understanding that in all aspects of the design we meet the single failure criteria with one division out of service. It's also my understanding that the PRA reflects one division out of service continuously.

So I'm really not exactly sure of where this 90 day came about, but I think we need to take an action and make sure we have consistency there.

CHAIRMAN STETKAR: We haven't seen the PRA. I mean, that's one of the questions that I would certainly have in the PRA is --

MR. SCAROLA: What is the basis of out of service?

CHAIRMAN STETKAR: Right. Right. But that's a different topic for a different day. And right now we're focusing more on more traditional licensing basis --

MR. SCAROLA: Yes.

CHAIRMAN STETKAR: -- for technical specification limits.

MR. TJADER: Yes. I'd just like to say that I was going to say exactly the point that Ken was going to make there. That basically you meet single failure with three trains, and therefore you don't need the fourth train. And theoretically you could have the fourth train out indefinitely. However, the maintenance rule as its availability goes and things like that would be a deterrent for doing that.

There are other designs that have four-trains in a similar situation and they spec the four-trains and then you run into that argument: Well, what should the completion time be? 120 days? Should it be a year? What could it be?

And in the reality, the PRA the risk-assessment would support it being out indefinitely, operable you know for an indefinite period of time.

So the goal is not to have it out indefinitely. The goal is that surveillances are performed on it, it would be operable and available so that maintenance can be performed on the other systems.

MEMBER BLEY: Just for my enlightenment, as I'm not fully conversant with the maintenance rule as I should be, what part of the maintenance rule puts pressure on your in this regard?

MR. TJADER: Well, I'm not an expert in the maintenance rule either. But the maintenance rule requires that you set goals, operating and reliability goals for systems. And if they're not met, then you have to change your maintenance regime, the frequency of maintenance and that sort of thing.

MEMBER BLEY: Okay.

MR. TJADER: And it's part of, I believe, that part of the elements of which a train is evaluated and whether they meet their minimum.

MEMBER BLEY: Okay.

MEMBER BONACA: Since you are going to look at it, another thing also why it is not credible with 10 CFR 50.59?

MR. SPRENGEL: Where the connection is?

MEMBER BONACA: Yes. I just don't understand.

MEMBER BLEY: Yes, I don't see it.

CHAIRMAN STETKAR: I think the actual

connection is that there might be guidance in NEI 96-07 to utilities for implementing 50.59 type analyses. But, again, that's NEI guidance, it's not a direct regulatory basis.

MEMBER BONACA: They would not refer to 90 days.

CHAIRMAN STETKAR: They would never refer to 90 days.

MEMBER BLEY: But I suppose before we got to this line which says it's not allowed, which is probably not true, your other statement is probably what drives this is that if you keep all four running you've got a lot of flexibility in how you do maintenance.

CHAIRMAN STETKAR: Well, but the question is that the risk you go is you don't want to specify a 72 hour allowed outage train for a single train because that does not give you flexibility from maintenance. You have to specify a long enough allowed outage time such that you can perform on-line preventive corrective maintenance at a reasonable schedule. So specifying the longer time allows you to do that. Specifying infinite time allows you a lot of flexibility for on-line maintenance.

MR. TANAKA: That's right.

CHAIRMAN STETKAR: Okay. I think we've probably discussed that point. I'm still a bit disturbed by the fact, and I think we'll discuss this with the staff when they come up also, but this limitless specification for a single train unavailability.

MR. SAJI: Excuse me. Let me say one thing.

CHAIRMAN STETKAR: Identify yourself also, just give your name.

MR. SAJI: I'm Etsuro Saji from MHI. Okay.

CHAIRMAN STETKAR: Well, it' just for our record so we'll know who we are.

MR. SAJI: All right. Let me say one thing. On the 90 days is not regulatory limitation, that's what I understand. But actually I have keep the 90 day backstop as the actual limitation.

CHAIRMAN STETKAR: And my point is that if you as the applicant agree that that was your actual backstop limitation, why is here a reluctance to put that into the technical specifications? Why won't you specify that to actually just codify it and make it a formal limitation?

MR. SAJI: Because if the guideline would change, we'd have to change the technical specification itself.

CHAIRMAN STETKAR: The guideline is a guideline.

MR. SAJI: Yes.

CHAIRMAN STETKAR: The guideline is not the law.

MR. SAJI: So we don't want the 90 days in the technical specification because if in the future the guideline change, the 90 days maybe change. So if we put the 90 days in the technical specification, we'll have to change the technical specification also.

MR. SPRENGEL: So I think we're saying we commit to following the guideline of NEI 96-07, so in that respect we have committed to the 90 days.

MEMBER BLEY: Well, you can't. It's going to be the licensee who has to commit to that, and there's in the technical specification or anywhere else I've seen that assures you that this is the way the plant will be operated. You have no control over that once you build the plant.

CHAIRMAN STETKAR: If you have the certified design technical specification saying no limit on the operation and the licensee, the eventual

COL applicant simply adopts those technical specifications or at least in that area of the technical specifications from the certified design, the 90 days is meaningless.

MR. HAMZEHEE: Excuse me, John, this is Hossein Hamzehee.

We'll follow-up on this issue, but I believe that what they're trying to accomplish here is what is within the technical specifications and what is outside the technical specifications. So the 90 days is administrative control that they're proposing, but that's not something that has to be complied with under technical specification. They have three trains and they believe that's more than adequate to put it in the technical specifications and maintain the LCO and all the other operating requirements.

So, this is an administrative control that is somehow consistent with NEI guideline that would like to ensure as part of the maintenance rule that the safety related systems or those systems that are risk-significant have met the targeted liability. As part of that, then they say regardless of what your technical specifications say based on some other things such as PRA, we look at your risk and your risk profile and then maintain your targeted liability.

So I'm assuming that they're just maintaining as an administrative control the fourth train as a 90 day backstop so that it doesn't get into some kind of what you just mentioned, that it becomes unavailable for too long.

MEMBER BONACA: I thought you mentioned another train before on 90 percent --

MR. HAMZEHEE: I beg your pardon?

MEMBER BONACA: I thought that another train that is controlled. So I agree with interpretation they're making that probably this is a self-imposed limit --

MR. HAMZEHEE: Correct.

MEMBER BONACA: -- to be consistent with the NEI approach.

MR. HAMZEHEE: Correct.

CHAIRMAN STETKAR: Let me follow-up on that line of reasoning. If that's true, where in the DCD is this 90 day administrative limit, if we want to cast it that way, specified?

MR. HAMZEHEE: We have to go back and follow-up on that item to see if it has been clearly identified. And if not, it's something that should be added. I'm not sure if they articulated this clearly.

MEMBER BLEY: Yes, because these slides don't have any meaning.

MR. HAMZEHEE: Correct. You're absolutely right. And maybe the word that they have used there is not the right word of saying it's not allowed. Because if you say it's not allowed, then it should be part of the technical specification.

CHAIRMAN STETKAR: Yes. I mean, the slide says it's not allowed for more than 90 days in accordance with 10 CFR 50.59, which is not a correct statement.

MR. HAMZEHEE: We will look at that.

CHAIRMAN STETKAR: It might be consistent with some guidance in NEI 96-07.

MR. HAMZEHEE: Correct.

CHAIRMAN STETKAR: But the statement as its written here is not a correct statement.

Okay.

MR. TANAKA: Can I move forward?

CHAIRMAN STETKAR: Yes. Sure. Please.

MR. TANAKA: The next slide. The main deviations between the standard technical specifications and the US-APWR technical specifications.

Here is the typical deviations between the standard technical specifications is described.

First is a four train safety systems, which we have just discussed in the previous slide.

And the gas turbine generators, which is quite unique, is unique to the US-APWR design.

And also the digital platform.

And also the surveillance interval. We have 24 months which is accordance with the refueling cycle.

And these are deviations between the standard technical specifications and the US-APWR technical specifications.

Another feature of the US-APWR technical specifications is the adoption of the risk-informed technical specifications initiatives.

US-APWR technical specifications adopts Initiative 4b: A risk-managed technical specifications, which is called RMTS. This program allows completion times to be flexibly determined on site by a licensee using PRA results based on the real time plant configuration. And its program will be developed in accordance with NEI 06-09.

Another one, Initiative 5b: Surveillance frequency control program, SFCP. This program relocates surveillance frequencies to licensee controls using the PRA and operating experiences. This program will be developed in accordance with NEI 04-10.

CHAIRMAN STETKAR: I didn't look ahead. Is this your only slide on the risk-informed --

MR. TANAKA: No, there's a next one.

CHAIRMAN STETKAR: Okay. Why don't you finish that one then.

MR. TANAKA: Okay. And the technical specification provides only the framework o the risk-informed technical specifications initiatives 4b and 5b and adoption of each program is specified as a COL item. In other words, the COL applicant can choose whether or not to adopt these programs which include the PRA model qualified for these programs as well as the station procedures will be established by the COL applicant who intends to implement these programs.

And since this technical specifications only provides the framework of these risk-informed applications, the implementation of the program itself COL item.

The US-APWR DCD technical specification is therefore not effected by the ongoing issue regarding a risk metrics for new reactors.

So the key point is that in the DCD technical specification we only provide the framework, not the detailed program or the PRA.

CHAIRMAN STETKAR: Okay. Let me ask you a couple of things about that. I understand that the material, I understand those statements regarding the surveillance frequencies, the framework that's been established is there are nominal surveillance frequencies specified in the DCD technical specifications and then there's consistently that second level that could be modified by the COL applicant to apply a risk-informed surveillance frequency program.

There is not a comparable framework, if you want to call it that, for the completion times, the allowed outage times. The allowed outage times are simply simplified, I believe -- no, I'm sorry. In some places they're specified. In other places you do have the framework.

But the question I was asking is have any of the allowed outage times, being the DCD technical specifications, been derived from a risk-informed basis or are they strictly developed from the technical specifications except for the single train that we talked about earlier?

MR. TANAKA: Basically is developed from the standard technical specifications.

CHAIRMAN STETKAR: Okay. Okay. Okay. So essentially the values that are currently in the DCD technical specifications do not take benefit from any risk-informed analyses, is that correct?

MR. TANAKA: Yes, correct.

MR. SCAROLA: But I think it's important there to point out that the outage times are the time that we do consider in the PRA. So the PRA enforces that these are acceptable outage times. We meet the core damage frequency, we meet the other--

CHAIRMAN STETKAR: Understand. But those outage times, with the exception of the fourth train that we talked about earlier, the 72 hours, 24 hours, 8 hours, 2 hours; whatever they are are all derived from the standard technical specifications and not derived from a PRA analysis that has developed those. I understand the PRA uses those values, but the PRA does not generate those values, in a sense?

MR. SCAROLA: Right.

CHAIRMAN STETKAR: Okay.

MR. SCAROLA: There are a number of cases, at least in the I&C area, where the starting point was the standard technical specification. But then we do justify an extension of those times based on features in the I&C system. For example, in some cases we have more levels of redundancy, or we have automated testing for the things that are remaining in operation. Therefore, we make arguments, deterministic arguments of why we can extend the outage times.

CHAIRMAN STETKAR: That's the key. But those arguments are deterministic --

MR. SCAROLA: Those arguments are deterministic arguments, they're not PRA-based.

CHAIRMAN STETKAR: Okay. Thank you. That helps.

MR. TANAKA: Okay. From here, this is the major RAIs. Mr. Ken Scarola will make the presentation.

MR. SCAROLA: Thank you very much.

As Mr. Tanaka said, most of the technical specifications are based on the standard technical specifications for Westinghouse and CE PWRs. Of course, as in many areas and our digital I&C is an exception to that and there are some deviations.

And although we do have a number of RAIs that remain in a confirmatory state or in an open state, there are really only three major issues in the I&C area, but these are replicated over and over again since there are so many measurement channels and so many chains and so many functions.

The first issue is identified on slide 9 of your handout, and it relates to the method that we use to calculate allowable values.

The second issue is on slide 11 -- and I'm going to go back to these. I just want to give you an overview.

The second issue is how we apply these AVs, allowable values.

And the third issue is the functional verification method, and that's on slide 16.

So we'll be going through these three issues now and, hopefully, we'll see that they're not actually very significant.

The first one is on the method of allowable value calculation. And here, first of all, the allowable value is the value that you use to determine the acceptance criteria for what is operable or not operable during surveillance tests. So, for example, when you have a setpoint, your setpoint is never going to be right at that value, there's always going to be some leeway. And the allowable value determines the acceptable leeway in that setpoint.

We submitted to the staff a setpoint methodology document. The staff pointed out to us that our seventh grade math was not quite accurate. That the root of all of the sum of the squares is not equal to the square root of the parts of the sum of squares. And this is actually better shown on slide 10 where if you see what we first did, if you see that there's a safety limit on this chart at the very and then the analytical limit which is used in Chapter 15. Then from the analytical limit we subtract all of the uncertainties using the sum root of the sum of the squares method to get to the setpoint. Okay. That's the trip setpoint that you see at the bottom.

In Rev. 0 of our methodology we then added to that the measurable uncertainties and said that's the allowable value. Well, the staff correctly pointed out that if you do that method, you don't leave enough for the unmeasurable uncertainties. There's not enough margin left because the sum of the parts is not equal to the square root of all the uncertainties.

Rev. 0 we are starting with the

analytical limit, subtracting from the analytical limit the unmeasurable uncertainties, and that's now the allowable value for surveillance testing.

So as you can see, we have pushed the allowable value closer to the setpoint leaving more margin for the unmeasurable uncertainties.

The staff is now reviewing this document. We think we got it right this time. We think the staff will find this acceptable. But this is a Chapter 7 review issue. It's related to the technical specifications but it's reliant on the acceptance by the Chapter 7 review team.

So that's the first issue. Before I move on, any questions on that one?

The second issue relates to how we apply the allowable value. The AV is traditionally applied to the COT, Channel operability test, which is really where you establish the leeway in the setpoint.

In MHI's design we intend to apply the allowable value during channel calibration for digital functions. The intent is to reduce what is a two step method of surveillance for analog plants to a one step method of surveillance for digital functions. I'll go through the reason for that is so we can have less manual intervention to avoid human error, and also to reduce O&M labor. And I'll explain what that all means in these subsequent slides.

The first couple of slides simply to give the background, explain how we check the allowable value for analog functions or how plants do this conventionally for analog systems.

The first step is any surveillance is to calibrate the measurement channel. We typically do this by pumping up a transmitter with a mechanical pumping mechanism. We valve out the transmitter, hook in a valving manifold, pump up that transmitter and we check the accuracy of that transmitter typically at five points over its entire span: Zero, 100 and then three points in between, 25, 50 and 75.

And at each one of these points you verify that you have an accurate output from that transmitter, what we call the performance test acceptance criteria. Now are we within the acceptable tolerance of that transmitter. This is what we call the as-found value on channel calibration. So this is step one that we calibrate the transmitter in an analog plant.

Step two, if we go to slide 13, is where we actually check the setpoint. Now after we have a calibrated transmitter, now we disconnect that transmitter from the I&C rack and we inject a calibrated voltage source into the I&C rack. And we ramp that voltage source up to the setpoint and we verify that we actually get a trip from that setpoint.

And at the setpoint we again have a PTAC value, what is the acceptance criteria. Above that PTAC there is some margin, but ultimately we will get to the allowable value, whereas if that setpoint trips above the allowing value, we now have an inoperable channel. And this is an example of a rising setpoint. We do the opposite on a decreasing setpoint.

So for analog functions we'd do a two step calibration. We would like to, if we go to the next slide, make this a one step calibration function for digital channels. And this slide, let me just give you an orientation. It looks a little complicated but I can, hopefully, verbally simplify it.

On this slide you see we have a measurement device. This would be something like a pressure transmitter. That feeds into the plant safety monitoring system, through a distribution module which is just a passive filtering device, and then it goes into the digital controller, what we call the MELTAC controller. Inside that controller is where we do calculation. So trip setpoints, logic functions, whatever it might be.

We ultimately, though, send an output from the module into what we call the power interface module, PIF module, and that's the thing that finally actuates valves and pumps, et cetera.

We would like to determine that we have operable channel by stimulating that measurement device, the same as we would do with an analog function, let that signal propagate through these heavy lines that you see here and read the output on an video display unit that you see on the left hand side of the drawing. So as we pump up that transmitter, we'll read the five calibration points not at the transmitter as we do in an analog plant, but at the video display unit. So we take that signal, e sent it all the way through the digital system through the A to D conversion, through the controller that's going to do the setpoint calcs, send it out through the data communication and we read it on the VDU. This is one step calibration.

If we got to the next slide what it shows now is in order to accomplish this one step calibration, now instead of applying the allowable value to the setpoint as we did for an analog plant in step two, step two is gone now. So now we're applying the allowable value to the five calibration settings; to zero, 5, 25, 50, 75 and 100. So we now have the allowable value verifying the entire loop accuracy from the measurement all the way to the VDU, but we completely eliminate the second step because we verify everything during that channel calibration. We don't apply the allowable value during channel operability tests.

So this is certainly new to the Technical Specification Branch. They are working with the I&C Chapter 7 seven guys to try and see, okay, does this all make sense? Is there some gap that we may be missing in this test? We certainly think there are no gaps. We think it's a viable method. And we certainly think one step is better than two steps, primarily because we know the human interaction is the highest source, history shows, for common cause failure. So the less human interaction we can get with these systems, we feel we're minimizing CCF potential.

CHAIRMAN STETKAR: Not being an expert on instrument calibrations, certainly, the challenge is to make sure then that the allowable value setpoint criteria at the transmitter now appropriately account for the summed uncertainties through the digital and analog devices. And that you've done your seventh grade math correctly through that serial --

MR. SCAROLA: Right.

CHAIRMAN STETKAR: -- string, right?

MR. SCAROLA: So our setpoint methodology, which also explains the allowable value methodology, is detailing that to the staff.

CHAIRMAN STETKAR: Okay.

MR. SCAROLA: We're pretty confident we got it right this time.

CHAIRMAN STETKAR: And we'll see that in Chapter 7?

MR. SCAROLA: We'll see that, yes. I believe the actual calculation methodology is going to be addressed in the Chapter 7 SER.

CHAIRMAN STETKAR: So is there a separate topical report on it, Ken?

MR. SCAROLA: There's a separate technical report.

CHAIRMAN STETKAR: Separate a technical report.

MEMBER BLEY: And NRC has that now and they're reviewing it?

MR. SCAROLA: The NRC has read one of that. Rev 0 we got RAIs, they now have Rev. 1.

MEMBER BLEY: We might have it. I'm not sure.

MR. HAMZEHEE: You should have it. If not, let me know.

MR. SCAROLA: Now we actually think this is a more thorough way of actually confirming the allowable value because it takes into account all of the measurable uncertainties. Of course, we still have to reserve margin for the unmeasurable uncertainties, but it takes into account--

MEMBER BLEY: It sounds right.

MR. HAMZEHEE: I think you have a copy. If you don't, let us know, we'll send you one.

MEMBER BLEY: Okay.

CHAIRMAN STETKAR: You know, we're sort of starting up the US-APWR from our Subcommittee schedule after quite a delay. We received several topical reports and technical reports, but probably more than a year ago in many cases.

MEMBER BLEY: Rev 1 is pretty recent or is it --

MR. SCAROLA: December.

MEMBER BLEY: December. Okay.

MR. SPRENGEL: No, no, no. It was more recent in the last month.

MR. SCAROLA: April 30th. Excuse me. April 30th.

MEMBER BLEY: Rev 1 of the technical report.

MR. SCAROLA: OF the setpoint methodology technical report was April 30th, I believe.

CHAIRMAN STETKAR: We certainly have not received it that recently. Anything that we have on technical reports or topical reports is probably--

MR. SCAROLA: This methodology of applying the allowable value to channel calibration versus channel operability was in Rev. 0. So nothing in this area has changed.

What has changed between Rev. 0 and Rev. 1 was the method of doing the calculation. That sum of the squares problem that we talked about. But the actual methodology of applying it is the same.

MEMBER BLEY: I didn't read it there.

MR. SCAROLA: Okay. Now let me go on to the third item, and this what we call functional verification methods.

Setpoints and logic functions are traditionally set by direct manual verification. What that means is if you have an and gate in your logic, you'll actually inject two signals and make sure the and gate has an and function. If you have an or gate, you'll inject whatever number of signals are in the or gate and you'll verify the or gate has an or function. The same thing with the latches, flip-flops, whatever it might be.

It requires a lot of manual labor, multiple signal injections. Similarly for setpoints. If you're going to verify that a setpoint is exactly 2251, then you have to ramp up your signal right before that, make sure you don't get a trip, and then slightly above it and make sure you do get a trip. These are all very time consuming functional verifications.

The US-APWR verification method is a combination of self tests and manual tests. We do rely extensively on self-testing. We confirm the self-testing is functioning through manual tests. Our intention is to eliminate all manual functional verification tests: That's our intent. And, again, the same reason: Less manual intervention results in a lower potential for human error and also reduced operations and maintenance.

So the staff has requested more information on how we are ensuring that the system is actually operable through this combination of tests.

So what I have here is a series of slides that will walk us through what we are taking credit for. These are simplified slides. I know they look complicated, but they're actually simplified drawings. And. hopefully, this will give you a feel for the methodology we are proposing.

The first test that we are crediting is what we call continuous self-testing. All of the dark lines that you see on this drawing, this is the same drawing that we saw before, represent the portions of the system that are continuously self-tested.

So, for example, if we look at the MELTAC controller, this is the device that's doing the algorithms, the setpoint calculations, the actuations of the pumps and the values, the self-testing is continuously verifying that the CPU is running, that the CPU is reading and writing to memory locations. It's also checking all the memory to make sure that there has been no alteration in either the basic software, or what you might think of as the operating system, and the application software. So all of these tests are running continuously.

In addition, there are tests that are verifying all of the data communications that that controller can talk to all of the other controllers in the system, it can talk to the VDUs, it can send data to the plant computer. These are all self-tests that are running continuously.

Another very important self-test is the automated cross channel checks. Normally inside control rooms the operators run cross channel checks. The operators will look at the A channel, the B, the C and D and they will do comparisons. They will do visual comparisons. In this plant that's automated, it runs continuously, and it runs in this separate computer which is part of the plant control and monitoring system.

So what you see here that we show is the A train sending data to the plant computer, similarly the B train, C train and D train. So inside the plant computer we're doing a comparison.

So if there is any failure in the MELTEC controller or in any part of this MELTAC system, it should be picked up by MELTAC's self-testing. On the other hand, if for some reason it's not and MELTAC does a wrong calculation and it sends bad data, there's a second computer here on the side that's looking at all these analog values -- excuse me. Looking at the digitized version of he analog values and saying are they right? Is the A channel, B channel, C and D channel all falling within an acceptable tolerance?

So these tests are running continuously one internal to the safety system and one external to the safety system. First step.

Any questions on this one? There's many steps to this, so I just want to make sure we're getting as we go through? Okay.

Now let's look at the first manual test, which is the one we talked about before, Channel calibration. Channel calibration is where we pump that measurement device and we read the value on the video display unit. The important point here is when we do that, we are completely overlapping with those self-tests that I spoke about before. So there should be no surprises here.

When we do this measurement channel calibration if for some reason we see that this thing is out of calibration and the problem is not in the transmitter, the problem is inside the system, it means that the self-testing missed something. So this is essentially a test of the self-tests. It also tests the system, but it's a test again of that self-test because it overlaps with all the self-testing functions. So this is the first manual test that actually overlaps with the automatic tests.

MEMBER BLEY: Is there a way to briefly describe what the self-tests actually do? What are they testing and what aren't they testing?

MR. SCAROLA: There are many, many self-tests. For example, one self test is a watchdog timer. The start of every software cycle it sets a timer. At the end of the software cycle, it reads that value. And if that timer times out, it's a hardware timer, it sounds an alarm, stops the system and generates a trip. That's a self-test.

There's a self-test that divides all the memory inside the memory into blocks. Every block calculates a CRC check or the checksum. I forget. Oh, a checksum. Excuse me. Checksum. So inside the system there's a known checksum value.

MEMBER BLEY: And these two things are within MELTAC?

MR. SCAROLA: These things are all in MELTAC. These things are all in MELTAC.

There's data communications where all the system will continuously send data through the data links. It will send data through the data networks and it looks for things like parity checks, CRC checks. It's constantly running those data communications.

I/O modules, the system will continuously send data to an output module. Receive feedback back from the output module that it received the data.

There's many, many more.

MEMBER BLEY: Are they described in that technical report?

MR. SCAROLA: They're in the MELTAC topical report.

MEMBER BLEY: MELTAC topical.

MR. SCAROLA: All the self-testing for MELTAC is in the MELTAC topical report.

The cross channel checks that I spoke about, which are inside this PCMS computer, that's a very, very simple cross channel calibration --

MEMBER BLEY: Thanks.

MR. SCAROLA: -- or cross channel verification. Similar to what the operators would do manually.

Okay. So this channel calibration is an input test. Now we move to TADOT, or trip actuation device operability test, which is an output test. This is a test conducted by the operators. They will call up a video display that shows the pumps and valves in a piping mimic diagram. They will select a single pump or a single valve or even groups of pumps and valves, and they will manually start, stop, open/close those components.

The signal path is from the left side of the figure where you see operator control demand from the VDU through the data communications, through the same controller that we talked about before, again fully overlapping with all those self-tests, through the power interface module and out to the pump and valve. So this is where we actually run the pumps, cycle the valves. Again, we're not only testing the system to verify operability, but again we are looking to see if there's any problems that the self-testing may have not picked up. Because there should be no surprises here. If the self-testing says the system is working, when the operators run this test the system should work the exception of possibly things that are outside the self-testing. For example, maybe the pump motor center is not working right, or you'll find that here. But you shouldn't find any problems in MELTAC, or any data communications because this fully overlaps with all this.

MEMBER BLEY: We're calling this an operability test, but this is actually an operation, pushing the button or clicking on some level and seeing that the thing works the way it should.

MR. SCAROLA: Right. Correct.

Is that wrong to call this TADOT?

MEMBER BLEY: Oh, it's fine. I have no idea. I just wanted to make sure I understood it. He's doing what he would normally do to start that pump or operate the value.

MR. SCAROLA: Yes. Exactly.

MEMBER BLEY: Okay.

MR. SCAROLA: And his manual actions completely overlap with signals for example that would be generated as an ESFAS function which for example you might let a low pressurizer pressure that starts an SI pump while he's starting the SI pump here. But it overlaps completely with that same function.

CHAIRMAN STETKAR: The difference being that the low pressurizer pressure comes in from four analog measurement devices through four channels are then compared in a voting logic, which is not quite the same as touching a touch screen.

MR. SCAROLA: But it's the same CPU. The same CPU has got to respond to either one. And the logic here is that --

CHAIRMAN STETKAR: Occasionally when I put a number in with my key pad here, it's a different number then what gets calculated to an algorithm that's got some errors it.

MR. SCAROLA: Okay. But if there's an error there it's likely because you have a memory problem. Something happened in your memory. So we are separately testing this memory that's also a test.

Okay. So so far we have talked about continuous self-testing, manual input testing which is channel calibration, that's every 24 months and manual output actuation, again that's 24 months.

There is in addition a separate test for the safety VDUs. And the reason we do this as a separate test is because the non-safety VDUs are what the operator is going to use day in and day out, but they're not Class 1E, so they're not fully credited. So we do need to test the safety VDUs as well because they are the accident credited interface for the operators, even though in this design they're anticipated as being the backups. Those of you who have been to our simulator know that you run everything from non-safety VDUs, but the safety VDUs they are the Class 1E backups. So this is a separate test. So this verifies that the safety VDU can talk to the controller and the controller can talk back to the safety VDU, separate test.

Finally we have on slide 21 a diverse software memory integrity test. Now as I said before, the original continuous tests that we're doing continuously verifying all the memory locations. However, that test cannot detect if there may have been an erroneous alteration to the software. You know, maybe a technician put the wrong software in at some point in time.

This is a diverse bit-by-bit memory comparison that's done through this engineering tool where the engineering tool has a copy of the software that should be in every controller and the technicians manually initiate this test, but the engineering tool actually conducts it. It does a bit-by-bit comparison to make sure that there has been no unexpected alteration to the software for any reason.

So again, this is overlapping with the continuing self-tests so it's verifying that the self-test picked up everything that it should have, but its also going beyond that and saying okay, was there some sort of technician error or possibly if you get into the cyber security world, was there some sort of cyber problem, security problem.

MEMBER BLEY: And all of this, this is a manual test?

MR. SCAROLA: This is a manually initiated test, but of course --

MEMBER BLEY: Computer driven?

MR. SCAROLA: Yes.

MEMBER BLEY: But all of these manual tests it looks like you do every two years?

MR. SCAROLA: All of the manual tests are done at refueling intervals.

MEMBER BLEY: Okay.

MR. SCAROLA: But not necessarily at refueling. They are done every two years. All of these can be on-line tests. That's one of the advantages of requiring only three trains and having the fourth train available for testing, you can do them anytime.

MEMBER BLEY: Okay. What's the basis for

only doing the manual tests, especially the operable tests, only once every two years?

MR. SCAROLA: That is justified in the PRA. Normally these manual surveillance tests --

MEMBER BLEY: But we'll find that out in Chapter 19?

MR. SCAROLA: Well, Chapter 19 uses that 24 months surveillance interval as the basis for CDF and LRF calculations.

MEMBER BLEY: Okay. Let me ask you another question then. Many of these pumps and valves may have monthly or quarterly surveillance of its own, wouldn't that be done the same way as this operability test?

MR. SCAROLA: And that would force that operability test to be done more frequently. Absolutely.

MEMBER BLEY: Okay.

MR. SCAROLA: So there are two components of frequency that goes into this TADOT. There is an I&C technical specification requirement and there is a mechanical. Whichever one is more limiting is going to dictate the frequency.

For an I&C perspective, it's only required every 24 months. But as you say, the pump may require a monthly test.

MEMBER BLEY: This isn't really a safety issue? Well, in a way it is, in kind of a bad-ended way.

Are you folks, because you're doing the technical specifications too, are you providing the operators with a way to effectively minimize the amount of surveillance testing they're doing on equipment by making sure that one may operate it if you need to test a valve for one purpose, that those all get counted and they aren't multiple testing the same equipment just for fun? To keep track of separate requirements?

MR. SCAROLA: I would certainly expect that we would do that. And we have a detailed--

MEMBER BLEY: And it would have a equipment out of service list often then?

MR. SCAROLA: Right. So what you're saying is anytime you cycle valve, take credit for that as part of your surveillance tech. It is done in operating plants today, I would certainly --

MEMBER BLEY: It's done as an add-on because people found it was a lot of -- they were multiply testing things quite a bit, not on purpose, but testing other things. You need the valves to test the pump.

MR. SCAROLA: Exactly.

CHAIRMAN STETKAR: Ken, before you get-- I didn't want to interrupt you because you were on a good roll. But it's time to interrupt you, because you only have one more slide.

This has been real helpful, by the way. Trying to divine what indeed was done just reading through the technical specifications themselves was rather difficult.

The technical specifications do call out something specified as an actuation logic test, that phrase is used in the technical specifications. The description of that test in the technical specification bases document seems to be consistent with what you have up on this slide here, is that correct?

MR. SCAROLA: Yes. I probably should have added that annotation on that slide to make it clear.

CHAIRMAN STETKAR: Okay. So this is one in the same. Okay. I at least understand what the term means now.

MR. SCAROLA: This fulfills the ALT requirement, the actuation logic test. There's also a COT, channel operability test, which is the same sort of test but on different controllers. Some controllers we define it as a COT, some controllers we define it as an ALT. In an attempt to follow the standard technical specifications as much as could, the distinction being in Westinghouse plants you have the COT applied to 7300 racks if you're familiar with Westinghouse. The analog processing racks.

CHAIRMAN STETKAR: Okay.

MR. SCAROLA: And the ALT is applied to the SSPS, which is the solid-state protection system.

So we have controllers that mimic the function of the analog processing racks. So we call that software memory integrity test the COT. And we have other controllers that mimic the function of the solid-state protection system racks, so we call that software memory integrity test an ALT.

In doing this, we may have caused more confusion than we helped. But we were trying to line up with the standard technical specifications as best we could.

MEMBER BLEY: I think it probably helped.

I have a question. Back when you began all this talk about the self-tests, the manual tests, I thought I heard you say something about you were trying to eliminate manual tests but the four manual tests we just went through are intended, they're going to be there? You're trying to minimize manual calibrations and that kind of thing.

MR. SCAROLA: Yes. I think there are actually three manual tests. There's only three. We are trying to minimize --

MEMBER BLEY: I'm calling the last one manual too, because that's manually started.

MR. SCAROLA: Yes, you're right.

MEMBER BLEY: Okay.

MR. SCAROLA: There are four manual tests. You are correct. Because the safety VDU is a manual test also. Yes.

I probably should have said we are trying to minimize manual testing, not completely eliminate it. We don't think we can --

MEMBER BLEY: That's fine. I just wanted to make sure I didn't misunderstand.

CHAIRMAN STETKAR: Ken, tell me what tests or combinations of these tests essentially does the confirmation that you described in your introduction, your initial introduction, the test that confirms, indeed, when I have that two-out-of-four low pressurizer pressure of signal coincidence that I have an out put signal to your PIF module?

MR. SCAROLA: Okay. The two-out-of-four logic is logic that's in the memory. So if we go to continuing self-testing, we say inside the MELTAC controller we are continuously verifying all the application software. Well, the application software includes two-out-of-four logic. That is part of the application software. So that's the first place where we verify that the two-out-of-four is in fact still two-out-of-four. Then we do that diversely on the last page, which is the diverse software memory integrity tests where again, we look a that application software using a different method of memory checking to verify that it is still two-out-of-four.

The actual generation of the output is done through the TADOT.

CHAIRMAN STETKAR: Okay.

MEMBER BLEY: But the continuous self-tests, you said also part of what they do is send signals all the way through the system I think somewhere in there you talked about that.

MR. SCAROLA: Yes. The measurement channel signals are sent all the way through the system.

MEMBER BLEY: Okay. As they're currently

being measured? You don't generate signals?

MR. SCAROLA: No. Go to the channel calibration slide and you'll se it.

MEMBER BLEY: Yes, I have it there. On the channel calibration slide?

MR. SCAROLA: Yes. Channel calibration what it shows is that we are continuous -- excuse me. Thirteen.

MEMBER BLEY: That's where I was, yes. Okay.

MR. SCAROLA: Well, actually, it's a continuous self-test. I probably could have done a better job on the continuous self-test slide.

MEMBER BLEY: Yes.

MR. SCAROLA: Because this slide we're actually reading the measurement device continuously. That's part of the normal processing.

MEMBER BLEY: Yes.

MR. SCAROLA: So I should have actually bolded that measurement device, bolded that distribution module and bolded the signal path into the MELTAC controller.

MEMBER BLEY: That's fine.

MR. SCAROLA: That really should have been bolded.

MEMBER BLEY: Okay.

MR. SCAROLA: Because what we're sending into that computer are the continuous --

MEMBER BLEY: The actual signal?

MR. SCAROLA: -- digitized measurement values. So that's part of that continuous test.

MEMBER BLEY: Okay. In this system I guess we have software in several places. There's probably more than one place in MELTAC that there is software running. There's software running over in the PCMS.

MR. SCAROLA: And there's several MELTAC controllers.

MEMBER BLEY: And there's several --

MR. SCAROLA: This is a greatly simplified diagram.

MEMBER BLEY: Yes. And I assume as you have improvements in the software or mods, they're all changed at the same time? One gets changed when there's a mod needed for it?

So what I'm kind of wondering about is this isn't the place -- I mean, you're telling us one thing here, but I'm kind of branching off into Chapter 7, I guess. What I'll be interested in there is on this a the possibility of one piece of software being updated and somehow getting matched up with something that's incompatible from a previous version and one of the modules somewhere around this system. How do we --

MR. SCAROLA: Well, configuration control is a major Chapter 7 issue.

MEMBER BLEY: Okay. We'll wait for that.

MR. SCAROLA: And we have addressed it in our software program manual, which is part of the software life cycle.

MEMBER BLEY: Okay.

MR. SCAROLA: So, yes. I think it's a very valid concern. What we can find in the system is that the application software -- remember there are two kinds of software inside a controller like there are two kinds in your PC. You have the Windows Operating System and then you have all the indications --

MEMBER BLEY: Not on my PC?

MR. SCAROLA: Or in Apple. You have the Apple and then you have all the application programs. It is on our intent that the application programs could be modified individually.

MEMBER BLEY: Yes.

MR. SCAROLA: But we expect all the

operating systems in all the controllers to be managed the same.

MEMBER BLEY: Exactly the same? Okay.

MR. SCAROLA: If there's an upgrade to the operating system, it would be done across the board.

MEMBER BLEY: It's the same across all of them?

MR. SCAROLA: Yes. And the other thing about the operating system, is that an only be done by physically replacing the programmable read-only memory. That can't be done by engineering. You have to actually physically replace the integrated circuits.

MEMBER BLEY: Okay. Thank you.

MR. SCAROLA: Entirely different process.

MEMBER BLEY: Well, we'll wait until Chapter 7 and ask about that.

MR. SCAROLA: So in summary, we go to the last slide. The US-APWR technical specifications are essentially the same as the standard technical specifications in most areas. I&C, as we saw, is one area where we have differences.

The LCOs are actually the basic part of the technical specifications require three operable trains for four train systems. Now realize, not all systems are four train systems. There are some two train systems, for example containment isolation is only a two train system. Main steam isolation. Most of the isolation functions are two trains. But where there are four trains, we require only three. Where there are four channels in most cases we require only three. There are some cases where we do require four, so there are some variations in the tech specs.

This all provides the framework for risk-managed technical specifications and for the surveillance frequency variations.

The method that we use for allowable values for period surveillance ensures there's sufficient margin preserved for unmeasurable uncertainties. This was a major RAI from the staff. We think we have now resolved this RAI. Of course, the Chapter 7 guys are still reviewing that.

The one step surveillance method for digital channels ensures total channel operability equivalent to the two step methods of analog channels. I would actually suggest that it's a better method. It's not just equivalent; it's better because its a total channel test.

The digital portion of the system is continuously self-tested including all setpoints and logic. Now this is probably the biggest issue that the Chapter 7 guys are wrestling with right now. Because we test all the memory, have we convinced them that we have gotten all the functions verified? And of course, there's a combination of memory integrity plus these actual manual tests and we believe this is a sufficient combination to claim that everything has been tested.

MEMBER BLEY: This, again, is not particularly relevant to the technical specifications in terms of periodic surveillance. It's more relevant to -- I don't remember what it is. Chapter 13, I guess, where you talk about startup testing programs and things like that. I think that's 13.

What type of at least functional tests will be performed, and this again is probably just a takeaway for Chapter 13, to at least verify those functions in terms of what I call an end-to-end test, at least before plant startup? And again, that's probably Chapter 13. It's beyond necessarily what we want to talk about today.

MR. SCAROLA: Certainly there will be end-to-end factory acceptance tests. There will be end-to-end systems startup tests for each of these I&C systems.

I can't speak to Chapter 13. I'm not familiar with it.

MEMBER BLEY: Yes. We'll address that, similar to some of the Chapter 7 stuff that we're talking about.

MR. TAKASHIMA: This is Makoto Takashima. Completely integrated tests.

CHAIRMAN STETKAR: Okay.

MR. TAKASHIMA: And we integrated all our machine. And we have tested all functions in the factory. But it's exactly that, other under Chapter 13 this is a factory accepted test.

CHAIRMAN STETKAR: Well, I understand the factory accepted tests. I'm worried about after you install it in the facility, connect the input sensors to the plug-in units --

MR. TAKASHIMA: Oh, yes, yes.

CHAIRMAN STETKAR: -- and connect the output devices into the output plug-in units and making sure that indeed if I verify the input sensors over the full range, not just about the trip setpoint, but drive them to saturation at high and low ends, that indeed the software will not respond unexpectedly to those conditions.

MEMBER BLEY: You just hit on the way I've seen in other applications where an out an area that doesn't normally get tested --

CHAIRMAN STETKAR: Minimum maximum range.

MEMBER BLEY: -- because you don't expect the plant to work there. But somehow a signal is generated there and registers overflow and all of a sudden things go squirrely.

CHAIRMAN STETKAR: Yes.

MEMBER BLEY: So that driving to saturation idea kind of covers it.

CHAIRMAN STETKAR: Yes.

MEMBER BLEY: So that would be Chapter 7, right?

CHAIRMAN STETKAR: 13 is where they specify what's done in terms of startup testing.

MEMBER BLEY: Okay.

MR. TAKASHIMA: All testing, internal will check in other chapter.

MEMBER BLEY: Yes, I understand. But that's the box.

MR. TAKASHIMA: Of course we will check with the transmitters and actual devices. And that testing are discussed in Chapter 13.

CHAIRMAN STETKAR: Okay. We'll get to that when to get to 13 then.

MR. SCAROLA: And I think it's also important to understand that when we talk about technical specifications we're talking about formal in writing part of your licenses basis test as opposed to all the other things that in practice has shown technicians do.

When they do this channel calibration, we're not doing it just at the setpoint. We're forcing them to send the signal from zero all the way up to 10 percent and calibrate at zero, calibrate at 100. So during these calibration points, I don't think they will ignore signals that say hey, the system has gone wild and done something that's unacceptable, even though the thing may calibrate properly. So, you know, again, it's a difference between what they do in actual practice versus what are we going to document as licensing basis. The licensing basis is the allowable value.

CHAIRMAN STETKAR: The other things is, Ken, they don't do it, for example you can't simultaneously calibrate live two or three of those channels to saturation simultaneously and see how the system responds to that, which is where other systems at times have gotten into trouble.

MR. SCAROLA: But those are the things that we would do during validation testing.

CHAIRMAN STETKAR: Yes.

MR. SCAROLA: Those are all part of our V&V program. To put the system to put extraordinary abnormal conditions.

I don't think it's practical to duplicate that kind of testing --

CHAIRMAN STETKAR: Not necessarily on a periodic surveillance, but in terms of confidence in the fact that you've at least baselined or benchmarked whatever you want to call it, the installed system in the plant to confirm that it does not respond in an unexpected way is I think an important thing to do.

And then other surveillance and administrative controls you have in place throughout operations to give you confidence that that benchmarked or baselined performances valid is more the periodic surveillance that you're talking.

MR. SCAROLA: The only thing to keep in mind is that the reason we develop software in phases and we test it in phases is the smaller the module that you're testing, the more different combinations of inputs you can stimulate that module with.

As you get bigger and bigger and ultimately finally get to the plant, it becomes more and more difficult to establish so many different combinations of test conditions. So we have to be cautious of that.

Okay. Finally the last point of the slide, is that the periodic surveillance tests confirm not only system operability, but self-test operability. And this is probably one of the things that I&C Branch are wrestling with. To say, okay, yes, do we have adequate manual tests so that we can take credit for those automated tests. Kind of like, okay, we got an automated test running but how do we know it's really running? What tests the tester. And this is the test of the tester.

MEMBER BLEY: Yes. This is kind of new for us. I'm just kind of wondering if you get to a manual test and you fail, that kind of means you got to do some real digging to figure out what's going on with your self-checking.

MR. SCAROLA: Well, realize there are certain things that are not self-tested. So if the failure is in a part that's not self-tested, that would be expected. Okay, I found that. But if it's a failure of a part that self-tested and the self-test missed it, I agree. Now we have a real issue.

MEMBER BLEY: And if you start getting more of the first kind, you might need to figure out ways to self-test but do more manual tests?

MR. SCAROLA: Absolutely. Absolutely.

MEMBER BLEY: Interesting.

MR. SCAROLA: Okay.

CHAIRMAN STETKAR: This was a great presentation, by the way, on the calibration and I&C stuff. Thanks.

I do have a couple of questions playing way back from this. And that is as I read through the technical specifications I start to think about the systems that are actually in the plant. And I haven't had the benefit of that of actually reviewing the plant design, that'll come later, so understanding the systems that are in there and some of the subtle and nuance is not really feasible at this point. But a couple of things that I noticed is that, for example, the US-APWR design contains a four train essential chilled water system, safety-related system, and nothing with technical specifications on that system. Why?

MR. HAMAMOTO: This is Hiroshi Hamamoto.

This is separate cooling water for the safety HVAC system.

CHAIRMAN STETKAR: Yes.

MR. HAMAMOTO: So the HVAC system, it safety is a system.

CHAIRMAN STETKAR: Well, there's no technical specifications on the HVAC systems either. That was the next question.

I thought I'd start with chilled water because it was more obvious. There is no technical specifications on the HVAC systems. And there are no technical specifications on the chilled water system.

MR. HAMAMOTO: I need to confirm. My understanding is chilled water system including --

CHAIRMAN STETKAR: I couldn't find it. If it's hidden in there, it's called something else. I couldn't find it.

So the reason I'm curious about this is that there's apparently been some discussion between the staff. And I'm going to ask the staff about this to telegraph things. About the process that was used to identify which particular systems in the plant are indeed covered by the technical specifications. There seems to be some documentation through the RAI process that a screening process qualitative or perhaps quantitative was performed to identify risk-important SSCs that are included in the technical specifications and by implication things that are not risk-important are not included in the technical specifications.

So I was curious, for example, because I couldn't find either chilled water or HVAC in the technical specifications whether they were actively screened out because they're not considered risk-important, or were they screened out for some other criteria, or are they simply not included?

I'm talking here about the process, you know the scoping process for the technical specifications themselves.

MR. SCAROLA: I guess we'll have to take an action. I don't have an answer.

CHAIRMAN STETKAR: I'd be curious. I mean, chilled water seemed pretty obvious to me. The ventilation stuff I actually did some homework on and there is some rationale about why some parts of the ventilation systems might be included by being subsumed within the technical specifications for the equipment that's cooled. For example, ventilation for a pump room is subsumed in the technical specification requirements for that pump because it's a support system for that pump. And I can understand that.

But looking into the designs of some of the ventilation systems that are indeed shared between multiple divisions there's not a one-to-one divisional allocation in those ventilation systems just because of the way that they're configured and designed.

And of course, because the chilled water system then cools those ventilation system, it's just not clear how they're treated.

MR. SCAROLA: There are certainly technical specifications related to the I&C portions. Some of those systems. For example, the main control room habitability and all the HVAC ducts that have to close and revent, you know that's all in the I&C technical specifications. So I can't--

CHAIRMAN STETKAR: Because the note here says "Except for main control room." The main control room ventilation seems to be covered pretty well.

MR. SCAROLA: Right.

MR. HAMAMOTO: But basically support the system for ECCS, it is basically forthright system. And also the system is forthright.

CHAIRMAN STETKAR: But there are some areas. For example, Class 1E electrical switch gear rooms where the way the system is designed instead of having train A HVAC -- I don't remember whether you call them 1, 2, 3, 4 or A, B, C, D. I'll call them A, B, C, D.

Train A HVAC cooling the train A switch gear room, and B cooling B, C and D. Trains A and B are designed such that each train can cool both A and B and has sufficient capacity to do that. So, for example, you have now effectively a two functional train ventilation system cooling four switch gear rooms.

MR. SCAROLA: Correct.

CHAIRMAN STETKAR: So you can't say, for example, if you remove train A ventilation from service, it's the same as removing train A switch gear. It just doesn't work that way.

And I don't know if there are other samples. All I needed to do was find one example where there are that type of different divisional dependencies as opposed to a strict one-to-one cooling for a particular pump room, for example.

So I think we'll leave it.

I'm curious about the chilled water and

ventilation, but I'm more generally curious about the process that was used to identify which particular system structures and components are in the technical specifications and which are not. Because if there was some basis for screening out, for example, the chilled water system, I'd really like to understand what that basis is.

MR. SCAROLA: So we'll take that action.

MR. TJADER: This is Bob Tjader, Tech Specs Branch.

Basically what in general we applied the 50.36 criteria for criteria for whether or not a system should be included in the specs. And then, you know, whether or not it is a system to mitigate an accident or prevent a fission product barrier, which would be under Criteria 1, mitigate an accident Criteria 2; that type of thing. Apply those to the systems.

Now Criteria 4 is whether or not the system is risk-significant. I think the systems that you referred to are support systems that support other systems that are in technical specifications.

There are confirmed cooling water, essential service water. There are, as you pointed out, the control room habitability systems; those are in technical specifications.

Now we do have an RAI, and it's listed in our set of RAIs, technical RAIs that are still open. That is that we requested the analysis or the application of Criteria 4 to their systems to confirm that some of these systems that weren't incorporated with the application of the standard technical specifications, whether or not they should have been incorporated or not. So we're awaiting that analysis of the plant systems with respect to Criteria 4: The risk incorporate through risk-significance.

CHAIRMAN STETKAR: Yes. Thanks. We'll talk a little bit more about that I think when you folks get up.

I think I only had -- I'm trying to read through several notes here that again are not organized very well.

Another question I think before MHI steps down, and that is the -- let me read my notes here for a second.

Silence is wonderful, isn't it?

Okay. The question I have is relates to the gas turbines. And it doesn't really relate to the gas turbines. It has nothing to do with the fact that they're gas turbines. They could be anything. It relates to the technical specifications for the day tank, the gas turbine day tanks. There's a technical specifications, and this is more of a curiosity that I believe the technical specification says that the day tank has to contain more than 600 gallons of fuel. And I did a little bit of homework and as best as I can tell, that 600 gallons of fuel will support gas turbine operation for about 66 minutes at full load capacity. It's a little more than an hour's worth of fuel. That's fine. I mean, that might be the design.

Does that mean that in practice you have fuel oil transfer pumps that transfer fuel. This is partly a technical specification question, but it's more of a design-related question that's sort of derived from this technical specification value.

You have fuel oil transfer pumps that supply fuel from the storage tank to the day tank, refill the day tank. If the day tank contains enough fuel for about an hour's worth of operation, does that mean the fuel oil transfer pumps cycle on and off if the gas turbine needs to operate for a nominal 24 hour mission time, let's say. Does that mean that those fuel oil transfer pumps cycle on and off, something, 22, 23 times during that 24 hours?

MR. TAKASHIMA: This Makoto Takashima.

That's covered by the level of the day tank.

CHAIRMAN STETKAR: So when the level goes down, the transfer pumps comes on.

MR. TAKASHIMA: Yes. Yes.

CHAIRMAN STETKAR: High level of transfer pump cycles off?

MR. TAKASHIMA: Yes. And that function is a new function and I will check on this.

CHAIRMAN STETKAR: I was more curious about just the design actually if I'm going to run those turbines for 24 hours, do I have these pumps coming on and off roughly once an hour or so?

MR. TAKASHIMA: Yes.

CHAIRMAN STETKAR: Okay. Check that. Again, that's more probably when we get into Chapter 9 usually has the fuel oil transfer systems. But I wanted to make sure that I had didn't think about something that was incorrect here.

All right. I don't have any more questions.

Any other members have any questions for MHI?

ell, thank you very much. That was a

really good presentation, especially the I&C stuff.

MR. SPRENGEL: Let me clarify what we are going to get back.

CHAIRMAN STETKAR: Good.

MR. SPRENGEL: We had a long discussion on the 90 day limitation. So we'll look into that and get some clarification. Tied into that 10 CFR 50.59, our statement of how that's tied in.

I'm not sure if we need to go any further with taking credit for surveillance when we're looking at --

CHAIRMAN STETKAR: That, I think we'll probably get into that in Chapter 7.

MR. SPRENGEL: Yes.

CHAIRMAN STETKAR: You know, the basic surveillance scheme and the philosophy.

MR. SPRENGEL: That discussion there. And along with that, we'll be sure to touch on it in Chapter 10 with the software update. And that will come again later. But I think we covered it pretty well here.

CHAIRMAN STETKAR: Yes.

MR. SPRENGEL: Chapter 13 we'll touch on factor testing.

CHAIRMAN STETKAR: That again, will be

Chapter 13. But make sure you have it.

MR. SPRENGEL: Yes. And then we do need to look into the --

CHAIRMAN STETKAR: I mean, that's an example, but I'm more interested in what the process is to identify the scope of systems that are in.

MR. SPRENGEL: And then need to do fuel oil.

CHAIRMAN STETKAR: And that again, it's more of a Chapter 9 type of --

MR. SPRENGEL: Yes. So a couple of these to cover now, a couple of them we'll make sure to incorporate in future presentations.

CHAIRMAN STETKAR: Yes. Yes. Yes. Good.

Thank you very much.

We have a break scheduled at 3:00. And to avoid getting the staff up and then just interrupting them as they're coming up to speed, I think what we'll do is take a break a little bit early now. And then continue with the staff after the break.

So let's break until -- I'm still going to be generous. Until 3:00.

(Whereupon, at 2:38 p.m. off the record until 2:58 p.m.)

CHAIRMAN STETKAR: Okay. We're back in session.

Hear from the staff's presentation on Chapter 16.

And I just realized that do we have a copy of the Staff's -

MR. CIOCCO: Yes, we do. My apologies. I thought they were distributed.

MEMBER SHACK: There they are.

MR. CIOCCO: These are identical to the ones that were sent.

MEMBER SHACK: SO they are the same as the electric version?

MR. CIOCCO: Yes, they are.

Does everybody have one? For the rest of you, they're in the back of the room.

Okay. John, are you ready?

CHAIRMAN STETKAR: I'm good.

MR. CIOCCO: Okay. My name is Jeff Ciocco with the NRC staff. I'm the Lead Project Manager.

Just briefly introduce you to our Chapter 16 Technical Specification, our staff experts. Then we'll get into our specification.

On the staff review team, there's about

six individuals. two of them are going to present today. Bob Tjader is the Team Leader. He's going to cover the technical specifications risk-managed technical specifications. And Joe DeMarshall is going to present the instrumentation.

These other reviewers, they are here. If you have any questions, we'll be happy to answer them. But the way we've set up this presentation today when we look at our next slide, we've issued about 300 RAI questions, 290 on Chapter 16. A lot of those have been resolved. Of the 54 open items, that's where we focused our presentation today, the majority being in the implementation area. Joe DeMarshall and Bob Tjader is going to cover the rest.

And then there's 20 confirmatory items where we have acceptable answers, we just need to see them in the next update of the DCD, which would be Revision 3.

So with that, I'm going to turn it over to Bob Tjader. He's going to explain the areas where we have our technical topics and the open items and then get into our specific presentations.

MR. TJADER: Of the 54 open items the technical topic that are yet to be resolved, that is that we come to an understanding with MHI as to what the resolution is are in the list here. The others we've come to some sort of conclusion, we just haven't seen an input to. Some of the them are redundant in nature, but this is basically the list of technical topic open items. The ones that are asterisked are the significant ones, the ones that may have some impact on schedule, perhaps, that we certainly don't see the end result immediately in sight.

Okay. The next slide here.

The significant open items. They cover the risk-informed technical specifications metrics and instrumentation: The TADOT surveillance requirements, the credit for continuous self-test and self-test diagnostics and post accident monitoring instrumentation.

The next slide.

Covering the risk-informed initiatives proposed by US-APWR, they've proposed some of the risk-informed initiatives including the two significant initiatives of the risk-informed completion times, otherwise known as Initiative 4b, which is specified in technical specification 5.5.18, the admin control section 5.5.18. The risk-informed completion time is a real time calculation of a completion time based upon a quantified risk assessment of the configuration of the plant at the time and it is based upon a risk-management document which we referenced in the admin control section of the technical specifications, section 5.5.18, that is the NEI 06-09 which contain the requirements for risk-informed completion times.

And also the surveillance frequency control program, otherwise known as Initiative 5b, and that is it contains the requirements to perform surveillances -- requirements to perform surveillances remain in the technical specifications. The frequencies, however, can be adjusted in accordance with the control program. The program uses both a quantitative and a qualitative criteria to assess off-line the surveillances and to make a determination in accordance with the NEI document 04-10, which is also the guidance document. NEI 04-10 is also referenced in the admin control section 5.5.19. So in essence, it becomes a technical specification requirements documents.

Now NEI 06-09 and 04-10 metrics the guidance or requirements that we utilize to make determinations for risk-informed completion times and surveillance frequencies are based upon Regulatory

Guide 1.174 and 1.177, 1.174 be the overriding document. The metrics in these documents are basically derived for existing plant today. There has been a Commission policy back in the '90s that says that in light of the fact that the new generation of reactors will be safer, that safety shall maintained.

And so the question comes and to whether or not metrics for new reactors need to be revised or that they need to be more stringent for the new reactors. And if that is the case, then that may necessitate a revision to the regulatory guidance documents and including revisions to the NEI guidance/requirements documents.

The next slide, please.

MEMBER SHACK: You don't buy their argument that they're only setting up a framework and therefore this all can be pushed off to the COL sage?

MR. TJADER: Yes. Yes, I do buy that to a degree. And we're going to slightly get into that there.

Basically what they have proposed, as an aside, for these two initiatives 4b and 5b, they put in brackets as an option for which the COL applicant can adopt if they so desire, you know. And so if we do not have these resolutions at this point in time, the COL applicant will just not, in essence, adopt them at this time.

So the framework is there for the applicant adopt. There is just one minor little area where maybe there needs to be a revision in the DCD, and that is when they reference those documents they need to come up with appropriate revisions within the admin control section of the technical specifications. And I mention that later.

So, this is where I mentioned it. Impact of quantified risk metrics if they're to revised for new reactors. Last year we sent -- about a year or so ago, we sent a information letter to the Commission informing them of this issue and that we would follow it up with either an information document or an options document. But at any rate, this very issue, in fact, will go before I believe ACRS in a month or so and later in the year a paper itself will go to the Commission. And depending upon what is determined by that, will determine whether or not we need to revise these documents and the degree to which we need to revise these documents.

If we have to revise these documents in accordance with what Mitsubishi says, they implied there would be no change to the DCD, I say it's very minimal and that is, i.e., the references to the NEI 06-09 and 04-10 will need to be themselves bracketed so that the appropriate revision number of those documents is included in the DCD. It would have to be, but then it would be more complex and a departure would be entailed.

Then with regard to the COL applicants themselves it is a significant implication if the metrics are not determined in an appropriate time. And that is that if it's not in the DCD, the applicants will not be able to adopt these two initiatives, risk-information completion time/surveillance frequency control program. At least they will not be able to adopt them in accordance with the DCD. They could go through a much more convoluted process of departure or something like that and conceivably they could have themselves provide addendum to the requirements documents and we could do it on an ad hoc basis like that. But I don't see that as being feasible, in a way, but I'm not going to rule it out. The applicants are certainly free to propose what they wish to propose.

But at any rate if the COL applicant does not adopt these at the time that the COL is issues but they desire to do that, the other path to adoption of these initiatives is that once they get their license, they would do it through the normal license amendment process.

That is that big open issue with regard to risk metrics at the moment.

Yes, go ahead, I'm sorry.

CHAIRMAN STETKAR: But again, Bob, in terms of the staff's safety evaluation at least the DCD stage today with the exception of references in the DCD to specific versions or bracketed references to regulatory guidance and NEI documents. There's no staff review of any type of risk information for the completion times or the surveillance. Is that at the DCD stages?

MR. TJADER: At the DCD stage what would be reviewed is where they incorporated into the specs, and they've incorporated into a set of specifications, and that set I think we find appropriate at this point in time.

As far as the process of implementing risk-informed completion completion times, that is fully defined in NEI 06-09. There has been a safety evaluation written on 06-09. 06-09 was treated, and

04-10 were treated as topical reports. So there's safety evaluations in those. That process and those metrics that are incorporated in them for current operating reactors have been fully vetted and acceptable. If the Commission finds that for operating purposes we don't need to revise metrics, we could go forward with this immediately.

As far as the risk that is assessed at this stage, the PRA Branch is assessing the DCD PRA to the extent that they can. Obviously, the PRAs are very much a plant-specific beast and I would say the majority of that burden or the majority of that effort would be when the COL comes in. Now it does raise other issues as to whether or not the PRA, when would that be acceptable for adopting the specs.

CHAIRMAN STETKAR: That's exactly my whole point.

MR. TJADER: Right.

CHAIRMAN STETKAR: Is that the quality and level of detail in the PRA must be sufficient to support a risk-informed technical specifications initiative, if you want to call it that.

MR. TJADER: Right. Yes. And that puts a pretty big burden, actually, on the staff.

Go ahead, I'm sorry.

CHAIRMAN STETKAR: Yes. But it's my understanding that that -- and I recognize that it is a large burden. That burden right at the moment though will certainly not be incurred at least until the COL stage.

MR. TJADER: That's right.

CHAIRMAN STETKAR: Okay.

MR. TJADER: But the burden is more than just assuring that the PRA is adequate, which it absolutely must be determined for this. The problem is, is that for instance in the instrumentation area all the pieces may not be together to fully complete the PRA until just prior to fuel load or something after the COL and we come up with a problem of we have to, in accordance with the ISG-08 that was put out a year and a half or two years ago, the technical specifications have to complete at the time of issuance. We have to in essence come up with a program, a process that we're going to follow to ensure that the PRA is adequate. Now that includes both the Regulatory Guide 1.200 effort and also another ISG, in fact, that we're in conjunction with the PRA Branch developing at this time to ensure that when the COL is issued we will have confidence that we can determine that the PRA will be sufficient to support 06-09 and 04-10.

CHAIRMAN STETKAR: Thanks. That helps.

MR. TJADER: And then at this point I'd like to turn it over to Joe DeMarshall, who is our reviewer in the instrumentation area and he will cover the open items in that area.

MR. DeMARSHALL: Okay. Trip actuating device operational tests or TADOT surveillance requirement.

The TADOT, as originally defined in the standard technical specifications in NUREG-1431 was revised under the GTS to accommodate aspects of the fully digital MELTAC I&C platform design.

TADOT, as defined in Revision 2 of the GTS, which is the current revision, states that there are two types of binary devices: Those that have no drift potential an those that do have drift potential.

Next slide.

Details regarding this distinction are included in the GTS definition which goes on to state:

That the operability of binary devices that have drift potentials be confirmed through channel calibration and/or response time testing.

While the channel calibration confirms the accuracy of the device's binary state change with regard to a strip setpoint requirement and the response time testing confirms the accuracy of the device's state time with regard to a trip timing requirement.

The GTS definition also states that the operability of devices that have no drift potential is confirmed through TADOT, and that the TADOT confirms only the state change operability, i.e, there is no setpoint or timing accuracy conformation needed.

In other words, the TADOT provides confirmation of state change operability only and not a confirmation of the accuracy of a binary device's state change with regard to either trip setpoint or trip timing requirement.

The last statement cited from the GTS definition reads as follows: The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the necessary accuracy. This statement appears to be contradict the first three statements on the slide with respect to what the TADOT surveillance is actually confirming the operability of.

Next slide.

Okay. The staff is presently unable to make a conclusive determination regarding the capability of the TADOT to adequately verify trip actuating device operability for designated functions in LCOs 3.3.1, 3.3.2 and 3.3.5 on the basis of ambiguities associated with TADOT performance specifics that exist relative to information provided in the definition for TADOT in Revision 2 of the GTS. Specifically, is the TADOT a confirmation of states inoperability or does it involve an adjustment of the trip actuating device?

Next slide.

I probably have some overlap with Ken's presentation with regard to this next topic, which I also see as the biggest issue out there as far as instrumentation.

Credit for continuous self-test and self-diagnostics features.

Okay. The first bullet makes reference to the protection and safety monitoring system, or the PSMS. I'd like to at this time provide some upfront information that will actually serve as a good lead into the first bullet.

That with few exceptions the PSMS encompasses all safety-related I&C systems in the plant including but primarily, the microprocessor-based digital RPS and ESFAS systems. RPS and ESFAS functional logic and algorithms are performed by PSMS software, except for ones which are stored as digital values that have no potential for variation. For the digital PSMS the only factors hat can result in variations in the trip function are uncertainties that are associated with the analog portion of the system, such as the sensor, analog, following circuitry and A to D, or analog to digital conversion circuitry.

Okay. So the first bullet reads: The US-APWR safety-related protection and safety monitoring system includes continuous automatic self-testing and on-line self-diagnostic monitoring to verify the proper functioning of digital systems and to ensure the integrity of the installed application and system software.

The DCD credits these features as a means of:

Eliminating manual surveillance tests of functional logic and algorithms, setpoints, and constants, specifically elimination of the conventional channel operational test and conventional actuation logic test for digital equipment. The premise being that manual testing and manual calibration are only provided for functions with no self-diagnostics.

At this point, I'd like to briefly touch on one significant aspect of the self-diagnostics. PSMS self-diagnostic features continuously check the software memory of the PSMS controller to verify that the stored data has not been corrupted. And this is accomplished via what is commonly referred to as a memory checksum which Ken alluded to earlier.

And basically a checksum is a means of checking the validity of a set of data by assuming all the bytes of data and comparing that summation to internally stores checks and values. And these internally stored values are what are calculated during PSMS controller initialization.

This continuous automatic assessment of the software serves as the basis for elimination of the conventional channel operational tests and conventional actuation logic test surveillance requirements for the digital PSMS.

Now at the risk of sounding redundant, I want to reemphasize that last point. What we're talking about here is elimination of the conventional channel operational tests and the conventional actuation logic tests surveillance requirements for the digital PSMS, the digital equipment. It's important to point out that the GTS in addition to retaining the STS definitions for COT and ALT for functions implemented via conventional analog by stables has adapted the definition of these surveillance requirements to accommodate the digital PSMS and that's what Ken talked about previously with the software memory integrity test. I'm just going to briefly talk about that a little bit. So the COT and the ALT for the digital equipment, PSMS, are what are referred as software as software memory integrity tests. These are manually initiated functions which automatically compare the software memory of the PSMS controller bit by bit with a calculator software stored off- line. These functions are used during periodic surveillance tests 24 months on a fuel cycle basis to confirm that the software and the controller is the same as the off-line version, and therefore has not changed.

So what we're talking about is a 100 percent bit-by-bit check, it's a manual surveillance. The way I would describe the self-testing the continuous self-testing is more of an in between type test. It's not a 100 percent test, not a 100 percent bit-by-bit by test, it's not a representative sample type test, it's an in between test, or basically it's a checksum.

Checksum is a good check, however it's not an infallible test. I could have a satisfactory checksum value, but I could have two characters transposed; I will still see the same checksum value. That's where the software and memory integrity check on the 24 month basis comes into play and verifies that actual integrity.

Yet the COT and ALT surveillance requirements for the PSMS provide a diverse check of the software memory, including the memory that controls all self-testing, the memory that controls the automated trip functions and the memory that contains all setpoints and constants.

Regarding the last two items, the DCD also credits these features as a means of justifying in part the completion times and surveillance testing bypass times specified for certain LCO conditions, and it also justifies in part, the frequencies specified for certain surveillance requirements.

And the only thing I'd like to say about those two items is that these features are just one component of the justification.

Next slide.

Okay. So the PSMS continuous automatic self-testing and on-line self-diagnostic monitoring capabilities are being evaluated in Chapter 7 of the SER to determine the extent to which these features may be credited towards established requirements for periodic surveillance testing of reactor protection systems, and the justifications for several completion times, surveillance testing bypass times and surveillance frequencies in LCOs 3.3.1, 3.3.2 and 3.3.5.

Next slide.

Okay. Post-accident monitoring instrumentation.

MEMBER BLEY: But we'll continue to have an open item on the self-checking until Chapter 7 is complete at a minimum.

MR. DeMARSHALL: Yes, that is correct.

Okay. Post-accident monitoring instrumentation or PAM instrumentation.

COL applicant that reference the US-APWR design certification must address Revision 4 of Regulatory Guide 1.97 "Criteria for Accident Monitoring Instrument for Nuclear Power Plants."

Revision 4 must be referenced because

Revision 3 does not provide the criteria for advance instrumentation system designs based on modern digital technology.

PAM variable section criteria in Regulatory Guide 1.97, Revision 4, depend on the prior development of plant-specific emergency operating procedures, EOPs, and abnormal operating procedures, AOPs, which are post-COL activities.

Next slide.

COL applicants must complete site-specific technical specification information in the plant-specific technical specifications in accordance with interim staff guides DC/COL-ISG-8 "Necessary Content of Plant-Specific Technical Specifications When A Combined License is Issued." This must be done prior to COL issuance using one of three options:

Option 1 provides site-specific technical specification information or PAM function list derived from Regulatory Guide 1.97 guidance which cannot be done prior to COL issuance;

Option 2 provides useable bounding information, ie., the development of a bounding list of PAM functions, and;

Option 3 relocates the site-specific

information to a licensee-controlled document and establishes an administrative control technical specification that requires determining the information using an NRC approved methodology and that controls changes to the information, PAM function list derived from Regulatory Guide 1.97 guidance.

Next slide.

MHI has proposed a useable bounding list of PAM functions, which is Option 2. COL applicant could incorporate the bounding list by reference.

And the staff is evaluating the proposed PAM function list to determine if the list is truly bounding. That is also a Chapter 7 review item.

Okay. The last slide. The staff conducted a review and evaluation of the US-APWR DCD which generated 290 questions with 54 remaining as open items. Through the use of public meetings and conference calls, the open items have been defined.

The staff and MHI have arrived at a common understanding of the requirements that must be satisfied. Presently, the staff concludes that resolution of the 54 open items is manageable within the planned schedule.

Upon resolving the open items, the

Chapter 16 US-APWR DCD will provide sufficient information to assist a COL applicant in constructing a US-APWR plant that satisfies the requirement of 10 CFR Part 52.

And that concludes my presentation.

MR. CIOCCO: And that's the end of the Chapter 16 presentation.

MEMBER BLEY: Could you put a little structure, a little more then we had that in that first slide, into the 54 open items? Which are the ones that could be troublesome and maybe fairly difficult to get through? I assume those are the ones that are going to be resolved in Chapter 7?

MR. DeMARSHALL: Yes. That's a good question. Let me elaborate on that a little bit here.

Forty-two of those 54 open items, they're my issues. For example, 20 of them are the same or similar issues between the trip system LCO ESFAS LCO and the ESFAS LCO. So the way I wrote them up was I wrote them up to make sure I was tracking them as best we could. So that's actually ten issues. Twenty RAIs, but ten issues.

The other thing, eighteen of those I put together in a category that deals with completion times, surveillance testing bypass times and surveillance frequencies. And those, the reason I did that was because there -- I grouped them that way because there are a number of issues or a number of reasons why associated with justification for those times or surveillance frequencies. It could be a combination of the continuous self-testing. It could be automatic channel checks, continuous automatic channel checks depending on which ones we're talking about. It could be improved redundancy, and also single failure criteria issues as well. So once again, depending on which one we're talking about, there are similar issues with those 17 RAIs.

MEMBER BLEY: Okay. Are you actually doing the Chapter 7 reviews that are associated with these issues?

MR. DeMARSHALL: I am on the Chapter 16 I&C technical specification reviewer, but I have been working very closely with Chapter 7 on these issues.

MEMBER BLEY: Okay. You went through the TADOT issue and I couldn't complete follow it. It seemed to me as much definitional as technical. And what are the key technical things you're hanging on with respect to TADOT?

MR. DeMARSHALL: Well, the TADOT, it

seems to be that the existing definition has information that contradicts.

MEMBER BLEY: Yes.

MR. DeMARSHALL: In one case, where like in the bottom bullet there it says "That the TADOT shall include adjustment as necessary of the trip actuating device at the requirement setpoint to ensure the necessary accuracy." However, if you look at the first bullet it states that with regard to the trip setpoint that the channel calibration is what is actually taking care of that requirement. And with respect to the trip timing requirement, the timing response test, a separate test is taking care of that requirement.

If you look at the second and third bullets it specifically states, and these are right out of the definition, that the operability of the devices that have no drift potential is confirmed through TADOT. That its only confirming state change operability.

The point I was trying to make was that in one case we're saying it's an adjustment associated with the trip actuating device, in another -- and I have contradicting information that says that it's not. That that information is actually --

MEMBER BLEY: But if I'm reading this right, if they clarify these things, that's the problem. It's not a technical issue, or is there a technical issue buried in this that's troubling you?

MR. DeMARSHALL: Well, I'm not sure. And the reason is, is because in the STS definition for TADOT originally the adjustment of the trip actuating device was part of that. And now once again, this is Revision 2 of the GTS.

In Revision 1 that was taken out. That was not incorporated into the Revision 1 definition. The Revision 1 definition specifically stated that the TADOT was associated with binary devices that had no drift associated with them.

So now in Revision 2 I've got -- it's telling me I'm doing both. I don't know. And am I doing with a channel calibration with response time testing or am I checking my setpoint requirements with respect to accuracy with a TADOT.

MEMBER BLEY: Does staff have a position on what it ought to be or where these things ought to be cleared up, or are you just waiting for them to clarify it so you see that everything's covered?

MR. DeMARSHALL: Well, I'm looking for clarification. I personally -- it's a little muddy to me is why I'm asking you about this.

MR. DeMARSHALL: But do you understand the distinction I'm trying to make, though?

MEMBER BLEY: I think I do, but they seem to me things that could be easily resolved rather than real technical issues that you might not be able to actually accomplish a test or the test won't be able to give us the confidence that: (1) The equipment's working right, or; (2) that the self-test is working right.

MR. DeMARSHALL: Well, the thing that I'm struggling with is that when I looked at Revision 1 and I wrote my RAIs, I identified the difference between the standard technical specifications and Revision 1 with respect to calibration or adjustment of the trip actuating device and setpoint requirements.

Now in Revision 2 that information was retained as far as TADOT is supposedly only associated with binary devices that have no drift potential, but it also reintroduced the STS component of the definition. It talks about I'm making adjustments now with TADOT. I don't know what the intent is, and maybe it is something as simple as a wording thing or just massaging the definition. But

I'm confused as to what MHI is trying to do with the TADOT with respect to the trip setpoint requirement.

I mean, it makes sense to me that that could be done with a channel calibration. It makes sense, but why that was re-introduced -- well not re-introduced, but incorporated in the Revision 2 I don't know.

MEMBER BLEY: Okay.

CHAIRMAN STETKAR: I have two or three questions that, again, aren't related to I&C, kind of out of left field and probably more in the expertise of some of the other review areas.

I noticed that there was -- and the staff actually had some questions about this. That there was no requirement for instrumentation to initiate containment purge isolation. And apparently the justification for that was that in modes 5 and 6 the only possible cause for release of radioactivity would be a fuel handling accident and that the Chapter 15 safety analysis for fuel handling accident assumed that the containment was not isolated. And that under that assumption the off-site doses from those fuel handling accidents were acceptable.

MR. DeMARSHALL: Yes.

CHAIRMAN STETKAR: My question is why by definition is a fuel handling accident the only way that we can get a release of radioactivity during modes 5 and 6?

MR. DeMARSHALL: Well, I think with regards to your specific question, I was addressing the footnote in the table. There was a Table 3.3.2-1. The whole issue started with a footnote that states "During movement of irradiated fuel assemblies within containment." So that was a special condition other than modes 1 through 4 per se.

Now that in the standard technical specifications, that footnote, was an actual mode. Whereas in the GTS it was removed, and it was removed with the justification which you just stated, that fuel handling accident was evaluated with containment unisolated. But it is all associated with that footnote.

CHAIRMAN STETKAR: And that's Table 3.3.2-1?

MR. DeMARSHALL: Yes.

CHAIRMAN STETKAR: I can't find that real quickly.

I guess I still have a question. I know why I can't find it, because I'm looking in the wrong section.

If I step back from all of that, I don't particularly care about the Westinghouse technical specifications at the moment. I care more about what can happen. And as I understand the basis for this is that is Mitsubishi has performed an analysis for the fuel handling accident and said that if I have the nominal fuel handling accident when I'm moving fuel, because that's when you have it, and the containment is not isolated, my off-site doses are still acceptable. Therefore, I don't need a requirement to have containment isolation capability during those modes.

MR. DeMARSHALL: Right.

CHAIRMAN STETKAR: My question is why by definition is the only source of a potential release of radiation into the containment during mode 5 or 6 a fuel handling accident? Can I not have, for example, a loss of coolant accident during mode 5 or mode 6, or a loss of decay heat removal cooling during mode 5 or mode 6 that could cause a much larger release of radioactivity into the containment then a fuel handling accident? That's why we do shutdown modes, PRA example. Shutdown modes, PRA not being an insignificant contributor to estimated risk.

So my question is why is simply the

release of activity from damage to a single fuel assembly the thing that determines the fact that I don't need to have containment isolation capability or radiation monitoring that would initiate containment isolation during modes 5 and 6?

MR. DeMARSHALL: Yes. I understand --

CHAIRMAN STETKAR: And I don't know, maybe the people who wrote the standard technical specifications wrote the standard technical specifications without considering shutdown modes very carefully. You know, that's why I don't particularly care about the standard technical specifications, I'm looking at going forward.

MR. TJADER: You are right. I think the original standard technical specifications did not consider shutdown to the degree that they should have.

CHAIRMAN STETKAR: That's right.

MR. TJADER: But that doesn't mean that the only thing we're considering is the fuel handling accident. I know that the PRA Branch has come up with mid-loop operation as being a significant activity and there's been an RAI addressed about that, and MHI has agreed to enhance their RHR specs in light of mid-loop operation. So it's not the only one, and it's not the only one we're addressing.

CHAIRMAN STETKAR: It's just in this particular case the rationale says that I don't need to have operable I think it's radiation monitors that would initiate containment isolation during those modes because by definition the only accident that could cause a release of radiation during those modes, at least in terms of the supporting analyses, is indeed a fuel handling accident. And I don't know what the justification for that rationale is. Because if you had a much larger release of radiation into the containment and it was not isolated, it's not clear that you would meet the dose acceptance criteria that you do with a fuel handling accident.

Yes.

MR. LE: This is Hien Le from Technical Specifications Branch.

For that particular issue, if you look at the containment closure requirement was that basically in mode 6 the containment closure requirement there is two particular requirement that you technically can when you consider these other term for the accident dealing in that mode.

One requirement was a layer of a water to be 23 feet above the flange. And the other one is a decay time.

In the STS in the current fleet the technical specification have a decay time, but during the various evolution of changing the technical specification for current fleet, we've removed the decay time requirement of the technical specification and then drawn into the STS. So to capture the containment closure requirement, the decay time to add to water level is embedded into the containment closure technical specification. For these new design we ask the applicant to put in the decay time. And then an order to a technical specification on the water level. During that mode those two element will fulfil the requirement in the Regulatory Guide 1.183.

So, if the applicant re-evaluate the fuel handling accident to that Regulatory Guide, the staff feel that they fulfilled the need for containment closure. And the closure and the accident has been analyzed under open containment, that means there is no isolation requirement for high radiation.

CHAIRMAN STETKAR: Okay. Thank you.

I can see I'm not going to get very far here. So let's make sure that Mitsubishi when they explain their PRA for shutdown modes, when we get to

Chapter 19, convinces me that any accidents that they evaluate during modes 5 and 6 have been evaluated with the containment not isolated and see what, indeed, the off-site releases are from those accidents. So I'd be really interested to have supporting analyses that, indeed, confirm that some type of isolation capability is not required during those modes.

I might be able to be convinced, but I'd really like to see the supporting analyses to show that. Because a fuel handling accident alone is not adequate to do that.

A couple of other questions I had. And the standard technical specifications do include a limiting condition for protection against boron-dilution events. And that LCO has been removed from the US-APWR technical specifications. And apparently the justification for that is that there's no automatic features to protect against boron-dilution in this particular design. And significant time exists for manual actions to stop a dilution event.

And so I went over into Chapter 15 of the DCD and looked at -- but careful with those. Our reporter is loading up for you.

In Chapter 15 of the DCD when I looked at the supporting analyses for dilution events, I found that the most limiting time for that operator action was dilution that occurred during either shutdown or hot standby conditions when, according to I guess design-specific analyses, the time window, the available time was 16 minutes. So, I was curious why the staff would approve something based on the fact that the operators have 16 minutes available to take manual action to stop a dilution event?

The analyses during power operation, depending on whether the rods are in auto or rods are in automatic show time windows on the order of 61 minutes, if you want to be really precise if the rods are in manual, or 73 minutes if the rods are in auto. which sound like reasonable times. But 16 minutes when you're shutdown and there are a lot of things going on in the plant isn't an awful lot of time. So I was so sort of curious about why that's adequate justification.

And another related issue is that there's no -- I don't think there is, a requirement for closing -- let's see, a limiting condition that addresses closing the block valve for a main steam depressurization valve, main steam atmospheric relief valve, whatever you want to call it. And there, too, the justification for that is that operations actions are required to open the main steam depressurization valves and isolate the main steam depressurization valve under the most limiting event, which is a steam generator tube rupture. So that steam generator tube rupture is identified as the most limiting accident that affects operator actions to either open the depressurization valves to depressurize the intact steam generators and isolate the affected steam generator.

So I went over to the safety analyses in Section 15 of the DCD. And those safety analyses are based on -- and this is a quote if you want to look it up from Section 15.6.3.4.2 subpart C. It says: "The actions to isolate the ruptured steam generator are assumed to be completed within five minutes after the reactor trip," and that's isolation. And that's okay; if the block valve is closed, it's isolated.

Then 15,6.3.4.2 subsection D, dog says: "Operators are assumed to start to reduce the RCS temperature by opening the main steam depressurization valves on the intact steam generators five minutes after isolation of the ruptured steam generator, or accumulative total time of ten minutes." It assumed that those valves are opened in ten minutes after the initial indication.

So this is another case where now, depending on whether you count five minutes plus five minutes or just five minutes, is used as justification for no limiting condition on those block valves being closed.

MR. DeMARSHALL: So with respect to instrumentation, you're thinking that possibly --

CHAIRMAN STETKAR: Well, this isn't an instrumentation really. It's not a technical specification saying that a block valve for a main steam depressurization valve has a limiting time for it. So, it's not instrumentation.

The first one was an instrumentation because it's instrumentation --

MR. DeMARSHALL: Right.

CHAIRMAN STETKAR: -- to initiate the containment isolation function for whatever those accidents are in modes 5 and 6. This is not an instrumentation. It's strictly an LCO allowed outage time, let's say, for a time limit for the amount of time that one block valve, two block valves, however many block valves can be closed during power operation. And there's no limit on that right now. There is the standard technical specifications, but this says well because it's the limiting accident requires manual operator action anyway and sufficient time is available, it doesn't make any difference whether the operators have to open the block valves and the depressurization valves or only the depressurization valves.

Having been an operator if you don't expect the block valves to be closed, and you go open the depressurization valves and then get involved in doing everything else you need to do in a steam generator tube rupture, it might take a while for you to figure out that nothing's depressurizing and what that might be occurring.

So, it's another question. There was two areas where I found that time windows assessed for manual actions were used as justification for not imposing any LCOs --

MR. DeMARSHALL: Right.

CHAIRMAN STETKAR: -- on instrumentation in the first case and just allowed outage times in the second case.

MR. DeMARSHALL: Right. On the boron-dilution, I'll have to touch base with Chapter 15 people and --

CHAIRMAN STETKAR: And Chapter 15, you

know, is used as -- I cited the sections for the block valve stuff. It's just curious. Again, if the time windows were half an hour to open up the depressurization valves, I'd say well okay, fine. I'm not going to worry about one valve versus two valves. Or in the dilution event, as I said, for the time windows during power, an hour or so --

MR. DeMARSHALL: I understand.

CHAIRMAN STETKAR: -- is a reasonable amount of time.

MR. DeMARSHALL: Did you specify the section for the blind --

CHAIRMAN STETKAR: Well, I can if I can--

MR. DeMARSHALL: I think it's somewhere about 15.4.6.

CHAIRMAN STETKAR: It actually is. You're really, really good. 15.4.6.3.3.2 is actually where I found those time windows. Those are derived time windows. They start out by saying, well, the minimum time window must be greater than 15 minutes to satisfy some type of analysis criteria. And, you know, 16 minutes is more than 15 minutes, so they won.

MR. DeMARSHALL: Understand.

CHAIRMAN STETKAR: That's all I had.

Any other members have questions for Chapter 16.

Thank you. Thanks again for the presentation. It helped a lot, too, on the I&C stuff. The blue screen of death here, which is pretty -- with that, I think that we finished the presentations for today.

MR. SCAROLA: Mr. Chairman, Mitsubishi would like to address the TADOT issue.

CHAIRMAN STETKAR: That would be wonderful. We have time.

MR. SCAROLA: If you have the time for it.

CHAIRMAN STETKAR: We have the time if you have the ability. That's great.

MR. SCAROLA: I'm not sure that I have the ability, but I've been asked to do it.

Ken Scarola.

I'd like to address this issue on TADOT. And I have to agree with Joe, we have confusing words in the technical specifications. We need to clarify them. What I would like to attempt to do is explain our intent, and then we're going to go fix those words.

There are two types of binary devices. There are the types that need no adjustments. For example, the manual initiation switches for ECCS, containment isolation, these need to be periodically checked. You need to hit the button, you need to verify that the system gets the signal. That's a non-adjustable binary device. It has no drift. It has no mechanical adjustments. You simply are verifying that there's a state change and we receive the signal inside the digital system.

The other type of binary devices are things like the under voltage relays that are sensing loss of off-site power. Under voltage relays, they have the potential for drift. They have to be periodically adjusted.

There are two tests for the under voltage relays. One is the TADOT, which is done about every quarter, maybe every 92 days or something like that. And we say that's not going to verify the setpoint. That's simply a drop out test. Does the under voltage sense that there's no voltage, does its state change.

Then there's the 24 month channel calibration where we actually verify that the under voltage drops out at 89.5 percent, or whatever the setpoint is.

So what we tried to explain is there are two tests. Since the total channel uncertainty, the setpoint that we established for the under voltage relay, considers that 24 month surveillance and the amount of drift we can have over that period, there's no reason to test the setpoint any more frequently. We do, however, need to test the operability that it in fact does drop and mechanical change state. So there are two different tests there.

I don't think that the technical specifications clarify why we have two specs. The wording's not good. We definitely have to fix it.

The other case of an adjustable binary device are the reactor trip breakers. Now the reactor trip breakers get a TADOT, which is a state change test, and they get a response time test. The TADOT, again, is roughly a recorder, something like that. The response time is every two years.

Now here's where this confusion comes in about the adjustment during TADOT. The reactor trip circuit breaker manufacturer is going to tell you to test this thing every quarter, lubricate it and maybe check some mechanical clearances with feeler gauges and things like that. So you stick a feeler gauge in, do I have the right clearance? No. So I make an adjustment. That's different then a response time verification.

So we were trying to say during the TADOT we're going to make adjustments as recommended by the manufacturer's tech manual. But we're not going to do a response time test every quarter.

MR. DeMARSHALL: Ken, I know that --

MR. SCAROLA: We're going to do the response time test every two years.

MR. DeMARSHALL: I know exactly what you're referring to, and I'm sure you're aware of it. In the first part of that definition it also talks about adjustment to assure that the device for the trip setpoint requirement.

MR. SCAROLA: Yes.

MR. DeMARSHALL: And that's what's --

MR. SCAROLA: And that's what is wrong. We got to take those words "adjustment for the trip setpoint" out of there and simply say "adjustment according to manufacturer's recommendations," or something like that.

MR. DeMARSHALL: So just so I'm clear for the record. So with regard to trip setpoint adjustment for setpoint requirements and accuracy requirements, that's being done with channel calibration every 24 months and response time tests associated with that device being done every --

MR. SCAROLA: Every 24 months.

MR. DeMARSHALL: -- 24 months. And the TADOT is strictly a confirmation of state change operability?

MR. SCAROLA: With adjustment as necessary according to manufacturer's recommendations.

MR. DeMARSHALL: Right. But those adjustments have nothing to do with the trip setpoint?

MR. SCAROLA: Correct.

MR. DeMARSHALL: Okay.

MR. SCAROLA: So I fully understand why the technical specification guys are having difficulties with the words that we wrote because the words don't accurately state what we're trying to accomplish. We have to work on the words. But I don't think we have a technical disagreement on what we're trying to accomplish, and that's really what your question is.

MEMBER BLEY: That's what I was after. So thank you. This helps.

MR. SCAROLA: It is confusing.

MR. DeMARSHALL: The thing that where I struggled with that, Ken, was once again in Revision 1 you know that initial component of the STS definition was not part of the Revision 1 definition and it specifically stated that it was only a state change operability issue. And then when we went to Revision 2, we retained that premise but then we threw back in word-for-word right out of what was in the STS with regard to adjustments for the trip setpoint. And at that point, and when you add in the part that you talked about with the adjustments that you make regarding manufacturer's recommendations, which is also in the definition, I didn't know what was going on.

MR. SCAROLA: I have to apologize. There's a root cause analysis right there as to how we got it so confused, but I don't think we have a technical issue.

CHAIRMAN STETKAR: But this helps a lot. I mean, it sounds like there's a path to resolution i this and that it's just a matter of making sure that the technical specifications clearly define the boundaries about what you're talking about.

MR. SCAROLA: Thank you.

CHAIRMAN STETKAR: Anything from the staff or Mitsubishi? Any members? Okay.

What I'd like to do now is go around the table among the members and see if any of the members have either any final comments or questions first. And I'll start with Mario just because he's been so quiet.

MEMBER BONACA: I thought it was excellent presentations that we got today. And I think the issues are pretty clear.

CHAIRMAN STETKAR: Okay. Bill?

MEMBER SHACK: No comments.

CHAIRMAN STETKAR: Dennis?

MEMBER BLEY: It's more on me than anybody else. I thought they were great presentations.

I need to spend a little time rummaging through the revised setpoint technical report to see if I understand the things that were talked about today. I do that before we get to the chapters.

CHAIRMAN STETKAR: Well, good. I'll rely on you then to do that, sir. You're on the hook. On the record, too. Make sure he gets the transcript.

And I don't have any.

Again, I'd like to thank everybody.

One other thing that I would like to ask the members, and this will help our planning with the staff and with Mitsubishi, and I think we can probably go off the record for this. Because it's more planning. So what I will do is I will close the meeting.

DESIGNATED FEDERAL OFFICIAL COLEMAN: Oh, wait, wait. Any public comments would need to be on the record, if there are any?

CHAIRMAN STETKAR: I'm sorry.

DESIGNATED FEDERAL OFFICIAL COLEMAN: In case someone here choose --

CHAIRMAN STETKAR: Is there anyone from the public who have any other comments?

Thanks for reminding me. Hearing nothing, then I can close the meeting.

(Whereupon, at 3:58 p.m. the meeting was adjourned.)

US-APWR

Design Certification Application

Tier 2: Chapter 2

June 7, 2010

Mitsubishi Heavy Industries, Ltd.

Contents

1. Overview of Chapter
   - Title of Chapter
   - Scope of Chapter
2. Site Characteristics
   - Key Site Parameters
   - Outline of Subsections
3. Major RAIs
4. Summary

1. Overview of Chapter

- Title of Chapter

  Chapter 2: SITE CHARACTERISTICS

- Scope of Chapter

  This Chapter includes geological, seismological, hydrological and meteorological characteristics.

  COLA confirms site characteristics are bounded, or provides site-specific qualification.

2. Site Characteristics

- Key Site Parameters

Bounds estimated 75% to 80% of US landmass.

Site is defined as contiguous real estate with legal right to control access by individuals, and to restrict land use.

Table 2.0-1 is a summary identifying specific site parameters for the US-APWR.

2. Site Characteristics (cont'd)

➢ Outline of Subsections

Section	Title	Description
2.1	Geography and Demography	Site Specific Characteristics
2.2	Nearby Industrial, Transportation, and Military Facilities	Site Specific Characteristics
2.3	Meteorology	1. Normal winter precipitation roof load of 50 psf 2. Extreme winter precipitation roof load of 75 psf 3. 48-hr probable maximum winter precipitation of 36 in 4. Maximum tornado wind speed of 230 mph - Maximum rotational of 184 mph - Maximum translational of 46 mph

2. Site Characteristics (cont'd)

➢ Outline of Subsections (cont'd)

Section	Title	Description
2.3 (cont'd)	Meteorology	5. Radius of maximum rotational speed of 150 ft 6. Rate of pressure drop of 0.5 psi/s 7. Maximum tornado pressure drop of 1.2 psi 8. Tornado-generated missile characteristics in accordance with RG 1.76 Rev. 1 9. Bounding limits of atmospheric dispersion factors and deposition factors presented in Table 2.0-1 10. 155 mph extreme wind speed is for 3-second gusts at 33 ft above ground level based on 100-year return period, with importance factor of 1.15 for seismic category I/II structures

2. Site Characteristics (cont'd)

➢ Outline of Subsections (cont'd)

Section	Title	Description
2.4	Hydrologic Engineering	1. Groundwater elevation minimum of 1 ft below plant grade 2. Maximum level for flood or tsunami of 1 ft below plant grade 3. Maximum rainfall rate, hourly of 19.4 in/hr and short-term of 6.3 in/5min
2.5	Geology, Seismology, and Geotechnical Engineering	1. SSE peak ground acceleration = 0.3g 2. SSE is based on Certified Seismic Design Response Spectra, enhanced spectra in high frequency range of RG 1.60 (further detail in Subsection 3.7.1.1) 3. Maximum slope for foundation-bearing stratum of 20° 4. Potential for surface tectonic deformation at site; None within the exclusion area boundary

2. Site Characteristics (cont'd)

➢ Outline of Subsections (cont'd)

Section	Title	Description
2.5 (cont'd)	Geology, Seismology, and Geotechnical Engineering	5. Subsurface stability a. Minimum allowable static bearing capacity of 15,000 lb/ft^2 b. Minimum allowable dynamic bearing capacity, normal conditions plus SSE of 60,000 lb/ft^2 c. Minimum shear wave velocity at SSE input at ground surface of 1,000 ft/s d. Shear wave velocity of defining firm rock of 3,500 ft/s e. Shear wave velocity of defining firm to hard rock of 6,500 ft/s f. Shear wave velocity of defining hard rock of 8,000 ft/s g. Liquefaction potential; None (for Seismic Category I structures)

2. Site Characteristics (cont'd)

➢ Outline of Subsections (cont'd)

Section	Title	Description
2.5 (cont'd)	Geology, Seismology, and Geotechnical Engineering	5. Subsurface stability (cont'd) h. Total settlement of R/B complex foundation of 6 in i. Differential settlement across R/B complex foundation of 2.0 in j. Maximum differential settlement between buildings of 0.5 in k. Maximum tilt of R/B complex foundation generated during operational life of the plant of 1/2000

3. Major RAIs

➢ Values and descriptions of some site parameters are revised and added based on RAIs as follows

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.3 Meteorology	1. Normal winter precipitation roof load	100-year snowpack maximum snow weight	Normal winter precipitation roof load	Clarify scope of parameter [RAI 59-1086] (Value unchanged)
	2. Extreme winter precipitation roof load	50 psf	75 psf	Clarify design roof snow load [RAI 23]
	3. 48-hr probable maximum winter precipitation	-	36 in	Clarify design roof snow load [RAI 59-1086]
	4. Maximum tornado wind speed			
	- Maximum rotational	-	184 mph	Added tornado components [RAI 154-1643]
	- Maximum translational	-	46 mph	

3. Major RAIs (cont'd)

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.3 Meteorology (cont'd)	5. Radius of maximum rotational speed of 150 ft	-	150 ft	Added tornado components [RAI 154-1643]
	6. Rate of pressure drop	-	0.5 psi/s	(As above)
	7. Extreme wind speed	155 mph for 3-second gusts at 33 ft above ground level	155 mph for 3-second gusts at 33 ft above ground level based on 100-year return period, with importance factor of 1.15 for seismic category I/II structures	Clarify scope of parameter [RAI 23]

3. Major RAIs (cont'd)

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.3 Meteorology (cont'd)	8. X/Q for MCR and TSC			
	a. X/Q for 4-30 days	-	-	Will modify to bound a reasonable number of sites [RAI 562-4427] See pages 19,20
	b. Source location	-	Change indoor source to a vent stack	Clarify realistic pathway [OPEN ITEMS RSAC 2.3.4] See pages 21,22
	c. Description of Source-receptor combinations	Combinations only of the shortest distance	All combinations	Add tables of combination for COL applicants [OPEN ITEMS RSAC 2.3.4] See pages 23 to 27

3. Major RAIs (cont'd)

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.4 Hydrologic Engineering	3. Maximum rainfall rate - hourly	19.4 in/hr with importance factor of 1.2 for category I/II structures	19.4 in/hr for seismic category I/II structures	Remove erroneous reference to importance factor and clarify type of category [RAI 13]
	- short-term	6.3 in/5min with importance factor of 1.2 for category I/II structures	6.3 in/5min for seismic category I/II structures	(As above)

3. Major RAIs (cont'd)

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.5 Geology, Seismology, and Geotechnical Engineering	5. Subsurface stability a. Minimum allowable static bearing capacity	Average static bearing capacity	Minimum allowable static bearing capacity	Clarify scope of parameter [DCD_OI_2.5.4] (Value unchanged)
	b. Minimum allowable dynamic bearing capacity, normal conditions plus SSE	Average dynamic bearing capacity, normal conditions plus SSE of 95,000 lb/ft^2	Minimum allowable dynamic bearing capacity, normal conditions plus SSE of 60,000 lb/ft^2	Clarify scope of parameter and value [DCD_OI_2.5.4]
	c. Minimum shear wave velocity at SSE input at ground surface	Mean minimum shear wave velocity at SSE input at ground surface of "~1,000 ft/s"	Minimum shear wave velocity at SSE input at ground surface of 1000 ft/s	Clarify scope of parameter and value (MHI's independent correction)

3. Major RAIs (cont'd)

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.5 Geology, Seismology, and Geotechnical Engineering (cont'd)	d. Shear wave velocity of defining firm rock	Mean minimum shear wave velocity for defining firm rock of "≥3,500 ft/s"	Shear wave velocity of defining firm rock of 3,500 ft/s	Clarify scope of parameter and value (MHI's independent correction)
	e. Shear wave velocity of defining firm to hard rock	Mean shear wave velocity for defining firm to hard rock of "~ 6,500 ft/s"	Shear wave velocity of defining firm to hard rock of 6,500 ft/s	(As above)
	f. Shear wave velocity of defining hard rock of 8,000 ft/s	Mean shear wave velocity for defining hard rock of "≥ 8,000 ft/s"	Shear wave velocity of defining hard rock of 8,000 ft/s	(As above)
	h. Total settlement of R/B complex foundation	-	6 in	Added settlement parameter [DCD_OI_2.5.4]
	i. Differential settlement across R/B complex foundation	-	2.0 in	(As above)

3. Major RAIs (cont'd)

Section	Parameter	DCD Rev.0	DCD Rev.2	Note
2.5 Geology, Seismology, and Geotechnical Engineering (cont'd)	j. Maximum differential settlement between buildings k. Maximum tilt of R/B complex foundation generated during operational life of the plant	- -	0.5 in 1/2000	Added settlement parameter [DCD_OI_2.5.4] (As above)

3. Major RAIs (cont'd)

Three major changes from the original DCD are based on the following RAIs:

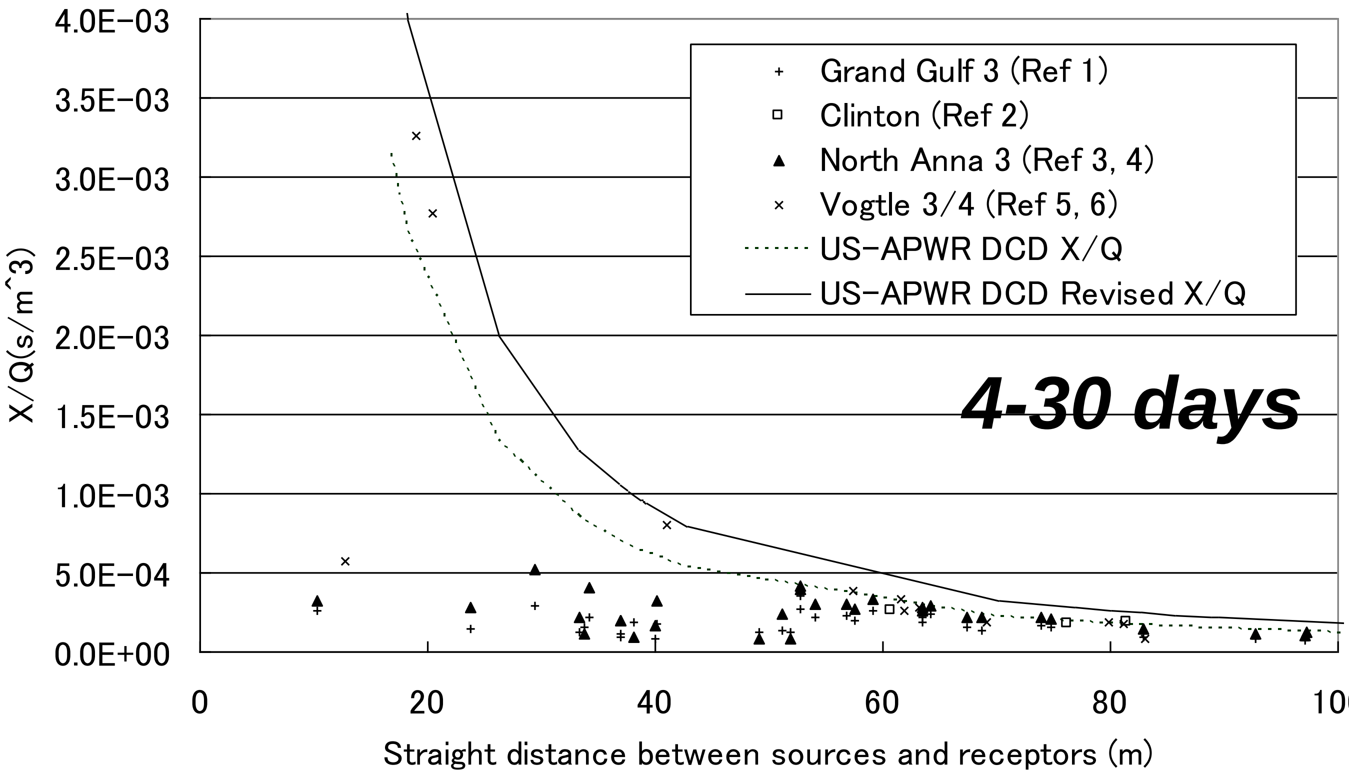
- **Change of χ/Q for 4-30 days**
  - RAI NO.562-4427 REVISION 2, 4/23/2010
  - QUESTION NO. 02.03.04-9 a
- **Change of source locations**
  - OPEN ITEMS RSAC 2.3.4, 2/13/2009
  - Open Item 02.03.04-1
- **Description of additional information**
  - OPEN ITEMS RSAC 2.3.4, 2/13/2009
  - Open Item 02.03.04-6

3. Major RAIs (cont'd)

- 1) Change of χ/Q for 4-30 days
- RAI NO.562-4427 REVISION 2, 4/23/2010
  - QUESTION NO. 02.03.04-9 a.
  - The staff found that the 4-30 days χ/Q values for MCR and TSC were not bounding for 3 out of the 4 sites (North Anna, Clinton, Grand Gulf and Vogtle), and they were not representative of a reasonable number of US sites. The staff suggested that the 4-30 days χ/Q values increase to ensure they bound a reasonable number of sites.

3. Major RAIs (cont'd)

- 1) Change of χ/Q for 4-30 days
- ANSWER
  - χ/Q for 4-30 days is raised up to 1.5 times of the present value, because the original value wasn't representative of a reasonable number of existing sites



3. Major RAIs (cont'd)

- 2) Change of source locations
- OPEN ITEMS RSAC 2.3.4, 2/13/2009
  - Open Item 02.03.04-1
  - Some pathways, where the source location is inside the building, imply indoor transport and dispersion. The ARCON96 are not appropriate for modeling "indoor" transport and dispersion. If the reactivity in the spilled reactor coolant is assumed to be discharged to the atmosphere from the plant vent stack for the purposes of modeling MCR doses, then the plant vent should be identified as the release pathway.

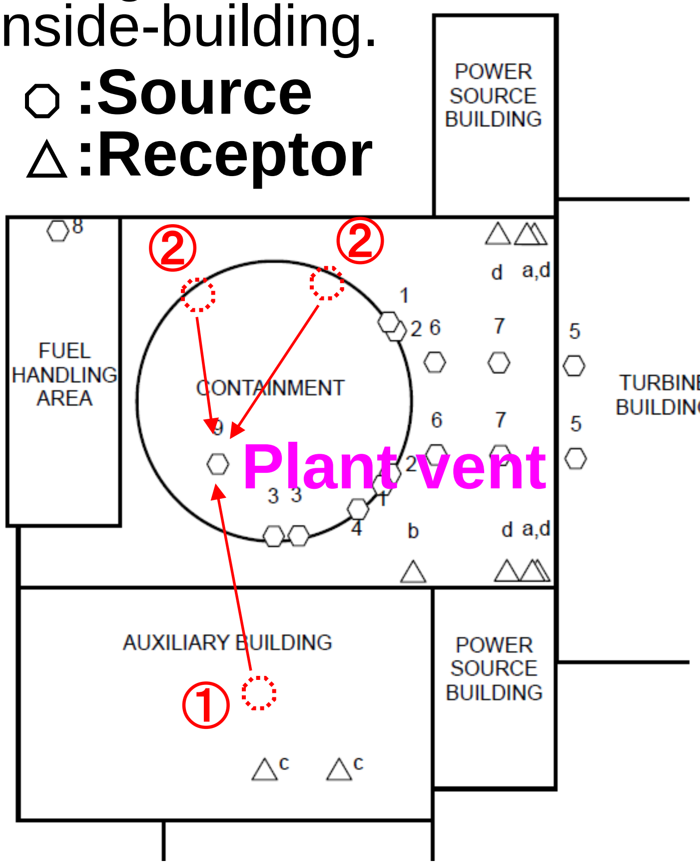
3. Major RAIs (cont'd)

- 2) Change of source locations
- ANSWER
  - Some source locations of the following accidents are changed to a plant vent from an inside-building.

①Failure of small carrying primary coolant outside containment

②Fuel handling accident in the fuel handling area

Although the above accidents occur inside a building, radioactive materials is discharged from a plant vent into the atmosphere. Therefore, the realistic pathway from a plant vent to a receptor should be taken.



Layout of US-APWR

3. Major RAIs (cont'd)

- 3) Description of additional information
- OPEN ITEMS RSAC 2.3.4, 2/13/2009
  - Open Item 02.03.04-6
  - DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1 identify inleakage locations for some (but not all) of the postulated accidents and anticipated operational occurrences. COL applicants should be directed to evaluate χ/Q values for each inleakage location (i.e. class 1E electrical room HVAC intake, auxiliary building HVAC intake, and reactor building door) for each accident release point and compare the resulting bounding χ/Q values with the corresponding key site parameter values listed in DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1.

3. Major RAIs (cont'd)

- 3) Description of additional information
- ANSWER
- The following information is described for COL applicants:
  - All combinations of the sources and receptors for MCR and TSC, as well as the shortest distance combination used in the dose calculation
  - Source locations for each accident in Table 1
  - Locations of source and receptor is shown in Figure 1

3. Major RAIs (cont'd)

- 3) Description of source -receptor combination
- Figure 1 Layout

⬡ :Sources 1 to 9

△ :Receptors a to d for

- ▲ MCR intake
- ▲ MCR inleak
- ▲ MCR inleak and TSC intake/inleak

Location of Receptor

	Intake	Inleak
For MCR	a	b, c, d
For TSC	c	c

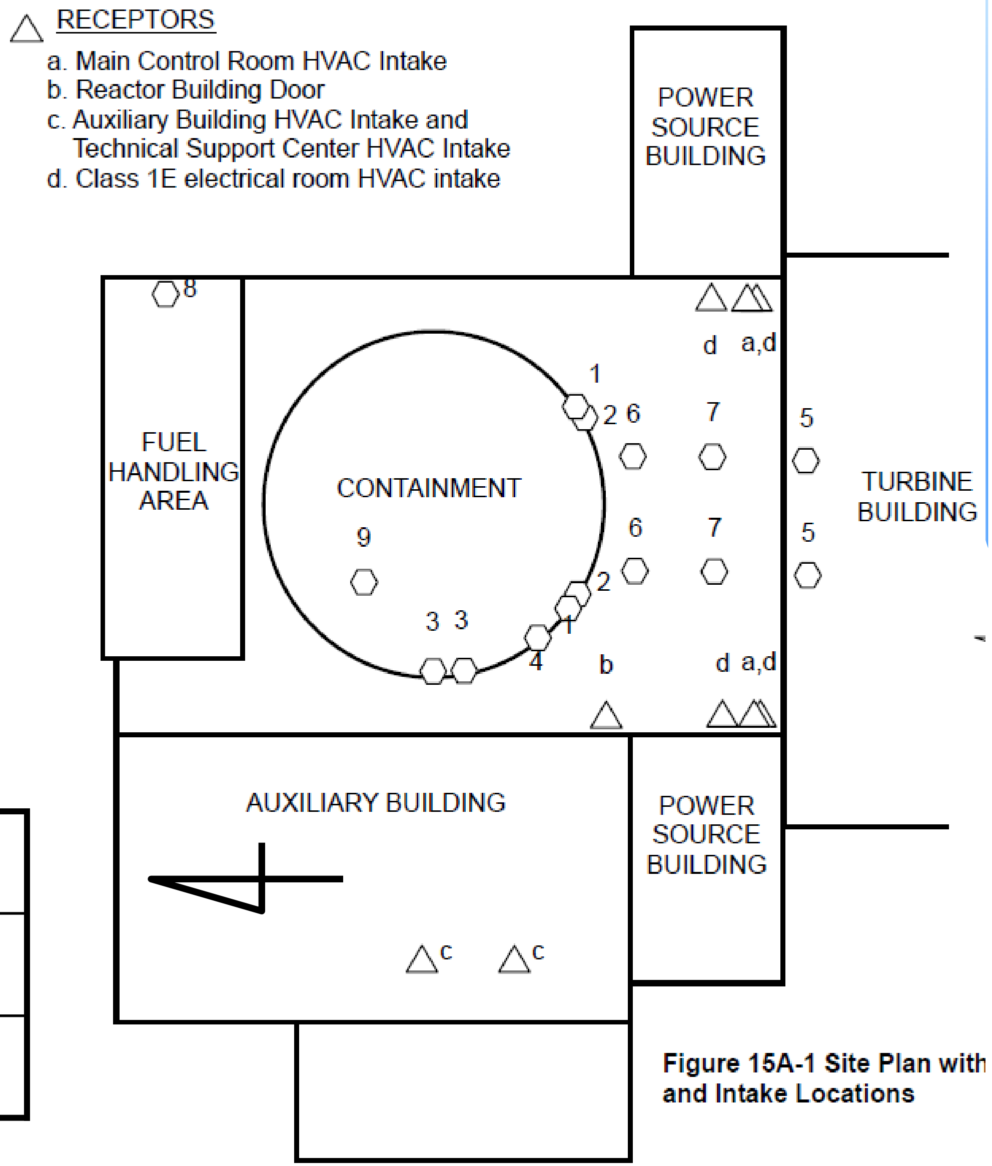


Figure 15A-1 Site Plan with and Intake Locations

3. Major RAIs (cont'd)

- 3) Description of source-receptor combination
- Table 1 Source Location of Accident Releases

Sheet 1/2

Accident	Source	Indication of location in Figure 1
Steam system piping failure	Main steam line	5
	Main steam relief valve and safety valve	6 and 7
RCP rotor seizure accident	Main steam relief valve and safety valve	6 and 7
Rod ejection accident	Plant vent	9
	Main steam relief valve and safety valve	6 and 7
	Ground level containment	1, 2, 3 or 4
Failure of small lines carrying primary coolant outside containment	Plant vent	9

3. Major RAIs (cont'd)

- 3) Description of source-receptor combination
- Table 1 Source Location of Accident Releases (cont'd)

Sheet 2/2

Accident	Source	Indication of location in Figure 1
Steam generator tube rupture	Main steam relief valve and safety valve	6 and 7
LOCA	Plant vent	9
	Ground level containment	1, 2, 3 or 4
Fuel handling accident in the containment	Plant vent	9
Fuel handling accident in the fuel handling area	Fuel handling area	8

4. Summary

- Chapter 2 defines site parameters of the US-APWR standard plant and also identifies important site parameters.
- COLA is to confirm that DCD site parameters envelope site-specific parameters.
- Table 2.0-1 is a summary identifying specific site parameters for the US-APWR.

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Protecting People and the Environment

Presentation to the ACRS Subcommittee

Mitsubishi Heavy Industries, INC (MHI)
US-APWR Design Certification Application Review

Safety Evaluation Report with Open Items

Chapter 2: SITE CHARACTERISTICS

June 7, 2010

Presentation Contents

- Staff Review Team
- Overview of Design Certification Application
- Discussion of Open Items
- Technical Areas of Interest
  - 2.1 Geography and Demography
  - 2.2 Nearby Industrial, Transportation, and Military Facilities
  - 2.3 Meteorology
  - 2.4 Hydrological Engineering
  - 2.5 Geology, Seismology, and Geotechnical Engineering

ACRONYMS

- COL – Combined License
- CSDRS – Certified Seismic Design Response Spectra
- D/Q – Deposition Factor ($1/m^2$)
- EAB – Exclusion Area Boundary
- LPZ - Low Population Zone
- MCR – Main Control Room
- OI – Open Item
- RAI – Request for Additional Information
- SE – Safety Evaluation
- SRP – Standard Review Plan
- TSC – Technical Support Center
- US-APWR – United States – Advanced Pressurized Water Reactor
- χ/Q – Atmospheric Dispersion Factor (sec/m^3)

Staff Review Team

- **Technical Staff**
  - **Seshagiri Tammara**
    Siting & Accident Consequences Branch
  - **Brad Harvey**
    Siting & Accident Consequences Branch
  - **Nebiyu Tiruneh**
    Hydrologic Engineering Branch
  - **Weijun Wang (Presentation by Yong Li and Sarah Tabatabai**
    Geoscience and Geotechnical Engineering Branch 2
- **Project Managers**
  - **Jeff Ciocco – Lead PM**
  - **Mike Magee – Chapter PM**

Overview of Design Certification Application

SRP Section/Application Section		Number of RAI Questions	Number of SE Open Items
2.0	Site Characteristics	1	0
2.1	Geography and Demography	0	0
2.2	Nearby Industrial, Transportation, and Military Facilities	0	0
2.3	Meteorology	33	4
2.4	Hydrologic Engineering	13	0
2.5	Geology, Seismology, and Geotechnical Engineering	5	1
Totals		52	5

Description of Open Items

- **Open Item 02.03.04-8:** Provide χ/Q site parameter values for containment releases to all MCR inleakage locations
- **Open Item 02.03.04-9:** Consolidate containment release source/receptor information
- **Open Item 02.03.04-10:** Correct DCD Tier 2 Table 2.3-3 listing of CR intake and inleakage receptor heights
- **Open Item 02.03.04-11:** Increase 4-30 day MCR and TSC site parameter χ/Q values
- **Open Item 02.05.04-1:** Explain the difference between the original proposed and the revised minimum allowable bearing capacity values

Section 2.1 - Geography and Demography

- The review involves the following sections of the US-APWR DCD:
  - 2.1.1 - Site Location and Description
  - 2.1.2 - Exclusion Area Authority and Control
  - 2.1.3 - Population Distribution
  - 2.1.4 – Combined License Information

The COL applicant is to provide this information as part of the COL application.

Section 2.2 - Nearby Industrial, Transportation, and Military Facilities

- The review involves the following sections of the US-APWR DCD:
  - 2.2.1 - Locations and Routes
  - 2.2.2 - Descriptions
  - 2.2.3 - Evaluation of Potential Accidents
  - 2.2.4 – Combined License Information

The COL applicant is to provide this information as part of the COL application.

Technical Topics of Interest
Section 2.3 - Meteorology

Section 2.3 - Meteorology

- The review involves the following sections of the US-APWR DCD:
  - 2.3.1 – Regional Climatology
  - 2.3.2 – Local Meteorology
  - 2.3.3 – Onsite Meteorological Measurements Program
  - 2.3.4 – Short-term Atmospheric Dispersion Estimates for Design- Basis Accidental Releases
  - 2.3.5 – Long-term Atmospheric Dispersion Estimates for Routine Releases
  - 2.3.6 – Combined License Information
- The COL applicant is to provide this information as part of the COL application

Technical Topics of Interest

Section 2.3 - Meteorology

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Meteorological Site Parameters

- The applicant identified meteorological site parameters related to:
  - Climate Extremes and Severe Weather
  - Atmospheric Dispersion (Accident & Routine Releases)
- A COL applicant needs to demonstrate that its site characteristics fall within the US-APWR site parameters
- The staff evaluated the US-APWR meteorological site parameter values to ensure they are representative of a reasonable number of sites that have been or may be considered for a COL application

Technical Topics of Interest
Section 2.3 - Meteorology

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Climatic Site Parameters

- Winter Precipitation (for Roof Load Design)
  - Expected to be representative of a reasonable number of potential COL sites
- Tornado
  - Consistent with RG 1.76 Revision 1
- Extreme Wind Speed (other than in Tornado)
  - Expected to be representative of a reasonable number of potential COL sites
- Ambient Design Air Temperature
  - Expected to be representative of a reasonable number of potential COL sites

Technical Topics of Interest

Section 2.3 - Meteorology

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Short-Term Dispersion Site Parameters for Design-Basis Accident Releases

- EAB and LPZ χ/Q Site Parameter Values
    - Expected to be representative of a reasonable number of potential COL sites
- CR and TSC χ/Q Site Parameter Values
    - **Open Item 02.03.04-11:** Increase 4-30 day MCR and TSC site parameter χ/Q values
    - **Open Item 02.03.04-8:** Provide X/Q site parameter values for containment releases to all CR inleakage locations
    - **Open Item 02.03.04-9:** Consolidate MCR source/receptor information
    - **Open Item 02.03.04-10:** Correct DCD Tier 2 Table 2.3-3 listing of CR intake and inleakage receptor heights

Technical Topics of Interest

Section 2.3 - Meteorology

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Long-Term Dispersion Site Parameters for Routine Releases

- Site Boundary and Food Production Area χ/Q and D/Q Values
  - Expected to be representative of a reasonable number of potential COL sites

Technical Topics of Interest
Section 2.3 - Meteorology

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COL Information Items

- COL Information Item 2.3(1)
  - Provide pre-operational and operational meteorological monitoring programs
  - Verify site-specific regional climatology and local meteorology are bounded by the US-APWR site parameters
- COL Information Item 2.3(2)
  - Provide design-basis accident χ/Q values per SRP Section 2.3.4
- COL Information Item 2.3(3)
  - Provide annual average χ/Q and D/Q values per SRP Section 2.3.5

Conclusion
Section 2.3 - Meteorology

- Except for the SE Open Items:
  - Applicant has identified an appropriate list of site parameters
  - The values assigned to each of the site parameters are expected to be representative of a reasonable number of sites that may be considered for a COL application

Technical Topics of Interest
Section 2.4 -Hydrologic Engineering

Section 2.4 – Hydrologic Engineering

- The review involves the following sections of the US-APWR DCD:
  - 2.4.1 Hydrological description
  - 2.4.2 Floods
  - 2.4.3 Probable Maximum Flood on Streams and Rivers
  - 2.4.4 Potential Dam Failures
  - 2.4.5 Probable Maximum Surge and Seiche Flooding
  - 2.4.6 Probable Maximum Tsunami Flooding
  - 2.4.7 Ice Effects
  - 2.4.8 Cooling Water Channels and Reservoirs
  - 2.4.9 Channel diversion
  - 2.4.10 Flooding Protection Requirements
  - 2.4.11 Low Water Considerations
  - 2.4.12 Groundwater
  - 2.4.13 Accidental Release of Liquid Effluents in Ground and Surface Water
  - 2.4.14 Technical Specifications and Emergency Operations Requirements
  - 2.4.15 Combined License Information

Technical Topics of Interest
Section 2.4 -Hydrologic Engineering

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- Information in all the sections is site specific and will be provided by the COL applicant.
- Hydrologic Parameters
  - The applicant identified the following hydrologic parameters:
    - Maximum groundwater level (1 ft below finished grade)
    - Maximum flood (tsunami) level (1 ft below finished grade)
    - Maximum hourly rainfall rate (19.4 in/hr.)
    - Maximum short-term rainfall rate (6.3 in/5 min.)
- A COL applicant needs to demonstrate that its site characteristics fall within the US-APWR DCD site parameters
- Staff evaluated these parameters to determine the acceptability of the parameter values

Technical Topics of Interest

Section 2.4 -Hydrologic Engineering

- COL Information Item 2.4(1)
  - The COL applicant is to provide sufficient information to verify that hydrologic-related events will not affect the safety-basis for the US-APWR

Conclusion
Section 2.4 – Hydrologic Engineering

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- The Applicant has provided plant specific hydrological site parameters and the Staff finds those acceptable.
- The Applicant has properly identified the site specific information to be provided as part of the COL application.
- The Applicant has satisfactorily answered all the RAI's and there are no open items.

Technical Topics of Interest
Section 2.5 – Geology, Seismology, and Geotechnical Engineering

Section 2.5 – Geology, Seismology, and Geotechnical Engineering

- The review involves the following sections of the US-APWR DCD:
  - 2.5.1 Basic Geologic and Seismic Information
  - 2.5.2 Vibratory Ground Motion
  - 2.5.3 Surface Faulting
  - 2.5.4 Stability of Subsurface Materials and Foundations
  - 2.5.5 Stability of Slopes
  - 2.5.6 Combined License Information

- The COL applicant is to provide this information as part of the COL application

Technical Topics of Interest
Section 2.5 – Geology, Seismology, and Geotechnical Engineering

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- Establishes geotechnical site parameters for a candidate site
  - Minimum bearing capacity
  - Minimum shear wave velocity
  - Maximum settlement, etc.
  - Total settlement and differential settlement
  - Maximum tilt of R/B complex foundation during the plant's operational life
  - Maximum slope for foundation bearing stratum

  - These parameters are expected to be representative of a reasonable number of COL and ESP sites

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering

- Establishes other site parameters for a candidate site
  - No liquefaction potential for seismic category I structures
  - No surface tectonic deformation potential within the exclusion area boundary

  - These parameters are expected to be representative of a reasonable number of COL and ESP sites

Technical Topics of Interest

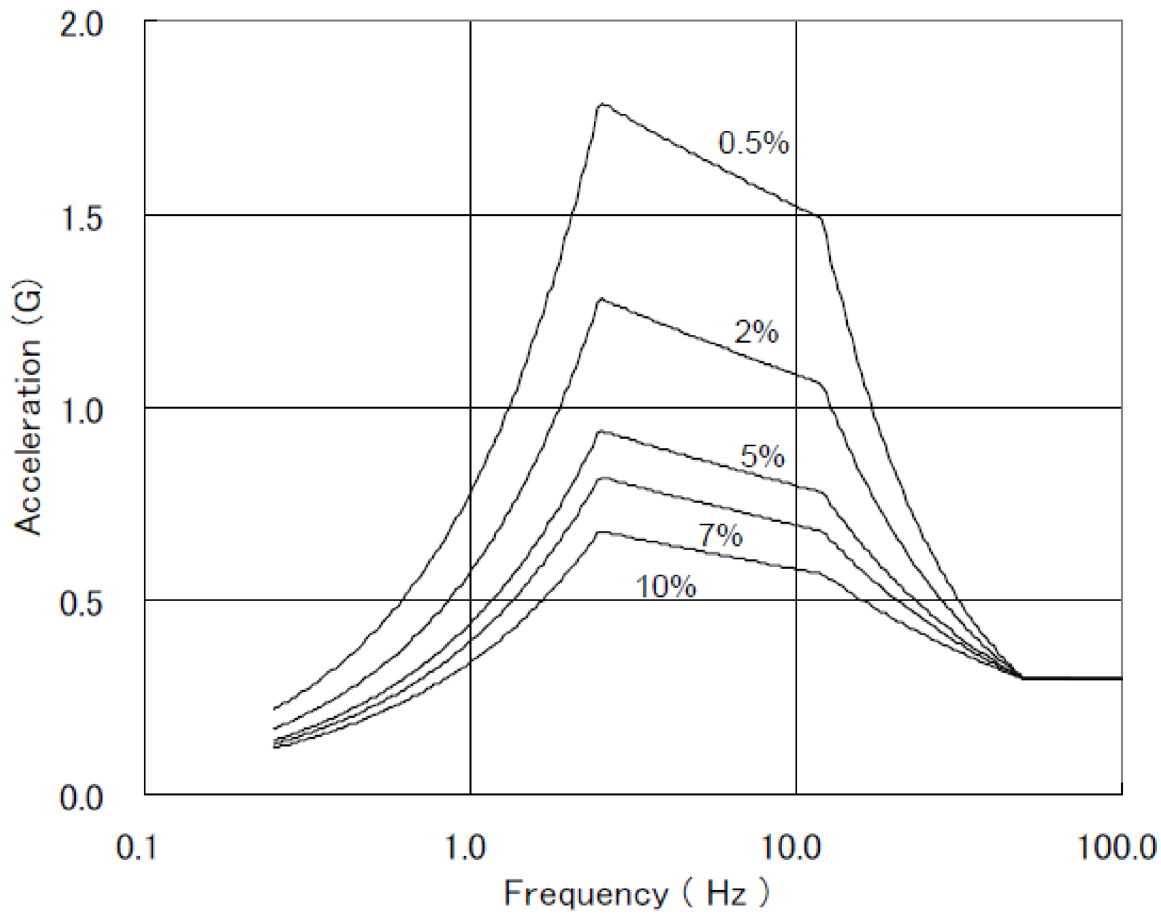
Section 2.5 – Geology, Seismology, and Geotechnical Engineering

- Establishes certified seismic design response spectra (CSDRS) for a candidate site (figure on next slide)

- Based on RG 1.60, anchored at a peak ground acceleration of 0.30 g, and enhanced in the high frequency range

- The US-APWR CSDRS is considered to be representative of general plant conditions in the US

Technical Topics of Interest
Section 2.5 – Geology, Seismology, and Geotechnical Engineering



Note: spectra for damping 0.5, 2, 5, 7, 10%.

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering

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- Open Item # 02.05.04-1:
  - Provide an explanation on the difference between the original proposed and the revised minimum allowable bearing capacity values

Technical Topics of Interest

Section 2.5 – Geology, Seismology, and Geotechnical Engineering

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- COL information Item, 2.5 (1)
  - The COL applicant is to provide sufficient information regarding the seismic and geologic characteristics of the site and the region surrounding the site

CONCLUSION

Section 2.5 – Geology, Seismology, and Geotechnical Engineering

- Except for the SE Open Item:
  - Applicant has identified an appropriate list of geologic, seismologic and geotechnical site parameters
  - Applicant has properly identified the site specific information to be provided as part of the COL application
  - The values assigned to each of the site parameters are expected to be representative of a reasonable number of prospective COLA sites

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Questions?

US-APWR

Design Certification Application

Tier 2: Chapter 16

June 7, 2010

Mitsubishi Heavy Industries, Ltd.

Contents

1. Overview of Chapter
    - Title of Chapter
    - Scope of Chapter
2. Features of Technical Specifications (TS)
3. Major RAIs
4. Summary

1. Overview of Chapter

- Title of Chapter

  Chapter 16: Technical Specifications

- Scope of Chapter

  This chapter includes the following categories of information as required by 10 CFR 50.36 and 10 CFR 50.36a.

  Safety limits, limiting safety system settings, LCOs, surveillance requirements, design features and administrative controls.

2. Features of TS

➢ Features of US-APWR safety system design

- Design concept is based on current PWRs in the USA
- Four-train safety systems are one of the characteristic design features

➢ Features of US-APWR Technical Specifications

- Basically follow the Standard TS* (STS)
- Maximize the benefits of on-line maintenance (OLM)
- Provide the framework of Risk-Managed Technical Specifications (RMTS) and Surveillance Frequency Control Program (SFCP)

*** NUREG-1431, Rev.03, "Standard Technical Specifications Westinghouse Plants"**

2. Features of TS (cont'd)

➢ 2.1 Utilization of STS

- US-APWR Technical Specifications are almost the same as the STS of NUREG-1431

- US-APWR Technical Specifications differ from STS to reflect technical differences between conventional PWR designs and the US-APWR design

- Technical report* describes the justification for deviations between the STS and US-APWR TS

*** Justification for deviations between NUREG-1431 and US-APWR Technical Specifications (Nov 2009)**

2. Features of TS (cont'd)

➢ 2.2 Safety Benefits of Four-train systems

- Enhanced redundancy (50% x 4)
  - Capability beyond single failure criterion

- Maximize the benefits of on-line maintenance
  - TS LCO only require three operable trains
    - One train out of service is not allowed for more than 90 days in accordance with 10CFR50.59 and its guideline NEI 96-07*

* NEI-96-07, Revision 1, "Guidelines for 10CFR50.59 Implementation"

2. Features of TS (cont'd)

2.3 Main deviations between STS and US-APWR TS

- Characteristic design features
  - Four train safety systems (e.g. LCO is three of four SIS trains shall be OPERABLE)
  - Gas turbine generators (e.g. Fuel oil testing program)
  - Digital Platform (e.g. Actuation logic test interval increased)

- Surveillance Interval
  - 24 month refueling cycle

2. Features of TS (cont'd)

➢ 2.4 Adoption of Risk Informed Technical Specifications Initiatives

- Initiative 4b: Risk-Managed Technical Specifications (RMTS)
  - ✓ This program allows Completion Time (CT) to be flexibly determined on site by a licensee using PRA result based on the real time plant configuration.
  - ✓ Developed in accordance with NEI 06-09

- Initiative 5b: Surveillance Frequency Control Program (SFCP)
  - ✓ This program relocates Surveillance Frequencies (SF) to licensee control using PRA and operating experiences.
  - ✓ Developed in accordance with NEI 04-10

2. Features of TS (cont'd)

- DCD TS provide the framework of RMTS and SFCP and adoption of each program is specified as COL item.
- Actual Programs which include the PRA model qualified for these program as well as the station procedures will be established by the COL applicant who intends to implement them.
- The issue of risk metrics for new LWRs does not affect DCD TS.

3. Major RAIs

➢ 1) Setpoints – Allowable Value Calculation

- Allowable Value (AV) is the acceptance criteria for channel measurements during periodic surveillance
- NRC staff correctly commented that MHI's method of calculating AV does not provide sufficient allowance for those uncertainties not measured during the test.

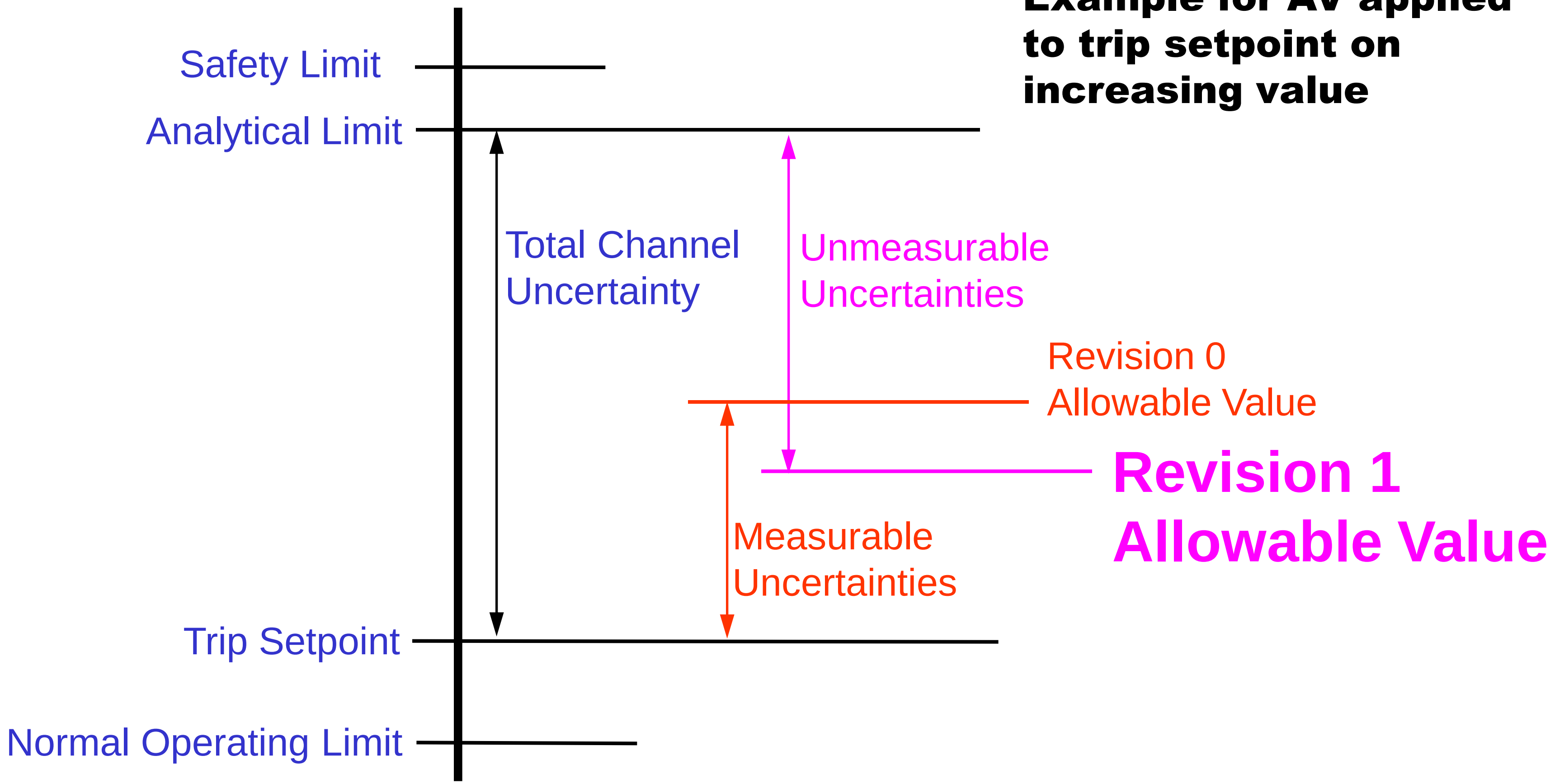
Total Channel Uncertainty $= \sqrt{\underbrace{A^2 + B^2 + C^2 + \ldots}_{\text{Unmeasurable Uncertainties}} \quad \underbrace{T^2 + U^2 + V^2 + \ldots}_{\text{Measurable Uncertainties}}}$

$\leq \sqrt{\underbrace{A^2 + B^2 + C^2 + \ldots}_{\text{Unmeasurable Uncertainties}}} + \sqrt{\underbrace{T^2 + U^2 + V^2 + \ldots}_{\text{Measurable Uncertainties}}}$

3. Major RAIs (cont'd)

- MHI addressed this issue by revising the AV calculation method.

Example for AV applied to trip setpoint on increasing value



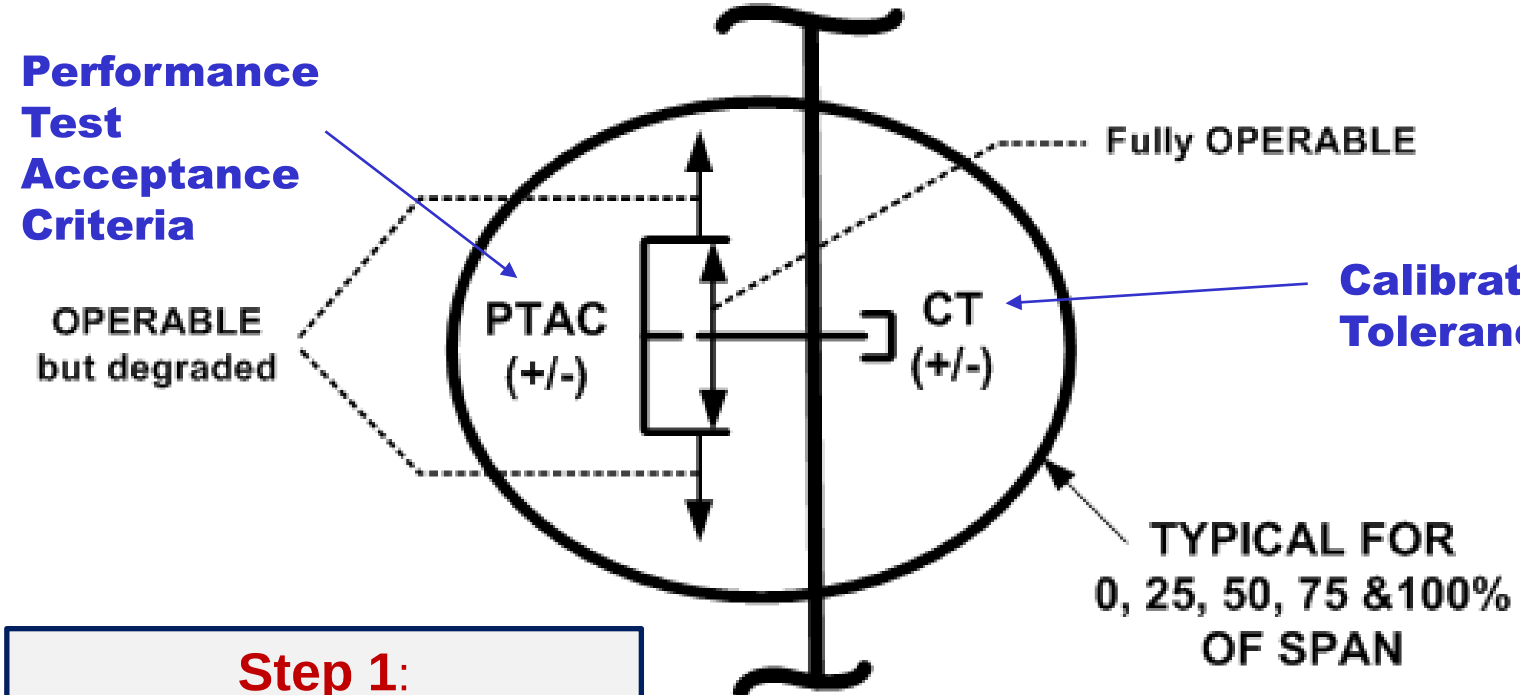
3. Major RAIs (cont'd)

➢ 2) Setpoints – Allowable Value Application

- AV is traditionally applied to setpoints during CHANNEL OPERABILITY TEST (COT)
- NRC requested more detail on MHI's application of AV to CHANNEL CALIBRATION for digital functions
- MHI's intent is to reduce the 2 Step surveillance traditionally applied to analog channels to 1 Step for digital channels
  - Less manual intervention to avoid human error
  - Reduced O&M labor

3. Major RAIs (cont'd)

Periodic Surveillance Analog Processing Functions – TWO STEPS

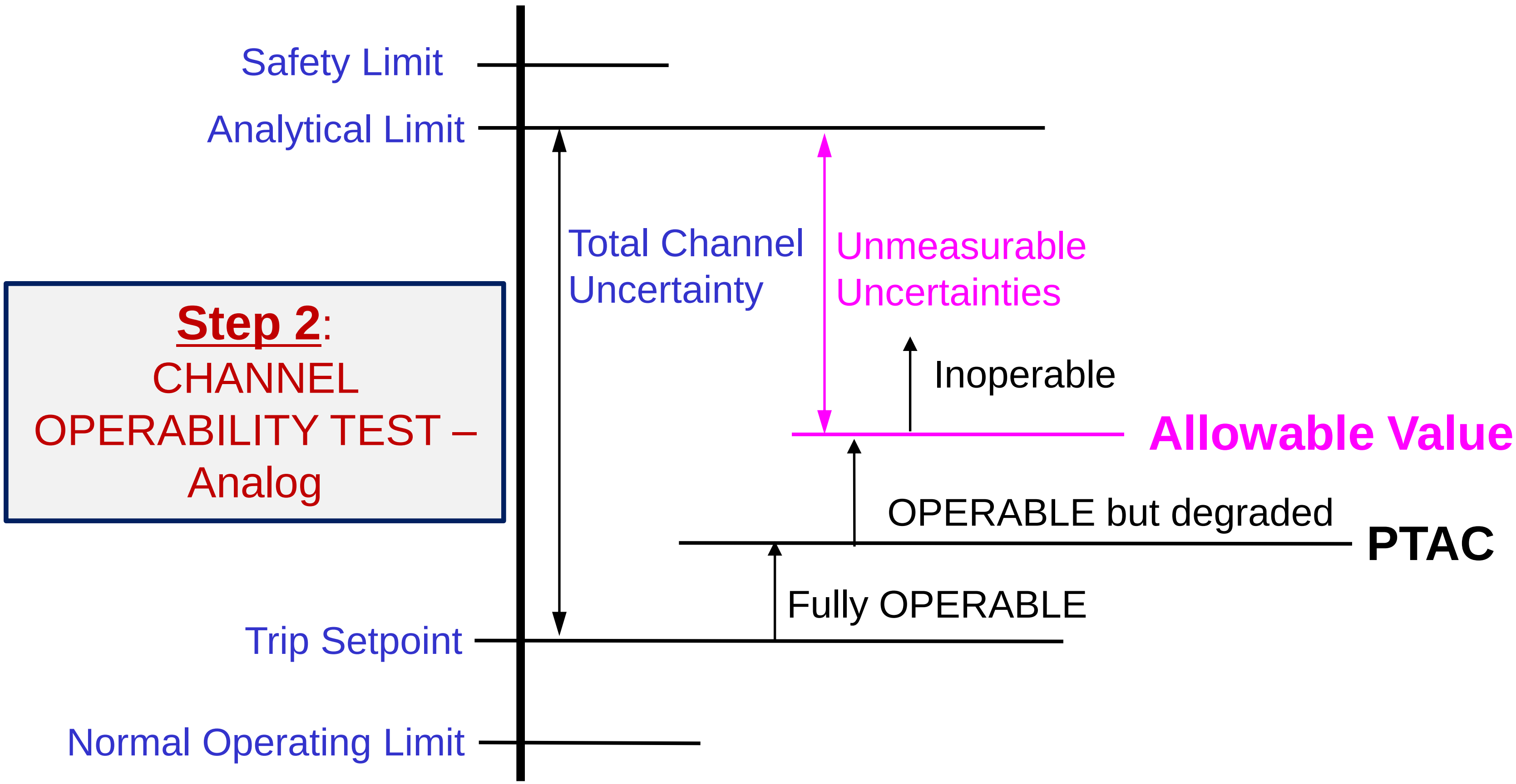


Step 1:
CHANNEL CALIBRATION

- Step 1 checks measurement device accuracy (eg. transmitter)

3. Major RAIs (cont'd)

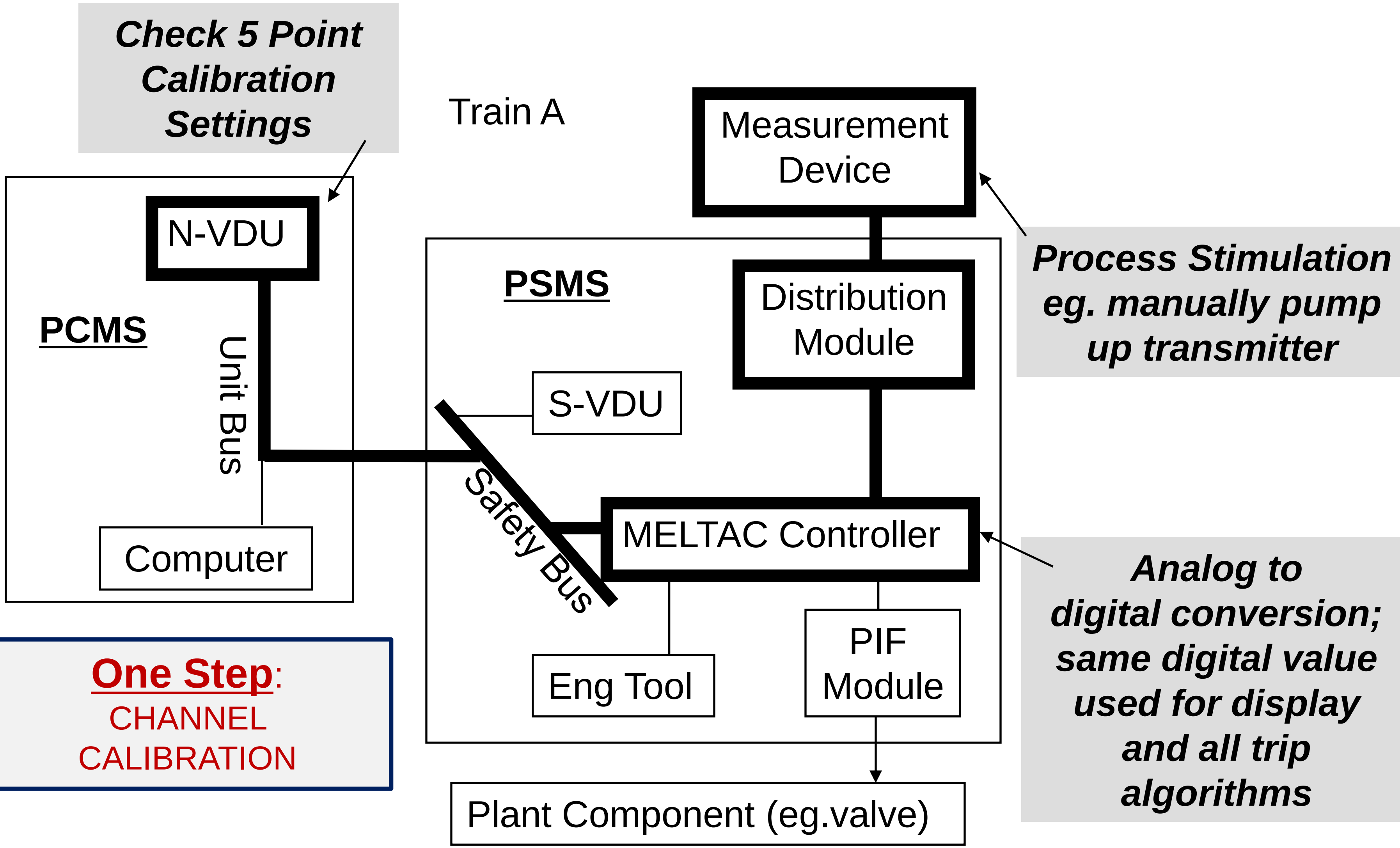
Periodic Surveillance <u>Analog</u> Processing Functions – TWO STEPS



- Step 2 checks setpoint accuracy within I&C equipment rack
- Two steps are needed for analog channels due to separate analog drift contribution of measurement devices and I&C equipment racks

3. Major RAIs (cont'd)

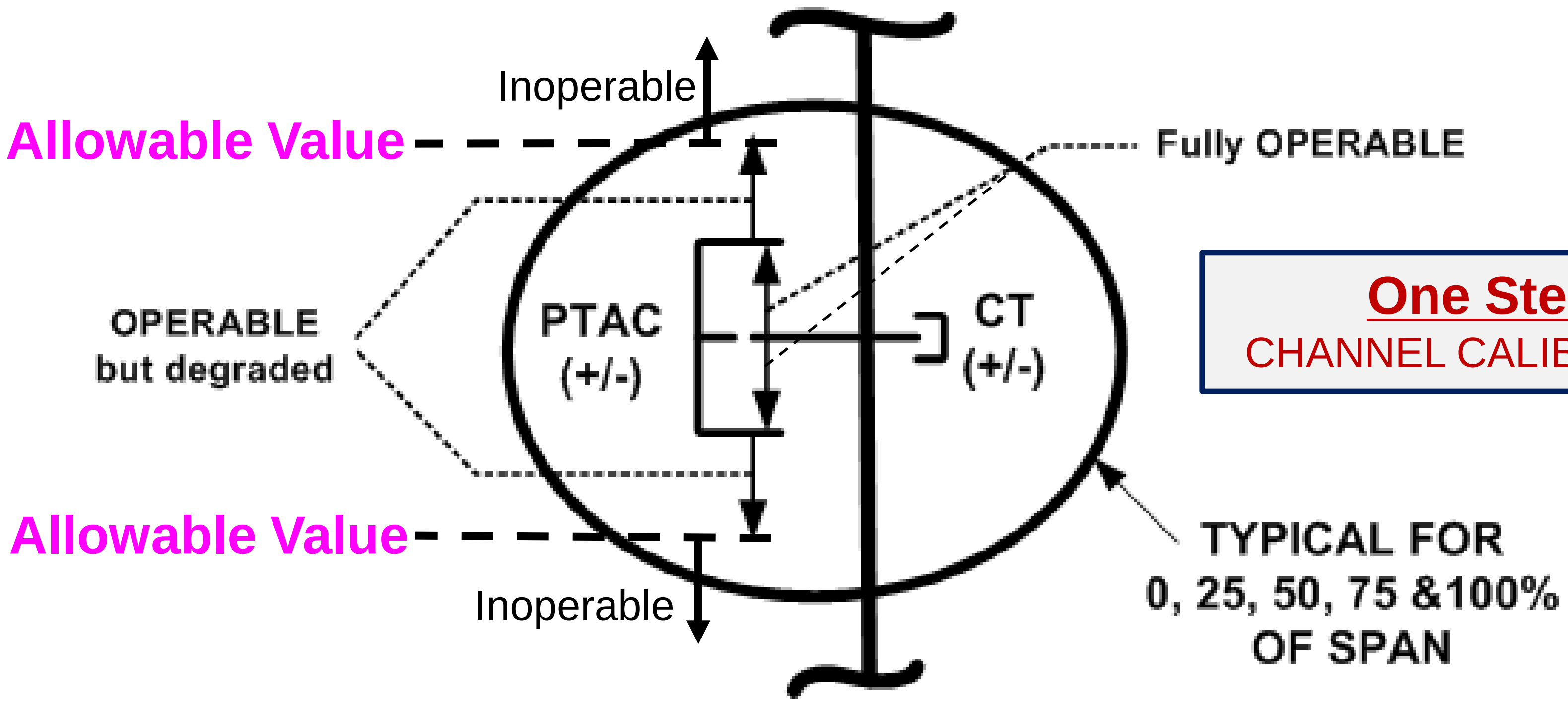
Periodic Surveillance Digital Processing Functions – ONE STEP



One Step: CHANNEL CALIBRATION

3. Major RAIs (cont'd)

Periodic Surveillance Digital Processing Functions – ONE STEP



One Step:
CHANNEL CALIBRATION

- ONE STEP checks total channel accuracy from measurement device to visual display unit, including all analog to digital processing
- ONE STEP is sufficient since digital setpoint drift contribution is negligible; digital setpoint has no adjustments

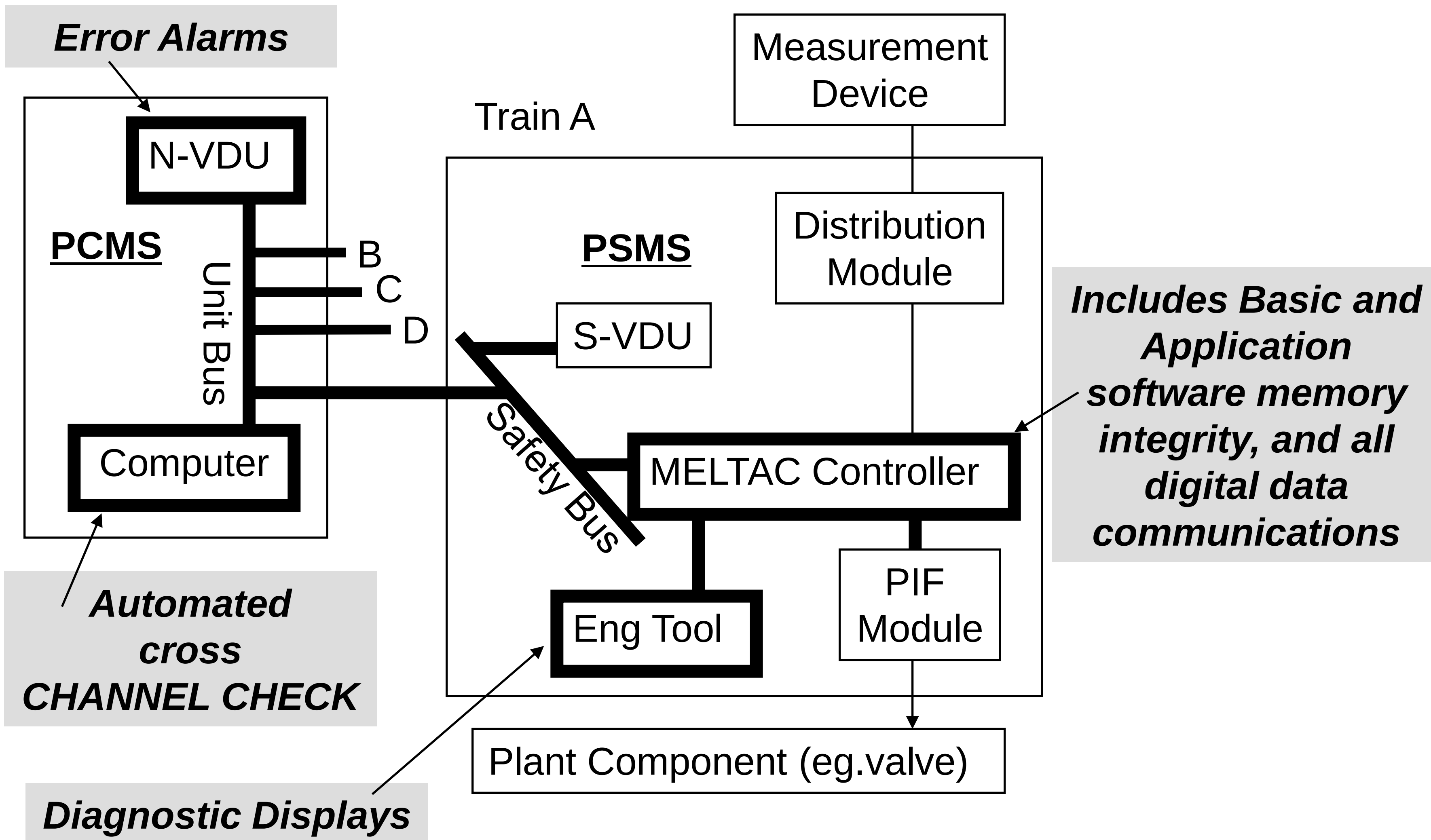
3. Major RAIs (cont'd)

➢ 3) Functional Verification Method

- Setpoints and logic functions are traditionally checked by direct manual verification
  - » Multiple signal injection – system response check
- NRC requested more detail on US-APWR verification method
  - – a combination of self-testing and manual tests
- MHI's intent is to eliminate all manual functional verification tests
  - – Less manual intervention to avoid human error
  - – Reduced O&M labor

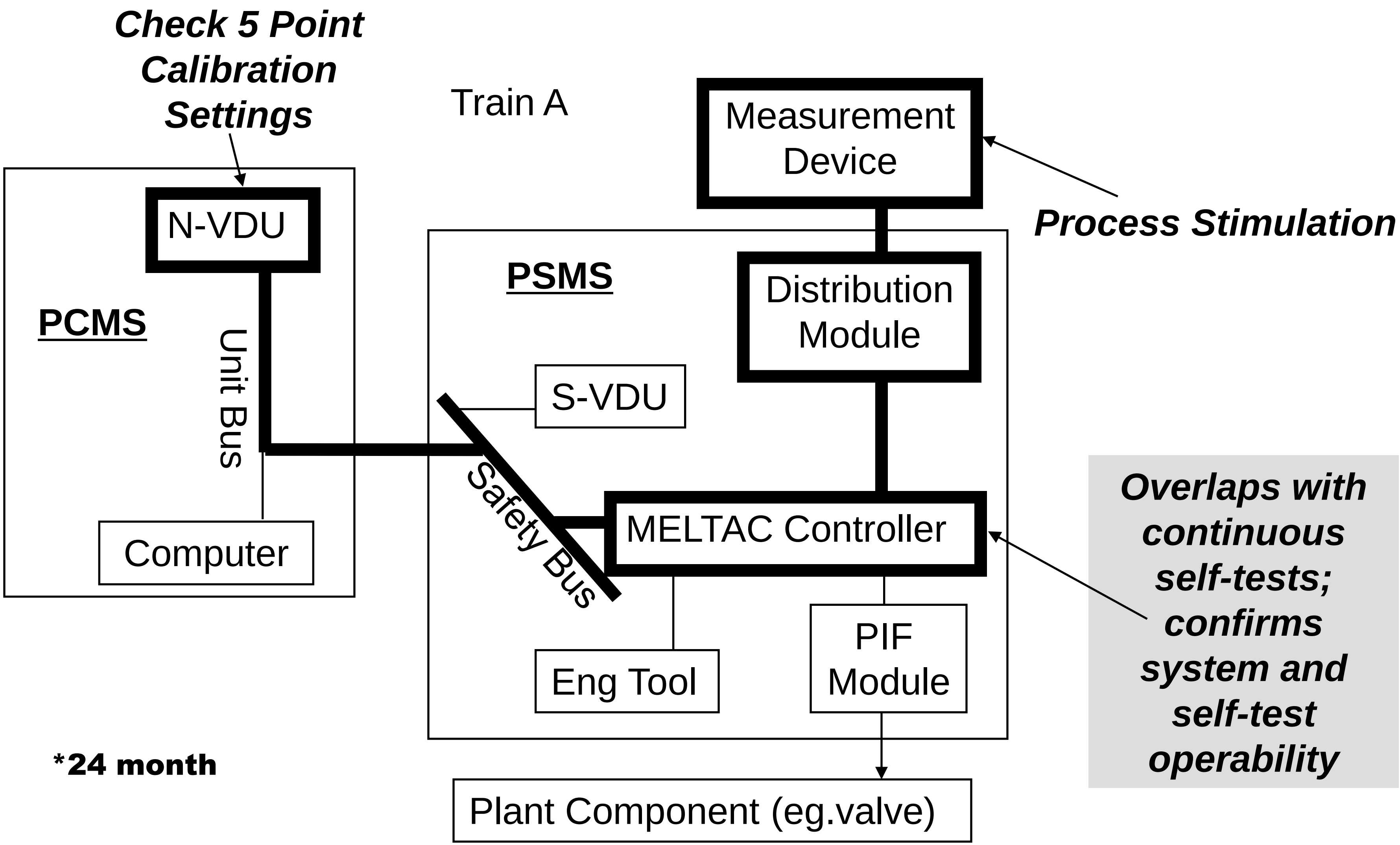
3. Major RAIs (cont'd)

Continuous Self-Tests



3. Major RAIs (cont'd)

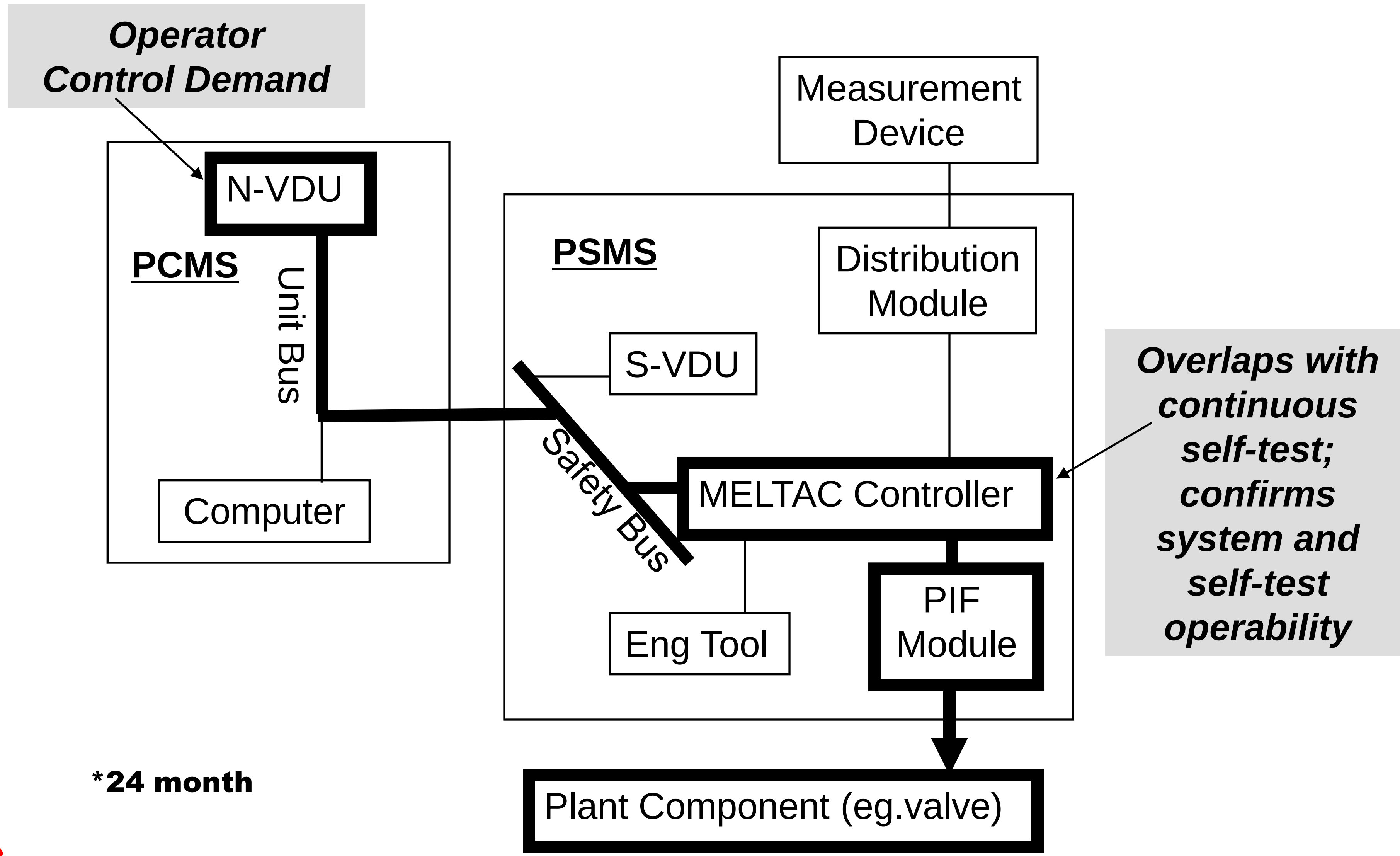
CHANNEL CALIBRATION*



*24 month

3. Major RAIs (cont'd)

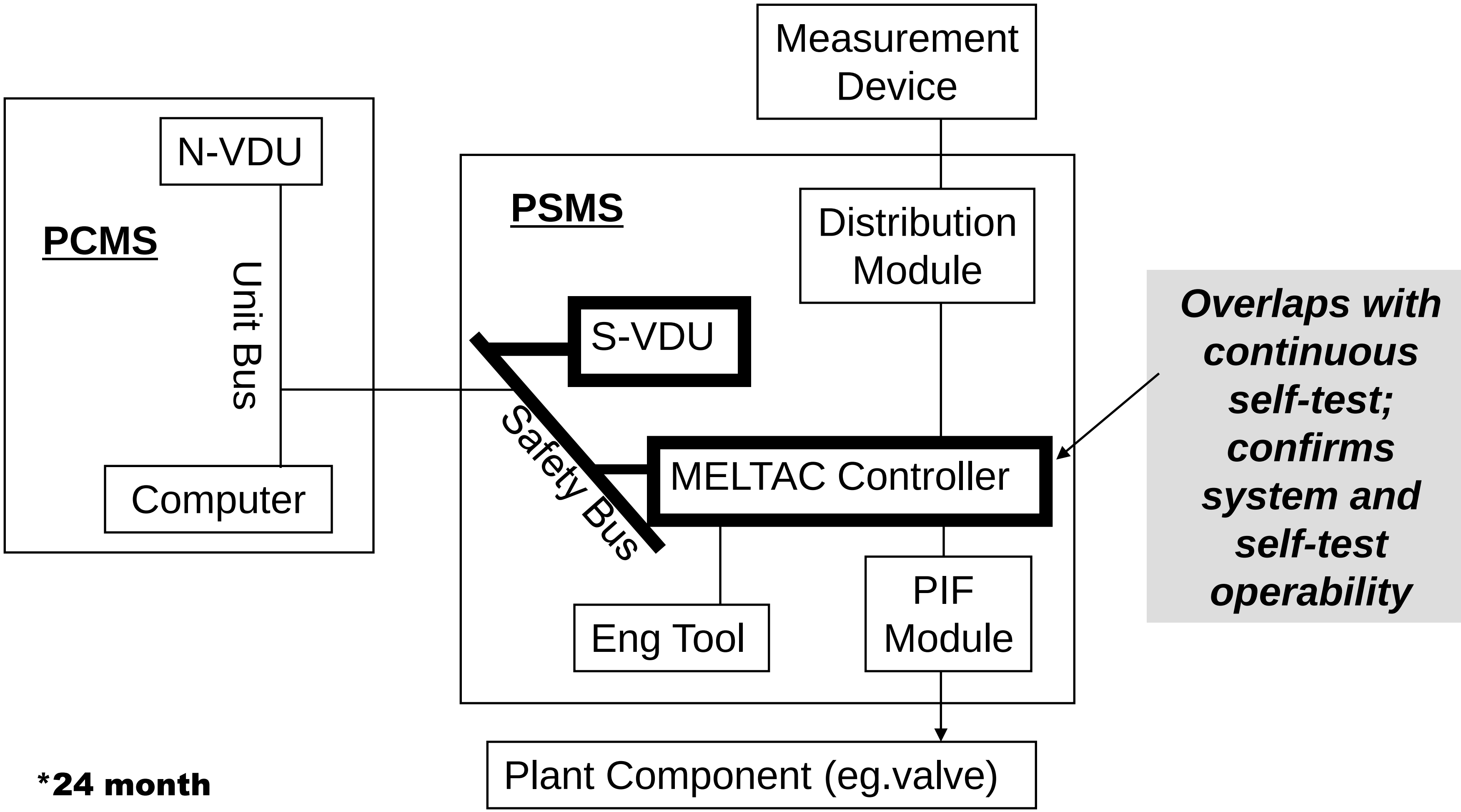
Trip Actuation Device Operability Test (TADOT)*



***24 month**

3. Major RAIs (cont'd)

Safety VDU Test*

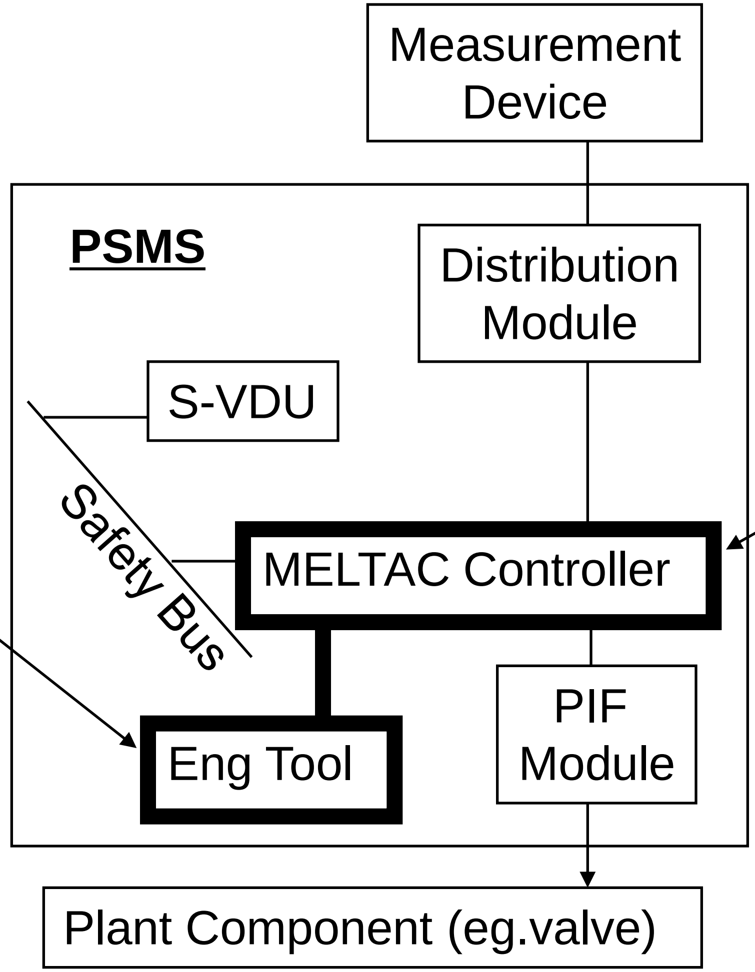


*24 month

3. Major RAIs (cont'd)

Diverse Software Memory Integrity Test*

Compare controller Basic and Application software, including setpoints, constants, logic, self-test, to software copy in Engineering Tool; diverse comparison method from continuous self-test



Overlaps with continuous self-test; confirms system and self-test operability

***24 month**

4. Summary

- US-APWR Technical Specifications are the same as the STS of NUREG-1431 in most areas.
- LCOs only require three operable trains for four train systems.
- Provide the framework of RMTS and SFCP.
- Allowable Values for periodic surveillance ensure sufficient margin is preserved for unmeasureable uncertainties.
- ONE STEP surveillance method for digital channels ensures total channel operability, equivalent to the two step method for analog channels.
- Digital portions of the system are continuously self-tested, including all setpoints and logic.
- Periodic surveillance tests confirm system operability and self-test operability through diverse methods.

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Presentation to the ACRS Subcommittee

Mitsubishi Heavy Industries (MHI)
US-APWR Design Certification Application Review
SER-OI Chapter 16
Technical Specifications
June 7, 2010

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- **Jeff Ciocco**, Lead US-APWR Project Manager
- **Mike Takacs**, Chapter 16 Project Manager

RAI Status Summary

• Original Number of RAIs	290
• Number of RAIs Resolved	216
• Number of Open Items	54
• Number of Confirmatory Items	20

Technical Topics
Open Items

- TS Section 3.3 (Instrumentation) Issues
  - TADOT Surveillance Requirements (SR)*
  - Credit for Continuous Self-Test and Self-Diagnostics Features*
  - Post Accident Monitoring (PAM) Instrumentation*
- TS 3.4.9, Pressurizer Water Level LCO Value
- TS 3.4.12, LTOP Relief Valve single failure criteria met
- TS 3.5.2, ECCS Valve Operability Issues
- SR 3.8.1.8, power factor (pf) of .85 vs .9
- TS 3.9.4, Equipment Hatch Design Information
- TS 5.5.18 & 5.5.19, Risk-Informed Technical Specifications Metrics*
- T.S 5.5.21, Use of a Setpoint Control Program (SCP)
- Use of 10 CFR 50.36(c)(2)(ii) Criteria 4 on SSCs for Inclusion in TS

*To Be Discussed

Significant Open Items

TS 5.5.18 and 5.5.19

- Risk-Informed Technical Specifications Metrics

TS 3.3 Instrumentation

- TADOT Surveillance Requirement (SR)
- Credit for Continuous Self-Test and Self-Diagnostics Features
- Post Accident Monitoring (PAM) Instrumentation

Risk-Informed Initiatives for US-APWR Technical Specifications Requiring Quantified Risk Metrics

- **Risk-informed completion times (Initiative 4b) ,TS 5.5.18**
  - "Real-Time" calculation of completion time (CT) based upon plant configuration and associated quantified risk assessment
  - Risk Management Guidance Document (NEI 06-09)
- **Surveillance frequency control program (Initiative 5b), TS 5.5.19**
  - Requirement to perform surveillance remains in TS, frequency adjusted outside TS in TS program using both quantitative & qualitative criteria
  - Risk-Informed Method for Control of Surveillance Frequencies (NEI-04-10)
- **NEI 06-09 & NEI 04-10 metrics are based on RG-1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis"**
- **Metrics for New Reactors may need to be revised, which would necessitate revisions to RG 1.174, NEI 06-09 & NEI 04-10 ?**
  - NEI 06-09 & NEI 04-10 are referenced in Admin Control Tech Specs

Impact if Quantified Risk Metrics are to be revised for New Reactors

- Paper has been sent to Commission presenting the Risk-Metrics issue.
- If Risk-Metrics are to be revised for New reactors, the impact on TS will be:
  - Minimal to DCD Generic TS, in that the references to NEI 06-09 and NEI 04-10 will need to be bracketed to allow applicants to reference the appropriate revision.
  - Significant to COL TS, in that applicants will not be able to adopt Risk-Informed Completion Times and Surveillance Frequency Control Program initiatives until revisions to RG 1.174, NEI 06-09 and NEI 04-10 are completed, IAW ISG-08; TS must be complete when COL is issued. Applicants would have to adopt later by license amendment.

TADOT Surveillance Requirement

- The TADOT, as originally defined in the STS (NUREG-1431), was revised under the GTS to accommodate aspects of the fully digital MELTAC I&C platform design.
- TADOT, as defined in Revision 2 of the GTS, states that there are two types of binary devices – those that have no drift potential and those that do have drift potential.

TADOT Surveillance Requirement (cont'd)

- The GTS definition also states the following:
  - The operability of binary devices that have drift potential is confirmed through CHANNEL CALIBRATION and/or RESPONSE TIME testing.
  - The operability of devices that have no drift potential is confirmed through TADOT.
  - The TADOT confirms only the state change operability (i.e., there is no setpoint or timing accuracy confirmation needed).
  - The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the necessary accuracy.

TADOT Surveillance Requirement (cont'd)

- The staff is presently unable to make a conclusive determination regarding the capability of the TADOT to adequately verify trip actuating device OPERABILITY for designated functions in LCOs 3.3.1, 3.3.2, and 3.3.5.
  - Ambiguities associated with TADOT performance specifics (i.e., adjustment versus confirmation) exist relative to information provided in the definition for TADOT in Revision 2 of the GTS.

Credit for Continuous Self-Test and Self-Diagnostics Features

- The US-APWR safety-related Protection and Safety Monitoring System (PSMS) includes continuous self-testing and self-diagnostics to verify the proper functioning of digital systems and to ensure the integrity of the installed application and system software.
- DCD credits these features as a means of:
  - eliminating manual surveillance tests of functional logic and algorithms, setpoints, and constants (e.g., Conventional Channel Operational Test, Conventional Actuation Logic Test) for digital equipment, and
  - justifying in part, the Completion Times and Surveillance Testing Bypass Times specified for certain LCO Conditions, and
  - justifying in part, the Frequencies specified for certain SR's.

Credit for Continuous Self-Test and Self-Diagnostics Features (cont'd)

- PSMS continuous self-testing and self-diagnostic monitoring capabilities are being evaluated in Chapter 7 of the SER to determine the extent to which these features may be credited towards established requirements for periodic surveillance testing of reactor protection systems, and the justifications for several Completion Times, Surveillance Testing Bypass Times, and Surveillance Frequencies in LCOs 3.3.1, 3.3.2, and 3.3.5.

Post Accident Monitoring (PAM) Instrumentation

- COL applicants that reference the U.S. APWR design certification must address Revision 4 of RG 1.97, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants”.
- PAM variable selection criteria in RG 1.97, Revision 4, depend on the prior development of plant-specific Emergency Operating Procedures (EOPs) and Abnormal Operating Procedures (AOPs), which are post-COL activities.

PAM Instrumentation (cont'd)

- COL applicants must complete site-specific TS information in the plant-specific TS in accordance with DC/COL-ISG-8, "Necessary Content of Plant-Specific Technical Specifications When a Combined License Is Issued," prior to COL issuance using one of three options:
  - Option 1 provides site-specific TS information (PAM function list derived from RG 1.97 guidance – cannot do before COL issuance).
  - Option 2 provides useable bounding information (i.e., development of a bounding list of PAM functions).
  - Option 3 relocates site-specific information to licensee-controlled document and establishes an administrative control TS that requires determining the information using an NRC-approved methodology and that controls changes to the information (PAM function list derived from RG 1.97 guidance).

PAM Instrumentation (cont'd)

- MHI has proposed a useable bounding list of PAM functions (Option 2). COL applicants could incorporate the bounding list by reference.
- The staff is evaluating the proposed PAM function list to determine if the list is truly bounding.

Staff Finding

- Common understanding between MHI and the staff of the requirements that must be satisfied and how to do so.
- Manageable within the planned schedule.
- TS are sufficient for COL applicants to satisfy the requirements of 10 CFR Part 52.

Discussion/Committee Questions