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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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FUTURE PLANT DESIGNS SUBCOMMITTEE

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WEDNESDAY

SEPTEMBER 9, 2015

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ROCKVILLE, MARYLAND

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

COMMITTEE MEMBERS:

MICHAEL L. CORRADINI, Subcommittee Chairman

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR., Member

DANA A. POWERS, Member

JOY REMPE, Member

HAROLD B. RAY, Member

STEPHEN P. SCHULTZ, Member

GORDON R. SKILLMAN, Member

DESIGNATED FEDERAL OFFICIAL:

MAITRI BANERJEE

ALSO PRESENT:

GREGORY CRANSTON, NRO/DNRL/LB1

JEFFREY SCHMIDT, NRO/DSRA/SRSB

MARK E. TONACCI, NRO/DNRL/LB1

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P R O C E E D I N G S

8:31 A.M.

CHAIR CORRADINI: This is a meeting of Future Plant Designs Subcommittee of the ACRS. My name is Mike Corradini. I am chairman of the Future Plant Designs Subcommittee of this subcommittee. ACRS members in attendance are -- let's see who's here today -- Harold Ray, Steve Schultz, Dick Skillman, Dana Powers, Ron Ballinger, and Joy Rempe. A couple other members will join us later.

Ms. Maitri Banerjee is the Designated Federal Official for this meeting.

Today, we have members of the staff to brief the subcommittee on the staff's development of the Design-Specific Review Standard, DSRS, for the NuScale Small Modular Reactor. This document is being developed in anticipation of the NuScale Design Certification Application for the integrated pressurized water reactor technology.

The discussion topics of today's agenda will be DSRS Section 6.3, ECCS systems.

The rules for participation in today's meeting were announced in the Federal Register. The meeting was announced as an Open Public Meeting. No request for making a statement to the subcommittee

has been received from the public.

We have one bridge line established. That bridge line and password were published in the agenda posted on the NRC public website.

To minimize disturbances, the public line will be kept in listen-only model and the public will have the opportunity to make a statement or provide comments at the designated times at the end of the subcommittee meeting.

Dr. Rempe has a conflict of interest in the area of NuScale severe accident consideration because of her prior work as she completed it with NuScale in this area. And Dr. Rempe will recuse herself from discussion in this area.

Okay, let me invite Mr. Greg Cranston, the NRO Project Manager, to introduce the presenters and we'll start from there.

Greg?

MR. CRANSTON: Good morning. My name is Greg Cranston. I'm the Senior Project Manager for the NuScale project. This is the second in a series of meetings on selected draft DSRS sections for the NuScale project.

Since our last meeting, we've started to receive comments. The vast percentage of the

comments received so far are from NuScale, so just under 700. And we did receive some general comments from NEI and we are told that there are some more comments that are going to be coming in as soon as they're processed through document control that we haven't seen yet. So we're currently putting those into a comment matrix and we're going to be getting them out to the respective technical branches for incorporation.

This will give us an opportunity for updates during the comment and incorporation, where appropriate, based on the comments that we've got and any other information that we've received since the DSRSs were originally drafted.

Some DSRS sections may revert back to Standard Review Plans after we've had a chance to see what the comments look like, what we know now about the design compared to what we knew previously. So that's something that's just out there, but no decisions have been made specifically in that area.

What we want to do is provide ACRS with the approach staff took in developing the DSRS sections and you can see there what the presentations intended to cover, as far as what change between the SRP and the DSRS, why the change was made and any

questions that you may have on the design information available to date.

This is a brief history which I did cover last time, but the only thing that's really changed is that we do have comments in-house that we are processing.

That's all I have as far as the introduction. If there are no questions or comments, I'd like to turn the meeting over to Jeff Schmidt who is going to cover Section 6.3, Emergency Core Cooling Systems.

CHAIR CORRADINI: So let me just give a comment to the subcommittee and get your guys' reaction so you can see where I'm coming from. So I am sure you're reading this word for word in great detail. My problem with this is it's so much detail I can't see the forest for the trees. So I've kind of alerted Greg that what I'm looking for is some sort of connection so that we understand the key innovations, unique features of the NuScale design and how it's being reviewed so we can map that on to the safety issues, whether it be for high pressure decay heat removal or low pressure decay heat removal. Right now we're going to look at ECCS systems. But if you have general comments like that to me that you

see ways to improve how we look at this, I'd welcome it from the committee members because I see a lot of trees, but I'm having a hell of a time seeing the forest.

MEMBER SKILLMAN: Mike, I appreciate your comment, but let me direct my question right to Greg.

CHAIR CORRADINI: Sure, go ahead.

MEMBER SKILLMAN: Greg, I read 6.3 very carefully and in order to understand the changes from the SRP and get a fix in my mind on the type of thing that Mike is talking about, I also reviewed 4.4 which is thermal-hydraulic design and 15.6.5 which is the loss of coolant accident.

What I was looking for in 6.3 was an overwhelming direction towards confirmation that the thermal-hydraulic capabilities of the passive system would be successful. The overwhelming direction was towards the passive functions. And I would agree that that is very slightly provided in 6.3, but not as firmly or as I would say articulately as it needs to be.

We're dealing with another passive issue on another design, and what we found is the assumptions for heat transfer, the assumptions for the rate of condensation, the collection of the

condensation are critical in the success of the decay heat removal function. My sense is that that issue will be on the Nu$cale design on steroids.

So I would just comment that what I read in 6.3 doesn't firmly communicate the sensitivity of the passive thermal-hydraulic function that is the heart of decay heat removal. And I'll be glad to give Dr. Corradini my specific comments, but that is my over-arching comment. Where is that fully communicated? It isn't really there in the current draft.

CHAIR CORRADINI: We're going to -- I think Jeff is going to address 6.3, but I want to make sure I understand your point, Dick. Is it that you're looking for some sort of over-arching play book as to this is what we're concerned about and here's where we're referring each of the pieces? Is that what you're after?

MEMBER SKILLMAN: I would expect that the Design-Specific Review Standard would force the staff to interrogate the passive features to the same extent that they would have examined a hardware type system for decay heat removal.

On this design, the decay heat removal is really tied up to opening two valves, but a complete

passive process. And it is the effectiveness of that passive process that removes the decay heat as opposed to the size of the pumps, the redundancy of the pumps, the size of the heat exchangers, the UA of the heat exchangers, literally down to the ultimate heat sink.

6.3 is an SRP section that once had all of those details. 6.3 has been changed for NuScale and it doesn't have that same level of rigor down on the passive pieces that are essential for decay heat removal to be successful.

MEMBER RAY: Mike, that triggers a question that I wouldn't have asked at this point in time, but let me ask. Thank you, Stephen.

That triggers a question that I would have probably postponed, but I think it fits here now in terms of what Dick is saying, at least in my mind it does.

Does Appendix B apply to the work that is done to support the information that's provided by the Applicant?

MR. SCHMIDT: I'm not sure I understand the question.

MEMBER RAY: You don't understand the question?

CHAIR CORRADINI: I don't understand the

question either, so help.

MEMBER RAY: Okay, Appendix B calls for a lot of things to be done like Dick is asking about, to validate and verify the information that's used in the design. And I'm just asking at this stage, the information provided by the Applicant, will it have to comply with Appendix B?

CHAIR CORRADINI: You've got to get closer.

MR. CRANSTON: Yes, Appendix B, Appendix A from the general design criteria or whether it's getting into quality issues, they both apply to NuScale as they would for any application from a pressurized water reactor.

MEMBER RAY: All right, things that are asserted are subject to being challenged on the basis of whether or not adequate design verification, for example, has been done to satisfy Appendix B?

MR. CRANSTON: Correct.

MEMBER RAY: All right, thank you.

CHAIR CORRADINI: Do you want to take up Dick's comment now or wait until we go through your presentation and then come back to it?

MR. SCHMIDT: I would say that there's -- I think there's some truth to that. There is

another component which you have to look at which is the containment portion. I don't think you listed 6.2 -- I can't remember if it said 6.2.5 or 6.2.2 off the top of my head. Because that has a lot to do with the condensation which we were referring to which is true, I think that's an important piece.

So I would just ask you to look at that component as well because it's not clear, it's not as straight forward how you separate out the ECCS function from the containment function in this design, right? The containment is crucial to the ECCS system, so it's -- it might be split in two different spots.

MEMBER SKILLMAN: Jeff. Thank you. I accept that, but I would respond by saying that subtlety should be made clear in probably both 6.2 and 6.3.

MR. SCHMIDT: Right, agreed.

MEMBER SKILLMAN: Thank you. I would like to reinforce Harold's question. What I am really getting at is the validity of the analyses and the assumptions of the analyses to ensure decay heat removal under emergency core cooling conditions. And if Appendix B applies, then that would apply to the codes, to the calcs, to the record keeping, so that

when the NuScale design is complete, we've got confidence that the functions that they communicate will be performed, are performed.

MR. SCHMIDT: Yes, they're currently doing testing or trying to do testing with basically the ECCS system probably as we speak. They're running tests. When we went out for inspection, I guess it was two weeks ago, and they were going to run an ECCS test. Unfortunately, they weren't able to because of some hardware problems. But all that is under Appendix B program.

CHAIR CORRADINI: You mean the whole testing program?

MR. SCHMIDT: Yes.

CHAIR CORRADINI: I think we should let you go forward, but let me -- I think we're all kind of going around the same issue which is everybody is trying to find a way to get their hands on it. But if it were just me, I'm looking for when we had the initial presentation, I think it was in June or May, I can't remember when, from NuScale. As Dick mentions, they essentially have -- they look through a series of potential accident scenarios and they have to have a certain set of functions which were either active valve functions or the equivalent of

the passive behavior, just natural circulation.

I'm trying to figure out in the review, okay, this is how the system behaves, now you're going to look at this part of the system here, and this part of the system here and here and somehow we're down here into the pieces and I'm having a hard time connecting back up to everything else. I think that's kind of what you're saying.

MEMBER SKILLMAN: Correct.

CHAIR CORRADINI: Right? Because at least in this design, the ECCS requires the action of four valves to one set of valves and a redundant set and life is good. But then we have to see things that I would expect and I'm not sure when we'll see it is since it's all passive, they're going to have to have a scaling logic for all their thermal-hydraulics so we can understand when they tested, you feel the integrated response really matches up and is scaled appropriately. So if it's not here, where is it? If they're going to look at needing some sort of DC power for valve actuation, we already brought this up in the meeting in August. Where are you looking at it and where is it being tested? That's where I'm -- I'm kind of down here in these individual pieces and I'm having a hard time coming back up and around

to where it connects. I kind of repeated myself, but I can't -- I was struggling this weekend, to put it mildly.

MR. CRANSTON: And I think that's something that when we talk this afternoon, I think that fits right in to what we were looking for to try to bring to you the right DSRSs and put a package together.

CHAIR CORRADINI: So I'll ask my first question and then I'll let you start. So my first question was how does the accident -- how do the various accidents evolve relative to high pressure and low pressure? Because I understand the way the system behaves that if I'm able to remove decay heat at high pressure, the DHRS, the Decay Heat Removal System, is the key system and all individual functions. And then if I can't maintain it, then I depressurize, I essentially cause myself to have a LOCA or I have a LOCA of some size. And now the ECCS systems have to behave.

And so when we walk through this one today, I'm kind of curious about details how the two interaction, right?

MR. SCHMIDT: You know, this is really for loss of coolant accident. The decay heat removal

system is primarily for the non-LOCA loss heat sync incident. And that's their primary function.

CHAIR CORRADINI: If they fail to do it there, then they cause essentially just like the AP1000 --

MR. SCHMIDT: Right, they have a back-up capability effectively which it says in the first paragraph here that if you don't have the decay heat removal system, you can use the ECCS system to remove decay heat.

CHAIR CORRADINI: Why don't you go ahead and we'll ask some other questions. Go ahead through your presentation. We won't stop you now for a while.

MR. SCHMIDT: This is the NuScale ECCS system. Probably the presentation isn't really set up for what you're looking for, unfortunately.

CHAIR CORRADINI: That's all right, we have questions. I'm ready.

MR. SCHMIDT: So there's no change in the applicable GDCs. No change in the acceptance criteria. Major changes were due to NuScale design specifics. Major changes included eliminating BWR material, eliminating references to active flow systems and references to piping and added a general description of the RVV and RRV function.

We talked about nine public comments. People recommended deletions, one a rewording, and preliminary staff review of those questions or those comments, staff would agree with those changes.

CHAIR CORRADINI: Okay, so I have a question. So as I understand it, we have to have -- we have a pair a RVVs and RRVs that have to actuate to essentially initially ECCS either because I want to depressurize because I haven't been able to do it at high pressure or I have some sort of line break, right?

MR. SCHMIDT: Right.

CHAIR CORRADINI: Feeding into the integral vessel.

MR. SCHMIDT: Right.

CHAIR CORRADINI: Are those the only valves that need to be closed or check valves that need to operate properly? Where in the review is containment isolation specifically, the staff is looking at containment isolation to make sure that everything closes appropriate? Or is this design such that I don't need everything to close? I can essentially still remove decay heat at low pressure with leaky valves. Where is that in 6.3? Or is it somewhere else?

MR. SCHMIDT: I think it's in 6.2 something.

CHAIR CORRADINI: Let him answer.

MR. SCHMIDT: Containment isolation is in 6.2.4, I believe.

MR. CRANSTON: Yes, 6.2.4 is containment isolation.

CHAIR CORRADINI: So in this design, do I need to have all the connective systems isolated for effective ECCS operation? Or can I get away with leakage through a check valve of CVCS and still essentially remove decay heat? Is that being checked in 6.2 or going to be checked in 6.3?

MR. SCHMIDT: I would say it's probably going to be checked in 6.3.

CHAIR CORRADINI: Okay. Can you point to where it is in there because I had trouble. We can come back to that.

MR. SCHMIDT: CVCS will talk about the check valve related to the CVCS system. This discusses the check valves related to the ECCS system. So I guess what I would say is it's probably in the CVCS system if you're talking about the CVCS slide.

CHAIR CORRADINI: Okay. But is staff -- I don't know how to ask the question. But so is the

function separated such that -- or is one individual or one group looking at the whole concept of it for NuScale? Because as I understand it, you could have, as I understand the design, you don't necessarily need to have complete containment isolation to remove decay heat. Or am I wrong about that?

MR. SCHMIDT: I have not heard that before.

CHAIR CORRADINI: Okay, so I'm probably misinterpreting.

MR. SCHMIDT: I have not heard that.

CHAIR CORRADINI: So CVVS is done in where, I'm sorry?

MR. SCHMIDT: 9.3.4.

CHAIR CORRADINI: Okay. And all of containment isolation discussion here is only for the ECCS system.

I have another question, unless members have others. Are the CVCS lines normally open to the reactor coolant system piping connections?

MR. SCHMIDT: Yes.

CHAIR CORRADINI: So they would have to isolate or the check valve would have to function?

MR. SCHMIDT: I think the CVCS, if I remember correctly, the one safety function of the

CVCS is isolation.

CHAIR CORRADINI: Okay. What about the -- you have other systems which I'm not familiar with. The CFDS, Containment -- I can't remember what all these -- Containment Flooding and Drain System and Containment Evacuation System. Is that part of the necessary isolation for operation of ECCS?

MR. SCHMIDT: I'm not sure. I don't really know.

CHAIR CORRADINI: Is 6.3 the place they're supposed to worry about that?

MR. SCHMIDT: Again, I would probably think it would be isolation for containment isolation.

CHAIR CORRADINI: So it's not clear, but it should be in here where it's checked?

MR. SCHMIDT: Yes.

CHAIR CORRADINI: So let me ask my question in general then. So there should be no, at least as you understand the system design, there should be no open lines connected to containment volume. There's either got to be what I remember as double isolation or check valve isolation for the CVCS?

MR. SCHMIDT: Right. I'm not aware of

any identified leak path in the pre-application information that I've been given.

CHAIR CORRADINI: Okay. Let me ask a different question. So going back to the CVCS, if the check valve leaked, we would have containment bypass essentially an interfacing systems LOCA?

MR. SCHMIDT: Right.

CHAIR CORRADINI: So it's in 6.2 where -- or it's in 9.3.4 where that -- the reviewer would have to worry about that and verify?

MR. SCHMIDT: There's an isolation valve -- if there is a check valve in the system, you're saying?

CHAIR CORRADINI: Yes.

MR. SCHMIDT: Inter-system LOCA is usually covered in 6.3.

CHAIR CORRADINI: Okay.

MR. SCHMIDT: At least it has you look for inter-system LOCA potentials. But I think the CVCS person would also be looking at potential bypasses.

CHAIR CORRADINI: And that's both probably here in 6.3 and in the CVCS?

MR. SCHMIDT: Right.

CHAIR CORRADINI: I'm just making notes. I'm sorry. If others have questions, feel free to

jump in.

MEMBER SKILLMAN: I do. At the areas of review which is the draft one, you've deleted SAR and replaced SAR with technical submittal. And I question why you removed SAR. I would think SAR is a required component of NuScale's submittal.

MR. SCHMIDT: Could you point to where that --

MEMBER SKILLMAN: Sure. It is the draft 6.3. It is Roman numeral I, areas of review, and it is the first sentence.

MR. SCHMIDT: Oh, first sentence.

MEMBER SKILLMAN: "The reviewer reviews the information presented in the Applicant's previously SAR, now technical submittal." Why is SAR removed?

MR. SCHMIDT: I'd have to get back to you on that. It is probably a legal change. I don't think it's a change that I made.

MR. TONACCI: Jeff, this is Mark Tonacci on the side. I think this also applies to topical reports as well which goes beyond just Safety Analysis Report?

MR. SCHMIDT: Usually 6.3 is just the DC.

MR. TONACCI: But they're submitting

topicals.

MR. SCHMIDT: Yes, they are submitting topicals.

MR. TONACCI: So as written, it's broader and covers both aspects.

MEMBER SKILLMAN: But wouldn't the SAR identify a topical as a reference?

MR. TONACCI: If it comes in -- if the DC comes in first, but if the topical comes in first, I'm just looking at this just grammatically. If Jeff gets a topical report in next month and the DC is not submitted yet, he would use this DSRS if it were approved to review the topical if he needed it.

There are a number of topical reports on the order of 15 to 18 coming in prior to the DC application.

MEMBER SKILLMAN: Then it would seem as though the sentence should reflect the capability to either address the topical or the SAR, whichever is the -- if you will, the final document for the design cert.

MR. TONACCI: I agree. I mean you could write it several ways, but just writing it broadly as the submittal allows you to -- the way I read it, allows you to do it either way.

MEMBER SKILLMAN: Thank you. I understand. One of the -- I'll tell a story and then I'll ask a question. In April of '79, we stopped the reactor coolant pump at the TMI-2. We didn't know whether or not one loop or both loops would go into natural circulation. That had never been done before and certainly not full-scale tests and certainly not a full-scale test with a LOCA. And I was involved in that and I will tell you we held our breath. We stopped that reactor coolant pump and we didn't know what was going to happen. And after about 45 to 50 seconds, we began to see the trace and both loops went into forward natural circulation and what drove that was the difference in density between the hot core and the cold water and the same elevations in the cold legs in steam generators.

I was one of probably several hundred people that were holding our collective breath. We didn't know what was going to happen. We shouldn't be in that situation here. We should know that these loops will go into natural circulation and we should also know that gas binding cannot threaten the success of that function. So as Dr. Corradini pointed out, kind of having this angst around at least several of us, how this DSRS applies to NuScale because of the

essential passive nature of this decay heat removal which is last stand system or last stand function to protect the core, we should have confidence that when this system is called upon it can't be cast-bound. It is a thermal driving head system, so it really is a thermal siphon. It needs to function as long as the core is not blocked.

It seems that the essential elements of those words ought to be perhaps the front piece of 6.3. I guess that's my -- that's the comment that I would ask that you hear me communicate.

CHAIR CORRADINI: Can I ask Dick's question a little bit differently? Is this a separate function or is there a separate review of the experiments that are going to be the basis of the scaling logic that shows the system functions or is it in 6.3 that you're asking the reviewer to go look at these tests that show at some scale, like the scale we saw, we both saw when we toured NuScale that gives us confidence that everything is going to function as expected.

MR. SCHMIDT: Well, there are topical reports that inform the 6.3 review. There's going to be a scaling report. There's going to be a natural circulation report. There's going to be probably

LOCA will have its own reports.

CHAIR CORRADINI: So it's a normal set of state of affairs that you write the review under the assumption that somewhere else there's a topical staff has already looked at, audited, and done some we'll call check calculations or review, right? But it isn't called out in the review stint. That's what I guess I'm getting at. Do you know what I'm asking?

MR. SCHMIDT: That's typically true of the DCs in general is that there will be 15.6.5 is usually supported by multiple topical reports and those reports are reviewed. And a lot of the details of code applicability and methodology are all covered in those topical reports.

CHAIR CORRADINI: Okay. So we shouldn't have expected this -- what I'm trying to get at is just the specific. Dick's worried. How do we allay his worry? Your answer is there's a separate set of topical reports that will be reviewed, audited and do check calculations that will give confidence to the staff to check off in 6.3 that life is good.

MR. SCHMIDT: You're right, absolutely.

CHAIR CORRADINI: All right.

MR. SCHMIDT: There has to be.

CHAIR CORRADINI: But there's no word

linkage to that effect. It's expected. And that's the way it was done in the past?

MR. SCHMIDT: Right, that's correct.

MEMBER BLEY: Can I follow that up just a little to understand better. For the ones we've already done, you have the SRP as written which was used as a basis, but there we had the submittal first. We had the application and in the design cert. document, these things are called out, are referenced. I take it that's really the link that ensures that we cover these reviews that we've been talking about for the last 15, 20 minutes.

MR. SCHMIDT: I guess I'm not sure I followed your question.

CHAIR CORRADINI: I think what he's asking is in some sense we're going in a different order than we're used to which is we're looking at the review standard. We've yet to see the application that would say gee, I want to see that topical report. I want to see that calculation. I want to see that experiment so I feel comfortable.

MR. SCHMIDT: Right.

CHAIR CORRADINI: Before we come back to if staff's comfortable or in some simultaneous. So we're kind of ahead of it. We've never done this

before.

MEMBER BLEY: I go back to the first one we did since -- when I got here, the ESBWR. And as we were looking at that we started asking some more questions and on some of the details, people told us if it's not in the DCD, we don't have to have to look at it. And we had long discussions and that went on for many, many months. And eventually, yes, in fact, everybody agreed that it needs to be reviewed in detail.

I'm not sure what the link is that makes that happen other than good management and the ACRS chiming in at some point in time. Or is there a process that makes that happen? That's all. And it's kind of following up the same thing. Somebody new comes in and they're doing the review. How do we make sure -- how does this review guidance make sure they look at all the things that are going to be --

CHAIR CORRADINI: So I'm going to broaden this question. So this is my ultimate worry. You guys have looked through it. You think you understand the system. You've taken the Standard Review Plan and said okay, we've got to change this, this, and this, so we catch all the features of this -- we'll call it innovated design. Fine. You send

it out. You get multitudinous hundreds of comments from the vendor that says wait a minute, that's not right. This is not right. But there's a completeness part of this which is not them looking over it in this detail. It's somebody looking over to make sure there's the integral behavior is still being looked at.

And I don't think -- so I'm speaking for myself but I'll include a few of us. I don't think most of us here have (a) the time, nor the -- I'll use me personally, the patience, to go into that detail, but I need some sort of confidence that the integral behavior is being looked at. And the only way to do that is wait, get the design certification in and say wait a minute, you forgot about this. But in some sense that's going to cause -- that's like the horse has gone out of the barn and we're trying to drag them back in. So I'm trying to catch it now, but I'm having a hard time.

So I think that's what Dennis is saying. Where, at this point, can we put in the input that we're missing something? Or at least we don't understand where you're looking at. Am I making sense?

MR. SCHMIDT: I'm having a little trouble

following it, to be honest.

CHAIR CORRADINI: Okay.

MR. SCHMIDT: You can put it -- I mean one place to put it if there's concerns about the interactions say between the containment branch and reactor systems branch, more integrative review would be in the review interface sections of the document.

CHAIR CORRADINI: Okay.

MR. SCHMIDT: I mean that's the way we normally catch, if there's other pieces of information we need. I don't know if that answers your question per se, but that's where you would try to put it, I believe.

MEMBER REMPE: What do you mean by the review interface document?

MR. SCHMIDT: Interface section of the --

CHAIR CORRADINI: There's a section in each of these where it says we don't do it here. Go over there.

MR. SCHMIDT: Right.

CHAIR CORRADINI: That's what's worrying me is that this interface connection, I have a hard time following all of that. I'm not sure I want to follow it all. I just want to feel some sort of

overall integrative comfort that things are being looked at.

And where I think Dennis is coming from is similar is that if we go through all of this and we say yes, the design specific standard looks okay, then the design certification comes in. And then something pops up, a technical report or a set of experiments and we go wait a minute, why are they doing that? We have heard in the past that says well, we weren't asked to that, so we're not going to do that, right?

MEMBER BLEY: Yes, sir.

CHAIR CORRADINI: So we might end up calling full stop at that point and I would prefer to catch it now. That's what -- that's where my kind of underlying uneasiness fits in. So that's why I think Dick was asking questions about since it's an all-natural circulation system, at full operation and under all accident modes, to me that's the over-arching thing that the staff would be looking at. And I don't want to say things are coupled, but there is a lot of coupling between the systems.

MR. SCHMIDT: I think there is a lot of coupling between the systems, especially between containment and reactor systems or ECCS system. I

mean you can't -- one can't function without the other in this design. So that review is going to have to be very integrative. I'm not sure how to capture that, other than to acknowledge it, that it is integrated and it could be maybe highlighted especially in the review interface section of the containment function and the ECCS system are tightly coupled.

CHAIR CORRADINI: Well, I have more specific questions, but I wanted to get the general ones out of the way.

MEMBER SCHULTZ: I appreciate that comment, Jeff. I think it's very important that what you've just described, the document clearly, because otherwise there's the possibility that something could be at least construed as having the possibility to fall through the crack.

MR. SCHMIDT: Right.

MEMBER SCHULTZ: And if you describe it clearly, it in fact can prevent something from being missed. This interface approach sounds very good, but it in itself doesn't guarantee that one group is going to believe that the other group is doing the review and it's not happening. So it really does need to be documented carefully.

And this is a design-specific review, so you've got the opportunity to identify those key things as we're trying to do here, identify those key things up front so that both the staff as well as the Applicant understand that everything is going to be appropriately reviewed, carefully reviewed and validated.

MEMBER RAY: Well, leave the microphone on. Let me just add again if you read Criterion 3 of Appendix B, and you say what you tell us has to meet that standard, there should never be a circumstance in which somebody says well, I didn't do it because you didn't ask me to do it, because you're required to do what's necessary to validate the design.

And I think we -- in listening to this, it just would concern me that we're trying to make a checklist for what the Applicant is required to do and we don't want to get ourselves in that position.

CHAIR CORRADINI: No, we don't. No, we don't.

MEMBER RAY: That's all I'm trying to say.

MEMBER SCHULTZ: No, I was thinking about what the staff needs to do to assure that the review is complete.

CHAIR CORRADINI: But on the other hand to Harold's point, I have a few questions and our beloved chairman left me a couple of questions that I at least want to get answered because there are certain things that I'm having a hard time figuring out where it might be, either here or somewhere else in the --

MR. TONACCI: Dr. Corradini, if I may interject at this point? So the SRPs have been used for a number of years in a number of different designs, ESBWR, ABWR, all the others. It represents a lot of our collective history and knowledge, but by no means is it going to capture everything in every situation and that's what we have to rely on our training and qualifications and depth of our staff.

CHAIR CORRADINI: Sure, sure.

MR. TONACCI: And supervisors to think out of the box so you're not using this as a checklist. I did this and I've done far enough. You've got to be able to think well, what if this and what if that? And I've witnessed the staff do a lot of that, not that these can't be enhanced.

I think where we started I thought was a really good point from -- is it Dr. Skillman, where you're focusing on the key safety functions that

really have to -- that are essential and if we have not emphasized that enough in this particular SRP to drive home that you've got to think broadly, you can't narrow yourself down to one specific aspect of the design because it could change between now and a year from now. They're still tweaking pieces and parts of their design. So you have to write these broadly. But the essential function of heat removal and a passive nature and how important it is here is not going to change and I thought those points were good.

And so I think they're enhancements, but we have to recognize for the most part this DSRS is being called an SRP and it's been used for many years successfully by the staff. So just kind of put that over-arching theme on it.

MEMBER RAY: Well, okay, it's been used successfully, but let me tell you we're soon going to have a meeting on a certified design in which we're going to look at how it came to be that we didn't recognize the need for something to be done and reviewed. The plant is well under construction at this point. So we need to learn from that experience as well. It's not up to us to make a list of things that they need to do. There is an over-arching set of requirements that we need to make sure are met.

I'm talking about programmatic requirements when it comes to the Applicant identifying what he needs to do to validate the design.

CHAIR CORRADINI: Okay, does anybody have other specific questions? I have a couple.

Dick, do you have any? You get another one.

MEMBER SKILLMAN: This is under the revised 6.3(I)(2). I believe you initiated the discussion towards the passivity requirement for heat removal and I would assert that that Arabic 2 is just not thorough enough to get to the full body of the functional performance requirement that you're asking the reviewers to review or the Applicant to fulfill.

I read from Arabic 2, "The design basis for the ECCS is also reviewed for its capability to actuate automatically so as to assure timely and sufficient core coverage by cooling water in the event of loss of coolant accident and the valuation of the need for operator monitoring and manual action and control as a backup to automatic actuation."

I think you've got the key thought, but what is absent is another add on to that that says this is fundamentally a passive function and the passive features that are relied upon must be reviewed

and demonstrated effective. Those words don't show up anywhere in current Roman I and they also do not show up in reviewer interface which is the next major set of comments.

I would agree that you get partially into it, but I'm looking for something that's really unambiguous. It's very clear and it really points to the essential need in decay heat removal to show that the passive features are fulfilled and that includes the analysis, the assumptions, the variations, the permutations and combinations of heat transfer coefficients. Because in this design, the function that is carried is carried by the passive features, not the plumbing. Once you get the valves open, it's all passive.

MR. SCHMIDT: Agreed.

CHAIR CORRADINI: So can I -- I didn't mean to interrupt you. So since he brought up passive features, so in item 21 of Section 3, there is a discussion about that the design must be capable of sustaining a single active or passive failure without a loss of function. So what do you mean by passive failure?

MR. SCHMIDT: Yes --

CHAIR CORRADINI: Of course, this is not

my comment. This is our beloved chairman's comment, but I --

MR. SCHMIDT: You know, passive failure is considered like a pipe.

MEMBER BLEY: What about a check valve?

MR. SCHMIDT: Check valve, I thought that was considered an active failure?

MEMBER BLEY: Well, that's why the question was asked, one of the reasons the question was asked. We've heard some people sometimes say check valves are passive devices, but they have to change state.

MR. SCHMIDT: Right.

MEMBER BLEY: If that's considered -- where the heck is that defined? I was nosing around trying to find that in other documents and I'm not sure any longer.

MR. SCHMIDT: I'm not sure I can find -- I can point to a specific document for you right now.

MEMBER BLEY: I think IEEE has done it for electrical, but I haven't looked at that in a long time and I'm not sure at all where it's defined for mechanical. So how does a reviewer know what things are passive here?

MR. SCHMIDT: I think it's just tribal

knowledge. I can't think of -- I can't give you a specific document.

MEMBER BLEY: Maybe before the next time you guys could dig into that a little because I --

MR. SCHMIDT: I think I know a person to ask.

CHAIR CORRADINI: So let me expand on Mr. Stetkar's question. I guess where I'm coming from is I was guessing it was piping, but as I understand the design is, at least the current version of the design, everything that comes out of containment is going to have isolation valves. So typical of everything on either side of the containment.

So does that essentially preclude the worrying about a piping failure? Because I don't know of any other -- so my question really kind goes is -- are there any connections that are coming out of containment of NuScale that doesn't have an isolation valve logic to it that I'd essentially isolate in and out to make sure that if I have -- to make sure that I've got isolation? Because except for valve the RVVs and the RRVs opening, everything else is either natural circulation driven or I've buttoned up the system so that nothing -- no inventory is leaking out. So it's like a little more than what

Dennis is asking.

Is it piping that you were thinking of or is it what?

MR. SCHMIDT: It's basically piping or the containment vessel, but all that we're assuming that containment is isolated in this.

MR. CRANSTON: Just one minor comment, the containment isolation valve arrangement that NuScale is proposing is basically both valves outside containment.

CHAIR CORRADINI: And why is that?

MR. CRANSTON: Based on the accessibility and space inside -- there is precedent for having both valves outside on PWRs and that's the approach that they are currently indicating that they are going to be taking.

CHAIR CORRADINI: So okay, so the standoff then would be a pipe break that you'd have to consider as part of the containment function I assume? In other words, if I've got the containment and I've got some sort of connection point that goes out a foot, then I've got my set of isolation valves. So I've got to consider that portion as part of containment.

MR. CRANSTON: That would be like a super

pipe extension of containment, yes.

CHAIR CORRADINI: Okay. All right. Another question from our colleague, in item 20 you put in that ECCS operation ought to occur in sufficient time and 20 minutes is put in. Where did that come from?

MR. SCHMIDT: That's language from the SRP.

CHAIR CORRADINI: Okay, so we're back to legacy questions. So either it's got to be explained or at least -- it's not necessarily appropriate for NuScale is what I'm saying.

MR. SCHMIDT: Not necessarily, but it's still something that I think we'd want to meet if it was applicable. I mean I wouldn't necessarily delete it.

CHAIR CORRADINI: And then you'll come back -- well, let me ask the question differently. You would come back with their analyses to see if that's more than sufficient, less than sufficient?

MR. SCHMIDT: Right.

CHAIR CORRADINI: Okay. So now I have a relatively big question. In review procedures, Section 3, I guess it is, 25(b) implied that you're going to require them to do full flow testing of open

valves. What does that mean? That strikes me -- I've now gone to the dark side and I think that's inappropriately tough, but I want to understand what you meant by it.

MR. SCHMIDT: It's a current requirement to do full flow testing on current ECCS systems and we left that in there --

MEMBER POWERS: Because we've had incidents in the past where valves were not tested at full flow and when they were called on to work under full flow they failed to work.

MEMBER BLEY: Forty years ago.

MEMBER POWERS: Forty years ago, yes.

MEMBER BLEY: A number of cases.

CHAIR CORRADINI: So this is asking for periodic test surveillance. Is that doable?

MR. SCHMIDT: That's a very good question. One of the big issues that I'm not sure I understand either is how are they going to test these valves on some type of periodic basis? How are they going to test our ECCS function?

CHAIR CORRADINI: So it's more than a preoperational test.

MR. SCHMIDT: Yes.

CHAIR CORRADINI: I remember back in the

time of Zion, there were full flow preoperational tests, but not periodic tests after the plant was up and running. But the way I read this, you want periodic testing once the plant is up and running?

MR. SCHMIDT: That is consistent with today's standards.

MEMBER BROWN: ECCS valves, Mike, you're still talking about the ECCS valves?

CHAIR CORRADINI: Yes, sir.

MEMBER BROWN: That's the reactor vent valves and the reactor recirculating valves.

CHAIR CORRADINI: Yes, sir.

MEMBER BROWN: I guess I had the same question. They also talk about pressure in that testing section. They wanted it to be full flow and maximum -- I've forgotten what the exact words were, but maximum operating pressure or something like that, but that's what it used to say. Now they've changed it to say whatever pressure they can do and then they can use an analysis to extrapolate on the pressure side, but not on the flow. They still have to do the design flow, but they can extrapolate from whatever pressure they conduct the test out up to the maximum operating pressure or the consideration under the circumstances. So that's another change. It's

difficult to see how you can test these.

CHAIR CORRADINI: That's what I'm struggling with.

MEMBER BROWN: They're in the evacuated part of the reactor recirculation valves are in the evacuated part of the containment and they connect right in to the reactor itself. You've got to get the vent valve stuff going back in. How you ever open and close those --

MEMBER POWERS: They have to open and close.

MEMBER BROWN: I understand that.

MEMBER POWERS: It's absolutely crucial.

MEMBER BROWN: And then they're under water once they're in service also, so I have no idea.

MEMBER POWERS: How are you going to -- what computer code is going to convince me that they haven't degraded over time?

MR. SCHMIDT: I agree. The staff has not gotten information in the pre-application phase that would help us understand how they're going to test the system. We left it in there on purpose because we were hoping to elicit a comment from NuScale.

MEMBER POWERS: How did you just apply the not having full pressure?

MR. SCHMIDT: Well, I'm not sure we did a good job justifying that.

MEMBER POWERS: Well, I mean if you're going to --

MR. SCHMIDT: We accepted some extrapolation based on --

MEMBER POWERS: If you accepted an extrapolation there must surely be an extrapolation that you would accept. I just don't know what that is. Because why did the valves not work when you go to full flow and full pressure. It's things that I'm not sure we can model. There are aging effects.

CHAIR CORRADINI: I guess -- I'll go against him for a moment. So I'm still trying to remember back in AP1000 ESBWR what the requirement was because I seem to remember since I had a little bit of a conversation with somebody over here about that the -- I'll call it the chemical charge was tested, but not the actual --

MEMBER BLEY: On the explosive valves.

CHAIR CORRADINI: On the explosive valves, but not the actual opening of the valve. And staff felt this was comfortable. We had a big round and round here that we maybe agreed to disagree on some portions of this, but --

MEMBER POWERS: You all agree to disagree with me. I never agreed to this. I disagree with agreeing with you.

CHAIR CORRADINI: But I guess what I'm getting at is --

MEMBER POWERS: Well, you and Sam held fast. I made comments and nobody paid any attention to them.

MEMBER BALLINGER: We all paid attention to them.

CHAIR CORRADINI: But I'm trying to relate this back to AP1000 ESBWR.

MEMBER POWERS: I'm not sure that that's the right way to go.

CHAIR CORRADINI: But in their cases they have to -- they are expecting essentially a series of experiments that would demonstrate its scale, the apex experiments and the experiments and then once those tests were done and staff approved them and they were reviewed by ACRS, there is no requirement for full flow or full pressure testing of AP1000 periodically. Am I missing something?

MEMBER POWERS: No.

CHAIR CORRADINI: Okay. So if I were a vendor that's after that, I'd say what are you doing

to me that you're not doing to the AP1000 ESBWR.

MR. SCHMIDT: Which is what we kind of expected as a comment, but --

MEMBER POWERS: From NuScale.

MR. SCHMIDT: Yes. But we did not receive a comment on that portion. We did receive a comment on they can't do testing while they're in refueling because they're disassembled which makes sense to me, but we did not receive a comment on their ability to do full flow testing.

CHAIR CORRADINI: I guess --

MR. SCHMIDT: I've conceived a way to --

CHAIR CORRADINI: I mean I don't want to tell them the way out of the box, but unless I misremember what happened with AP1000 ESBWR it was scaled testing with calculations and I don't remember any commitment to periodic testing through the life of the plant, but I could be wrong.

MEMBER RAY: Mike, I'll need to think about this before I answer your question, but there may be a more fundamental difference why.

CHAIR CORRADINI: Which is?

MEMBER RAY: That's why I said I need to think about it.

CHAIR CORRADINI: Okay.

MEMBER RAY: But just leave open the possibility that there is a bigger difference than you're assuming in your question.

CHAIR CORRADINI: Well, I mean at low pressure you've got a series of actuated -- four stage actuate -- I mean, we'll just leave ESBWR out of it since I'll bring up past ghosts with some people. With the AP1000, you have four stages of depressurization, each with a series of larger squib valves, explosive opening valves. And then you rely on essentially natural circulation to let all this through.

In ESBWR, assuming the valves worked, where we got hung up was that we wanted to see very clearly that they essentially had done enough venting there would be no condensable gas trapped that would essentially choke off the natural circulation flow. And so we went through a series, but I don't remember in any case in both of those that once done every five years, ten years, whatever, they've got to go back and check it out.

MEMBER BLEY: Let me offer something up. If you go way back to the 40 year ago time frame, when we came up with the full flow requirements. My memory is and I could be wrong on this, Dana, is it

wasn't aging problems, it was post-maintenance problems that was some manual valves left in wrong positions. It was debris, some places I know of it was even polyethylene left inside a monitor of a valve, things that prevented valves from moving to their full open position.

MEMBER POWERS: With the valves, actually, we had occasions when the valves would not turn. There was not enough force to open the valve against the full --

MEMBER BLEY: No, he did have those. We have those for a variety of reasons. Now one might look at the valves we're looking at in this system and what kinds of activities people can do to affect them. That's all I really want to say about that, but some of those cases where valves wouldn't operate or pumps wouldn't run following maintenance, had to do with people over tightening packing, that sort of thing beyond what the operators would handle.

It might be that for some of these there isn't much we can do to make them bad except aging kind of problems. But right now, it's not clear what -- why we're requiring it or how it would be done.

MR. SCHMIDT: I think it's not a bad thing to do if you can do it.

MEMBER BLEY: It's certainly not a bad thing to do. It's kind of not a good thing to put requirements out in front of people that can't be met and then back off with them either, I think.

MR. SCHMIDT: Right. I mean one thing you could possibly do is when -- you can take these valves out when they do their refueling, maybe remove these valves and then do some type of bench testing.

MEMBER BLEY: Then you've got put them in and that --

MR. SCHMIDT: Or you have replacements that go in.

MEMBER POWERS: It doesn't obviate the problem.

CHAIR CORRADINI: That's right. That's where the problems occur. I've run out of questions. I will save the best one for last.

MR. SCHMIDT: I mean we were a little surprised we didn't get a comment on that, to saying that it was going to be infeasible to do. But like I said, we didn't receive a comment on that so maybe they have some strategy that we're not aware of that can do it.

CHAIR CORRADINI: I think I and Mr. Stetkar are kind of on the same page on this. I

couldn't understand how you do it and I couldn't remember the precedent for the other passive designs that would be required to do it on a periodic basis. So that's kind of where I sit on this.

MR. SCHMIDT: I think this is the SRP that was used for those passive designs.

CHAIR CORRADINI: Probably, but if I remember the agreement was at least for the explosive valves as you would essentially test the chemical charge, but not the actual operation of the valve at full scale because that caused a little bit of a disagreement amongst us.

MEMBER BLEY: When we come to issues like this, going back to the real operating experience and basing arguments on those makes me a lot more comfortable than just having abstract requirements.

CHAIR CORRADINI: Right. Other questions by members of the committee? I've run out of questions. Thank you.

Any parting comments by members of the subcommittee?

MEMBER BLEY: I guess only one relative to that.

CHAIR CORRADINI: I'll start over with Dr. Rempe. I'm sorry, excuse me, I made a mistake.

We still have the public.

So can we open up the outside line. Is there anybody here that wants to make a statement? Is the voice from the control booth is the line open? I don't hear any crackling.

Is there anybody out there that they can at least acknowledge their presence?

MEMBER BLEY: On the phone line.

CHAIR CORRADINI: On the phone line. I hear crackling. If anybody is out there, can you at least acknowledge you're there? I guess nobody is there and it's crackling, so we can close the phone line.

Now back to Dr. Rempe.

MEMBER REMPE: Listening to the questions from other members today and is there any motivation to find a way to graphically show all these requirements and interfaces instead of having that section?

CHAIR CORRADINI: I think that's a marvelous idea. I was thinking of that because I'm a graphic sort of person, but what are you thinking about?

MEMBER REMPE: I'm not sure. You guys have done this more than I. Maybe you've tried it

and said this is a waste of time or something, and all that, but it just seems like if you've got this interface in one section has somebody methodically gone through and said well, the same interface connects the dots at least and it's consistent among different sections? But graphically might be easier sometimes for folks. It's just a comment to throw out.

MR. SCHMIDT: I've never heard anybody attempt that before, but that doesn't necessarily -- it hasn't been attempted before. Not to my knowledge.

CHAIR CORRADINI: So can I ask her a question a little bit differently? So how do you convince yourself that you haven't fallen through the cracks on oh, sure, Mary would have looked at that because that's in the containment section, but Sam doesn't have to look at it because that's in the CVCS section.

How have you convinced yourself that all is good?

MR. SCHMIDT: Well, I think we know what -- I mean in this system, for example, we know what's interconnected. We're aware that the containment is a vital function of the ECCS system and we know

condensation is a vital function to get recirculation flow. So I mean we try to do the best we can in the interface section, but there is just some basic knowledge that you have that we know is more important in this design than other designs.

I mean these SRPs, I think it was mentioned before, these SRPs are used for a lot of different designs, even BWRs, PWRs, so there's no catch-all here that can be in these documents. There's got to be some just basic engineering knowledge that's applied.

CHAIR CORRADINI: Okay.

MR. SCHMIDT: I'm not sure I could write a perfect interface document, even if I were to graph it out to capture all of the interconnections.

CHAIR CORRADINI: So to say it differently from your perspective, although there might be things that fall through the crack, graphically illustrating it doesn't necessarily guarantee completeness.

MR. SCHMIDT: We could try to take this and try to graph it out, but yes, I think there still could be a line in that visualization that doesn't exist because nobody thought of it.

CHAIR CORRADINI: Joy?

MEMBER REMPE: Well, so it may not help the staff, but it might even help the Applicant a bit to try and meddle through this and all that or they will just have to take it and bring me a rock, and then well, you forgot that and the rock and that's just the way it goes.

MR. SCHMIDT: I don't know, I've never heard an applicant ask for it. I don't know what an applicant would say. They'd probably say yes.

MEMBER REMPE: Anyway, it was just a thought when I was listening to this today. But that's all I have.

Charlie?

CHAIR CORRADINI: Charlie?

MEMBER BROWN: Yes, just a follow up on the other question was the other reference in this 6.3 was to go look at the containment heat removal system in 6.2.2 which I went to see what were -- how were they separated and whatever. And I was unable to figure out how you would connect the dots relative to making sure that the ECCS, what had to be done in this other system to make sure that worked and back and forth. There was no -- I think somebody brought up that integration thought process earlier.

I just wanted to comment. I did try to

look at 6.2.2 which was referenced in 6.3 and was unable to get any basic confirmation or there was some connection that you had to do between the two of them to make one work and the other work or what have you. So somebody made that comment earlier, I just wanted to emphasize that somebody -- I did look at that and was unable to see anything.

CHAIR CORRADINI: Okay. Ron.

MEMBER BALLINGER: I have sort of the same comment that -- trying to fit things together it's like reading the old ASME Boiler and Pressure Vessel Code. You have to read it with your finger stuck in five or six different places to thumb back and forth. Has there been any thought -- it also seems like it's compartmentalized in a kind of a structural way. That's the way these things are.

CHAIR CORRADINI: Right.

MEMBER BALLINGER: But what about since this is so integrated, have you thought about putting like a little team of folks together from the various functions to sort of answer all these questions that we've been asking all along about how these things are all connected. And then come up with some of a -- I don't know, maybe it's a document or something, that has the discussion that we've been having here.

CHAIR CORRADINI: Road map.

MEMBER BALLINGER: Something like that, yes.

CHAIR CORRADINI: I think Ron is still kind of looking at the same elephant that I was looking at. I just have a hard time understanding how the staff understands how this is all connected. So maybe you have it. Maybe it's all clear to you, but for me to gain confidence in that, I'm still having a hard time nailing it down. So for example, does the Containment Branch and what I'll call the ECCS --

MEMBER BROWN: Reactor Systems.

CHAIR CORRADINI: Reactor Systems Branch meet on a continuing basis and talk about this so that it's very clear where the interface is between them as individuals? That's what I think --

MEMBER BALLINGER: That's what I'm saying. That's what I'm saying.

MR. SCHMIDT: Well, I think we will have to for this design, certainly. This is a far more integrated design than we've dealt with before, so yes. But certainly like mass and energy into containment, we have to provide them that data. I don't know if it's actually written down anywhere

that we provide them that information, but we do provide that information and they do their containment calculations based on it. So there are like preexisting interfaces that already occur for current designs that we work with containment.

MEMBER BALLINGER: But you've struck exactly on the problem. You know those are the obvious ones. But what about the not so obvious ones that you would not even think about until you sit down as a group and go through the analysis without sending people various things.

MR. SCHMIDT: Right. We haven't done that. We haven't done what you're --

CHAIR CORRADINI: So it's early in the game for that?

MR. SCHMIDT: Yes, it's early.

MEMBER BALLINGER: But you surely would like to know whether or not or make yourself feel comfortable that you really haven't missed anything?

MR. SCHMIDT: Oh yes, sure. Certainly. Certainly.

MEMBER BLEY: Yes, a couple of things. This is a design specific review and that's a real opportunity to kind of clean up some of the things that have always been troublesome. This is something

we talked about not just here. Every design cert we've looked at we get this -- it's real hard. When you dig in deep enough, hundreds of RAIs and stuff, you find often that stuff has been covered. But whoever even comes here has a little trouble pointing out where that was looked at and it takes some work to bring it out.

I would have hoped for the design specific review standard, at least those common things that are really crucial to this design might have been highlighted. It seemed like a real opportunity. And some thought to this idea of a map would be nice. I don't know. It could be way complex and really too hard to do, but it smells like not a bad idea.

MEMBER BALLINGER: But it actually proved very beneficial going forward.

CHAIR CORRADINI: Charlie.

MEMBER BROWN: For Chapter 7 and I haven't looked at it, but what we did for mPower and what we were supposed to be doing for Chapter 7 is provide a road map, an architecture as part of the presentation that the vendor is required to submit so you can see the total connections of everything and the interfaces for each piece. In other words, how

sensors are connected, what interconnections between channels, what other stuff they connected with and through what and all that other kind of -- not details, but just an architectural map.

And if you look in these chapters, either the ECCS one or the DHLS system or the ECCS or the DHLS system or the ECCS, you don't -- there's no request to say hey, give us just an interface with this system of other stuff that connects in. That's all you have to do. You don't need the whole plant, but you do need what stuff connects in or is required to make this system work. You could do that chapter by chapter. You don't have to know what the design looks like, but you ask them to provide that as part of the BSRS chapter for each of the major systems. So you get the connections or interfaces with other places. Very simple to do. It's not hard.

CHAIR CORRADINI: Since you've been leading the Chapter 7 part, is there an example of that for the mPower?

MEMBER BROWN: I haven't read it all yet, but mPower has got the requirement in the front of it. It's either 7.0 or 7.1. I'm not sure which, which talks about an architecture needs to be developed and shown as part of specifying what this

thing looks like. Unless somebody deleted it subsequent to our reviews.

It was also in the ISGs that we developed about six or seven years ago that same ISG7 or 5 or 7 or whatever, lost track of those, too.

CHAIR CORRADINI: Okay, thanks, Charlie. Dana? Dick?

MEMBER SKILLMAN: Yes, just one or two. In my review, I did find myself over 15.6.5. 15.6.5 suggests that whoever is needs to take a look --

CHAIR CORRADINI: Is your mic on?

MEMBER SKILLMAN: It is now. Excuse me. My review took me into 15.6.5. And if you were to review 16.5.6 Roman I, Arabic 1, Golf, G, that paragraph references 5.2.2 as containment depressure and heat transfer capacity when in reality I believe it's 6.2.2.

MR. SCHMIDT: 6.2.2, yes.

MEMBER SKILLMAN: As is well described in your new paragraph which is the intro to your revised 6.3.3.

The other comment I would make is in your revised standard under acceptance criteria, you probably should include Appendix B to 10 CFR 50 as a reference guide and more specifically criterion 3,

design control. Because criterion 3 of Appendix B is what really pulls together the requirement for the analytical integration for the functions that we're talking about. Thank you.

MR. SCHMIDT: Now that was also a 15.6.5? I didn't catch the --

MEMBER SKILLMAN: Oh, no, that's over in 6.3.3.

MR. SCHMIDT: Okay.

MEMBER SKILLMAN: And that would be an acceptance criteria which is Roman II under revised 6.3.5, page 6.3.5.

MR. SCHMIDT: Okay.

MEMBER SKILLMAN: Thank you.

MEMBER SCHULTZ: Having heard the comments that have been focused on establishing a structure, perhaps started by what mPower -- what had been specified for mPower, it sounds like a good idea. I would only caution that to do that one would want to be sure that the focus would start at a high level on those features that are important to safety, because if one goes into this process and believes that it's going to be a pictorial structure of everything that needs to be done, it will never be done.

MR. SCHMIDT: You're saying it ought to be at a higher level?

MEMBER SCHULTZ: High level to identify those things that we talked about here to make sure that those things that are very important are identified and that the cross connects between review teams are going to be fully recognized and implemented in the review.

The other point is that what we've identified is a number of issues. We picked this section because of that reason, important to safety, let's start with this section, ECCS, because of its overall importance, we're now faced with the challenge of what we do next in terms of the review and it's in the face of 700 comments that are coming in that are going to change the documentation that we've been provided to make that decision of how that committee is going to proceed. Just to take under advisement that we need to follow that up and make sure we get information that will allow us to make those decisions.

CHAIR CORRADINI: Thank you, Stephen.

Harold?

MEMBER RAY: I guess, Mike, I don't know if this is in contrast or not, it's certainly not in

contrast with some that has been said already, but this is a design specific review standard as has been pointed out. And some of us have occasion over at Forrestal to listen to how critical it is for new plants to get the NRC on board early and understand what the NRC's requirements are going to be. And this is one vehicle that may do that.

I am reluctant to see us go down a path in which we go further than we should and maybe Steve's reference to high level is the appropriate thing to say here. Again, it's my concern that we've become too much a captive of what we've said we're going to review before we really understand all of the elements of the design.

Now our role here on the ACRS is to try and push back against that happening that we not become so wedded to a design specific review standard that was developed years before we finally get to the certification point that we don't look at things that don't happen to be in that standard, but should have been.

So my concern is just that we prematurely become too specific at too low a level. I said this may be in contrast because I think it is somewhat in contrast over what might be implied from what Charlie

said. If we say here are the things we want to know about this without yet understanding the design fully, it's just a matter of concern to me.

Like I said, we've got some experience now to indicate that we need to be cautious because we don't ask questions sometimes, that later on we wish we had, and everybody wishes we had actually. So that's my only comment here is that I'm kept at a high enough level and not being so specific that we're subject to being said well, you didn't say you wanted to look at that. The reference to Appendix as both Dick and I have said I think is appropriate because that allows you to always say listen, you have not verified this design. You need to do this test or you need to do this analysis. Because absent that, you can't claim that it has been verified or validated. That's always got to be something we can do.

So anyway, as I say, we don't want this to become just such a prescriptive checklist that the vendors can say all right, now, here are the questions I've got to answer. When I answer them, I'm done.

MR. SCHMIDT: Thank you.

CHAIR CORRADINI: I don't have any other further comments. I think I've captured most of the

committee's -- I hope I've captured all of the committee's major comments.

The only one that --

MEMBER RAY: Mike, can I interrupt? I'm sorry, there's one thing, I've made a note here. I forgot to refer to it. Jeffrey made the point that this is a far more integrated design than we've seen before and that was really what I meant when I said maybe there's a reason why this is different in some respect. It's just an example of what I was saying.

CHAIR CORRADINI: So the only thing I guess I'll bring back up is that I'm still ruminating about this periodic testing. So at least in my mind we've only had two meetings about this. We're going to -- in fact, if we have enough time now maybe we can have our short meeting now and discuss how we move forward with subsequent meetings on the DSRS to try to reorganize ourselves on that regard.

But I haven't seen anything in the first two meetings that's a show stopper that worries me on what you're doing, except perhaps the last thing that worries -- which I brought up about this testing, this periodic testing, but generally speaking, I think we're looking at kind of the details of how this all fits together so that we feel comfortable

that you're looking as comprehensively as we can into the design.

So with that, I have nothing more to say and we're adjourned.

MR. TONACCI: Dr. Corradini, before you adjourn, can I explore your last concern a bit to make sure I understand it?

CHAIR CORRADINI: Sure.

MR. TONACCI: So I look at these DSRSs or SRPs as review guidance, not as regulation. And many of the paragraphs and bullets in them are to make sure we don't forget something and the staff has the latitude to shift and change and so forth once they get into and actually see the design, but I guess I'm feeling like -- reflecting on some of the comments that were just made if we start narrowing ourselves down too early and things shift, we may wish that we had left the comments in.

All its doing now is making sure Jeff or somebody that looks like Jeff a year from now, two years from now who does it, starts asking the question. It doesn't force us to do testing -- full testing like the plants do now, but it makes us think about it.

In that regard, I thought it was worth

leaving there so they don't forget it. Maybe it's only prescriptive. Maybe we could make it a little more subtle, but that's -- I'm just more concerned with leaving something out.

CHAIR CORRADINI: I understand. I guess my reaction is that I don't want to propose that it get taken out. I just want to understand how it's possible to do so I'm still back in my thought process of is it possible to do and is this setting a precedent that I don't remember. And I could be misremembering from the current set of passive plants and what they're required to do. Because I seem to remember off bench scale testing of squib valves as the agreeable way to feel comfortable that things can work as expected. As an example. As an example. But I guess I don't want to take it out. I just want to understand it better. Because it seems like a very big requirement.

MEMBER BLEY: I agree with you, to want to understand it. On the other hand, there's a reason why plants were asked to do that a long time ago and existing -- not meeting that fully by exception seems more appropriate and I think I'm aligning with you, but more appropriate than removing it from everybody because there were special conditions that made it

difficult for one actor.

CHAIR CORRADINI: I don't remember enough about -- I remember being part of some of these things back in -- for the full flow testing for the active system, so I don't remember enough, but I get your point.

Okay, any last parting shots? Okay, we're adjourned.

(Whereupon, the above-entitled matter went off the record at 9:57 a.m.)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

ACRS Presentation on the NuScale Design Specific Review Standard (DSRS) Section 6.3

Gregory Cranston,
Sr. Project Manager
Office of New Reactors
September 9, 2015

NuScale DSRS Briefings to the ACRS Subcommittee on Future Reactors

- Second in series of meetings on selected draft DSRS sections
- Comments being received and processed
- Opportunity for updates during comment incorporation
- Some DSRS sections may revert back to SRP sections

NuScale DSRS Briefings to the ACRS Subcommittee on Future Reactors

- Purpose: provide ACRS with approach staff took developing selected DSRS sections
- During the course of these presentations staff will cover:
  - What changed SRP to draft DSRS
  - Why change made (new system, elimination of system, significant design difference, etc.)
  - Questions based on the design information available to date

The Status of the NuScale DSRS

- Draft NuScale DSRS issued for public comment on 6/30/2015
- Public comment period closed on 8/29/2015
- Comments being processed and will be sent to staff for disposition
- ACRS Future Reactor Subcommittee briefing on public comments tentatively scheduled for November 2015
- Schedule for issuing Final DSRS based on magnitude and complexity of comments and DCA submittal date

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NuScale DSRS 6.3 Emergency Core Cooling System

by

Jeff Schmidt

September 9, 2015

DSRS 6.3 ECCS

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- No change in applicable GDCs
- No change in acceptance criteria
- Major changes where due to NuScale design specifics
- Major changes include,
  - Eliminated BWR material
  - Eliminated references to active flow systems and most references to piping
  - Added general description of RVV and RRV function

DSRS 6.3 ECCS Public Comments

U.S.NRC
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- Nine public comments
  - 8 recommended deletions, 1 rewording
  - Preliminary review staff agrees with changes

Closing Remarks
ACRS SC Meeting

Closing

- Second in a series of briefings to the Subcommittee on selected Draft DSRS sections
- Sections were selected based on significant changes from SRP or nonexistent in SRP
- ACRS provided Compare DSRS sections vs SRP section to facilitate ACRS selection of DSRS sections for upcoming briefings
- Some DSRS sections may revert back to corresponding SRP section
- Comments or Questions?