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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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SUBCOMMITTEE ON THE WESTINGHOUSE AP1000 DCD

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OPEN SESSION

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WEDNESDAY

NOVEMBER 3, 2010

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ROCKVILLE, MARYLAND

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

SUBCOMMITTEE MEMBERS:

HAROLD B. RAY, Chairman

SAID ABDEL-KHALIK, Member

J. SAM ARMIJO, Member

DENNIS C. BLEY, Member

MARIO V. BONACA, Member

SUBCOMMITTEE MEMBERS: (cont.)

CHARLES H. BROWN, Member

JOY REMPE, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

JOHN W. STETKAR, Member

CONSULTANTS:

THOMAS S. KRESS

GRAHAM B. WALLIS

DESIGNATED FEDERAL OFFICIAL:

WEIDONG WANG

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

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

8:29 a.m.

CHAIRMAN RAY: The meeting will now come to order. This is the second day of the meeting of the AP1000 Reactor Subcommittee as standing subcommittee of the Advisory Committee on Reactor Safeguards.

I'm Harold Ray, Chairman of the subcommittee. ACRS members in attendance are Jack Sieber, Dennis Bley, Sam Armijo, Said Abdel-Khalik, Mike Ryan, Bill Shack, Joy Rempe, Mario Bonaca, John Stetkar and Charles Brown, and their attendance is very much appreciated.

We're going to - let me do a couple other things here that are pro forma as well. As I stated yesterday, we will be hearing presentations from the DCD applicant for Revision 17 of AP1000 DCD.

At mid-morning here, another hour or so, the meeting will be closed in order to hear proprietary information that will be presented by Westinghouse pursuant to 5 USC. And attendance at the closed portion of the meeting dealing with such information will be limited to Westinghouse representatives, the NRC staff and its consultants and those individuals and organizations who have entered into an appropriate Confidentiality Agreement with

them.

Consequently at that time, we will need to confirm we have only eligible observers and participants in the room for the closed portions of the meeting. This meeting is scheduled to run until noon today.

We're going to be continuing to gather information and analyze relevant issues and facts and formulate proposed positions and actions that are appropriate for deliberation by the full committee.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register.

Weidong, we have an open line at this time, do we?

MR. WANG: Let me just check and make sure.

CHAIRMAN RAY: Okay. There is a transcript being kept and it 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, the participants should first identify themselves and speak with sufficient clarity and volume so that they

may be readily heard.

Now, yesterday we had, among other things, discussion of the topic of aircraft impact. Let me just say that upon deliberating and recognizing the staff's review isn't yet complete so that we can hear their final input on that subject and given the otherwise character of the subject, we have concluded that we'll be looking to write a separate letter on aircraft impact from the comprehensive letter that we are targeting to be able to write in December.

And, therefore, we will produce the ACRS letter on AP1000 aircraft impact when we're able and ready to do so.

We'll continue on with the other items that are on our agenda aiming toward the December full committee meeting, as I indicated.

We're going to begin that process or resume that process, I should say, with another action item that will be discussed this morning because of staff availability. That item is as noted on the screen.

We'll not begin the I&C portion of the meeting until - it's scheduled for 9:45, I think.

MR. WANG: 9:45, yes.

CHAIRMAN RAY: Yes. That's going to limit

the time available. So, I want to make sure that we start timely then regardless, because it's very important that we have the opportunity. And, as I say, time is limited to explore the issues involved there.

As time permits after the discussion of this item and any other specific items that we have, we will also want to review briefly the entire list of action items remaining just to make sure that we are on track toward closure of those items.

There will be a three-day AP1000 subcommittee meeting later this month at which the bulk of the heavy lifting that remains needs to be completed, and it behooves us not to have any miscommunications about where we stand.

One other item that I want to note here is that yesterday there was some further review opportunity of the classified material that Westinghouse provided. And that has led to some further discussion between at least one of the members here, perhaps others as well, and Westinghouse.

Ed, you know what I'm talking about, do you?

MR. CUMMINS: Yes, I do.

CHAIRMAN RAY: All right. Do you

anticipate that will occur yet this week or at some later time?

MR. CUMMINS: I think at a later time.

CHAIRMAN RAY: I see. All right.

Well, that and the fact that the staff hasn't finished their review, both of them lead to the conclusion that I stated, which is that we will have an AIA letter when it's ready to write, but it won't hold up proceeding on toward a December letter on the DCD application - amendment, I mean, generally.

Okay. All of that having been said, I'll ask my colleagues if they have any comment they'd like to make to start with, please.

MEMBER ABDEL-KHALIK: Mr. Chairman, just for the record, Joy's last name is Rempe rather than Rempke.

CHAIRMAN RAY: Ah, that's my mistake.

MEMBER ABDEL-KHALIK: With a difficult last name, I'm always sensitive to the pronunciation of people's names.

CHAIRMAN RAY: Yes, that was a - that was my fault.

Something about Rempke that just -

MEMBER ARMIJO: We all knew Rempkes.

MEMBER STETKAR: You'll just have to change

it, Joy.

MEMBER REMPE: It's my husband's name.

(Laughter.)

CHAIRMAN RAY: All right. Any other important information?

With that, then, we'll turn to Westinghouse.

MR. SEELMAN: Thank you, Mr. Chairman. My name is Bob Seelman from NPP Licensing, Westinghouse. To my right is John Ewald, NPP Engineering.

John is the subject matter expert for this item, reactor circuit breaker testing. This is ACRS Action Item Number 41.

In this slide, I restate the action item. Again, it deals with testing frequency and it involves - we'd like to know more information on the operating experience on the circuit breakers. And in addition to that, discussions on yearly testing - focus on yearly testing.

Now, I'll turn this over to John. This slide here talks about the history from the last ten years, basically. 2000 to present.

MR. EWALD: Okay. As Bob stated, we did a database search on the INPO database and pulled the - every breaker failure or fault that occurred in the

last ten years on Westinghouse plants. And we came up with 17 cases of issues that occurred with reactor trip circuit breakers.

And I started out with we had three cases of reactor trip circuit breaker failure to trip, and I've categorized these as to what the end result was. One was an undervoltage trip failed during testing due to an undervoltage coil issue, but the shunt trip still worked.

So, the breaker still would have tripped on the dual undervoltage shunt trip arrangements that we use.

We had one trip fail during a shutdown testing due to mechanical failure of the breaker. I identified that as the one case where the breaker actually failed to trip regardless of what we would have done.

And we had one other failure to trip due to a UV driver which is basically the - on the auto side of those - that particular system that we're using in that plant, which would have prevented an auto trip, but not a manual trip.

In other words, I wouldn't really have considered that a breaker failure. More of a driver failure that prevented the breaker from tripping.

Then the other cases that we had which are the majority of the cases you happen to see with most reactor trip circuit breakers, we had five cases where the reactor trip circuit breaker failed to close or reset. And there was various reasons for that, but all of those - and all of these actually occurred during some type of reactor trip circuit breaker testing that we were doing either during a routine tripping of the breakers or during an extended shutdown, do an extensive maintenance inspection on the breakers.

MEMBER BLEY: When you say "reset," is that the relays failed to reset in time?

MR. EWALD: There was multiple - when I say "close" or "reset," I mean either some of these have - they have a charging motor that will charge the springs, and then you can reset.

Sometimes that didn't reset. Sometimes the springs failed or - the end result was either the breaker couldn't be reset or recharged in order to re-shut it. Or when it did re-shut, it either had a mechanical failure, a latch failure of some sort or the charging motor didn't charge, so he couldn't shut it.

And I had five cases of inadvertent trip

of reactor circuit breakers during maintenance. And most of those were procedural issues where someone skipped a step in the procedure and tripped a breaker before they expected it to trip during testing.

Also had four cases which I couldn't really fit into any other categories, defects identified during shutdown maintenance. And those were either clearances in the mechanical linkage, inspections that showed degradation in the physical quality of the breaker.

None of them that would have affected tripping, but - and in most of those cases if you dig deep into the details, most of them would probably been an issue with resetting and shutting the breaker.

So, that's my entire history. So, based on that - that's the last ten years in particular Westinghouse plants. And I have a - my summary of that would be in the last ten years we had one case of where a breaker would have failed to trip.

MEMBER STETKAR: John?

MR. EWALD: Yes.

MEMBER STETKAR: This is interesting information for the numerator of the failure rate.

Do you have any sense of what the denominator is, the actual number of circuit breaker

valid demands to open?

Are we talking about a hundred, 10,000, a million?

MR. EWALD: That's a good question.

(Off the record comments.)

MR. EWALD: Yes, if you figure - does anybody know exactly how many Westinghouse plants we have?

(Laughter.)

MR. CUMMINS: 60

MR. EWALD: Do we have 60?

MEMBER BROWN: How many breakers per plant?

MR. EWALD: Four.

MEMBER BROWN: That's the existing.

MR. EWALD: Existing plants, right. The AP1000 obviously has eight.

MEMBER BROWN: Right.

MR. EWALD: And understand that the four breakers in an existing plant, two of those are bypass breakers for testing the normal breaker that's in service. Because if you open it, you trip the plant.

So, you have a bypass breaker that you put in place while you're testing that breaker, and you test the bypass breaker.

MEMBER STETKAR: Do people have to report

failures of the bypass breaker?

MR. EWALD: Yes, the - some of these are bypass breaker issues. Okay. A couple of these if you read the reports, was actually bypass breaker testing.

Actually, one of these I recall, they were racking a bypass breaker in and the racking bar crossed the, you know, caused a short in the supply to the CRDMs and dropped a bunch of rods.

So, what you get from this history kind of goes back to why we came up with the particular design of the eight breakers we have in AP1000.

MEMBER ABDEL-KHALIK: But to answer John's question, it would seem that the failure rate would be a few times ten to the minus four.

MEMBER STETKAR: I'm trying to get that from that.

MR. CUMMINS: This is Ed Cummins. We don't have the pure answer, but we could discuss what the basis of the answer is that the surveillance is basically every 90 days, we think, for most of them.

So, 60 plants or 50 plants times four per year for surveillance, plus one for shutdown, let's say, every year and maybe one more, and then times 60 and that's the basis of your number of demands in

total, I think.

MR. EWALD: And the ten years.

MR. CUMMINS: Times ten years. Ten years times 60 plants or -

MR. EWALD: So, ten to the minus fourth is pretty close.

MEMBER STETKAR: Okay. Thanks. That's all I was looking for, you know.

MR. EWALD: Okay.

MEMBER STETKAR: Precision is not necessary, Ed.

MR. EWALD: Precision is not necessary.

MEMBER STETKAR: Reasonable accuracy is accepted.

MEMBER BROWN: The manual trip, the third bullet you have there -

MR. EWALD: Correct.

MEMBER BROWN: - was that an electrical manual trip or was that a walk to the breaker and -

MR. EWALD: That was an electrical manual trip.

MEMBER BROWN: Okay.

MR. EWALD: Because -

MEMBER BROWN: So, it actually exercised the same coil to -

MR. EWALD: It actually exercised -

MEMBER BROWN: - the manual trip circuit -

MR. EWALD: Which is why I eliminated it, yes. They actually had the UV -

MEMBER BROWN: What kind of breakers?

Are these the molded case-type breakers, air circuit breakers?

MR. EWALD: These were all multi-case, I believe.

MEMBER BROWN: Molded?

MR. EWALD: Molded case, yes.

MEMBER BROWN: Okay. Standard small size distribution panel-type breakers, not the big 2,000 - these are 250s, 400s.

MR. EWALD: They're 250s, 400s.

MR. BROWN: Okay.

MEMBER STETKAR: They're not what you'd normally think of as multi-case breakers.

MR. EWALD: No, not what you'd normally think on -

MEMBER BROWN: No, I understand that.

MEMBER STETKAR: They're better characterized as an air circuit breaker, but not the way you think of those.

MEMBER BROWN: All breakers are air -

they're all air circuit breakers.

(Simultaneous speaking.)

MEMBER BROWN: They come in a molded case or they're just in a metal frame.

MR. EWALD: They're just in a metal frame.

MEMBER BROWN: Okay, but they're small rated.

MR. EWALD: They're smaller breakers.

I guess compared to the rest of the breakers in a conventional plant, they're small.

MEMBER STETKAR: They're typically about 380 volts contact. It's a different voltage that they run the CRD power supplies with. They're like a 480 volt.

MEMBER BROWN: Yes, well, I mean, I'm just looking for the same rates. The ones I was familiar with are 600-volt rate, 250, 400 amp-type breakers. They've got a very tight case because they're meant to be compact. And these don't have to be compact, that's all.

MEMBER SIEBER: It's like a wall switch.

MR. SEELMAN: The same subject was addressed - is addressed in the SER under open items SRP 7.2 ICE-03. And the staff considered this item resolved. And if you all read through it -

MEMBER BROWN: Let me - if you don't mind me interrupting for a second, please, John asked a question. We were trying to get to a number.

Characterizing the failures that you had if you were only testing these once a year, what would that - and you had the same failures -

MEMBER STETKAR: It depends on the failure rate model that you use, but it would be approximately four times higher.

So, you'd be looking at sort of middle times ten to the minus four-ish depending on whose theories you work about latent incipient-type failures versus shock-type demand failures and all that kind of stuff.

It would essentially multiply it by about four.

MEMBER BROWN: Okay. All right. So, that's they way you would be thinking on that in your world.

MEMBER STETKAR: Yes, it's the way one could think about it.

MEMBER BROWN: Okay. Thank you.

MR. SEELMAN: I'll just read the words from the SER.

Westinghouse stated that each individual

RTCB would be opened during a trip actuation device operational test once per year. In current licensed plants, the maximum length of time between openings of RTCBs, or equivalent, is typically 92 days. This issue is discussed in Chapter 16 of NUREG-1793 and this supplement. This issue was determined to be adequately addressed in Revision 15 of the DCD and no changes were made to the RTCB layout or design, including the periodicity of RTCB testing. Therefore, this open item is considered resolved.

MEMBER BROWN: The point of this one is that this was a pre-recertification or pre-amendment, whatever we want to call it, design and it has not been changed.

MR. EWALD: That's correct. In plain English, yes.

MEMBER BROWN: That's what I was trying to get down to, plain English.

MR. EWALD: That's plain English.

MEMBER ABDEL-KHALIK: Given the failure rates that we're talking about here, do you still consider this periodicity of annual versus quarterly to be still appropriate?

MR. EWALD: Yes.

MEMBER ABDEL-KHALIK: And on what basis is

that "yes" reached?

MR. EWALD: That basis is because the AP1000 design is different than what the conventional plants are using.

In AP1000 we have - if you'll recall, we have eight breakers versus four. Eight that are in service. And you need two of the four divisions to open at least one of its breakers in order to trip the plant.

So, you need two out of eight breakers to work in order to trip the plant. So - and there's a little bit more that piles on in that and we can sit here and figure out all the different angles, but it's kind of a combination of more breakers and four divisions versus two that will cause a plant trip.

So, you have additional redundancy not only in your electronics, which one of those failures was due to the undervoltage trip unit control, but you also have more breakers available to trip the plant.

CHAIRMAN RAY: Well, that seems to me like a better rationale than the statistics we've been discussing. Although that's -

MR. EWALD: But the question came up.

CHAIRMAN RAY: Yes, I understand.

What I was going to say is it seems to me

like this kind of testing is - can't presume uniformity of behavior.

In other words, what I'm considering is a defect in a particular model of a breaker that makes it an outlier in terms of the total set of breakers out there, and how do you detect the fact that it has this defect.

That's the way I would have approached thinking about why do we do this quarterly when the data don't seem to support it?

Answer: Because I may have a breaker in my plant that doesn't fit the data that we're talking about.

It seems to me like a response to that in this case would be well, but we have a much more robust arrangement of breakers, so I don't rely on as much reliability as others do.

In other words, I wouldn't want to take your data and apply it to the other plants that aren't of this design and say oh, well, just do it once a year or maybe every five years or whenever you feel like it, because it just doesn't seem to me like you can make the leap that I might not have something that's uniquely problematic with regard to the breakers that I have in my plant.

But anyway, I just want to make that observation.

MEMBER BLEY: I'd make a slightly different observation in addition to that.

The one thing we have to be alert to when we do this, is that the - here are ten years, but actually more like 30, 40 years of experience with these breakers as being exercised quarterly, and now they won't be exercised quarterly.

They'll be exercised annually, and that means other failure modes might show up that aren't showing up because we're exercising them. So, we need to watch this pretty carefully as we go ahead.

And so you can't just extrapolate on the test frequency.

MEMBER BROWN: One of the issues we had with the breakers, we had if you didn't exercise them you had a tendency for them to not - you got a different failure history.

MEMBER BLEY: He had one manual failure - I mean one mechanical failure.

MEMBER BROWN: All I'm doing is emphasizing we actually saw that we failed to the - I don't want to say "fit." Poor word. We opted to test and continue testing at the quarterly rate just because of

that particular thought process and condition.

One other thought - just let me throw one other thing. We're touting the new I&C systems that we have in here with all the self-diagnostic capabilities. So, we're testing the whole rest.

All the rest of the protection train is being continually tested all the time 360 days a year - 365 days a year. I'll get that right. 24 hours a day.

Yet for these, the last - the last door that has to be opened, we say oh, it's okay. We're just going to test those once a year.

It just seems to be counterintuitive when you - when you look at how do you want to make sure these things are working satisfactorily.

MEMBER STETKAR: Eventually we'll get you to think like a PRA guy once you realize that what you just -

MEMBER BROWN: Did I just now sound like one?

(Off the record comments.)

CHAIRMAN RAY: Okay, everybody. We've got a half-day meeting here. Let me ask them to move on.

MEMBER BLEY: Well, before we leave that, I want to make one comment about there is the opposite

side of it that we all should stay aware of. And that is you identified five cases of inadvertent trips during maintenance.

I don't know how many of those tripped the plant, if any, but -

MR. CUMMINS: About three of them tripped the plant.

MR. BLEY: So, that's putting challenges on the plant. So, the more you test, the more those kind of challenges you'd see.

CHAIRMAN RAY: I'm sure that's in people's mind when they try and pick the right interval is to avoid inadvertent trips, as well as the maintenance time that's required to set up and conduct the task.

Okay. Please go ahead.

MR. EWALD: And I have a conclusion which I believe I've already stated, but there is - I have only one breaker failure in the Westinghouse operating fleet in the last ten years that would have prevented the opening of a reactor trip breaker.

In AP1000, we only need two out of the eight to function in order to ensure reactor trip, as I stated before.

And I believe based on the historical low failure rate of reactor trip circuit breakers

combined, which was, I think, is the relevant point, which the increased redundancy in the AP1000 reactor trip circuit breaker configuration, it's a reasonable engineering judgment to conclude that the 92-day staggered testing frequency is acceptable.

CHAIRMAN RAY: Okay. Any further comments/questions?

I'm prepared to see us close this open item unless there's anyone who feels there's something more that needs to be done.

Hearing nothing, so be it.

Now, in addition to my failure to pronounce Member Rempe's name correctly, I failed to also note that we have consultants Graham Wallis and Tom Kress with us here at the table, which I should have done, but I was improvising from yesterday's script. Thank you, gentlemen.

Okay. Weidong and Eileen, what is next, if anything?

MS. MCKENNA: I'm going to ask was there any other action items that you had a specific presentation on?

MR. NELSON: I mean, that's it for action items other than looking at status and planning.

MS. MCKENNA: This might be then since

we're going to wait a little later for the I&C, that this might be the right time to do the more comprehensive review of the action items that you had suggested.

CHAIRMAN RAY: We will do that then. All right.

Now, Weidong has been in communication with all of us seeking to make sure we've got the right timing and schedule for closing action items.

We'll probably have to continue to do that. There's a lot of coordination involved in doing it.

We're just today speaking to one of our consultants who has a conflict that's rather critical for us and we may wind up having that person on the line from overseas at the time when we try and address the issues that he's concerned with.

So, in any event, this will be the last time I believe I'll ask your indulgence to take a look with us at the action item list. Weidong passed out a copy yesterday. Anyone who doesn't have one, please indicate to him now that you need a copy and will take a look at it. And with Westinghouse participation as well.

So, we managed to close Item 2 yesterday.

I don't want to revisit anything that we've closed. I've made that rule.

Item 4, however, reactor coolant pump flywheel, we have a schedule to address that, do we, and Westinghouse is prepared?

MS. MCKENNA: We are, but I think the staff is doing it in light of some of the calculations that were done for the lock rotor and we're not finished. But they will report back at one of the later days in November after they finish that review.

CHAIRMAN RAY: All right. Still open.

Six, we've had a lot of discussion about. We wound up with some remaining questions that are indicated here for Item 6. Sanjoy is not here quite yet. He'll be here later today.

Any comment anyone has on that, including of course you, Eileen, or Westinghouse?

MS. MCKENNA: I have no comment.

CHAIRMAN RAY: All right. Fine. Thank you.

Item 10, this - I think the only item that remained here was as indicated in the right-hand column.

What's the status, Graham, of this as you understand it?

DR. WALLIS: I don't know of any status. Nothing has changed.

CHAIRMAN RAY: Well, okay. At the September meeting, it indicates that there was an exchange between you and Sanjoy.

DR. WALLIS: It says Westinghouse provide a reference. Is that - Sanjoy was looking for the reference.

CHAIRMAN RAY: No, on the right-hand column where it says September 21st subcommittee meeting Sanjoy asked to pass the consultant reports by Dr. Wallis to staff to address the -

MEMBER SHACK: Graham came up with the rationale.

DR. WALLIS: I came up with the rationale. That's all with that. I don't know what happened to it.

DR. KRESS: I've got a copy. I think I sent it to everybody.

CHAIRMAN RAY: All right. Weidong is -

MR. WANG: All I know is that consultancy reports I passed to the members and also the staff.

CHAIRMAN RAY: Okay. So, we need to have a slot at which we close that out scheduled. All right. I'm not going to try and do it here.

MR. WANG: Closed.

MEMBER SHACK: Graham did it by Bayesian update. You can do it by maximum likelihood, but you come up with their formula, basically.

CHAIRMAN RAY: Okay. All right. Well, let's just do it when Sanjoy is here.

Item 11 I have addressed. It's neither open or closed at this point. It is simply a work item that we will address by letter when - the open item would consist basically of us hearing from staff about the conclusion of their - final conclusion of their review with closure of the item that Sam identified and reviewed last evening.

And so as I say it's open in that sense, but there isn't any other work pending that I'm aware of.

MEMBER ABDEL-KHALIK: In addition to the items that we talked about yesterday.

CHAIRMAN RAY: Yes, that's right. We did that in closed session at the end of the day. That's right, yes. Okay. So, in that sense I guess I should just say it remains open.

Item 37, Sam.

MEMBER ARMIJO: I think we're going to be addressing long-term cooling this week, right? In the

full committee meeting.

CHAIRMAN RAY: Okay.

MEMBER ARMIJO: And I did get the reports and they address the issue. So, it just needs to be - to hear the staff from Westinghouse discuss those and talk -

CHAIRMAN RAY: Okay. So, we anticipate it's on course for conclusion.

MEMBER ARMIJO: Yes.

CHAIRMAN RAY: Thank you. We've just heard 41 and closed it.

46.

MR. NELSON: This is Mike Nelson. We're scheduling 46 for the 17th, 18th and 19th. However, we were looking for any additional information on the PRA questions if anybody recalls as we prepare for the meeting.

CHAIRMAN RAY: Okay.

MR. NELSON: We checked the transcripts and still had trouble determining what the - we were looking to answer on the risk ranking for the MOVs and the POV testing.

If anything comes to mind, we'd appreciate it.

CHAIRMAN RAY: Well, let's ask John and

Bill to provide any comments that they would like to at this point.

MEMBER SHACK: That's John's issue, I think.

MEMBER STETKAR: I'm trying to remember. If I recall, you know, you may have to prompt my memory, but I was looking for the basis, you know, how you used the PRA results to provide that risk ranking of the MOVs for the testing program, you know.

What I'm looking for, you know, did you use risk importance measures, specific numerical measures that came out of the PRA?

Was it more of a qualitative assessment or, you know, how was the PRA used, if it was, to determine that risk ranking of valves for the testing program?

CHAIRMAN RAY: All right. 48 is even more obscure to me. So, these ADS interlocks, I'm not even sure - Weidong, could you help clarify whose issue this was or is one of the members -

MS. MCKENNA: I went back and reviewed the transcript. I think this also was John Stetkar's issue. And I think Graham also might have had some - it was a question about whether if ADS 1, 2, 3 - there's kind of a time delay normally between how

they're sequenced. And if ADS 1 was actuated, whether then ADS 2 and ADS 3 would also go off.

And I think that was - and was that covered by the analysis, because the analysis in Chapter 15, I believe, really looks at the ADS 1 opening.

And that's the way from looking back at the transcript is how I understood the issue, but certainly we'd be welcome to have a clarification today.

MR. NELSON: We have a presentation for that when we were going to cover Chapter 15 last meeting - this is Mike Nelson again.

And when we do 15 on the - as we scheduled for these next three days, we'll have a presentation there to address that action.

MEMBER STETKAR: And I think, I'm trying to also remember, fogginess, but I believe it was - it was questions about exactly how the timing in the interlocks are set up both from the perspective of can you actuate later stages of ADS given failure, for example, an earlier stage, or could you spuriously actuate, for example, ADS 4 despite the fact that ADS 1, 2 and 3, you know, were disabled for some reason.

That's also in the general sense of that

interlock-type issue. It's more of trying to understand exactly how the system works.

CHAIRMAN RAY: And you guys plan to make a presentation that will allow that?

MR. NELSON: That's correct.

CHAIRMAN RAY: All right. Fine. Thank you.

All right. Now, Dr. Banerjee isn't, as I said, here yet. Item 49 concern is attributed to him and has a number of items identified.

Any comment, Eileen or Westinghouse, on 49? I assume it's scheduled -

MR. NELSON: It would be part of Chapter 15.

CHAIRMAN RAY: - as attendance in mind.

50 similarly. All right. 51, we've been talking about this just offline here recently.

Anybody need any clarification there? It seems straightforward enough.

MEMBER ARMIJO: Yes.

CHAIRMAN RAY: Go ahead.

MEMBER ARMIJO: Qualitatively I know what's going to happen, but I wouldn't mind having either a Westinghouse document or technical report on exactly what they're going to do so I could actually read it.

CHAIRMAN RAY: What they're going to do in performing the welds or -

MEMBER ARMIJO: Yes, how are the welds going to be made, and what's the kind of inspection that's going to be done since there structurally has to be some volumetric-type inspection.

So, I'm presuming that Westinghouse already has documentation to that affect. So, I'd like to get copies.

MR. WANG: Actually, this is the one - yes, we have received the document and I'm going to put this together before you leave this week.

MEMBER ARMIJO: Okay. Thank you.

MR. WANG: And also the page numbers, I'm aware the documents will have that information on it.

MEMBER ARMIJO: Okay.

CHAIRMAN RAY: 52 and 53 the same, Weidong?

MR. WANG: Yes.

CHAIRMAN RAY: Okay. All right. Now, 55 is back to the testing of the squib valves.

Charlie, do you have any comments you want to make?

MEMBER BROWN: Well, Sanjoy brought it up initially. And then my other comment was - okay. I'm supposed to look at my latest copy. Excuse me for a

minute to make sure I'm - I know what I'm looking at here.

CHAIRMAN RAY: 55, Page 7.

MEMBER BROWN: Yes, yes, yes. Okay.

My interest there was what documents - the actual configuration testing of the squib valves. In other words, are they tested in the configuration under which they're actually expected to operate for the piping configuration, tanks, heads, stuff like that to see that they actually perform in the same plant configuration as are expected to operate.

CHAIRMAN RAY: Okay. Do you have any -

MEMBER BROWN: We haven't gotten anything, or at least I don't think we have. I haven't seen any subsequently.

CHAIRMAN RAY: Right.

MEMBER BROWN: So, we're supposed to -

CHAIRMAN RAY: Westinghouse, you okay with this item?

MR. NELSON: Yes.

CHAIRMAN RAY: Clearing it out in a three-day upcoming meeting?

MR. NELSON: And I appreciate the additional clarification, Charlie. That helps.

MEMBER BROWN: Yes, I thought we had it

fairly clear. Literally, what's the configuration of it and how do we document their performance and the configuration of their testing, per se?

Is it equivalent to where it's applied in the plant? That's all.

MR. NELSON: I'd like to point you to some already documented information. So, we'll work on that right away.

MEMBER BROWN: Okay.

CHAIRMAN RAY: All right. Good. Thank you.

56 is yours also, Charlie.

MEMBER BROWN: I provided comments some time ago, didn't bring it with me today, have not seen any response to those comments.

CHAIRMAN RAY: Eileen, do you have any -

MS. MCKENNA: Yes, we do have the comments and we are actually looking into this and having some - I think there was - this brought up a potentially good issue here and we are having discussion with Westinghouse to make sure we understand exactly what overspeed protection they provided and how it provides sufficient inroads to itself. We'll have a few people come back later in November and be a part of the final story on that.

CHAIRMAN RAY: All right. 57, is this - Charlie, look at this again and tell me - I've looked at this a number of times trying to figure out if it was still an issue.

MEMBER BROWN: Yes, there - let me see. I'm reading it again here. I remember the issue. There was the issue of contamination off the top surface of the tank that they brought up, not us.

And they said they were putting it about ten to 12 feet up. And I just asked the question what's the basis for ten or 12 feet as opposed to a few feet or -

CHAIRMAN RAY: Yes.

MEMBER BROWN: In other words, why was that far enough up to eliminate the problem that they brought up themselves.

MS. MCKENNA: And I spoke with Mr. Roach earlier this week and he's providing a written response that we will deliver to the committee as soon as we receive it.

CHAIRMAN RAY: Okay. All right. Weidong, note that in the comment section.

MEMBER ARMIJO: Is that the diesel generator exhaust or what exhaust is it?

CHAIRMAN RAY: Isn't it spent fuel?

MR. CUMMINS: I think it's spent fuel.

CHAIRMAN RAY: Yes. Exactly.

MR. CUMMINS: Ventilation.

CHAIRMAN RAY: Right.

MEMBER ARMIJO: Oh, okay.

CHAIRMAN RAY: Yes, I mean, I was trying to see it - haven't we resolved this yet? But it sounds like there's something in the pipeline and it should be easily resolved soon.

60, we've had extensive discussion and presentation by Westinghouse. And I guess what is remaining here is mostly this information about - I know that the profile of the coating micrographs and the behavior of the coating, I guess I characterized it more generally, we had discussion - it's still open, is what I'm trying to say.

Yesterday we had quite a bit of discussion about water flow over the outside of the containment, what was assumed and so on.

And, Said, would you like to summarize where you think that stands on that point?

MEMBER ABDEL-KHALIK: There was a calc report or a calc note that Westinghouse was supposed to provide on the evaporation from the outside surface and the sensitivity to percentage of dry spots that

Graham was going to review. I would be delighted to review it.

What concerns me is that no one has looked at the stability. I mean, everybody talks about the uniformity of the distribution from those rings, but no one has talked about the stability of the film.

This is a classic Marangoni instability that is caused by surface tension gradient. So, if someone can figure out - and I tried to lead the discussion in that direction by asking what the Delta T is between the hot and dry spot and all that stuff.

For the known film condition, meaning film thickness, film velocity, and the temperature difference between the hot and dry spot, what is the Marangoni number, is this film subject to Marangoni instability so that you will always form rivulets on the surface rather than a uniform surface?

CHAIRMAN RAY: Okay. Now, we - that's well stated, I think. And the only thing I would add to it is we do understand, and I think you said clearly as well, that that question isn't, as far as we can tell, affected by the amendment.

Therefore, it becomes an item that is a question that maybe should have been asked and answered earlier. Maybe it was asked and answered

earlier. But it's a question, nevertheless, that we have to keep track of until we resolve it or decide we're not going to do anything about it.

But I just want Westinghouse to understand we do understand that this is the question that Said just described -

MEMBER ABDEL-KHALIK: Right. It's not caused by the -

CHAIRMAN RAY: It's not caused by the -

MEMBER ABDEL-KHALIK: - or change in the vent orientation or shape or anything.

CHAIRMAN RAY: Yes.

MEMBER ABDEL-KHALIK: How stable is this film given the sensitivity of evaporative cooling capability to the fraction of the surface that's assumed to be wet or dry?

CHAIRMAN RAY: Yes, go ahead, Sam.

MEMBER ARMIJO: I'm listed here as had questions on water management, and all of those questions have been answered. So, I don't have any open issues.

CHAIRMAN RAY: Thank you. All right.

So, what I'm going to do is parse this very carefully. Yesterday I indicated that I felt where we were was there were some items here that got

my name associated with them that do go to the COL application.

We understand that. And so to that extent, they're not going to continue to be part of the DCD open items.

Then there's the one that Said just mentioned, and I won't try and restate it. I'll just tell you that we understand what bucket it belongs in, but it's still an outstanding issue that we will - if it's not further addressed, we'll have to identify it, I presume, as a concern.

And, therefore, leave it to you guys, Ed, to see if you want to say anything more to us. If you don't, I understand.

MR. CUMMINS: No, I think the clarification just now is even more helpful than - well, we'll take it under.

CHAIRMAN RAY: All right. And I would say the same thing to you, Eileen. If the staff has any insight as to how to respond to this concern that was just described, please bring it to our attention. All right?

MS. MCKENNA: Yes.

CHAIRMAN RAY: Okay. 62.

MR. SISK: Excuse me, Chairman.

CHAIRMAN RAY: Yes.

MR. SISK: The Item 3 -

CHAIRMAN RAY: Okay, Rob.

MR. SISK: - on 60.

CHAIRMAN RAY: Yes. Yes, I'm sorry. Yes, I mentioned that and I failed to include it in my final summary.

As far as I know, again the same thing would apply to it. I don't believe there's anything that the amendment has done to affect the question of how this coating can be expected to perform, which is fundamentally what he's asking about based on what do we know about how it is bonded.

Now, one might say well, gee, that's really a COL question. I mean, the design is the design. How it actually ends up being verified, I guess, in the field is maybe something that one could say well, that's something we could ask the COL applicant.

But nevertheless, there is this question. I think it does - you're right to remind me that it's not yet resolved.

I want to try and close this bigger open item because it was so broad and had so much stuff in it, and try and narrow things down and put them in the

right categories going forward. And that's what I'm trying to do here.

MEMBER ARMIJO: I think Sanjoy was really just asking for a document to show what Westinghouse knew about the interface bond between the coating and the steel.

CHAIRMAN RAY: Yes.

MR. SISK: Right -- was going to provide an item.

CHAIRMAN RAY: Yes.

MEMBER ARMIJO: So, I don't know if we've received that and --

CHAIRMAN RAY: I don't believe we have. At least not to my knowledge. In any event, we should track it and we will do so, but we're going to close this open item because it's got too many piece parts to it that I don't want to keep it hanging out there the way it is.

All right. 62.

MEMBER ABDEL-KHALIK: I'm sorry, sir.

CHAIRMAN RAY: Yes, sir. All right.

MEMBER ABDEL-KHALIK: So, you're going to replace this Item 60 with a follow-up item on the Marangoni instability -

CHAIRMAN RAY: I am.

MEMBER ABDEL-KHALIK: Okay.

CHAIRMAN RAY: That's right. And a separate one on Sanjoy's question.

MEMBER ABDEL-KHALIK: Okay. Thank you.

CHAIRMAN RAY: Yes. It may seem like this is a lot of silly bookkeeping, but the point is it's really important that we, as we get down to the last night here, we know what bucket which thing is in and what it consists of.

Okay. 62 is - has to do with the seismic area. And I don't know - do we know anything, Weidong, about what the status of -

MR. WANG: For these, 62 and 63 is for the summer steel air. And 64 is -

CHAIRMAN RAY: All right. You're right. I should have noticed that. Sorry.

MR. WANG: And then right now I think still stable.

CHAIRMAN RAY: All right. I'm not worried about it if that's what it's for. I've sort of got the blinders on right now. And so that's true through to 64.

65 we're going to get to today.

MEMBER ARMIJO: Harold?

CHAIRMAN RAY: Yes.

MEMBER ARMIJO: I'm listed as asking this question on Item 64.

CHAIRMAN RAY: Yes.

MEMBER ARMIJO: And I believe it was answered during the meeting. So, I don't have any issue -

CHAIRMAN RAY: Okay.

MEMBER ARMIJO: - about the handling of hydrogen and -

CHAIRMAN RAY: If nobody has any other objection, we'll close it then. All right.

65 we're going to deal with here shortly. 66, I believe that's true as well. 67 is - it says Westinghouse, but I thought I was -

MS. MCKENNA: That was to be a Vogtle item and staff is ready on that one when -

CHAIRMAN RAY: Okay. Great. Yes, let's changed the designation to Vogtle.

68, I believe this is GSI-191. And I need to check with Sanjoy as to whether there's - as far as I know, it remains an open item.

If anybody else who was present here could reduce it or modify it or clarify it, I'd be happy to take the input. But in his absence, I don't want to do anything to change it.

There was a visitation to a Westinghouse facility since our last meeting. And Sanjoy is going to report on that.

69, that same thing is true. 70, Graham, is this yours?

DR. KRESS: That's mine.

CHAIRMAN RAY: I'm sorry. Tom, yes. That's right.

DR. KRESS: The issue there was for, in the core, the boron composite on the tubing -

CHAIRMAN RAY: Right.

DR. KRESS: But if the concentration of boron is lower than its precipitation level, it will just wash it off. And Westinghouse made an analysis and said yes, it was. But that analysis was strictly based on a 50 percent quality carryover of the liquid.

And it was correct for that 50 percent carryover, but it doesn't take much less carryover until you'd exceed the precipitation level at these temperatures.

So, my issue there was what's the basis of 50 percent carryover? We need to look at that a little more carefully.

If it's a little bit less like 40 percent, well, then you're above the precipitation level and

you could not wash the stuff of the tool and it could inhibit the cooling.

CHAIRMAN RAY: Yes.

DR. KRESS: That was the issue.

CHAIRMAN RAY: You were very clear about that, I thought.

Westinghouse, do you need any more input on that point?

MR. NELSON: We're planning to address - this is Mike Nelson.

We're planning to address - 17th through the 19th.

CHAIRMAN RAY: All right.

MR. NELSON: Including 71.

CHAIRMAN RAY: And 71, again, was what led to this visit that I mentioned that's occurred, but Sanjoy is not here at the moment. I believe it's still open. We'll leave it open.

All right. That completes the review of the action item list. It's 20 minutes after 9:00. Eileen, do you still want to wait until 9:45 to begin?

MS. MCKENNA: No, the staff is here and I believe Westinghouse is ready. So, we're prepared to begin the discussion of the follow-up issues. I think we are ready, and we just need to get some techs on

line and check the room kind of thing because there is proprietary information.

CHAIRMAN RAY: Yes. Thank you. We'll do that. We're going to now enter closed session at which proprietary information will be discussed.

Westinghouse, I assume you're ready?

MS. SISK: We have to set up.

CHAIRMAN RAY: Okay. Fine. Weidong, will you let me know then - you guys can go ahead and take your places.

(Whereupon the open session was adjourned at 9:22 p.m.)

ACRS Action Item #41
Reactor Trip Circuit Breaker Testing

DCD Chapter 16 - Tech Specs

Bob Seelman – NPP Licensing
John Ewald – NPP ESI

November 03, 2010

Westinghouse

ACRS Action Item #41

RTCB test frequency…

Need to know more in operating experience

Discuss basis for yearly testing

RTCB History in Westinghouse Plants

- **INPO Westinghouse Plant History 2000 to Present**
  - 17 cases of RTCB issues
  - 3 cases of RTCB failure to trip
    - *1 under voltage (UV) trip failed during testing, but shunt trip passed*
    - *1 trip failed during shutdown (S/D) testing due to mechanical failure of breaker*
    - *1 UV trip failed during S/D testing due to UV driver this prevented auto trip but not manual trip*
  - 5 cases of RTCB failure to close or reset
  - 5 cases of inadvertent trip of RTCBs during maintenance
  - 4 cases of RTCB defects identified during S/D maintenance, none that would have prevented RTCB opening

Reference OI-SRP7.2-ICE-03

Westinghouse stated that each individual RTCB would be opened during a trip actuation device operational test once per year. In current licensed plants, the maximum length of time between openings of RTCBs (or equivalent) is typically 92 days. This issue is discussed in Chapter 16 of NUREG-1793 and this supplement. This issue was determined to be adequately addressed in Revision 15 of the DCD and no changes were made to RTCB layout or design, including the periodicity of RTCB testing. Therefore, OI-SRP7.2-ICE-03 is considered resolved.

Conclusion

•There was only one breaker failure in the Westinghouse operating fleet in the last 10 years that would have prevented the opening of the reactor trip breaker. In AP1000 we only need 2 breakers out of the eight to function in order to ensure a reactor trip.

• Based on the historical low failure rate of RTCBs, combined with the increased redundancy in the AP1000 RTCB configuration, it is reasonable engineering judgement to conclude that the 92 day staggered testing frequency is acceptable.

Questions?