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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

SUBCOMMITTEE ON REGULATORY POLICIES AND PRACTICES

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FRIDAY,

OCTOBER 29, 2004

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. William J. Shack, Chairman, presiding.

COMMITTEE MEMBERS:

WILLIAM J. SHACK, Chairman

GEORGE E. APOSTOLAKIS, Member

MARIO V. BONACA, Member

THOMAS S. KRESS, Member

VICTOR H RANSOM, Member

STEPHEN L. ROSEN, Member

JOHN D. SIEBER, Member

GRAHAM B. WALLIS, Member

ACRS STAFF PRESENT:

MICHAEL R. SNODDERLY

NRC STAFF PRESENT:

WILLIAM D. BECKNER, NRR

STEPHEN DINSMORE, NRR

GLENN KELLY, NRR

RALPH LANDRY, NRR

EILEEN McKENNA, NRR

MARK RUBIN, NRR

BRIAN SHERON, NRR

JENNIFER UHLE, NRR

A-G-E-N-D-A

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

8:30 a.m.

CHAIRMAN SHACK: The meeting will now come to order. This is the second day of a two-day meeting of the Advisory Committee on Reactor Safeguard, Subcommittee on Regulatory Policies and Practices. I am William Shack, Chairman of the Subcommittee.

Members in attendance on George Apostolakis, Mario Bonaca, Tom Kress, Vic Ransom, Steve Rosen, Jack Sieber and Graham Wallis.

The purpose of this meeting is to review the staff's draft proposed rule language of the Voluntary Alternative Rule to allow licensees to implement a redefined large-break loss-of-coolant accident and associated risk-informed emergency core cooling system requirements.

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the Full Committee.

Michael Snodderly is the Designated Federal Official for this meeting.

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

Register on October 20, 2004. A transcript of the meeting is being kept and will be made available as stated in the Federal Register notice.

It is requested that speakers first identify themselves and speak with sufficient clarity and volume so they can be readily heard. We have received no written comments or requests for time to make oral statements from members of the public regarding today's meeting.

We will now proceed with the meeting. I will call upon Brian Sheron of the Office of Nuclear Reactor Regulations to begin.

MR. BECKNER: Okay, I'm Bill Beckner, I'm the Program Director of the new Research and Test Reactors Program. I apologize, Brian called me, I thought about this question for about five minutes, I think I have a pretty good answer, I couldn't bring my Part 52 expert here, but do you want to restate the question just to make sure I understand exactly what the question is?

CHAIRMAN SHACK: Why can't the rule be applied to new reactors?

MR. BECKNER: Okay.

First of all, I think let's use the ABWR for an example. ABWR has a design certification,

obviously. That's a rule, it's a done deal, it's not going to change unless they went through the process again. I brought this, since I couldn't bring the expert I thought, yes, I've got extra copies.

This is a pretty good process of the licensing process.

MR. ROSEN: Move it up closer to your mouth, please.

MR. BECKNER: Okay.

MR. ROSEN: Maybe you ought to just put it on, so then you won't have to be bothered with it.

MR. BECKNER: Okay.

Recognize to build an ABWR or any other plant you actually need a license, probably a combined license under Part 52. Now, if you read this thing, a combined license can reference a design certification, an early site permit, both or neither. Okay, so one can come in with a combined license to, say, build an ABWR, but not reference the design certification. They'd have to submit all the information that you normally submit for a license, it would have to be reviewed by the staff and so forth.

The disadvantage of doing that, by not referencing a design certification, is what can be reconsidered during hearings, basically. So, yeah, it

probably would not be advantageous to try to build an ABWR without referencing a design certification unless you are making a lot of changes. That's my personal opinion.

Now, clearly, too, you could get a license and do an amendment after the fact. All right, but the primary benefit of a design certification, or making use of the design certification in a licensing hearing, is to limit the issues that would have to be reconsidered, or could be reconsidered, during that licensing process.

Now, there's a question I couldn't answer, you may talk about, what about hybrid, what about referencing a certified design, but we'd like to change this little piece, and I don't know the answer to that. My expectation is that would probably open it up to a lot of hearings also.

That's it in a nutshell, so it would be possible, you could clearly build an AP1000, or AP600, or an ABWR and license it without referencing that certified design. Again, you'd lose that benefit though. Okay.

CHAIRMAN SHACK: But, you know, I don't say anybody would do that, but you are saying even a license amendment would then open yourself up.

MR. BECKNER: Once you got your license it would be like any other license amendment, like we do for power uprates or for an existing plant, and again, that's also subject to hearing process. So, the real issue of making use of a standardized design is its fix, it's not only what can be considered in a hearing, but also any changes the staff could make, too. That's the benefit, it's the finality of a lot of the design issues.

MR. ROSEN: That's a very good answer, but I'm not sure that's the question we asked.

MR. BECKNER: All right.

MR. ROSEN: I thought the question was, why can't a new plant use the new 50.46?

MR. BECKNER: If we went through - the answer is, if we went through a new design certification process, for instance, if one of the ESBWRs or another plant came in, they could choose to reference the regulations in place at that time. So, if we modify the regulations today, and I think there's a six-month time period, the reference is to regulations some period of time before the submittal. So, yeah, a future design certification could make use of this rule once that rule is in place.

MR. ROSEN: Okay, but not with any tests -

MR. BECKNER: But, ABWR -

MR. ROSEN: - like AP600 or AP1000.

MR. BECKNER: - AP1000 will have a rule within a year or whatever, and that will be fixed.

MR. ROSEN: As long as that beats this, then it can't use this.

MR. BECKNER: Correct.

MR. ROSEN: But, if this, for some reason, beats the final certification -

MR. BECKNER: Well, AP1000 is out the door, too, because we've got the final design.

MR. ROSEN: And, we've already evaluated it.

MR. BECKNER: Right, but ESBWR, which maybe the next one to shoot, they could, in theory, modify their submittal to reference a revised 50.46.

MR. ROSEN: Okay, I get it.

MR. BECKNER: Okay, and again, anyone can submit a license amendment or a license application without referencing a design, it's just you lose all that benefit.

MR. ROSEN: Yeah, and the question was, okay, so if you are - if you've got a certification before this comes out, say, AP600, you want to build one of those, you say I'd like to use the 50.46, the

question was, well, that reopens the whole ball game. It's like the arguments against the constitutional amendments.

MR. BECKNER: Right, you would not reference the design certification, you'd submit all the information necessary and that would be subject to staff review and also reconsideration at hearings.

MR. ROSEN: So, not just the issue of 50.46 if you did that, but potentially everything in the certification.

MR. BECKNER: And again, Steve, my question is I'm not sure about some hybrid of that. My guess is that wouldn't work either, I don't know.

MR. ROSEN: But, you know, an ASLB could decide to limit it to just this.

MR. BECKNER: That's true. That's true.

MR. ROSEN: And then, that could be appealed and, you know, go through all that, and it might end up that -

MR. BECKNER: It might be just about as bad.

MR. ROSEN: - yeah.

MR. BECKNER: All right?

MR. ROSEN: Thank you.

MR. BECKNER: Okay, thank you.

I'll leave some copies of these. If you haven't seen it, really, it is a good refresher, it's not enough detail to probably answer this question, but it is a good refresher. I'll leave these with you.

CHAIRMAN SHACK: Steve, are you next up?

MR. KELLY: Good morning. My name is Glenn Kelly. I'm with the PRA Branch in NRR. With me is Stephen Dinsmore. We've prepared a presentation for you today, regarding how we would go about evaluating the acceptability of proposed plant modifications and how we would expect the licensee, if we had an inconsequential plant change that they wanted to make, how they should go about making their plant modifications.

The first thing that I wanted to note is kind of reiterating what Brian Thomas - Brian Thomas - Brian Sheron spoke to you about yesterday, was that we don't want and won't accept unacceptable increases in risk under this rule. So, one of the major things that we want to assure is that any changes that are made, that are reviewed by the staff, or that are made under the inconsequential change process, that these would be acceptably small increases in risk.

As under risk informed regulation, the

reason why we are doing risk informed regulation, as I'm sure you are already aware, is we want to promote safety by focusing the regulations on, basically, those aspects of the plant or how the plant is operated, they are really the most important as far as risk goes, and so that the resources of the utility and of NRC can be most wisely spent.

As part of that, as you've heard yesterday, and heard during various presentations to you before, the expected frequency of the largest double-ended guillotine LOCA is believed to be very small.

DOCTOR WALLIS: This is only part of the equation, because you've got to take frequency and consequences, and I guess what you are saying is that the consequences of all these LOCAs are sort of similar, so you can only judge by frequency? Because, if the large-break LOCA has far worse consequences than all other LOCAs, you couldn't just talk about its frequency, could you?

MR. KELLY: That's correct.

DOCTOR WALLIS: So, you are sort of assuming that all LOCAs are kind of equivalent in terms of consequence?

MR. KELLY: No, they are not - actually,

they are not all equivalent.

DOCTOR WALLIS: So, how do you put consequence into this equation?

MR. KELLY: Well, you can, again, as we've talked about, that there are two aspects associated with calculating risk.

Mark?

MR. RUBIN: Yes, this is Mark Rubin from the staff. I could, perhaps, give a little perspective on it.

The focus was that the expected frequencies of the large-break LOCAs, the ones that yield to break, are very small, much smaller than press assumed in WASH-1400 and many other studies. But, the key incite from the severe accident study, the severe accident risk from LOCA-initiated in general are very low. So, you have to keep, you know, of course, that in mind, too. LOCAs generally do not dominate risk, and large-break LOCAs don't dominate LOCA risk.

So, taken altogether, the indication is that this is an area that got great regulatory attention in the past, and we've discovered through the severe accident methodologies that a lot of the risk really exists in other areas, station blackout

for instance. We've had some risk-informed rulemakings at WIS SBO because of these severe accident incites that now we are getting back to the basic regulations and trying to clean up some of the discrepancies, and that's why we are going forward with this program.

DOCTOR WALLIS: So, your real argument is that the risk contribution of this thing is very small, it's not just the frequency.

MR. RUBIN: A combination of both.

DOCTOR WALLIS: Yes, but if you just mention frequency, it's only half the argument.

MR. DINSMORE: This is Steve Dinsmore from the staff.

I think we also were aware that the consequences of the large-break LOCA are being controlled by these defense-in-depth calculations.

DOCTOR WALLIS: As long as you don't back off on them.

MR. DINSMORE: Well, we discussed this specifically in the slides what is going to be taken care of through the defense-in-depth part of it. So, the consequences are being controlled as well, so we didn't put it on this slide.

DOCTOR WALLIS: So, they are being

controlled, they are not just only being controlled -

MR. DINSMORE: 70 percent probability.

DOCTOR WALLIS: they are not being ignored.

MR. DINSMORE: Yes, they are not being ignored.

CHAIRMAN SHACK: See, I'd look at it a little differently. I always find this reason somewhat circular. The LOCAs make very low contributions, because the system is designed to handle LOCAs.

DOCTOR WALLIS: So, if you stop worrying about the system -

CHAIRMAN SHACK: If you stop worrying, you know, and if you make design changes you can, in fact, increase the risk.

MR. ROSEN: Not if you say we are not going to allow substantial changes in risk.

MR. RUBIN: Right, that's the key issue, that whatever changes you make could, indeed, affect a number of other severe accident sequences totally unrelated to LOCA, and that's why an integrated risk assessment, to the greatest extent we can, will be made to look at the impact on the other accident sequences, other initiators.

MR. KELLY: And, as we go through, we'll

talk about, besides core damage frequency and LERF an additional metric that we are proposing that we believe would help assure that we'd have adequate defense-in-depth for the plants.

CHAIRMAN SHACK: Well, I mean, we'll all get to the same answer, you know. I just make the argument that it is really the fact that the DEGB LOCA frequency is very small, as Tom pointed out yesterday, if you assume it goes to failure the frequency is probably small enough that you are still in the small risk basis.

The defense-in-depth is really just in case we are wrong about how frequent the DEGB really is, and so we are covered in both ways. I mean, our rationalist assessment is that the DEGB LOCA frequency is very small, the defense-in-depth is there if we are wrong about that.

MR. KELLY: We're going to talk about four basic steps.

DOCTOR KRESS: You mentioned the third risk method, is that light releases?

MR. KELLY: Yes, it is.

We're going to talk about four basic steps to making plant modifications. The first is to define your proposed change, identify the process you are

going to make, then perform an engineering analysis which includes PRA in your typical deterministic evaluations, define your implementation and monitoring programs, and then submit the proposed changes, if the submittal is required.

So, when one goes about defining a proposed change, we are looking for the licensee to effectively indicate what are all of the aspects of the plant that are going to be affected by this change. This includes aspects of the plant's design, other aspects of its licensing basis, operating conditions, et cetera.

We want them to identify the SSCs, procedures, et cetera, that will be changed, and when we look at this, as we talked yesterday a little bit about cumulative risk, when NRC looks at the changes that are proposed over time under 50.46a, if we are going to treat these as, in essence, when we are doing the numerical comparisons, as a single change.

DOCTOR KRESS: Let me ask you a question about that. It's bothered me a little in the past.

I can envision one change increasing the risk and another change bringing it back down, but the two changes may not be equivalent in terms of the contribution to uncertainty.

Do you have a way to deal with that, because a set of changes together may not end up at just the same risk point, it may add up with a different uncertainty.

MR. KELLY: Well, that's correct.

DOCTOR KRESS: And, I don't know how to actually deal with that in this process.

MR. KELLY: Well, I think that that's a good point, and one of the aspects that goes along with all of this is that, I think we've talked a little bit already about defense-in-depth, and one of the major reasons why we have defense-in-depth at power plants is because of the inherent uncertainty in certain aspects.

I believe is that if we saw that what was being proposed was a set of changes that might be significantly increasing the uncertainty associated with the ability to plan, to prevent, or mitigate serious accidents. We expect defense-in-depth would be commensurately increased to take into account such changes.

DOCTOR KRESS: That would be the logical approach. So, I gather from that you are going to ask for uncertainties associated with these changes, uncertainties that we are going to see?

MR. KELLY: That's correct, in our proposed rule we are asking the licensees to specifically address uncertainties in their submittal.

MR. ROSEN: Now, Glenn, I must have blanked out when you were talking about that third bullet. Are you really saying that every time the licensee comes in, if a licensee was doing this repetitively, to ask for a change he has to go back to the very beginning of time and, basically, add them all up and show that the total continues to be insignificant? Is that what you -

MR. KELLY: Well, in essence, what you are looking at is, I could take an example, I have my PRA for my plant today, and it's not too difficult to put some things in the event trees and fault trees such that I can turn on various gates on and off with certain commands so that I can effectively model or take out of the model things that I've done for 50.46a. So that, if I'm not longer, for example, taking credit for my accumulators I can - I don't want to get too much into details, but you can effectively put it into the model directly, the PRA model, such that over time as I change the model it's just I'm adding one more piece here that I can turn on or turn off, so that when I look today I can say, okay, here

we are today with my plant, here's how I'm going to change it, and I'm going to model it that way. And then, I can go back to my plant before I had all the changes, and I can run the PRA in both situations, and see what's the differential core damage frequency.

MR. RUBIN: Maybe I could add something.

Doctor Rosen, were you asking the changes, the larger changes, or just the inconsequential group of changes?

MR. ROSEN: No, I was just asking what that third bullet meant, how are you going to measure that?

MR. RUBIN: Yes, these are considered under the 1.174 approach these are considered a single bundle to change, due to the rule, and, yes, they will be looked at, and totally they must meet the accepted criteria of at most a small increase.

DOCTOR WALLIS: Is this going to be at different times, you make some changes this year, next year, and the next year, you add them all up?

DOCTOR KRESS: Well, I think the 1.174 process automatically tracks that.

MR. RUBIN: If it's a related change, and we've defined this as part of the rule process as being a related bundle change. Even if they're done over years apart, you have to keep track of the 50.46a

related changes, and that in combination shouldn't increase, they shouldn't cause more than a small increase in risk, which should be developed in the reg guide, and some will be negative. We expect some will be improvements in safety and we are suggesting some quantifiable, some not quantifiable.

MR. ROSEN: So, effectively, a plant will have a budget, a budget, each plant will be granted a budget by this thing of some element of risk, and they can - additional risk, incremental risk - and they can use it as they choose over the remaining life of the plant.

MR. RUBIN: Kind of Kyoto, perhaps, on greenhouse gases, but, in any event -

MR. ROSEN: I'm not an expert on Kyoto, you'll have to use another analogy.

MR. RUBIN: Yes, they'll have a quota.

DOCTOR APOSTOLAKIS: Let me understand this, what you are saying. I make, say, three changes, you guys approve them, I get a delta CDF that's positive. Then three years down the line I propose another change, related to 50.46. The way I understand it is that this new change will have to be evaluated in the context of the modifying plan, because you have already made three changes.

MR. DINSMORE: No.

DOCTOR APOSTOLAKIS: No?

MR. DINSMORE: You'd have to compare back to the original configuration.

DOCTOR APOSTOLAKIS: So, that was my question, so you are going to calculate now a delta CDF which will be the combination of all four changes, the three that have been approved and the new one?

MR. DINSMORE: Yes.

DOCTOR APOSTOLAKIS: Well, that goes against 1.174.

MR. RUBIN: There will be two calculations. Based on the as-built plant with the previous changes, they'll take the new proposed change and calculate the delta, and that will probably have to show that it's a small increase in risk, at most, or maybe even improvement. But, they also will have to take the changes in combination.

DOCTOR APOSTOLAKIS: Even though they are three years apart.

MR. RUBIN: Even though they are three years apart, with the most current model.

DOCTOR KRESS: But, they are already in combination because they are reflected in the current state of the CDF.

MR. RUBIN: But, not as a group of 50.46.

DOCTOR KRESS: Well, what do you do with that information then?

DOCTOR APOSTOLAKIS: You are comparing to the current baseline.

MR. RUBIN: What we don't want is a creeping increase in risk in aliquots of 10^{-5} CDF that over time -

DOCTOR KRESS: But, 1.174 automatically has a break.

MR. RUBIN: 1.174 is a regulatory guide and not a rule.

DOCTOR KRESS: Oh, I see.

MR. RUBIN: And, it was our intent and expectation that we would not get this creeping risk effect, but there is no regulation to prohibit it.

The Committee and staff discussed just this very issue about six or seven years ago. And, the experience we've gained in many years of risk-informed licensing applications has been, in fact, there has not been a creeping increase in risk, all the changes have been small. In total, the impact to the risk-informed changes globally have been small or neutral or reductions in some cases, but now we are in rule space, and in rule space we are saying the draft

proposal is that there should always be a revalidation that all the changes in total, with the most current model, take them in and out of the model and make sure that the total impact is no more than a small increase in risk.

CHAIRMAN SHACK: But, I'm left with this argument that it's okay to change my risk by 1 x 10^{-5} under 50.44, but it's not okay to add another 1 x 10^{-5} under 50.46, even though the total risk is the same at the end of the process.

If I've made some change under 50.46, and I've added 1 x 10^{-5}, I've used up my full quota of 50.46 risk, but I can go off and change something else under 50.44 and up my risk by 1 x 10^{-5} and that's okay. But, I can't go back and add another 1 x 10^{-5} under 50.46. I don't know why I color the risk.

MR. DINSMORE: It's kind of set up, we've been doing this for all the applications, we've been consistently applying this process.

For each set of related applications, you are right, you can select different types of applications, and you can add those up independently. But, within an application we keep track of the cumulative effect of the changes.

The best example is this integrated leak

rate testing, where they came in, they started with three times in ten years, they got permission to do it once in ten years, then they came back in and said we want to do it once in 15 years. We compared that once in 15 to the original three in ten, not to the changed one in ten.

So, we've been doing this with all the applications, and it's correct that if they select from completely different applications they can always come up to this boundary for each application.

DOCTOR KRESS: I was under the impression that this rule was directly tied to 1.174. Is that a false information?

MR. DINSMORE: No. Well, it is, because - we believe it is, because what we are doing is we are grouping all the changes that you are allowed to do because of this rule as one application. So, in that respect it's identical to what we've been doing with IST, ISI, all these other applications. We take each application and we keep it in a box, and we control what's going on within that box.

MR. RUBIN: If I could add, this is, I believe, directly in line and consistent with the bundling application concept in 1.174, and all we are doing here is defining 50.46 changes are a bundle.

DOCTOR BONACA: It seems to me what you are really doing, I mean, you are saying that whatever plan, some of them will stay with according to Appendix K, some will stay with the current best estimate, and some of them will choose to go risk-informed, but the current baseline as the other plans that stay with current Appendix K, the existing baseline is still alive. I mean, you are still using it as a reference point to anchor the changes you make through the risk-informed process, and I agree with that concept.

DOCTOR APOSTOLAKIS: But, is that stated explicitly in 1.174 that you do that?

MR. KELLY: Reg Guide 1.174 indicates that the - again, Reg Guide is a guide, it's not a requirement, and it speaks about that, in essence, the maximum change would be allowed under that guidance would be an increase in core damage frequency of 10^{-5} per year. We could allow a higher increase, but it would be something that would require additional consideration.

DOCTOR APOSTOLAKIS: But, bundling requests that are made over a period of years.

MR. KELLY: Reg Guide 1.174 does talk about tracking the cumulative risk.

DOCTOR APOSTOLAKIS: Tracking.

MR. KELLY: It's in the back, right, it talks about tracking it.

DOCTOR APOSTOLAKIS: But, it doesn't say that the cumulative risk should be less than 10^{-5}, it says for each application I think it should be less than 10^{-5}.

MR. RUBIN: But, here we have a situation, as Doctor Sheron pointed out, there is expectation in the industry, some of the improvements in risk reduction, and that was the entire concept of the bundling effect in 1.174, to allow credit for decreases to compensate for increases in related applications, and only allowed in 1.174 in a related application, a related - where there's commonality driving the changes.

And here, the commonality is 50.46a, the change in the regulatory -

DOCTOR APOSTOLAKIS: Essentially then, what you are saying is that the way you are interpreting the risk-informed changes is that the most you can get from this rule, for example, is 10^{-5}.

MR. RUBIN: Yes, sir.

DOCTOR APOSTOLAKIS: We don't care when you get it, but that's your ultimate maximum benefit.

MR. RUBIN: Yes, but the expectation would be pluses and minuses as the process goes forward.

MR. ROSEN: And, that's true for every plant, regardless of their initial CDF. It's the same, it's a one-size-fits-all.

DOCTOR BONACA: But, what is the maximum benefit? I mean, I don't understand that, benefit to what, increased risk is a benefit. I mean, it's a stop to me, okay, it means there is built in the rule an expectation that the changes never - not necessarily, you know, they will not go beyond the stop, but in reality you expect some benefit.

DOCTOR APOSTOLAKIS: Anyone who proposes a change because of positive CDF obviously does it because they are benefits associated with it. I think that that's what they mean, it's not that they are increasing risk just for fun, it's a benefit.

DOCTOR WALLIS: I like this, because now there's some incentive to promote safety. They want to make these changes which increase risk, they've got to cash in these promote safety things that everyone has been talking about, but there's no incentive to do them unless you have something like this.

MR. DINSMORE: If they hit the limit, the only way to make future changes is to do as Doctor

Wallis said, make some positive changes.

DOCTOR WALLIS: So, you really are going to account for more safety by making use of this.

MR. ROSEN: Sure, but let me track this third bullet now one more step, this one-size-fits-all piece of it. A plant that now have a CDF of $1E^{-5}$ versus a plant that now has a 1 x $1E^{-4}$ CDF let's say, the $1E^{-5}$ CDF plant can double its risk, right?

MR. KELLY: That's correct.

MR. ROSEN: The $1E^{-4}$ plant takes a 10 percent.

MR. KELLY: Right, because it already has - the reason is that it already has a significantly larger baseline risk. I mean, if you go to Reg Guide - again, the rule, as it is currently proposed, indicates that there should be sufficiently small increases in core damage frequency, large early release frequency, and late release frequency - Mark, did you want to say something?

MR. RUBIN: Yeah, I just wanted to add, in track down with 1.174 it was clearly identified that plants that went $1E^{-4}$ or above we looked very carefully at, and we would not expect or be very receptive to the maximum allowed delta CDF and delta loop changes in those areas.

DOCTOR APOSTOLAKIS: Actually, the maximum is 10^{-6} then, a step down.

MR. RUBIN: Yes. The definition is only very small changes would be allowed. The definition in the Reg Guide is - $1E^{-6}$, of course, it's not a rule, it's a Reg Guide, but that concept probably should be carried through as we develop the final rule. I mean, very good point.

MR. KELLY: The statement of consideration as it currently exists has examples that lay this out very similar to what's in Reg Guide 1.174, that lays out an example of one way that the staff would consider increases in risk to be acceptable. And, as part of that the SOC currently reflects the idea that if your baseline CDF is too high, that we would frown on any additional increases.

MR. ROSEN: Let me turn the argument over for a minute, because I think you've made your point about baseline risks that are high.

How about baseline risks that are low? The plant that has already invested a lot of money to get its CDF way down, say $1E^{-5}$, it now comes in with a change that says it wants to double the risk. Is the staff going to go, oh, my God, the sky is falling?

MR. RUBIN: No.

MR. ROSEN: Or, is the staff going to say, well, yeah, you have invested a lot in getting it down, and you are much better than the average plant and -

MR. RUBIN: Yes.

MR. ROSEN: - now you want to take a little bit back?

MR. RUBIN: Yes, sir, that is what we are going to say, and that's consistent with our current risk-informed process, is this was, again, debated heavily when 1.174 was developed, as you probably remember, and the decision was that we would go with absolute deltas and that the plants that were much lower in risk would be allowed this same incremental changes at a maximum as any other plant.

DOCTOR APOSTOLAKIS: An issue that arises, though, is, okay, so it seems that you have a number of things when you say from 50.46 delta CDF is 50.44, other things, then how you define these things is important, right? Sometimes it's obvious, you have a rule 50.46, okay, anything that's related to large LOCAs is one thing. Then you have another one just for tech specs, all the tech specs are in one place?

MR. DINSMORE: We're still in the process of defining the bins. Most of them are pretty easy to

define.

DOCTOR APOSTOLAKIS: Yeah.

MR. DINSMORE: There might be some that are, for example -

MR. ROSEN: Wait a minute, wait a minute.

DOCTOR APOSTOLAKIS: Let him finish.

MR. DINSMORE: - for example, if somebody comes in, which has happened, and they want to reduce some type of tornado protection requirements, and they use risk to say it, if the same client came in and wanted to do the same thing with some other tornado protection requirements we'd probably call that a bin. It's not real -

DOCTOR APOSTOLAKIS: So fire is one bin?

MR. DINSMORE: Maybe, we haven't worked all that out.

MR. ROSEN: That's not what Mark said, that's why I wanted a time out here. Mark was saying the commonality is 50.46, not slices of 50.46, topical areas within it.

DOCTOR APOSTOLAKIS: No, no, no, we are talking about broader applications. If they apply this philosophy to everything, what is bundling? Which changes do you bundle together? Sometimes it's obvious, 50.46, okay, anything related to that. But,

they are not going to tech specs.

MR. RUBIN: If I could add, the bundling concept is much less rigorously defined for non-rule applications. Typically, it would be related to a specific application, they come in with a diesel generator AOT change, which 30 day, a 21 day, maybe they are really pushing the delta CDF limits on this change, but there's a seismic vulnerability to the diesel structure of the cooling systems, and they fix that at the same time. We've actually seen those, so there's an improvement. That's a bundle change, they add the pluses and minuses, we look at the deltas.

We don't have a bundle of tech spec changes. On some occasions, when there's a real commonality that goes over years, like the ILRT type A changes, very clearly it's the same issue, every 15 years, or three out of ten, or one out of ten, we do consider that a bundle change, as did Steve Ginsmore, but the concept of bundling is much more restrictive for general applications than we are making it here.

Here, it's rule related, and it's going to be defined very precisely.

DOCTOR KRESS: If I've got five different bundles, five different types of changes, I can have a 10^{-5} delta CDF in each one of them?

MR. KELLY: As of right now you can.

DOCTOR KRESS: So, the total depends on how many bundles I have and how I define them?

MR. DINSMORE: But you can't go over the 10^{-4}.

DOCTOR KRESS: Oh yeah, you might hit that limit.

MR. KELLY: Right, and the reason, this is something that, you know, assuming some day we get to the rest of option three, which is risk informing of Part 50, it may be at that point we'll have a process where we've got clearly defined, what is the allowed overall increase in risk at your plant, and we'd manage it that way.

But, at this point, because what we have is a series of independent risk-informed applications we -

DOCTOR KRESS: So, if I'm a licensee wanting to take advantage of the new 50.46 rule, I've got to sit down and carefully choose what changes I'm going to go for, because I've going to be limited in the number of them I can do.

MR. ROSEN: That's right.

DOCTOR KRESS: Limited by an arbitrary 10^{-5} in that bundling. You know, why shouldn't that bundle

be given more than 10^{-5}? Why is 10^{-5} an operate level for that particular bundle?

DOCTOR BONACA: Why should any - it seems to me that we have building expectations here that the regulatory process, through bits and pieces, will allow increases of risks here, and there, and everywhere. There is no regulation right now that requires any licensees, even with the plants at 10^{-4} are higher, to reduce their risk through some initiatives. I don't understand why we are building this expectation that, in fact, they will be allowed margins for increases in risks here, and there, and everywhere, and now they are talking about maybe in the future we'll bundle them together. I disagree with the concept.

I think we are building expectation on the industry in the wrong direction. I think that they should risk inform, okay, but the risk information should really, in my judgment, should come to a break even risk, there should be almost no risk increase. Otherwise, we are building a regulatory process -

DOCTOR KRESS: We came down several times in our letters saying it is appropriate to trade off risk for reducing unnecessary burden, so long as that tradeoff falls within acceptable ranges, and that

acceptable range in our mind was what was outlined in 1.174.

MR. ROSEN: That's right, you can't go back.

DOCTOR BONACA: No, I'm not saying you ought to go back.

DOCTOR KRESS: you are changing your mind.

DOCTOR BONACA: No, because you are putting a limit, okay, then I think it's really misconstruing the meaning -

DOCTOR KRESS: 1.174 has limits in it.

DOCTOR BONACA: I understand that. The limits were intended, in fact, that - the way we are talking about this it seems to me we are building an expectation that I'll be allowed this much of this, this much of this, I can -

CHAIRMAN SHACK: No, but there is an absolute stop sign.

DOCTOR BONACA: What is it?

CHAIRMAN SHACK: 10^{-4}.

DOCTOR WALLIS: I don't see the problem you've got with that, we talked about bundling some years ago, all this was explained, they are doing exactly the same now with bundling as they did before.

DOCTOR APOSTOLAKIS: No, it's not exactly

the same.

DOCTOR WALLIS: But, this particular rule change, there's got to be some incentive for industry to improve safety by all those changes, which they talk about but they won't do unless there's some incentive.

DOCTOR APOSTOLAKIS: But, no, when it was presented to us, I'm not saying that - maybe it's a clarification, I don't know, but when it was presented to us the issue of bundling was presented like, you know, what do you do if a licensee submits three requests that are related to the same issue, okay, should you consider them as one request or three separate requests? Because all three may lead to kind of 3×10^{-5} change, whereas each one would be approvable. And, we decided at that time that maybe bundling is okay.

But, this idea of bundling all the changes related to one issue, no matter when they are submitted, you might call it an interpretation of that, because it's not really deviating that much, but it's an interpretation that at least some of us here have not -

DOCTOR WALLIS: But, George, how otherwise would you give credit for improvements in safety?

DOCTOR APOSTOLAKIS: What does that mean?

DOCTOR WALLIS: Well, because now if you've improved you can trade that off, if you get 10^{-5} one year plus, and then you get a minus the next year, it means you are back to zero and you can -

DOCTOR APOSTOLAKIS: But, how can you improve? I mean, this -

DOCTOR WALLIS: It's like a bank account, you improve safety, you decrease your CDF, then you -

DOCTOR APOSTOLAKIS: So, you do something to decrease the CDF.

DOCTOR WALLIS: Right, and you trade that off against the next change. It's good to me, it's a bank account, put it in, take it out.

MR. ROSEN: Well, with one nuance, Graham, I think you might have some small misperception. Some of the changes that have been proposed by licensees that you see in the NEI document we reviewed, are changes the licensees want to do to reduce burden, but they also reduce risk.

DOCTOR WALLIS: That's fine.

MR. ROSEN: And, so that, to say that they won't do them because - they are not going to do any changes that reduce risk -

DOCTOR KRESS: They can use their bank

account then.

MR. ROSEN: - there's an incentive there for them to do it, simply -

DOCTOR WALLIS: Sometimes there is, so that's fine.

MR. ROSEN: It's a simpler way to run the plant that's less likely to -

DOCTOR WALLIS: Maybe they can get some credit towards other changes they want to make, bundle it. What's wrong with that?

MR. ROSEN: No, there's nothing wrong with it, I just want to make sure that it's understood that there are changes licensees want to make that reduce burden, but also reduce risk.

DOCTOR WALLIS: Well, I think they should be rewarded, and I think they are if they can bundle those with something else.

MR. DINSMORE: I think, Doctor Apostolakis, you are right. The 1.174 does not clearly lay this out, but if you looked in the individual Reg Guides, the ISTI aside, and I have the text here, I don't know if you want to -

DOCTOR APOSTOLAKIS: Go ahead.

MR. DINSMORE: - it's clear what's going on. For the IST, in-service testing, it says, "The

cumulative impact of all IST program changes, initial approval plus later changes, should comply with the acceptance guidelines." For greater QA it says, "If during the categorization process it becomes apparent that the initial categorization is modified to such an extent that the boundary results may be non-conservative a new boundary calculation should be performed."

Tech specs is a little more complicated, it says, "When AOTs and multiple safety systems are extended, the likelihood of simultaneous outages and multiple components increases, this issue is addressed as part of the implementation considerations." In other words, they control it by controlling what you can take out at the same time.

In-service inspection says, "Risk-informed ISI programs should be evaluated periodically as new information becomes available that could impact the ISI program." That's a little more fuzzy, but it pretty much tells you the same thing.

So, they all pretty clearly lay out that we expect to keep track of what's going on within the individual bundles.

DOCTOR APOSTOLAKIS: Well, maybe, I don't know, you should find a place to state that clearer

that this is what you doing, because if we are surprised, I mean, I can imagine that many other people would be.

MR. RUBIN: I think it's described more completely in the statement of considerations, and we certainly will take another look and see if it needs more amplification.

DOCTOR APOSTOLAKIS: Yeah.

MR. ROSEN: I think you can do that, you can say that individual applications or silos, the real risk is controlled, and then you need to say something about what the aggregate of all the silos and all the applications, how you control that. We have to make it very specific.

DOCTOR APOSTOLAKIS: Is there another revision of 1.174 coming up? We had one, right?

MR. RUBIN: There's not one planned as far as I know. Yeah, there was a revision done about a year ago.

DOCTOR APOSTOLAKIS: Yeah, because that would be a place really to state it clearly, there is this interpretation of all this.

DOCTOR BONACA: The reason why I said what I said, you know, I'm thinking of a plant that's five in 10^{-5}, and if the strategy was, you know, I'm going

to try to relax this, relax that, so with LOCA I can go to six in 10^{-5}, and with 44 I can go to seven 10^{-5}, and so it might keep creeping up. I don't think that was the intent at all of Reg Guide 1.174.

You have the stop there, but it wasn't the intent, and that would be a strategy which I would consider totally unacceptable on the part of the plant.

MR. RUBIN: Yes, you are absolutely correct, Doctor Bonaca, and that was -

DOCTOR BONACA: And, that's why I just made the statement, because that shouldn't be construed that there is an allotment of that much risk that you are going to spend here, and there, and everywhere. I think your effort should be the one of having no increase in risk in any one of these - because if I go into risk-informing because you have some benefits and some benefits to safety, and they wash out, and you get some better.

Now, you may increase in some cases, and it's small enough that it's acceptable, but again, that's different from the strategy described here as an example would be.

DOCTOR APOSTOLAKIS: But, 1.174, I mean, that issue was discussed at the time, and the question

was raised, okay, so by increasing by 10^{-5}, after a number of years will all be near the goal. And, the answer from the staff was no, this would not be allowed. But, this is different from saying now we have bins, and we go, you know - anyway, I'm not saying that this is not appropriate, it's just that it's kind of -

DOCTOR WALLIS: But, you are surprised.

DOCTOR APOSTOLAKIS: I am surprised, yeah. That doesn't mean it's - you know, it may be - it may turn out to be a pleasant surprise. I'm not saying anything, I'm just trying to digest it.

CHAIRMAN SHACK: Well, I think Graham has a good point, it gives you an incentive to kind of budget your bank account.

DOCTOR APOSTOLAKIS: There should be somewhere a statement of this, and maybe some explanations, because you are right, Steve, I mean, if I go to one of the guys at your site if it's clearly stated, but I'm not sure - only people interested in that change would read that.

DOCTOR WALLIS: This would help, I think.

DOCTOR APOSTOLAKIS: You need it in the general regulatory guide.

DOCTOR WALLIS: This would help the public

perception, too, otherwise you give the impression that all you are doing is relaxing regulations. You are actually providing an incentive for increased safety in some other way. I think you want to make the most of that. It seemed to be missing from the earlier documents, now it's coming in more.

DOCTOR APOSTOLAKIS: As a matter of fact, I would suggest that maybe you guys present that at the next PSA conference in San Francisco, as a first step. I'm serious, there should be a written document when you are actually stating this.

DOCTOR KRESS: I recall an ACRS letter which George Apostolakis had a lot of input into, I recall a letter from ACRS that George Apostolakis had a lot of input into, in which we talked about risk acceptance metrics in three regions. One region would define completely unacceptable to be above in terms of risk, a middle region which was a region which cost benefit changes are allowed, and a third region which is called completely unaccepted, you can move around in that all you want to, completely accepted I mean.

Now, this is just completely contrary to that concept which we, I think, bought up on, because we are talking about - we are in that region which cost benefit changes ought to be allowed, and we're

saying, no, we are restricting it very, very, very much.

DOCTOR APOSTOLAKIS: We're restricting it.

DOCTOR KRESS: Yes, we are.

DOCTOR WALLIS: But, the costs will drift towards the unacceptable region if you don't have some balancing tool.

DOCTOR KRESS: As long as it doesn't cross the line.

MR. KELLY: I'd just like to point out that what we currently have written in the SOC almost comes word for word out of the Guide 1.174. So, if you liked it in 1.174, you are going to like it here.

Perhaps, you'd like to move on to -

DOCTOR WALLIS: Are you going to tell us what an income sequential change is?

MR. KELLY: We will get there, yes.

MR. ROSEN: Maybe.

DOCTOR BONACA: I think ACRS has to talk about this issue again, because some of us were not there when you wrote that letter.

DOCTOR APOSTOLAKIS: But, the letters don't change as membership changes.

DOCTOR WALLIS: We can write another letter. When we learn something that improves our

knowledge we can change our minds.

CHAIRMAN SHACK: We're resolute.

DOCTOR WALLIS: That's right.

CHAIRMAN SHACK: Onward.

MR. KELLY: Okay.

The rule permits two basic plant change processes. The first is where a licensee would submit for our review and approval the changes that it wants to make. We'd look at the PRA, we'd look at their changes that they propose, we'd determine whether they had met the criteria, defense-in-depth, and things like that. And then, if we were satisfied they'd get a license amendment to give them the go ahead to make the changes.

The second process would be one where a licensee comes in and requests the authority initially. The first step is that they would initially request the authority to be able to make these inconsequential changes. In order for us to grant that authority, they'd come in with a submittal that demonstrates to us their process that they would be using for looking at these inconsequential changes. We'd look at their PRA in a much more robust manner, because now normally on a specific proposal that they'd come in in under a license amendment request

we'd be most interested in those areas that appear or that are dealing directly with the changes that are proposed.

Under the inconsequential change, we'd have to look at a broader range of the PRA, because they would have been asking normally for the ability to make inconsequential changes in many, many different areas of the plant, and we want to make sure that that process, as well as the PRA, were up to snuff as far as that goes.

Once we'd given approval to them, then a licensee, looking at these changes, would be allowed to make these inconsequential changes without prior NRC review and approval.

Again here, they would have to bundle these inconsequential changes, and they would have to, subject to our audit, be prepared to demonstrate that these changes that they made without our approval were, and continue to be, inconsequential.

MR. ROSEN: Now, there's a difference between doing it without your approval and doing it without your knowledge. Would you require them to inform you that we have - for example, the licensee writes you a letter saying under the inconsequential change thing we've made the following changes without

your prior approval, thank you very much.

MR. RUBIN: That's a very interesting question. We hadn't really thought a lot about that. I believe what we originally envisioned was, no, the information would be available on site for audit, but it's an interesting issue.

If I could provide some perspective of why this in the draft rule, there were some stakeholder comments that there would be numerous related 50.46a changes that would be truly so inconsequential, not only couldn't they be quantified in any risk model, but qualitatively they would have no impact at all. They'd be, perhaps, instrumentation changes, some small set point changes.

DOCTOR BONACA: Which we could expect to be covered under 50.59?

CHAIRMAN SHACK: Why do you need this 50.59?

MR. KELLY: The reason is, under 50.59 you have to meet all the regulations. Here you have an opportunity to do something different than what's in the regulations.

MR. ROSEN: As long as you brought up 50.59, with respect to my earlier comment about being informed, 50.59 at least used to require you to inform

the Commission of changes you've made under its authority.

DOCTOR BONACA: Once a year.

MR. ROSEN: Once a year, yes.

In this case, you don't even have that, so that's pretty permissive. I would suggest you might want to take a look at some of that.

MR. RUBIN: That's a very good point, Doctor Rosen, we'll take under consideration.

DOCTOR APOSTOLAKIS: I don't understand what you just said, 50.59 requires that we comply with all the regulations, but this one doesn't?

MR. KELLY: Well, the difference is here that we've changed - in essence, let me rephrase what I said.

DOCTOR APOSTOLAKIS: Good idea, do that again.

MR. KELLY: You still have to comply with the regulations.

DOCTOR APOSTOLAKIS: All right.

MR. KELLY: The difference is that in 50.46a you are operating under a slightly different set of regulations than you are under 50.46.

MR. RUBIN: Glenn, let me add one additional perspective, and then the real expert

sitting here next to me will give the proper answer.

50.59, the assessment of 50.59 is based on the likelihood and consequences having a very small impact, but they are design basis accidents only.

Here, the 50.46a process requires the assessment of, well, is your impact on severe accidents and the mitigation of the beyond TBS going to meet your accepted criteria or be inconsequential?

So, the assessment here is broader than 50.59 currently requires, because it looks into severe accident sequences. So, that's the significant difference.

Now, Eileen, you can help me.

MS. McKENNA: This is Eileen McKenna from the staff.

Mark is exactly right, 50.59 is the deterministic design basis, and this is trying to get a little more at the other aspect of it.

The Committee may recall, you know, back, I don't know, six, seven years ago there was some initial box about risk informing 50.59, and I think the thinking at the time was, well, you really couldn't risk inform the change control process unless the requirements themselves were actually risk-informed requirements.

So, now that we are seeing that we actually have, as Glenn was saying, as part of the rule that there are certain risk acceptance criteria that need to be satisfied, that making the process by which you assess your changes if you bring that kind of information into the picture, of course, Doctor Rosen is correct, that 50.59 does require periodic summary reports of changes that were made. I think the other thing is that, you know, we also have FSAR updating kind of information, so there is some way of getting knowledge, but we really have to, I think, think about whether it makes sense for us to ask for the same kind of reports on inconsequential as we do under 50.59.

MR. ROSEN: No doubt you could dig it out with your other inspectors or with your inspections, it's only a question of how easy it should be.

MS. McKENNA: Right, and that's something we're taking under consideration.

MR. KELLY: Doctor Rosen, you had asked before about whether there was a definition for what constitutes inconsequential, and what our current thinking is, and, well, if you go back to 50 - or, excuse me, to Reg Guide 1.174, it talks about in your lowest region when your core damage - if the increase,

proposed increase was less than 10^{-6} per year, that that would be allowed regardless of whatever your baseline risk was.

And, our preliminary thinking is that if a licensee came in with a risks that cumulatively were at the 10^{-6} or less level, that that would constitute an inconsequential risk. So, as long as they kept their overall inconsequential changes in total to be less than 10^{-6} we would feel that that's something that didn't require a lot of regulatory oversight.

DOCTOR APOSTOLAKIS: So, they would have to keep track of all the site changes for the life of the plant, right?

MR. KELLY: That's correct, because, I mean, we were told by industry that these are really inconsequential changes, and if they are really inconsequential changes it shouldn't be such a big deal to -

DOCTOR APOSTOLAKIS: But, a lot of these probably would not be amenable to quantification.

MR. KELLY: That's correct, much of it would be a qualitative type thing, where they would be coming in and explaining why it really has no effect at all on -

MR. RUBIN: Excuse me, Glenn, they will not

be coming in, but when they come in with their original submittal on their process, their capability, their PRA adequacy, to make these determinations that will include the application of qualitative risk determination and safety margins, defense-in-depth evaluation methods, and they'll need to convince us that they have a broad enough method that they can make these determinations that are truly inconsequential, and this we got from our stakeholders, where there were a number of things that weren't going to have any impact at all, I mean zero, essentially.

But, we want to make sure that their methods are adequate. If there's some limitation in their PRA scope, or their ability to apply non-quantifiable methods, and convince us they have a robust decision process, we may limit the changes they can make in this inconsequential bin and make them, for example, no external event analysis, that they have something in that area and they haven't convinced us that their margins, their qualitative methods are adequate, they'll have to come in, and we may limit it.

DOCTOR APOSTOLAKIS: But, there is an inherent limitation, in the sense that you cannot have

a quantitative estimate of the - but you will have to rely on your judgment and the licensee's judgment.

DOCTOR KRESS: Well, from that viewpoint, George, if I have a whole mess, as we say in Tennessee, a lot of inconsequential changes, at what point do I add up all these and say they are no longer inconsequential, if they are only qualitative? How about qualitative?

DOCTOR APOSTOLAKIS: I guess it would have to - you would have to trust the judgment of the staff.

DOCTOR KRESS: So, when you have different staff members -

DOCTOR APOSTOLAKIS: You cannot quantify everything.

MR. ROSEN: Well, clearly, you are going to reach this condition very soon, because most of these inconsequential changes will be changes on things that aren't modeled. So -

DOCTOR APOSTOLAKIS: Right.

MR. ROSEN: - you are going to not have a way to quantify it.

DOCTOR APOSTOLAKIS: Or they are not modeled well.

MR. ROSEN: Well, or modeled at all, you

know, like vents and drains on a primary system.

MR. DINSMORE: We have ways to deal with 50.69 and the South Texas Extension Project, there's a series of questions that people go through. So, we do have ways to systematically deal with these.

MR. ROSEN: But, they are qualitative.

MR. DINSMORE: Yeah, qualitative.

MR. ROSEN: Right.

MR. DINSMORE: And, we would assume that this would be a similar type of arrangement.

MR. ROSEN: Well, that's fine, but just those are good questions, I'm very familiar with them, but if you expect to get a number of 1E to the minus something you are fooling yourself.

MR. RUBIN: We don't expect to get a number, but there may be, in this whole group of inconsequential changes, there may be a few that are quantifiable, and we say, if there are, quantify them and keep them on your record sheet.

MR. ROSEN: Well, the question is, for example, does this component affect any emergency operating procedure? That's not quantifiable, but it's known, and if it doesn't, well, you get one answer.

DOCTOR WALLIS: Well, the inconsequential

measure is risk, and it's less than 10^{-6}, is that what I've heard?

MR. KELLY: Yes, increase in core damage frequencies.

DOCTOR WALLIS: But, I understood from yesterday that there are certain things like this 2200 degrees which have nothing to do with the risk and don't map onto it, so someone could make a change which doesn't show up in the PRA, and doesn't change risk apparently, but allows the temperature of 2400 degrees.

DOCTOR APOSTOLAKIS: If you work with the margins, yeah, the margins are not -

MR. KELLY: Well, in addition to -

DOCTOR APOSTOLAKIS: - so there's something else going on.

MR. KELLY: - in addition to considering the potential effect on core damage frequency estimates, licensees will have to also, in performing their inconsequential process -

DOCTOR WALLIS: So, there are other measures of consequence.

MR. KELLY: - look at Jennifer's things, because if you look here at the last bullet on this slide it says the licensee evaluation process is going

to be the same for both changes, in a sense of they are going to have to go through and consider the effects on peak clad temperature, the effects on -

DOCTOR WALLIS: So, inconsequential will be something like Jennifer's 300 degrees?

MR. RUBIN: Let me, if I can step in here, that area, as was pointed out by the Committee just now, this won't have a direct effect on risk, because the changes in the thermal-hydraulic areas will still be shown through the evaluations methods that Doctor Uhle and Ralph Landry are implementing, to show that there's still sufficient margin of thermal-hydraulic success, meaning you still have a resulting coolable geometry available, so you don't have an accident progression sequence, and there's no challenge to public safety.

So, even though there may be some reductions in margin, the confidence is still high enough that there won't be an impact.

DOCTOR APOSTOLAKIS: As long it remains high, you are right.

DOCTOR WALLIS: So, you're going to define what you mean by margin specifically, and point out that there are thermal-hydraulic margins, maybe there are some fuel damage margins, there's certain things

you measure which you then use to interpret this maintenance of margins? Margins have always been a somewhat vague term in the past. You are now going to define margins areas where you actually have measures of margin?

DOCTOR UHLE: This is Jennifer Uhle from the staff. The way we perceive this whole thing to work would be when a licensee could make a change without getting, you know, NRC approval, you know, this pre - essentially, they had the screening of the PRA tool to make sure that they have an adequate program in place, and then a licensee is allowed again the 300 degrees that they wouldn't have. They could make a change and just report annually, you know, what that change was to us, so the only time where a change could be made without NRC reviewing it and approving it would be following this inconsequential risk, as well as them still being below that 300 degree change.

And, in addition to that, to ensure that by margin we mean the plan is still below 2200, 17 percent, and the other three success criteria that hand in hand with the 300 degrees is that also all the success criteria are still met.

DOCTOR WALLIS: So, the Reg Guide or something will have a list of thermal-hydraulic

margins and some containment margins, yesterday we heard the containment pressure might go above the design pressure, there's going to be a list of specific things which you check to see if the margins are still maintained, rather than having a vague statement about margins, there will be specific things listed, and there will be measures of those margins?

MS. McKENNA: Let me say something -

DOCTOR WALLIS: So we know what we are doing and the licensee knows what he's doing?

MS. McKENNA: - before you get to the margins questions, I think -

DOCTOR WALLIS: Well, I'm just asking this. Can anyone give me a straight answer?

MS. McKENNA: Well, first I wanted to say that with respect to the revisions of the rule on inconsequential changes it states specifically the changes have to meet the acceptance criteria laid out in the rule, which include things like the 2200 degrees, the change in risk, the containment integrity provisions, all those things still have to be met.

As Jennifer was saying, there's also specific provision that the change, the amount of change in the model related temperature of the 300 degrees clearly doesn't make any sense to make a

change that will have to be immediately reported to the NRC as being a big enough change or requiring a reanalysis, you know, to do that on their own. So, that's specific in the rule, that those things have to be met, and that it be inconsequential.

DOCTOR WALLIS: I'm just saying, I think the rule is going to be written so that it's very vague about margins, and so I want to know where we find these margins, where are they defined?

DOCTOR UHLE: Our definition of margins, I alluded to this yesterday, is that the licensee's calculation indicates that the temperatures are below the acceptance criteria.

DOCTOR WALLIS: That's just one margin.

DOCTOR APOSTOLAKIS: The problem with that is that yesterday we heard statements like, oh, some of the calculations are 2100 degrees. Then I think somebody else said, you are beginning to see damage at 2300 degrees, because everybody agrees 2200 is a conservative limit.

Now, when you talk about numbers like that, I would really like to understand a little better what the probability is that they are going to have damage.

If you are talking about calculations that

give you peak temperature of, I don't know, 2000 or 1950, then I believe the margin is large and it doesn't really matter.

And, we did some calculations recently at MIT, under NRC sponsorship I might add, and it really, I mean, trying to put the margins into the PRA, most of the time if the margins are very large it doesn't matter. But, for nu reactors, for example, it does matter. The event sequences, the event trees, change again, because now, you know, you have the sequence, and at the end you have the issue of whether the actual - something we call dysfunctional failures, where the temperature in this case would actually exceed under certain conditions the damage temperature, or if it's a pressure or whatever. So, you get a bifurcation of the tree.

Most of the time for LWRs it does not, and the probability that it will go in the right direction is very high. But, in some cases, I don't know, it might matter. For future reactors it does matter, because you don't know, okay, these uncertainties are large enough so it does matter.

So, I'm pretty comfortable with most of the event trees we have now, that they are not really affected significantly by the margin, because the

probability is very high. But, when I hear statements like yesterday from Mr. Sieber and others that, gee whiz, you know, you don't have several hundred degrees difference, so you may have only 100 or 150 or something, that I don't know. Somebody have to look into it.

The margin - the probability may still be large enough that you will not have a failure, because see that's the problem with the margins, as they are defined in the deterministic world, as long as you below the limit it's okay, the probabilistic world says no, there is a probability you will exceed it. So, it depends a lot on the uncertainty you have about the estimates of 100 and the failure limits on the other.

DOCTOR KRESS: You have to have probability distributions.

DOCTOR APOSTOLAKIS: There's a big issue now with the failure limit in - fuels, right? In that case, I would go back to -

DOCTOR KRESS: Do you put probability distributions on the limits also?

DOCTOR APOSTOLAKIS: Yes.

DOCTOR KRESS: To get the overall?

DOCTOR APOSTOLAKIS: Yes, yes.

DOCTOR WALLIS: Well, that makes sense, we talked about that yesterday, if thermal-hydraulics were properly modeled in the PRA you could just rely on the PRA, you wouldn't have to have these separate definitions of margins.

DOCTOR APOSTOLAKIS: That's correct, if everything was -

DOCTOR WALLIS: What I'm trying to determine is where do I go, when I read the rule I don't think I'm going to get a definition of margins, I think I'm going to get some overall statement about maintaining margins. I think that's not good enough, so I want to - when I see the Reg Guide that's when I decide whether or not you've made a proper definition or margins and know what you are doing, and the licensee will know what the rules are. Is that the case? I'm just trying to sort this out.

MR. KELLY: Well, we haven't started on the Reg Guide yet.

DOCTOR WALLIS: So, I won't know when you are going to clearly define margins.

DOCTOR APOSTOLAKIS: In this context, I think they are using it the traditional way. As long as the calculation is -

DOCTOR UHLE: Yes, it's deterministic, it's

merging the deterministic with, you know, these in the PRA, and a margin, what you are saying that you have adequate margin, we have the safety limits, and that there's this perceived margin between the safety limits and then when you would actually have -

DOCTOR WALLIS: That's no margin, that's simply meeting a criteria, being below 2200, it doesn't say anything about margin to me, it could be 2199, I'd say the margin is one degree.

DOCTOR UHLE: But, it's perceived that the 2200 17 percent gives you 100 percent confidence that you are not getting -

DOCTOR WALLIS: You never have 100 percent confidence.

MR. RUBIN: It gives you such high confidence -

DOCTOR UHLE: High probability.

MR. ROSEN: - such high confidence that it could be modeled -

DOCTOR WALLIS: Okay, but this will be defined somewhere later on.

DOCTOR UHLE: The definition -

DOCTOR WALLIS: I'm going to look for it.

DOCTOR UHLE: - okay, but I'm going to tell you what -

MR. ROSEN: That's fair warning, I think, you know.

DOCTOR WALLIS: That's all I need to know, I don't really have to have -

DOCTOR UHLE: I can tell you what the definition is, and the definition is, if you meet the success criteria that is indicating that you have a sufficient margin.

DOCTOR WALLIS: But, you are saying this to me, I want to see it in writing, and I want to see it clear. I want to see that some time.

DOCTOR UHLE: I think if you read the transcript it will be in writing.

DOCTOR WALLIS: I'll look for it in the Reg Guide, that's all I'm saying. Word descriptions now don't mean anything until you've written it down, and that is your clear end statement, then we can review that.

I've said enough, I just told you, I'm going to look for it.

DOCTOR APOSTOLAKIS: Let me add something, I think in the traditional interpretation, as long as you are below everything is okay.

People know that the failure agreement is a conservative choice. People know that the

calculation means and computer codes are conservative, like Appendix K stuff. So, we say, as long as you are below they don't say, but they mean, there is a high probability that you will not have a failure.

And, what happens in the deterministic world is, when one of these assumptions is challenged for whatever reason, people go back and look, and I think that's what's happening with the enthalpy in the high burner fuel case. A lot of people say, now wait a minute, the failure limit, what is it?

Ideally, we should do what Graham just said, ideally we should assign distributions, take the difference and so on, so you will know that if you are exactly one degree below here is the probability of failure, if you are 200 degrees below here is the probability of failure.

This is not done right now, except in some rare cases, as I said yesterday, in the containment, for example, civil engineers who usually do these calculations they also have a tradition, in fact, longer than ours, on probabilities, and they give you bunches of curves, fragility curves and so on, and then you calculate the peak curves on ground acceleration, and automatically you get the result of the convolution.

But, we don't do that routinely, because even if you did, as I said, we did some calculations, the probability that you have a functional failure is very low under normal evaluation. Okay? It's very low, so it doesn't really affect the end result.

DOCTOR UHLE: Can I just add one thing, and, hopefully, this will provide a bit more comfort, is that the PCT reported, remember, is only for the hot pin, so this is not the average temperature in the core, it is the hot pin.

So, that is providing you extra, if you want say, margin.

DOCTOR APOSTOLAKIS: The message I think is that you will hear about this again in future meetings of this Committee.

CHAIRMAN SHACK: I'm just going to suggest that we take a break for 15 minutes. We've been sort of going at it for a long while this morning, and I'm sure George is ready for a break.

(Whereupon, at 9:44 a.m., a recess until 10:03 a.m.)

CHAIRMAN SHACK: This is a Subcommittee meeting by definition, a quorum of one. Onward.

MR. KELLY: On our next slide, what we wanted to talk about is the coolable geometry, and

what - and some implications about how we deal with coolable geometry.

Just kind of going over the rationale for why we did what we did, as you've noticed the requirements for evaluation of what's acceptable have been relaxed in the region beyond the TBS. And, in particular, you no longer, basically, have to assume single failure in that area.

The reality is that also at plants the risk significant SSCs, your emergency service water, LPSI, emergency diesel generator, will be removed from time to time for test and maintenance, among other things, or you run it and you find that it's broken and they have to do some work on it.

How do we assure, under those circumstances, because we are assuming when we do the analysis in the TBS area that everything works. So, how do you deal with that? Well, that's where we go to the next slide.

DOCTOR WALLIS: Well, coolable geometry, according to Jennifer, still meant 2200 degrees and all that kind of stuff?

MR. KELLY: As of this time, that's exactly what it means, until someone comes in with adequate -

DOCTOR WALLIS: Is the Reg Guide going to

be a bit more specific about what you mean by coolable geometry?

MR. KELLY: We will - I have to let Jennifer answer that.

MR. RUBIN: And, in Jennifer's absence, Doctor Landry will be answering that question.

Hi, Ralph, have a seat.

DOCTOR APOSTOLAKIS: Do you need to hear the question, Ralph?

MR. LANDRY: Do I get to hear the question or do I just answer.

MR. RUBIN: Is there going to be more in the Reg Guide on the coolable geometry as it is now defined in the material?

MR. LANDRY: In the Reg Guide, we do intend to give a great deal more description of what constitutes coolable geometry.

Now, yesterday we tried to talk about that, Jenny tried to talk about it, and I talked about it, what we mean by coolable geometry. And again, what we keep coming back to is the statement that coolable geometry, as we can define it today, is the speed limit of 2200 degrees Fahrenheit and 17 percent maximum local oxidation.

In light of the information that we have

today, that is what we define as coolable geometry. That may change next year as the Office of Research puts together all of the work that they've been doing in assembling a better understanding, or a different understanding, of what is the real relationship between ductility, temperature and oxidation, from all the fuel work that they are assembling right now.

DOCTOR WALLIS: So, you might have actually a more physical basis eventually, based on the ductility and the integrity and some other things, rather these surrogates.

MR. LANDRY: That's correct, they may have - we haven't seen the result yet, so we don't know what they will put together for this topic, and we don't want to preclude where they are going, or make a statement in a rule that we have to then in a year go back and change. So, we simply made the statement, coolable geometry, and we wanted to explain in the SOC and we'll explain and expound upon further in the Reg Guide of what we mean by coolable geometry, so that we have some leeway, that when we get the information from Research in another year we can change those guidance materials without having to change the rule.

DOCTOR WALLIS: I think when you do this, you have to make a statement about what consequences

you are trying to avoid.

MR. LANDRY: That's correct.

DOCTOR WALLIS: And, that is really the starting point, and when you actually work back from that maybe you can determine what kind of ductility you need.

MR. LANDRY: That's correct, and I believe that that will help with getting that definition will come in the Research material next year.

DOCTOR KRESS: Your consequences are implied as only gap releases, that's an implied consequence already. You don't allow gap releases, but you don't want the pictures to go to points that you are getting more than that.

MR. LANDRY: Well, in the 50.46 development in the early '70s, the point was that when you exceed 2200 degrees Fahrenheit, and/or 17 percent oxidation, you lose ductility to the point that - these failures we're positive, or we're sure will give us a core or a cladding that could be cooled without shattering, what the difference is between this value and the actual point of shattering we didn't want to define and say, well, it's 2300 and 18 percent, or something of that nature.

If you remember the interim rule was 2300

degrees and 17 percent, and the final rule backed off from that and said, let's put a little more margin and go to 2200 degrees and 17 percent, because we know that when you get above this range you start to lose ductility at a faster rate.

DOCTOR KRESS: The problem I've always had with that is, it's not 2200 or 17 percent, there is a relationship between the ductility, the temperature and the percent oxidation.

DOCTOR WALLIS: And the time.

DOCTOR KRESS: And the time, and the time that's involved in the percent oxidation, but there's a relationship between them, and I'm not sure that you are going to end up with - I mean, those two values aren't necessarily representative of all the sequences that have time, temperature, that's different - the sequence is a different kind of picture. You are going to get different ductility value, depending on how long you sit and get a picture, you can end up with 2200 and 17 percent and lose all ductility, is what I'm trying to say.

MR. LANDRY: We agree with you, Tom, and that's why we are waiting for the Research support. But, that's why we put in -

DOCTOR KRESS: Well, what would happen if

Research comes in and tells you that you've made a mistake on the 17 percent, and that it really ought to be a lot lower in order to bound these other sequences? Do you have to go back and fix all the ECCS?

MR. LANDRY: Well, we could go back and make a change in the rule if we have to, but right now, that's why we want these numbers far beyond TBS range to be in the SOC and the Reg Guide, rather than in the rule itself.

DOCTOR KRESS: The rule is just going to say coolable geometry.

MR. LANDRY: Correct.

Now, if you recall yesterday when Jennifer was making the presentation, she pointed out that one of the things that we want reported on in the up to TBS range now is not only a temperature change, but a change in oxidation, because we recognize that oxidation is not only a function of temperature, but it is a function of time of temperature. And, in the smaller breaks we'll have a longer time at a moderate to moderately high temperature, rather than a short period of time at a very high temperature, so that you can have more extensive oxidation. And, we wanted to preclude massive or large changes with oxidation.

CHAIRMAN SHACK: At the risk of distracting us further from the main point here, when you do the best estimate analysis, do you compute that oxidation of Baker-Just or can you use Cathcart-Pawel or some other more accurate model?

MR. LANDRY: At this point in time you can use another model, because the rule does not state which oxidation model you have to use. It does in Appendix K. Appendix K says thou shalt use Baker-Just.

CHAIRMAN SHACK: Yes, Appendix K I know, it was the best estimate.

MR. LANDRY: But, the best estimate does not, and S-RELAP5.

CHAIRMAN SHACK: But, I guess in large break you're peak temperature limited anyway, so it may not be quite as exciting as it would be if you went the small break best estimate.

MR. LANDRY: With the models we've seen so far, yes, but as I started to say, the S-RELAP5 - ANP model has both Baker-Just and Cathcart-Pawel built into it.

The rule does not say we have to use Baker-Just, so we looked at the model that was proposed for S-RELAP5, we came back and said, okay,

we'll have to accept this because the regulation says simply 2200 degrees, 17 percent oxidation, we don't have a regulatory basis for saying if you use this model you have to use this temperature and this percentage oxidation, if you use this model you can use this temperature and this percent oxidation, and so on. The regulation does not give us that flexibility today.

DOCTOR KRESS: I envision a little bit of correlation between temperature, time, rate of oxidation and ductility as a function of what kind of clad you have, actually. So that, in essence, I think the limit ought to be, if you have this much change in loss of ductility, or some measure of loss of ductility, and you no longer have a coolable geometry, I think that's what you ought to define coolable geometry as, and then they can calculate for all the LOCA sequences how much loss of ductility you have due to this correlation. And, the correlation will, of course, have either a Baker-Just or whatever the best estimate is of the oxidation models are. That seems to me like a coherent way to do these.

DOCTOR WALLIS: What we've established is that they are going to do something rational, it's not just going to be vague.

DOCTOR KRESS: Yes.

DOCTOR WALLIS: It will be defined in the Reg Guide, and they are going to do their own numbers.

DOCTOR KRESS: They are going to say coolable geometry -

DOCTOR WALLIS: Ductility, the appropriate variable, that's what they'll focus on.

DOCTOR KRESS: That's right.

DOCTOR WALLIS: And then, when they come back we can question them about whether it's a good model or not.

DOCTOR KRESS: The Reg Guide ought to specify something more than just the temperature and oxidation.

DOCTOR WALLIS: If it does not specify that, we'll tell them.

DOCTOR KRESS: Okay.

DOCTOR RANSOM: Is the fact that these criteria apply only to the hottest rod just added conservatism, presumably, there's only one rod.

DOCTOR KRESS: It may not be that conservative if you get significant power uprates, because you are starting to add that over the whole area. But, as of now it's sometimes conservatism.

MR. LANDRY: The current methodologies, and

Vic knows this even better than I do since he wrote the Code, the common methodologies have a single hot rod, hot channel calculation, and then an average rod for the whole rest of the core. The calculated peak cladding temperature and calculated maximum local oxidation are for the hot rod only.

There is, however, a calculation for the average rod, the peak cladding temperature on the average rod and the oxidation on the average rod. So, you can look at those two and say, what is the difference?

All the calculations to date, yes, we are only calculating the hottest rod in the core.

DOCTOR WALLIS: There's also a core-wide oxidation criteria.

MR. LANDRY: Yes, and we do a core-wide oxidation to calculate hydrogen generation.

DOCTOR WALLIS: But, that looks at all of the rods, not just the hottest rod.

MR. LANDRY: Now, where there's a difficulty is if you go to a calculation for which you have reduced peaking, so that the entire core is at a lower peaking factor, so that the hot rod is actually the entire core. This was a problem back in the mid-70s when a lot of steam generators were getting

heavily plugged and calculations were coming in from some of the utilities that wanted to leap their PCT limit by reducing the peaking factor on the hot rod to the core average peaking factor. That says now that the entire core is the hot rod.

DOCTOR WALLIS: Anyway, I think we can probably move on, but these are details we are going to examine pretty thoroughly when you come in with the Reg Guide.

MR. ROSEN: Steve and Glenn, this may be just a problem with the language in this bullet on this slide, but it would seem to me that it ought to say, would not result in loss of coolable geometry, rather than what you have in there.

MR. KELLY: That's correct. That's correct. It's not that we want to preclude them from having a coolable geometry, that's not normally our intent.

MR. ROSEN: No, I would expect not, but I would hate to see that language carried to the rule.

DOCTOR WALLIS: This looks like one of those sentences that in the ACRS letter that we have to work on.

MR. KELLY: Again, although it's not well stated in the slide, the way we intend on assuring that in the TBS region, and beyond TBS region, that we

are not setting ourselves up for operating such as if we had a large LOCA that we were going to core melt and maybe early release. What we are doing is, we are saying that you should only operate in a configuration where it's been demonstrated that if you were to have a large LOCA that you would continue to have a coolable geometry.

And, as it notes later on in the slide, one way a licensee could do that is to limit its power uprate or just to analyze those situations and show that, in essence, it could handle a single failure, or just to choose to operate to say that if it uses a LPSI pump because it has to go out for a test and maintenance or something like that, then they'll down power during that period while it's being fixed.

There are a lot of different options that they have, but we believe that this requirement of the rule will force utilities to make sure that they are operating in a safe condition.

Again, we also talked about here containment performance, and we have added a late containment performance metric, and the question is why are we doing that. Well, if you go back and you look at the proposals in the proposed rule for the changes in the GDC, you'll see in the area beyond the

TBS that licensees are not going to have to consider single failures, and this will allow them to make certain changes to the containment in the systems that they wouldn't have been able to make before.

We also note -

DOCTOR KRESS: Such as reducing the spray flow rate?

MR. KELLY: That's a potential thing that they could do, or the containment heat removal processes. And, those changes wouldn't change CDF or LERF, but they would affect the late releases.

So, you know, in the past -

MR. RUBIN: It would not necessarily affect LERF, they would not affect CDF.

MR. KELLY: Right.

In the past, what we are doing today, normally we handle looking at these late containment failure issues as part of our Reg Guide 1.174 we use our defense-in-depth argument. We believe that in this case, where we are specifically modifying the regulations to allow the potential for these changes that we should be a little bit more robust in our guidance about what's acceptable, and, therefore, we're going to be looking at what is an appropriate containment performance metric. We don't know what

that is today, but we're going to have that in time for the final rule.

MR. ROSEN: In time for the final rule, or in time for what you publish?

MR. KELLY: Well, we are going - we will be publishing it fairly quickly. We're planning on going to the Commission in December, to the EDO and to the Commission in December. We talked about that yesterday.

MR. RUBIN: Excuse me, Glenn, if I could comment. No, it wasn't for the final rule, we hope to have some certainly guides in the Reg Guide in the middle of next year, but we have a great deal of technical work, we've got the Research involvement to look at the options and proper way to try to deal with the late containment failure.

MR. ROSEN: So, what you are telling us now is there is going to be a guideline for late release, and that - but you are not telling us what it is.

MR. KELLY: At this point we have a placeholder there.

MR. ROSEN: We have to judge, okay, it's okay to go out and have a comment with just that much in it.

MR. RUBIN: The point we are making here is

that it's a useful or needed decision metric to help evaluate potential plant changes. We haven't yet developed the quantitative value, but, of course, it really doesn't include quantitative values for anything, and we are just pointing out here that this is needed for the decision process.

MR. ROSEN: No, that's okay, I understand that, when you do come up with that it will be in the Reg Guide and we'll get a chance at the Reg Guide.

DOCTOR KRESS: Are you in discussions with or aware of what the people working on the technology mutual framework is considering when its setting metric?

MR. DINSMORE: The technology neutral framework, I think, is looking at a conditional containment failure probability of .1, and so, you know, all of that is being kind of - we are kind of starting to figure out how to deal with this.

DOCTOR APOSTOLAKIS: I think they've changed their argument, they are really looking at the releases.

MR. DINSMORE: Is that what they are going to do?

DOCTOR APOSTOLAKIS: Because it's not clear, you know, the core damage versus containment.

They are going with frequency - consequence versus frequency curves, like the Farmer curve, you know, that's the latest we have seen.

DOCTOR KRESS: But, at one time they had a concept for an LRF, it had to do with conditional containment failure, and as best I remember it was accommodated by the value for core damage frequency. If you met the core damage frequency, you automatically met this scenario.

MR. RUBIN: Let me just comment here that, I mean, those are excellent observations, we did look at conditional containment curve probabilities for the damaged reactors eight or nine years ago. There are some difficulties in using that as a metric.

Here, I don't think we want to tell you that we've zeroed in on any metric, what we've done is identified this as what we think is a likely decision metric to go out with the draft rule. We'd like to get comment from the stakeholders. At the same time, we do some technical development to see if there's a feasible, justifiable approach to use for this metric.

DOCTOR KRESS: I believe you're going to have similar problems as you had with LERF, the consistently accepted value will depend on the site, because what you are worried about is the land

contamination -- you are worried about land contamination and total number of this latent cancer, that thing, and that's going to depend on the site, and it's going to be more sensitive than the LERF was.

You know, the LERF - a value of LERF over all the sites to be consistent with the safety goal QHO varied only by a factor of four or five. So, you could come up with one value and say it's good enough. You aren't going to have that freedom with the LRF, you are going out for 50 miles or so, and land contamination and total latent cancer, so the variation site to site will be a real problem in trying to come up with a value. I just wanted to caution you on that.

MR. RUBIN: Thank you, that's very helpful. There are a lot of challenges in developing this metric, especially with relationship of anything we can tie to elements of the safety goal or not. Perhaps, a site bounding criteria will have to be identified because of the issues you raised. We have a lot of work ahead of us in this area.

DOCTOR KRESS: It will be interesting to follow.

MR. KELLY: Okay.

We are going to move on to the numerical

risk criteria. The rule requires that the total risk of all changes must be estimated and be sufficiently small. I think I'd probably put the estimated there in quotes, because we do know that - we do allow for some use of non-PRA methods, but we are expecting that there should be strong justification for why those are adequate. We are going to talk a little bit more about that in a later slide.

One of the things that we have put in is that if proposed changes are not modeled in the PRA then they either should be modeled or should demonstrate that it basically doesn't make any difference.

MR. ROSEN: That happens all the time.

MR. KELLY: Right.

MR. ROSEN: Many features that aren't modeled, simply because if you do model them you can show that they never enter into any of the sequences, so it's a waste of time to model.

MR. KELLY: Right.

MR. ROSEN: It's just an exercise.

MR. KELLY: Right.

MR. ROSEN: So, is that the kind of demonstration you'll be seeking? I mean -

MR. KELLY: I believe we would certainly

accept something like that as a demonstration, but I'm not saying that that's the only way it can be demonstrated.

MR. ROSEN: That's a qualitative demonstration, having modeled all these things we can show you that they never show up in the sequence anyway.

MR. KELLY: Or, it may be I could just sit down and talk about why my water coolant has no effect on core damage.

MR. ROSEN: We have no way to put it in sequence.

MR. KELLY: Right.

DOCTOR WALLIS: Safety grading doesn't affect the non-PRA? You don't have to consider it?

MR. KELLY: The numerical criteria that are currently in the SOC that we're talking about in our examples come really right out of Reg Guide 1.174, and as Mark was talking about earlier, the guidance for LRF will be developed and we'll, in fact, have that ready in time for the Reg Guide.

CHAIRMAN SHACK: Just at the risk of bringing up the bundling argument again, suppose I take a power uprate, do I do two calculations, one where I have the new 50.46 and one where I have the

old one, and only the portion of the delta CDF that I can get because of the new rule goes to count against the 50.46 quota?

MR. DINSMORE: Is the power uprate due to your relaxed 50.46 requirements?

CHAIRMAN SHACK: Well, I can uprate it partially without the 50.46 by using a best estimate model, and then I can get a little bit more power uprate by using the new 50.46.

MR. RUBIN: That's - let me respond to that. That is a great question. I wish we'd thought of it.

But, right now we are seeing a lot of power uprates based on the current regulatory authority, and I guess we were assuming that everyone would be doing their power uprates as they are now under the current regulatory flexibility, and that we'd be seeing uprates that were just defined as 50.46a uprates. And then, we'd look at the impact of those against the criteria.

So, I think the answer to your question, scratching my head, is yes. We really should strip them out, it gets awfully complex. Hopefully, they'll just come in with uprates related to 50.46a, rather than trying to get the ones that we could get from

before, that would be our preference, but I guess we have to think about that in the rule.

Thank you.

MR. KELLY: The numerical criteria applicable for all modes of operation, again, doesn't necessarily mean that they all have to be quantified, but they certainly all have to be addressed. And, that's an expectation here, just as it was in Reg Guide 1.174. It's actually not an expectation, it's requirement in the proposed rule that they be considered.

Also, that as in Reg Guide 1.174 that the licensee should look at the proposed risk-informed plant changes would dramatically alter any risk-informed decisions that they had made previously.

DOCTOR APOSTOLAKIS: Wait a minute, let me understand that. This might create significant burden on the licensees, right, and the staff? They'd have to go back and look at what was requested, what was approved, and re-evaluate it, and I'm wondering in calculating delta CDF and delta LERF within 50.46, they would have to take the plant as it is with the changes that have been approved. Wouldn't that be sufficient information for you to make a decision? Why are you asking them to go back and revisit past

decisions?

MR. KELLY: Well, one of the reasons - the major reason why we have it here is that it is in Reg Guide 1.174, and that we - because it's our expectation under this rule change that licensees will be able to make much more safety significant changes than ordinarily they do make, that they might have, as was talked about a little bit yesterday, the tentacles from this may spread into many, many different areas.

MR. RUBIN: Let me add something here, if I could, Doctor Apostolakis.

Hopefully, this is not a big significant deal. The philosophy here is that it's risk-informed regulation, risk-informed changes that have been implemented over the years. Some of them may have come out acceptably because of a performance assumption or a system availability that now goes away because of the change from 50.46a, and we just want to ensure that if anything like that exists -

DOCTOR KRESS: Wouldn't that be reflected in the delta CDF?

DOCTOR APOSTOLAKIS: Yes, that's what I'm wondering about, I mean, they will have to do a delta CDF calculation for the 50.46, so if you have received permission to have something out wouldn't that be

reflected in the new calculation?

MR. RUBIN: It would be reflected to some degree, but it wouldn't fully reflect that the delta impact of the change that was approved some years ago still meets the acceptance criteria. I don't think - we don't want to be overly burdensome.

MR. KELLY: I can give an example. Let's say I had a plant that had a 72 hour AOT for its diesel, and they got a seven day or 14 day extension, and we said - and that that estimated increase in core damage frequency was 9×10^{-6}, and we said, yeah, you are just under the thing, it seems okay.

But now, with other changes that I may make under 50.46a, if I were to go back and look at that change, maybe now it's 1.8×10^{-5}, which would be the increase associated with that going from three days to 14 days. So then we would say, maybe that wasn't such a good AOT increase.

MR. RUBIN: I think we might even, I -

DOCTOR APOSTOLAKIS: Excuse me, on this topic, but the fact now that your diesels are allowed to be out for seven days, would affect the calculation of delta CDF for the proposed change.

MR. KELLY: No. It would affect your - because now that I've already made that change, okay,

that has affected, past tense, my baseline risk. So now, we are talking about on top of that we are now adding another - you know, all we are checking for when we do our 50.46a, when we are looking at the numerical criteria, we are looking at how much from our baseline today we are increasing core damage frequency.

DOCTOR APOSTOLAKIS: Yes, today, and today you have already approved the expansion of the AOT.

MR. DINSMORE: I think this isn't as dramatic as it looks, because the ASME standard, for example, when they do a PRA update, and I guess as they incorporate these changes into the update on the PRA, when they do a PRA update they are supposed to go back and check on all the previous risk-informed applications and estimates.

DOCTOR APOSTOLAKIS: Yes, so they have done this once, they now have a PRA that is up to date. Six months later they decide, you guys published this rule, they decide to request a different change.

The baseline now is the one I have now, where the diesel AOT is seven days, right?

MR. DINSMORE: Right.

DOCTOR APOSTOLAKIS: And, that fact will affect the new delta CDF calculation.

MR. DINSMORE: Right, and once -

DOCTOR APOSTOLAKIS: And, what I'm saying is, maybe that's enough. Why are you asking them to go back and re-evaluate the original petition that led to the seven days?

MR. DINSMORE: And, what I was trying to say is that they kind of have to do it - they are supposed to do it anyway, the ASME standard would say, all right, you are using your current PRA, you do your calculations, you come in to 50.46, the current PRA includes the 14 hour, 14 day, whatever, you do your calculations, you come in to us, we say, okay, you can make the change. You make the change, you put that change in your PRA, so, therefore, you've updated the PRA. Then you are - anyway you are supposed to go back and check the validity of all the other previous risk-informed applications.

DOCTOR APOSTOLAKIS: Really?

MR. DINSMORE: Yes.

DOCTOR APOSTOLAKIS: I don't recall that. It's in the ASME standard?

MR. DINSMORE: It's in the standard, yes, but it's kind of in there as a should, and this just kind of reassures us.

MR. ROSEN: My question about this bullet

is, is this the same thing you were talking about this morning, I mean earlier today, about cumulative tracking cumulative changes?

MR. DINSMORE: No, it's not the same.

MR. KELLY: No, it's -

DOCTOR APOSTOLAKIS: It's related.

MR. KELLY: It has to be related.

DOCTOR APOSTOLAKIS: Its' related, because if the original expansion to the AOT is affected by the 50.46 change, then you have the question of whether to include that original change in your bundling process. Would you consider it despite the 50.46 now, or is it a separate?

MR. KELLY: It's separate. I mean, what this - you know, I've gone along and I made some risk-informed decisions, and they were based on the plant being in a certain kind of configuration and other things. I'm going to change those configurations now. Have I changed the plant so much that the risk-informed decisions that I made before no longer make sense? I say, you know, if I go ahead and make these changes now it kind of negates the arguments that I made before on some risk-informed decisions.

If it doesn't negate them, then they are okay. If it does, then the licensee should look - we

even had a case recently where - didn't somebody come in when they found that they had -

MR. DINSMORE: Yes, somebody came in and said that the criteria - the new PRA violated the criteria if they used that to redo an analysis they did on an earlier application. So, they are tracking it, they can do it.

In this case, it turned out that it violated the criteria because when they updated the PRA they made a big mistake in the way they were doing the -

DOCTOR APOSTOLAKIS: Yes, but that was a mistake, and they wanted to tell -

MR. RUBIN: No, they reported it before they identified the mistake. They reported it as a potential violation of the acceptance criteria of a previous risk-informed application because of a PRA model update.

MR. DINSMORE: So, it is possible, and the answer is, yeah, it would be the cumulative impact of all the previous changes under each of them.

It starts to get a little complicated.

MR. RUBIN: We need the deltas more in the Reg Guide, of course, and I'm not competent or clear that requantification of all them is required, but,

perhaps, some high-level look to make sure that a fundamental assumption that was a basis of the acceptability of a previous change hasn't been invalidated.

DOCTOR APOSTOLAKIS: It probably makes more sense. Are we requiring this of all the rule changes, I mean, 50.44, if they do something there they would have to go back -

MR. KELLY: 50.44, although the first risk-informed change was really made, minor changes that affected risk, similarly with 50.69, this is the first risk-informed application that I think is making full use of -

MR. RUBIN: Yeah, 50.44 is a risk-informed deterministic rule, in fact, using the incites of PRA the rule, non-voluntary, the rule is revised to allow removal of certain pieces of equipment. No risk calculations are required by the licensee. The generic basis for the changes was sufficient.

DOCTOR APOSTOLAKIS: Yeah, but I mean, they made the changes, and they have already gotten five approvals of risk-informed changes. Should they go back and re-evaluate those because of the change?

MR. RUBIN: Yeah, well, the changes - the things, the recombiners and things they pull out of

the plant, yeah, will get reflected in the PRA model, but, in fact, they won't, because they have no benefit in severe accident space in the first place is why they were allowed to be removed in 50.44.

So, the answer to your question is yes, but it has no effect.

MR. ROSEN: I'm sitting here thinking about a real problem, and maybe you could just comment on it.

Let's just say a plant gets two or three of these 50.46 changes behind them, and then goes ahead and does fire risk requantification, kind of a global change. How would that play?

MR. DINSMORE: You mean they would do a fire PRA and use that instead of this?

MR. ROSEN: Yes, they had a PRA, but, you know, it was state of the art when it was done, but they go ahead and do this fire risk requantification, completely relook at all of the issues, try to deal with all the issues.

MR. DINSMORE: Hopefully, when they did the screening analysis against the fires, I'm not quite sure I understand the question.

MR. ROSEN: Well, I'm just trying to see with that kind of a big perpetually global change to

the PRA.

MR. KELLY: We're going to talk about this a little bit later. Steve is going to get into that when we talk about the cumulative and how you deal with PRA updates. We'll be talking about how you deal with PRA updates.

MR. ROSEN: That would be a substantial update, and could have broad scale impacts on the risk sequences.

MR. KELLY: And, I think the bottom line is, if you do a PRA update you are expected to go back and to confirm that you continue to meet the acceptance criteria on 50.46a.

MR. DINSMORE: And, hopefully, the screening criteria which they used to say that fire didn't impact the decisions which we were allowing, or the changes which we were allowing them, should have been sufficient such that when they actually do the fire PRA and incorporated it systematically, that the past changes should have been okay, and if they are not then we maybe should look at the way they are doing it.

MR. ROSEN: I think that's an expectation that, without having done the fire risk requantification that people will only have an

intuition about not have any real detailed knowledge.

MR. DINSMORE: Well, there would be some systematic way of saying, well, if it's involved in fire sequences, check and see if it's involved in fire sequences, if it's screened out, and if it has - if it's not involved then you should check and see if it had an influence on those that were screened out. So, it's a little more than an intuition, it might not be perfect, there might be cases where it would change, but that would be the intent of the way that the process would work.

MR. ROSEN: So, you see no bar to going ahead with 50.46 ahead of fire risk requantification. I mean, they can't -

MR. DINSMORE: It will limit the changes that they could make.

MR. KELLY: To some extent.

MR. DINSMORE: May limit the changes.

MR. ROSEN: Because at the end of the day you'll say, yeah, but you haven't done risk requantification on fire, and we don't know, there's a lot of stuff that goes through the same areas here.

MR. KELLY: I think licensees make these decisions all the time, where they say, you know, I'm a little bit ahead of the curve, so to speak, in a

certain area, now I can either be very aggressive and take the very maximum advantage I take of this, or I can say, you know, I'm going to only take those things which I'm really very sure of that will be okay, and even if I have to requantify this later.

MR. ROSEN: It's going to be a limitation.

MR. KELLY: Yes.

Steve is going to go ahead now and talk about the risk assessment requirements.

MR. DINSMORE: Yeah, okay, I'm going to discuss the PRAs that they are going to be using to calculate these things.

These things are very familiar. In general, we were discussing the other day, and we discovered we've been doing these risk-informed applications for about seven years, and these things that they are supposed to address, these have been very useful. We've actually been able to use them to identify insufficient modeling, and we've been able to work together with the licensees, and based on this list of stuff we've actually - we've had pretty good success. So, we are going to keep using these pretty much the way they are.

The PRA technical adequacy, this is going to be kind of a continuation of the way that we're

doing business. 50.46 application is not going to be a standard application, like an ISI or IST, it's, essentially, going to be, well, the licensees are going to go through their analyses and evaluations and try to figure out what they can change, and whatever they can change they'll come in and request that change.

So, it's a very open-ended type of arrangement. So, for each one that comes in, of course, we are going to review the PRA, take into account whatever standards exist, and if the standard doesn't exist then we'll have to review that PRA pieces in more detail.

We've changed this slightly to say that the PRA must be able to calculate the CDF, the LERF and the late release frequency. Actually, pretty much everybody can calculate late release frequencies now, it's no great burden. Plus, in the nu reg, which tells you how to calculate a simplified LERF that actually is in there how to calculate late release frequency, although NEI has been trying to get that taken out for years, but didn't succeed, so it's still in there.

And again, if there's approved standards out, and they meet those standards, it will have a big

impact on the degree of the amount of review that we have to do.

We are going to follow this phased approach to quality. The phased approach mostly tells you how to review a submittal coming in, based on what it wants to do and what standards and so on are available.

We have taken a little criteria from the phased approach and put it into the rule, which might be a little new, which is we say that the PRA must consider all initiating events and operating modes that would affect the regulatory decision in a substantial manner, should be in the PRA.

Now, there are two ways to do that. One is that if you don't have a fire PRA, and then you are not really supposed to change stuff that might affect the fire PRA. We haven't quite figured out what substantial manner is, but we'll work on that in the Reg Guide. I think we'll go ahead and further define this.

And, other than that, the process would be pretty much the same as what we are doing today.

MR. ROSEN: That's kind of what I was getting at. If you can't affect - if you haven't done a fire PRA, and you can't change anything that might

be affected by the results of such a fire PRA, that's pretty much everything. You just don't know a priori.

MR. RUBIN: We face that now, Doctor Rosen. It's been a challenge for applications that have come in where there might be some impact on fire. We've been able to deal with it sometimes using what incites came from the FIVE analysis, some bounding calculations, but there are definite limitations due to lack of scope of modeling, and that has always been a clear restriction limitation in the use of these techniques at the beginning of a full-scope, high-quality analysis.

MR. ROSEN: Then I come back to where we were before. It's going to limit what you can do, because you are going to have questions that you can't answer and that the licensee can't answer. And then you can say, well, I guess we are not going to come to a conclusion on this.

MR. DINSMORE: Well, it might not limit it completely, because we do have these guidelines on what we accept for risk assessment methods, other than what's actually in the PRA.

A lot of people in industry are pretty smart, and they'll come in and they'll give us arguments about why this won't make hardly any

difference whatsoever, and that point is going to be not a significant contributor, and we're allowing them that option.

MR. ROSEN: There will be cases where that will be pretty apparent on both sides of the table, but then there will be the ones where it's not so apparent, and you'll just have to exercise discretion.

MR. DINSMORE: Right, we'll work through those like we kind of do now to some extent, although not as - again, this is going to be a much broader scope of applications that we have to deal with. That's going to be the main change that's going to come down.

I guess we'll go back to 41. Uncertainty analysis, we are going to have to deal with uncertainty analysis within the framework that uncertainty analysis is generically dealt with and we can't come up with any new specific guidelines that we can use.

Essentially, they just must demonstrate that the risk assessment adequately addresses the uncertainty, so that there's confidence that the numbers that they do provide clearly reflect the effect on risk. I know that Research is developing guidelines how to deal with uncertainty, and I think

they are coming to talk to you in December, I believe.

MR. ROSEN: About model uncertainty.

MR. ROSEN: It's only on model uncertainty.

DOCTOR APOSTOLAKIS: Model uncertainty quantification.

MR. ROSEN: Not broader than that?

DOCTOR APOSTOLAKIS: Uncertainty which is broader.

MR. ROSEN: Okay. Well, I was listening - going to listen to part on what we are going to do about model uncertainty.

DOCTOR APOSTOLAKIS: Well, that's the key issue.

MR. ROSEN: Including those things we don't know about.

DOCTOR APOSTOLAKIS: Yeah, they have to tell us everything they know about things they don't know about, right?

MR. DINSMORE: We have great faith in Ms. Droun.

DOCTOR APOSTOLAKIS: We have great faith in what?

MR. DINSMORE: Ms. Droun.

DOCTOR APOSTOLAKIS: Oh.

MR. DINSMORE: Then we'll go to

implementation and monitoring is always a big piece of risk-informed activities. Licensees must demonstrate that the acceptance criteria in the rule continue to be met, given other changes to the plant, its operation, PRA model data updates.

This means that every time they update the model they are going to have to redo all the calculations for this risk-informed activity, and as I indicated earlier most of the other ones have the same requirement in it.

If it can't be demonstrated the acceptance criteria continue to be met, a licensee must propose steps to remedy the situation. I think we've kind of - I'm not sure it's a consensus yet, but we've kind of decided that if, for example, you bump up over to the 10^{-5} limit because you've been doing other things at the plant, you don't have to take out what you did, you might be able to address it by doing something else. In other words, you could - there's some flexibility in how you could get that back below those guidelines.

Again, that's not real clear, because I think the Commission used reversibility once, but what means isn't clear.

MR. ROSEN: I suppose they meant

reversibility if you can't do what is suggested, make some other change that's countervailing.

MR. DINSMORE: That's kind of the interpretation that we've been working on, working with.

And then, the last slide, the peer view process on the PRA is a one-shot deal, and the ASME guideline again does say that if you do substantial changes to your model you'd have people come in and review those substantial changes. But, it's still not clear over the long term how we are going to at least monitor the quality of the PRAs.

And, we've decided that the updated PRA must retain sufficient technical adequacy to demonstrate that the acceptance criteria continue to be met.

And, after our discussion we've kind of just looked towards I think it's the 50.46 - the 50 degree thing, we'd have to report it. And, we thought, and we looked back at why they were asking for that, and if you look in the regulations it says they are asking for that exactly for this reason, to retain confidence that the models that they are using are able to demonstrate that this criteria is being met.

So, we kind of just took that as a precedent which had been working quite well, and thought that we would apply it to the PRA side of the equation here. And, we just said, well, if they are going to have big changes in the CDF and LERF it would be nice to know. For example, if they had these big changes they could notify us and they'd say, oh, well it's already been peer reviewed and that would mean one thing, if they had big changes and just notified us that would mean another.

The 20 percent number I think is open for discussion. I'm actually not sure where it came from, but it was decided upon, and this was for the baseline numbers.

And then we also, even though that they are required to monitor the increase due to this application, and if it bumps over 10^{-5} than they have to do something, this is a somewhat lower boundary on if it changes by a certain amount they should notify us again. And again, this is to provide confidence that the adequacy of the PRA has provided confidence that the accepted criteria are met.

These numbers as well, we've used them from - we pulled them from the - these are very small changes. We couldn't, of course, make it the same

10^{-5} which is the limit, because they have to do something else, and that's where these came from.

And, if you'll notice LRF is in neither of these guidelines, late relate frequency, because we don't have any numbers for them yet, and so we didn't have any starting point.

CHAIRMAN SHACK: You could have made it 20 percent of the allowable change.

MR. KELLY: I would just note that on this last bullet that these increases or these changes are all associated with merely the updated PRA. It has nothing to do with any of the - it's just what the modeling change is, or other changes that might have happened in the plant, how they are going to affect the numbers that we've already calculated.

MR. RUBIN: And, I will add to that that this is purely a reporting requirement, the staff will not necessarily take any action here, it just gives us the knowledge and the ability if we want to look at something.

MR. ROSEN: Is that a report immediately or an annual report?

MR. KELLY: I think a proposed 60 days.

MR. RUBIN: And, PRA update process is a maximum of a two cycle period.

MR. DINSMORE: And, that concludes this presentation.

DOCTOR APOSTOLAKIS: A thought occurred to me that's not directly related to what they are doing, but maybe we might could take a note of. You know, we always review rules, draft rules, and regulatory guides, and then after they are published and implemented I don't think the Committee is aware of how they are implemented and what the experience is. And, from the discussions yesterday and today, I think it would be useful for us to have maybe an hour and a half, two hours presentation, an information meeting only, from people who do make decisions, have been making decisions for the last several years, using risk information.

Like Steve a few minutes ago just said, you know, we've been doing this for seven years, it's been working very well, the Committee is not aware of what is going on. So, maybe you guys can come here with several cases, some where you are really happy with what you saw, others where you denied the petition, the request, and just enlighten as to what are the issues of PRAs, how things are happening, because I might say we are in the dark here.

MR. ROSEN: George, Mark Rubin and I had a

conversation in the hall before this meeting about that very point, and there were people who, before we embarked on this thing, felt that making these kinds of changes would result in very abrupt performance degradations in the plant in various areas, ISI, IST, all these applications would have negative and almost immediate consequences.

And, I would - I don't think that's been true, been borne out.

DOCTOR APOSTOLAKIS: It has not been true.

MR. ROSEN: And, I think it would be useful to have some sort of time line and some sort of accounting.

DOCTOR APOSTOLAKIS: What is the experience of the regulatory staff in implementing 1.174? How do they apply, for example, I don't think we are really fully aware of how the stuff applies, these qualitative boxes, defense-in-depth, margins, and I'm really curious to see a case, for example, where the delta CDF were okay and everything, and the staff said denied because of defense-in-depth consideration. I'm going to send a note to the Planning and Procedures Subcommittee so you guys can consider it.

MR. SNODDERLY: I think we did that, George, last - well, 2003, when we did the Fleming

report, because the Fleming report looked at four examples of where the staff had used - done risk-informed decision-making, and he did an assessment of that.

DOCTOR APOSTOLAKIS: But, that was Fleming's point of view. I want to hear these guys.

MR. RUBIN: Yeah, we sent him a number of SEs, some that were favorable, and a couple of rejections for the Committee to review.

DOCTOR APOSTOLAKIS: When did that happen?

MR. RUBIN: It was about a year and a half ago.

MR. ROSEN: But, that's safety evaluations, I was more focused on performance in the plant. Have there been events that one could attribute to risk-informed changes that wouldn't have occurred.

DOCTOR APOSTOLAKIS: That's a separate issue.

MR. ROSEN: Yeah.

DOCTOR APOSTOLAKIS: No, I'd like to see the licensee's request and the staff's evaluation, and maybe tell the staff to make a presentation. Do we have those SEs that they sent, I remember there was a report but not any attachments from the staff.

CHAIRMAN SHACK: Maybe Carl saw the SEs, we

didn't.

DOCTOR APOSTOLAKIS: I didn't see them.

MR. SNODDERLY: I gave the SEs to all of us, or to those people - I showed the staff.

DOCTOR APOSTOLAKIS: I got the six cases from Gary Holahan, but that was five, six years ago. Those were extremely enlightening, now if we can do the same thing now, but include the licensee's application, to see what they actually - I don't think it's a big deal.

MR. RUBIN: No, and it's not unreasonable for, you know, once every year or two years that we have some examples.

MR. ROSEN: And, my point, the idea that you would tell me about events that have occurred, and maybe as Bill suggests, a null set, but just the point that, say, 56 out of 60 potential people who could have done this have performed a risk-informed ISI, for example, would be very useful to know. I mean, I know those numbers are getting high, but I don't know how high.

MR. KELLY: And, no large levels.

MR. ROSEN: And, there hasn't been one that I've been told about.

MR. DINSMORE: It's about 75 plants.

MR. ROSEN: Seventy-five units have now done risk-informed ISI?

DOCTOR APOSTOLAKIS: And, I think all of them are planning to continue it.

MR. DINSMORE: All but two.

DOCTOR APOSTOLAKIS: Okay.

MR. ROSEN: Well, that's just a thought.

DOCTOR APOSTOLAKIS: Vesner has a nice thing. Is that okay, if we could have such an information meeting?

MR. RUBIN: Sure, hopefully, after we get the rule out, maybe the Reg Guide.

MR. ROSEN: Well, you can do this while you are resting, it's easy.

MR. RUBIN: It was a timing issue, George, but we'll certainly accommodate your request.

DOCTOR APOSTOLAKIS: You could do it in your sleep. You could come here and -

CHAIRMAN SHACK: They may have to do it in their sleep.

MR. RUBIN: We would be pleased to accommodate the Committee in this area.

DOCTOR APOSTOLAKIS: Oh.

MR. ROSEN: You've been to charm school, too.

MR. SIEBER: When does your term expire? You can do it right after that.

CHAIRMAN SHACK: When will we have the presentation of the main Committee?

MR. SNODDERLY: Yeah, that's what Brian wanted us to provide the staff feedback on.

CHAIRMAN SHACK: How much time do we have?

MR. SNODDERLY: Right now we are scheduled to go from 8:35 until 10:30, so it's two hours.

DOCTOR APOSTOLAKIS: An hour and a half.

MR. SNODDERLY: Two hours, 8:30 to 10:30, so two hours.

DOCTOR APOSTOLAKIS: I think this last stuff must be reviewed because it's important. Not all of it, but a lot of it.

DOCTOR KRESS: Particularly the question of bundling.

DOCTOR APOSTOLAKIS: The question of what?

DOCTOR KRESS: We could lose the whole hour and a half, Tom, but that's going to be one of the items that's going to be discussed, I think rightly, before we write a letter.

DOCTOR APOSTOLAKIS: And, something from Jennifer, another chance of losing the whole hour and a half.

CHAIRMAN SHACK: I was going to suggest Brian's overview myself.

DOCTOR APOSTOLAKIS: That was good, that was good.

CHAIRMAN SHACK: But, that takes up a goodly chunk in itself, you know. I think we can have Brian's overview and one other topic, so you have to pick either Jennifer or PRA. I'd probably go for the PRA.

DOCTOR APOSTOLAKIS: PRA.

MR. RUBIN: I'd go for Jennifer.

CHAIRMAN SHACK: How about Jennifer doing the PRA?

DOCTOR APOSTOLAKIS: No, but I think what Mr. Fischer presented, it was only four slides, but there is information there that's useful.

CHAIRMAN SHACK: There's information that's useful in many places, but we only have an hour and a half, George.

DOCTOR APOSTOLAKIS: Well, all she has to do is show it and say here are the GDCs that are effective. It's not a big deal.

DOCTOR BONACA: Two hours.

DOCTOR APOSTOLAKIS: Yeah, Brian's presentation, I think, is - now one of the things

where you can - one of the things where you can save time - or also add something about the safety benefits.

MR. ROSEN: Safety benefits.

DOCTOR APOSTOLAKIS: The safety benefits, yeah.

CHAIRMAN SHACK: Well, he's got slide 4 with the second bullet.

DOCTOR APOSTOLAKIS: Slide what?

CHAIRMAN SHACK: Slide 4 of his presentation, second bullet.

MR. ROSEN: He expects to reduce plain risk. That's not enough, there's a whole submittal from NEI that one could at least -

DOCTOR APOSTOLAKIS: One of the things they don't need to do is tell us what they intend the risk-informing regulations is, if you are maintaining defense-in-depth, if you are trying to improve safety, we will know this stuff. You don't have to give us a general - I know that that's common to start that way.

MR. KELLY: is there anything out of our submittal or discussion that we had today that you particularly would like to cut out?

DOCTOR APOSTOLAKIS: That I'd like to cut out. Yeah, your slide two.

DOCTOR KRESS: Three and four.

DOCTOR APOSTOLAKIS: Three and four.

CHAIRMAN SHACK: No, no, no, four you want in, four is exactly what you want in there.

DOCTOR APOSTOLAKIS: Four is important, yeah.

DOCTOR KRESS: Yes.

DOCTOR APOSTOLAKIS: Six.

MR. RUBIN: Six is out?

DOCTOR APOSTOLAKIS: Yes.

MR. ROSEN: You definitely want to have eight, but have it right.

DOCTOR KRESS: The way it is.

DOCTOR APOSTOLAKIS: Twelve?

CHAIRMAN SHACK: In or out, George?

DOCTOR APOSTOLAKIS: Out. And, that's it in my mind, because everything else, you know, is really one way or another important.

CHAIRMAN SHACK: Yes, most of us are here, most of us have heard of all of this.

DOCTOR BONACA: Allow two and a half hours for this presentation, and qualified is going to be two and a half hours.

CHAIRMAN SHACK: You're the chairman, you are going to be in charge, you can whip them right

through, Mario.

DOCTOR BONACA: No, I can't whip them, I mean, you are in charge, you are supposed to be the one that you say two hours, you stay within two hours.

MR. ROSEN: You could get those done in an hour and a half and give the chairman back a half an hour.

DOCTOR APOSTOLAKIS: Mr. Dudley's presentation, I think, has to be there. It's right after Brian's.

Now, selecting the transitional break size probably does not belong to this, because we are going to have a separate meeting on that, aren't we?

MR. SNODDERLY: Yes, November 16th.

DOCTOR APOSTOLAKIS: So, that's out.

MR. SNODDERLY: And, maybe the analysis we leave out, too.

DOCTOR APOSTOLAKIS: The analysis.

MR. SNODDERLY: Because the idea would be that we understand the criteria that they are going to use, but it's going to be - the guidance will be provided in the Reg Guide, which we are going to review.

DOCTOR APOSTOLAKIS: I think there are two or three, or maybe four, issues that really require

some bundling of this issue.

MR. SNODDERLY: See, I think that's more important, because that deals more with rule language which you are talking about putting out, as opposed to things that are going to be in the Reg Guide.

DOCTOR SHERON: One possibility is that, you know, since I think you've asked a lot of the questions of myself and also Dick, I think I could get my slides in ten minutes. Dick, I just asked Dick, you know, without a lot of questions he thinks he could run through his in ten minutes. If there's two hours allotted, and you typically give 50/50, so you could have 20 minutes, you know, 15 or 20 minutes for Jennifer to run through the thermal-hydraulic analysis part, and then another 20 minutes for Mark or so to go through the - or, you know, whoever to go through the PRA, if you want. And, you are right, you could, if you are happy with the break and saving that for another subcommittee with Research that would be fine.

And then the only thing is the conforming changes. I think if you wanted, Dick, we could probably just merge that into Dick's and have him cover it.

DOCTOR APOSTOLAKIS: Jennifer didn't have very many slides, and as I remember she went through

them fairly quickly.

MR. ROSEN: You know, on the conforming changes you don't really need to do more than say we'll make conforming changes, right?

DOCTOR SHERON: Right, and I said Dick could probably just mention those in his presentation, and that would cover that.

CHAIRMAN SHACK: Okay, I mean, let's try that, and I'll just crack the whip hard enough to get us through, you know, we'll just cut off the discussion as need be to make it happen.

DOCTOR SHERON: Okay, so then, Dick and I will take about 20 minutes, about 20 minutes for thermal-hydraulics, and 20 minutes for PRA. Sounds good.

MR. ROSEN: Are we done?

CHAIRMAN SHACK: Unless anybody else has anymore comments or questions, I think we are ready to adjourn.

MR. SNODDERLY: Unless anyone wants to amend the comments that they made at the end of yesterday evening, but otherwise we'll go with those comments not hearing any others.

CHAIRMAN SHACK: The meeting is adjourned then.

(Whereupon, the above-entitled matter was concluded at 11:09 a.m.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: ACRS/REG. POLICIES & PRACTICES SUBCOMMITTEE

Docket Number: N/A

Location: ROCKVILLE, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

R. Davis

REBECCA DAVIS
Official Reporter
Neal R. Gross & Co., Inc.

Risk-Informed Evaluation of the Acceptability of Proposed Plant Modifications

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1

Risk-Informed Regulation

- Promote safety by focusing regulations and regulatory enforcement on safety significant issues
- Frequency of DEGB LOCA is very small
- Resources are better directed toward other more likely events
- Risk assessment methods allow integrated evaluation of the risk impact of changes that might be made as a result of re-directing resources from DEGB LOCA to other more likely events

2

Steps To Making Plant Modifications

- Define the proposed change and identify the change process
- Perform an engineering analysis
- Define or expand implementation and monitoring programs
- Submit proposed changes as required

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Define The Proposed Change

- Define what will be affected in plant's design or licensing basis including licensing conditions and commitments
- Identify all SSCs, procedures, and activities to be changed or affected
- The totality of changes made under 50.46a are evaluated as a single change for purposes of tracking changes to risk
- Rule permits two plant change processes
  - Changes with prior staff review and approval
  - Inconsequential changes without prior staff review and approval for each change

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Two Change Processes

(1) "Normal" risk-informed Licensing Action Request review process available for any proposed changes

(2)Licensee may apply for approval to make inconsequential future changes without staff prior review and approval
- Initial application required to demonstrate capability of evaluation processes and tools used to determine that acceptance criteria of rule remain satisfied
- May limit initial staff review by limiting scope of future changes
- Cumulative change in risk from all unreviewed changes must remain inconsequential

- *Licensee's evaluation process is the same for all changes*

5

Plant Changes Must Meet The Following Risk-Informed Principles

- Proposed change meets current regulations
- Sufficient Defense-in-Depth
- Sufficient safety margins
- At most, small increases in risk
- Impact of change must be monitored with performance measuring strategies

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Defense-in-depth Coolable Geometry

- Requirements have been relaxed in the Region beyond TBS.
- Relaxed analyses no longer require assumption of limiting SSC unavailability.
- At the same time, risk-significant SSCs (e.g., LPSI, CCW, ESW. etc.) may be removed from service for long periods for test and maintenance
- Assurance of protection for the core is via requirement that core retain coolable geometry for all analyzed breaks up to DEGB.

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Defense-in-depth Coolable Geometry (Cont.)

- To maintain defense-in-depth, the plant cannot enter or operate in a configuration unless it has been shown that a LOCA larger than the TBS with the plant in that configuration would result in a coolable geometry
- This may place some limits on power uprates or operation configurations, because the analyses would need to account for major SSCs out of service for maintenance.

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Defense-in-Depth Containment Performance

- Changes to containment and containment systems will be allowed by the rule
- Some changes to containment and containment systems will not affect CDF or LERF estimates but could still change the likelihood of a large release
- Late containment failure and late release qualitatively evaluated as part of defense-in-depth in risk-Informed licensing actions
- Late release frequency (LRF) was added to the CDF and LERF guidelines to provide a structured evaluation process and consistent acceptance criteria

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Numerical Risk Criteria

- Rule requires that the total risk increase of all changes be estimated and be sufficiently small
  - It is expected that the effect of the changes proposed can be measured quantitatively and in a realistic manner
  - Estimates using risk assessments other than PRA are permitted (qualitative, bounding, screening, etc)
  - If proposed changes are not modeled, then they should be modeled, or it should be demonstrated that the change has no, or only a very small negative effect on CDF, LERF, and LRF.
- Numerical criteria for CDF and LERF based on principles and expectations of R.G. 1.174
- Guidance for LRF will be developed as part of the planned RG

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Numerical Risk Criteria (Cont)

- Criteria are applicable for full power, low power, and shutdown operation for both internal and external events
- Licensees are to determine effect that proposed plant changes would have on important risk-informed decisions made previously

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Risk Assessment Requirements

- Risk Assessments are to address the following:
  - Initiating events - internal and external
  - Modes - full power, low power, and shutdown
  - Represent the current as-operated, as-built plant
  - Be of sufficient technical adequacy

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PRA Technical Adequacy

- PRA will be assessed by NRC taking into account standards and peer review results (see trial use R.G. 1.200)
- PRA must be able to calculate mean CDF, LERF, and LRF
- Meeting NRC approved standards should reduce the NRC resources needed to review
- Phased approach to quality of PRA's endorsed by the Commission

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PRA Technical Adequacy (Cont)

- A licensee must demonstrate that its risk assessment adequately addresses uncertainty so that there is confidence that the predicted changes in CDF, LERF, or LRF adequately reflect the plant and the effect of the proposed changes on risk
- Required uncertainty evaluation should be consistent with staff guidelines under development

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Risk Assessment Technical Adequacy

- Plants using risk assessment methods other than PRA's would need to:
  - Justify methods produce realistically conservative numerical results and appropriate safety insights, or
  - Justify method is capable of accurately determining expected changes in CDF, LERF, and LRF or
  - Justify the absence of PRA modeling for this initiator would make no significant difference in numerical results and insights.

15

Implementation and Monitoring

- Licensees must demonstrate that the acceptance criteria in the rule continue to be met given other changes to the plant, its operation, or PRA model/data updates
- If can not be demonstrated that the acceptance criteria continue to be met, a licensee must propose steps to remedy the situation

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Implementation and Monitoring (Cont.)

- The updated PRA must retain sufficient technical adequacy to demonstrate that the acceptance criteria are met
- To provide confidence in the technical adequacy of the updated PRA, the licensee must report
  - If the baseline CDF increases by 20% or more after an update
  - If the baseline LERF increases by 20% or more after an update
  - If the change in CDF from 50.46a implementation increases by more than 1E-6/year
  - If the change in LERF from 50.46a implementation increases by more than 1E-7/year

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