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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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SUBCOMMITTEE ON REGULATORY POLICIES AND PRACTICES

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MEETING

+ + + + +

WEDNESDAY,

MAY 6, 2009

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ROCKVILLE, MD

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The Subcommittee convened in Room T2B3 in the Headquarters of the Nuclear Regulatory Commission, Two White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 1:30 p.m., Dr William Shack, Chair, presiding.

SUBCOMMITTEE MEMBERS PRESENT:

WILLIAM J. SHACK, Chair

JOHN D. SIEBER

JOHN W. STETKAR

DENNIS C. BLEY

DANA A. POWERS

SUBCOMMITTEE MEMBERS PRESENT: (cont.)

MARIO V. BONACA

J. SAM ARMIJO

MICHAEL T. RYAN

HAROLD B. RAY

CHARLES H. BROWN, JR.

MICHAEL CORRADINI

NRC STAFF PRESENT:

DAVE BESSETTE, Designated Federal Official

TIM COLLINS

BILL RULAND

RALPH LANDRY

STEVE DINSMORE

ROB TREGONING

GIRIJA SHUKLA

JOHN FLACK

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

1:29 P.M.

CHAIR SHACK: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards Subcommittee on Regulatory Policies and Practices and I am William Shack, Chairman of the Subcommittee.

Subcommittee members in attendance are Jack Sieber. Dennis Bley, John Stetkar, Dana Powers, Mike Ryan, Harold Ray, Charles Brown, Mike Corradini and Sam Armijo has just shown up. Dave Bessette is the designated federal official for this meeting.

The focus of today's meeting is to consider a proposed rule on risk-informed changes to loss of coolant accident technical 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 in September.

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. We have received no written comments or requests for time to make oral statement from members of the public regarding today's meeting. A

transcript of the meeting is being kept and it will be made available as stated in the Federal Register Notice.

We request that participants in the meeting use one of the available microphones when addressing the subcommittee. The speakers should first identify themselves and speak with sufficient clarity and volume so they can be readily heard.

The Committee, of course, has been following the development of a risk-informed 50-46 for some time now. We wrote a letter back in November 2006 on an earlier version of the proposed rule that had a number of comments and recommendations for changes in the rule that we thought were needed. And some of those were essentially to look through and develop guidance so that people could essentially assure that their large-break LOCA frequencies were consistent with those that the staff had developed through the expert elicitation in NUREG and in the seismic studies that they'd done.

We also wanted them to have some rule changes to increase defense-in-depth for beyond transition size breaks and we thought there were some necessary changes to be made for the risk assessment process that would be used to determine what changes

could be made under this rule. Again, it's an enabling rule; in itself it makes no changes, it merely permits a licensee to come in on a voluntary basis and propose changes that would not be consistent with the current version of reg guide 156.

Since we have some new committee members who haven't heard any of the 50-46, I would encourage them to ask any questions they have about the overall development of the rule. I would like to focus on the staff's responses to our recommendations so I may limit the discussion at some point but feel free to pursue whatever you want. If it's going on too long I will then cut in but, again, since we do have new members and they haven't had a chance to have the full development, I think there's an opportunity here to ask questions. But we do want to make sure that we in fact do cover the changes in the rule in response to the recommendations for our November 2006 letter. Tim, are you going to lead off?

MR. COLLINS: Yes, I am. Actually, first thing I'd like to do is looking at the agenda, rearrange a couple of things if it's okay. We have Bill Ruland giving opening remarks after and I'd like to have him open before me. And one other thing the Item No. 7 here where we discuss defense-in-depth I'm

actually going to talk about that throughout my discussion of the rule concept and then just summarize that and then rather that pass the baton back and forth between us if I just kept going such that 5 and 7 would be combined in the order of presentations here.

CHAIR SHACK: Okay. If I could just turn to Bill?

MR. RULAND: Thank you. Good afternoon Mr. Chairman and fellow subcommittee members. My name is Bill Ruland, I'm the director of the division of safety systems in the office of NRR.

As Dr. Shack had alluded to, we're here to discuss the alternative to the current EECS performance requirements in 10 CFR 50-46. As you are well aware this rule-making has been around for quite some time and it has been reshaped several times both due to industry studies, subsequent Commission redirection and your comments.

I think the staff is prepared to answer the questions that you have alluded to, Dr. Shack, so I'd like to make note of that. The staff has in fact put considerable effort to derive the rule as you see it today and I think we have essentially addressed all your comments.

We are not asking for a letter at this time since the staff's plan is to re-notice this proposed rule for public comment. What we plan to do is come back to the committee after receiving public comment and we draft the final rule. So we don't need a letter as a result of this meeting; we anticipate our schedule would be some time coming back maybe next spring.

And we appreciate the time and effort that the committee has devoted to this endeavor and as always we look forward to your feedback during this meeting. Thank you.

MR. COLLINS: Okay. Now I want to staff off by giving an overview of the presentations we plan to make today. The first thing I'm going to put up is what I call a commission level vision for the rule, a very high level one slide summary, and then give a bit of background on where we have been, primarily for the sake of any members that haven't been involved in the past.

Then I'll go through with an overview of the current version of the rule, the one we want to send out for public comment in a couple of months or next month.

We refer to this version as the revised

proposed rule. There's been so many versions that we can get confused as to which one we're talking about. We'll try to be consistent. The version we have before us today we're calling the revised proposed rule. We will also use the term draft final rule, that's the one you commented on in November of 2006. And we may also refer to the original proposed rule which is the one that went out to the public back in 2005. Okay? Ideally, we'll be making only reference to two out of those three but you never know and hopefully we'll be consistent.

MEMBER BROWN: Which one is the current one?

MR. COLLINS: The revised--

MEMBER BROWN: --proposed rule.

MR. COLLINS: Right. Okay. After I go through the background on how it got through those versions of the rule, we're going to focus on the changes that have been made based on the last Commission SRM. That's the SRM that came out after the Committee's letter. We sent a subsequent paper up to the Commission discussing your comments and the Commission gave us direction. Okay? So we're going to talk mainly about the changes that have been made in response to your letter and the Commission's SRM.

After I go through that then Rob Tregoning is going to discuss topics associated with the applicability studies that really provide the fundamental basis for the rule, the expert elicitation study, and then there was also the seismic study that the staff did. Both of those have been discussed with the Committee at different times but Rob's going to touch on those again.

After Rob has finished, well this was the old schedule, after Rob has finished we'll go to Steve Dinsmore and he'll talk about changes to the risk assessment process. Okay?

There's also one other thing I want to point out right at the start. In the FRN we have included a question with regard to the use of Large Release Frequency, LRF, versus Large Early Release Frequency. We're not trying to solve that issue in this rule, okay. We'll basically go along with whatever decision is made in those areas.

But for legal purposes more than anything we've included this question in the FRN because if we decide to subsequently use LRF as a criteria down the road in this rule and haven't noticed it in a previous Public Notice we may have to re-notice a third time, okay.

So the main issue here is please don't ask us about that because we're not trying to solve that issue in this rule, okay. We don't have the people here to discuss that.

The rule concept, this is what I'm referring to as the Commission level vision, okay, the initial intent when the Commission asked us to start this rule making was hopefully to get licensees to focus on more risk significant events. And so we were directed to develop an alternative to the large break LOCA requirements that are currently in 50-46. And the alternative approach was never intended to be mandatory, it would strictly be what I call what would be a business decision for the licensees and they would have the option of maintaining the current 50-46 licensing basis of they could adopt this new alternative. Okay?

The new alternative would divide the LOCA break spectrum into two regions based on estimates of LOCA frequency. And the Commission suggested a guideline frequency for dividing the spectrum at about ten to the minus fifth per years.

Now breaks in the region that have the higher estimates of frequency would still continue to be treated as Design Basis Accidents and there would

basically be no changes to requirements for those breaks. They're estimated to have the lower frequency of occurrence, the Commission said they still must be mitigated but the performance demonstration need not be performed with Design Basis Accident assumptions. Okay? More realistic assumptions could be used.

And subsequent to a plant adopting an alternative, the Commission said that changes then to the plant should be reviewed by some sort of a risk-informed process. Okay? That was the starting point for the rule.

Now I want to give some background on how we got to where we are today. This originally started back around 2003 was the first SRM. The staffing Commission paper that precipitated the SRM had argued that the technical basis wasn't ready but the Commission decided that they wanted us to go forward anyway. And it took quite a while for us to even get the first draft put together. We then sent it to the Commission two years later, March 2005, and the Commission really didn't like that version either and it took us until November of 2005 to incorporate the changes that the Commission directed. Okay? It was finally published for public comment in November of 2005.

The most comments that we got on the original draft were from the nuclear industry, 11 out of 13, and they were pretty consistent. They thought that the licensing change process was too burdensome and they thought that the transition break size was too large.

We subsequently had three separate public meetings to work on addressing those comments and after those meetings we went back and tried to modify the rule in such a way that we would maintain our comfort and safety level but try to reduce the implementation burden. And at that point we posted what was called the draft final rule. Okay? That was the one you reviewed in November, and that was the one that precipitated your comments.

Next slide. In the ACRS letter on that draft final rule, the Committee recommended that the draft final rule not be issued as presented and the letter identified several significant concerns and included lots of suggestions as to how they might be addressed.

And the few things the Committee was satisfied with, they were happy with the relaxation of coincident single failure requirements being relaxed and the fact that loss of off site power need not be

considered coincidentally the Committee didn't object to that either.

However, there was concern with the defense-in-depth for breaks larger than a TBS and there was concern that safety margins may be eroded. They expressed concerns with the risk-informed assessment process; it was noted that the process in the draft final rule was different from the precedents and practices that had been established over the years in implementing Reg Guide 1.174 and that we really ought to look into what the implications of those differences were.

And the Committee also indicated that the process for licensees self approval of changes needed to be tightened up and that there would probably be more changes that the staff should review before they were approved.

Finally, the Committee indicated that the rules should require plan-specific demonstration of the applicability of the underlying studies, the expert opinion elicitation report and the staff's seismic study.

MEMBER CORRADINI: Just from a chronology kind of standpoint, at that point it did not go out for comment again? It has not gone out for comment

again?

MR. COLLINS: No.

MEMBER CORRADINI: Okay.

MR. COLLINS: No, the comments from the Committee were significant enough that we felt that we needed to go back to the Commission to get some guidance as to where they wanted us to go.

MEMBER CORRADINI: Okay. Thank you.

MR. COLLINS: Okay. So in the face of these comments which we thought to some extent were in conflict with what we understood the Commission's guidance to be, we decided that we needed to develop a SECY paper to ask the Commission what they really wanted us to do given all the advice they were getting.

And the subsequent SRM told us that we should continue with the rule-making. One of the reactions in the staff paper were to just discontinue the rule altogether. But the Commission said that we should continue the rule-making but its priority ought to be lowered.

We have been working on it as a high priority rule primarily because of the perception that this could result in a safety enhancement but the more we looked at it that became unclear that there would

be any such enhancement as a result of implementing the rule. So it became categorized more in accordance with those that may be considered burden reductions.

So the Commission said, well, treat it as a lower priority rule but continue working on it.

The Commission also agreed with the ACRS that the defense-in-depth ought to be increased for breaks larger than the TBS, and they also agreed that the expert elicitation report ought to be demonstrated applicable on a plant-specific basis. And although they didn't mention the seismic report explicitly, the implication is clear that no reason why people wouldn't have to do that as well.

So the Commission left it up to the staff to decide how defense-in-depth might be beefed up. They didn't tell us exactly any specifics as to how to do it.

The Commission also threw in another recommendation that we were kind of surprised at. They directed the staff to find ways to improve leak detection in plants for piping larger than a TBS, if a plant adopted this alternative.

And then the last thing that the Commission did, which was another surprise to us, they indicated that the total increases in risk should be

limited to very small. In the draft final rule we refer to them as "small" and in the PRA world, that's a factor of ten difference. Okay? So the total reduction then need to be very small.

MEMBER CORRADINI: Just for clarification, that doesn't change your initial elicitation analysis of 10 to the minus fifth as the cut point, it more changes the risk information and how you judge it after you've gone down this path?

MR. COLLINS: Yes.

MEMBER CORRADINI: Okay.

MR. COLLINS: Okay. Then after we got that SRM, actually it was quite a lull, it was almost a year where we weren't working on this rule while we were interacting with the Commission. We took that guidance and we drafted the current revised proposed rule and when we sent it by our Office of General Counsel for review they recommended that we should-- we noticed at least portions of the rule and when we talked about it more internally we thought that, since there's always been a lack of consensus on this rule and there is no urgency for the rule in that it's a voluntary alternative and parts of the rule seem to be so intertwined, we thought we would just re-propose the entire rule for comment again. Basically give

everybody another bite at the apple.

And we advised the Commission that we were going to do that in our Commission memo in December of 2008.

MEMBER CORRADINI: Again, a little more background. I'm sure you told us this in 2006 but I don't remember, so as Bill called it an enabling rule it's something somebody can voluntarily opt for?

MR. COLLINS: Yes.

MEMBER CORRADINI: In the current situation if this didn't exist, licensees can currently opt to choose between what I remember as the old Appendix K approach and a full treatment of uncertainties for the complete range. Those are the two ways in which you can address and show a compliance with 50-46, is that right?

MR. COLLINS: That's correct.

MEMBER CORRADINI: And one last thing. How many of them have chosen path A and how many have chosen path B?

MR. COLLINS: I don't know offhand. Do you have an idea Ralph?

MR. LANDRY: Ralph Landry from the staff.

MEMBER CORRADINI: I was trying to get you up.

MR. LANDRY: I'm trying to hide in the corner, Mike. The exact number I really can't give you because you have to break it down by break spectrum. All small breaks are analyzed by the old Appendix K methods. There are no approved realistic models for small break analysis.

Each of the PWR vendors has an approved Appendix K model and an approved realistic model for the large break spectrum. There are a small number of plants, significantly less than half the plants, that I believe today are still analyzed by the Appendix K method; the majority are now using the realistic model because so many--

MEMBER CORRADINI: For the large break spectrum?

MR. LANDRY: For the large break spectrum because so many have gone through license renewal and power uprate that as part of going through the power uprate many of them are using the realistic models for the margin it gives you. The difference between an Appendix K and a realistic approach for a large break is something typically on the order of 400 degrees on PCT holding everything else the same.

MEMBER CORRADINI: Of all the conditions and the requirements in terms of temperature,

oxidation, that tended to be the one that was most--

MR. LANDRY: Yes, for the large breaks.

MEMBER CORRADINI: Thank you.

MR. COLLINS: Okay. Our current plan for this rule-making the version that you're reviewing now was published on the Agency's web site on April 16th of this year. We're having our meeting with the subcommittee right now for the ACRS and like Bill said we're not asking for a letter at this time.

Our plan is to have the package signed out by the EDO by the end of June and we figure on about a 45-day comment period. Following the comment period we expect we'll be into the public meeting mode again unless everybody just loves the rule, which we're not expecting.

And then after we take into account those public comments we'll come back to meet with the ACRS again, we expect it will be probably next spring at some time, with the draft final rule version 2. Okay? And at that time we'll be asking for a letter from the Committee. And then if all goes well we'll get the final rule to the Commission by about June of 2010.

Okay. Now the revised proposed rule itself. Some of the things which we haven't touched at

all in modifying the rule is transition break size and of course since the November 6th meeting we've done absolutely nothing to change the transition break size. For PWRs it's still the largest attached pipe to the reactor coolant system. It typically turns out to be the surge line. And BWR is the largest feedwater or residual heat removal line inside containment.

MEMBER BROWN: And these are determined based on your ten to the minus 5th break frequency?

MR. COLLINS: That was the starting point.

MEMBER BROWN: And this is what fell out of that starting point?

MR. COLLINS: That fell out of that when we took into account primarily the actual pipe sizes in the plants.

MEMBER BROWN: The NRC determined this?

MR. COLLINS: Yes.

MEMBER BROWN: It's not up to the licensees to do that for the plant design, this now comes the metric, is that correct?

MR. COLLINS: Yes. The way the rule is written it says the large detached pipe.

MEMBER BROWN: I read the rule and that's

why I just wanted to make sure. I didn't understand that connection. It was fuzzy to me when I read all the letters.

MR. COLLINS: Okay. And mitigation must still be demonstrated for all LOCAs, that hasn't changed either. Okay?

Now there's changes from here on out.

MEMBER BROWN: I have one more question. I'm one of the new guys that don't know the background. Mitigation must be demonstrated for all LOCAs?

MR. COLLINS: Right.

MEMBER BROWN: Even the large break?

MR. COLLINS: All the way up to the double-ended guillotine.

MEMBER BROWN: The double-ended guillotine break. And when you say mitigation?

MR. COLLINS: We have some criteria in the rule which have to be met, mitigation criteria, which I'm going to discuss.

MEMBER BROWN: All right. I'll wait.

MR. COLLINS: It's a few slides down. Okay. Now from here on out there's some things that have stayed the same and some things that have changed. If a licensee wants to adopt the

alternative what do they have to do in the first place? How do they get started? Okay?

So first of all they have to submit a License Amendment Request to the staff. Okay? Now that License Amendment Request has to include enough information that will demonstrate the applicability of the elicitation report to their plant, Rob's going to talk about that in a little while, and it also needs to demonstrate the applicability of the staff's seismic study or provide a plant-specific study that gives us results that are favorable as the staff study, and Rob's going to talk about that as well.

They need to describe the process that they used for doing a risk-informed evaluation of any plant changes that came in with the initial amendment. They need to add to the tech specs any non-safety equipment that's credited for analysis of breaks greater than the TBS. That's new. Actually, the demonstration of the applicability of the elicitation report is new, the seismic report is new, okay. And then they have to provide the revised ECCS analysis; nothing new there.

MEMBER BROWN: The licensees you said in an earlier comment that the initial proposal, the licensees or people you can talk to, public comment,

said that that was burdensome and you worked to reduce the burdensomeness of it.

MR. DINSMORE: This is Steve Dinsmore. Much of the burden that they were talking about originally was the PRA-related burden.

MEMBER BROWN: Okay. Not this type of stuff? Okay. Because these were added back in so I would have viewed those as new burdens but not of the same issue.

MR. COLLINS: Oh yes. Well, this rule is no less burdensome now than--

MEMBER BROWN: But this is going to get better for them?

MR. COLLINS: No, I'm saying that facetiously. That was tongue in cheek. I'm sorry.

MEMBER CORRADINI: But just to clarify one thing just so I understand when you said the Commission kind of surprised you by changing a qualitative descriptor from small to very small, that involves the third bullet, does it not?

MR. COLLINS: No, not really. No.

MR. DINSMORE: It evolves.

MEMBER CORRADINI: The acceptance criteria?

MEMBER BROWN: Right. I guess that's

what I'm trying to say. You do the analysis but now the line by which you judge has moved?

MR. COLLINS: Yes. But there's process steps involved too that we're making reference to.

MEMBER CORRADINI: Okay. Right. That helps.

MR. COLLINS: Steve will discuss those.

MEMBER CORRADINI: Okay. Thank you very much.

MR. COLLINS: Actually, I'll touch on them and Steve will discuss them in more detail. Okay.

Now the ECCS analysis requirements. For breaks that are smaller than the TBS everything is the same as it was before we even started this whole thing. There's no changes, any breaks less than a TBS.

Now for breaks greater than the TBS we made some changes and there's some things that haven't changed. First of all, we haven't changed, the no-single-failure assumption is still in place now. For breaks larger than the TBS you do not have to assume a single failure. Okay?

You do not have to assume a loss of offsite power. Okay? Well one more thing that hasn't changed, we're still going to allow alternative

metrics for coolable geometry, if somebody wants to try to defend them. Okay.

Now things that have changed, in the credit for use of non-safety equipment, the previous rule allowed credit for non-safety equipment. This rule still allows it for breaks larger than a TBS but there's a few conditions that we've added. Okay?

First of all, the equipment's got to be identified in the tech specs. Now we're not talking about having a typical LCO on the equipment but it simply needs to be identified in the tech specs. In this way a licensee can't remove that without staff review. Okay? And the Commission in their SRM actually directed us to do that. They said that the equipment used for mitigation of breaks larger than the TBS should not be removed without prior staff approval. So we said we'll put it in the tech specs, that way they can't do that.

MEMBER BLEY: I'm just confused. I'm not familiar with the tech spec entry that's not associated with the LCO. How's that done?

MR. COLLINS: Well we don't know.

MEMBER BLEY: So nobody's done one yet?

MR. COLLINS: No. Nobody's done one.

MEMBER BLEY: This isn't in place yet?

MR. COLLINS: No, this is not in place. We'll have to create a section in the tech specs that identifies this.

MEMBER STETKAR: But in the rule there's a de facto LCO of 14 days.

MR. COLLINS: Yes, there's a back stop in there. Right.

MR. DINSMORE: But that's 14 days without having the equipment available to mitigate that you need. This is the equipment that you should have available. This equipment could--

MEMBER STETKAR: Could you say that again?

MR. DINSMORE: Let's say you're going to credit some fire pump instead of a LPIC pump, which you can do in this case. The 14 days means you can't have both one LPIC and the fire pump out for more than 14 days because you either needed one or the other. However, you could have that fire pump out whenever the LPIC pump is available.

MEMBER STETKAR: I understand that.

MR. DINSMORE: Yes. So that the 14 days is on--

MEMBER STETKAR: This is on the combination?

MR. COLLINS: It's on the combination, right. Right.

MEMBER STETKAR: But listed in the tech specs is that superset of--

MR. COLLINS: Fire pump.

MEMBER STETKAR: And LPIC.

MR. COLLINS: Yes, and any other pumps that they might want to add to the plant and take credit for at one point or another.

MEMBER STETKAR: Okay.

MEMBER CORRADINI: So can I just ask, I'm glad they asked it because I was confused. So just let me say it back to you so I get it right. So in your mind you have this vision that if this were to go forward and a licensee were to opt for this there would be a new section of the tech spec that says between TBS and double guillotine I need these things, or I'm going to need these things to mitigate.

MR. COLLINS: I would say I may take credit for any of these things.

MEMBER CORRADINI: I may take credit for it. And then the LCO for the 14 days applies to the complete set?

MR. COLLINS: The 14 days think of it as they must be in an analyzed condition throughout the--

whenever they're operating they need to be in an analyzed condition. They can use any of this equipment except for up to 14 days. Okay? Up to 14 days they could be in a non-analyzed condition.

MEMBER CORRADINI: Which some of these things could be unavailable?

MR. COLLINS: Yes, all of them in fact. All of the non-safety stuff could be unavailable for up to 14 days.

MEMBER CORRADINI: Okay. Got it.

MR. COLLINS: That's what the rule says.

MEMBER BROWN: So if you took credit for three non-safety pieces of equipment, they could all be out of service for 14 days and you could continue operating? The non-safety?

MR. COLLINS: That's correct. That's correct.

MR. RULAND: And it's 14 days out of what?

MR. COLLINS: Within any 12 month period.

MEMBER BROWN: Okay. So you add them up as you go?

MR. COLLINS: Yes, add them up as you go.

MEMBER BROWN: It could be one year three there and four--

MR. COLLINS: Right. Right. A total of 14 days in any 12 month period. Right. That's a backstop that we put in there.

MEMBER BROWN: Is that what LCO means?

MR. COLLINS: LCO means Limiting Condition of Operation. That's a defined term in the regulations and this is not an LCO.

MR. DINSMORE: It's a lot different because LCOs normally don't add up, you just go in and out.

MEMBER BROWN: Did the rule say they add up? I didn't--

MEMBER CORRADINI: Yes, we missed that.

MR. COLLINS: The words were deliberately written as 14 days in any 12 month period. We intended it to be added up, that's why it was written that way.

MEMBER CORRADINI: And then I'm sure we'll come back to that. In the most recent past incarnation of this it was seven, was it also added up over 12 days?

MR. COLLINS: No, I don't think so.

MR. DINSMORE: I believe what happened was the rule which went on the web back then said seven and when we came to make the presentation we'd

already changed it to 14.

MEMBER CORRADINI: What? Say that again? Because some of us actually do remember seven somehow so I was truing to figure out how you defined seven back then.

MR. DINSMORE: Right. There was a rule which was posed on the web which said seven days. When we came to make the presentation to the ACRS about the rule that was posted on the web, we had already decided to change that seven to 14. I have some backup slides that tell you where those numbers came from.

MEMBER CORRADINI: That'll come. I just wanted to understand the difference. Thank you.

MR. COLLINS: Okay. Another change that we made that kind of crosses over two bullets, there the credit for offsite power and the credit for non-safety equipment. Operators must be able to readily provide onsite power to any equipment that's credited for mitigation of breaks.

Now this is a defense-in-depth measure. Okay? They can still in the performance analysis take credit for offsite power so when they're trying to show that they meet the coolable geometry criterion they can take credit for offsite power for the non-

safety equipment. But they still have to be able to readily attach that equipment to onsite power for the purposes of accident management. That was not in the previous version of the rule. Okay?

MEMBER BROWN: Do those go together? If offsite is not available and how can they get it back?

MR. COLLINS: They would attach it to onsite power. It could be safety grade onsite power, it could be some other.

MEMBER BROWN: All right. You don't care where the power comes from?

MR. COLLINS: We don't care. They need to be able to attach it to some onsite power for the purposes of accident management. Okay?

Let's see am I still on this slide? There's another change we have made now to the analysis method that deals with ECCS requirements. The previous version of the rule did not require prior staff approval of the methods used for analyses of breaks larger than a TBS. Okay? And this current version of the rule, the revised proposed rule, requires fire staff approval for the methods used for larger than TBS breaks. That was one of the recommendations of the committee in their letter as I recall.

And we've also modified the acceptance criteria for breaks larger than the TBS. We've changed the criteria to a high probability that the acceptance criteria are met, just like the criteria in the best estimate methodology in 50.46 that says you have to meet the criteria with high probability.

The previous version of the rule had something like reasonable confidence that we meet the criteria and we just thought you ought to have more confidence in the result. Right? Why have two sets of methods divided by this magic line called the TBS? Your analysis ought to be reliable. So we decided we would make the high probability criteria apply for breaks larger than a TBS.

This also gives us more confidence and a better understanding in margins that may be eroded. We'll do a review of the methods and we'll have high confidence in the results. So that's a change from the previous version of the rule as well. Okay?

Now once someone has adopted the 50.46(a) option, you know, they're free to make changes to the plant that they might not have been able to make before they adopted the option. So changes that are now made must be evaluated using a risk-informed process if that change is enabled by this new rule.

And what we mean by enabled is that you will meet the criteria of 50.46(a) but you would not meet the criteria of 50.46. That's how we determine what an enabled change is. Okay?

Or if you bundle a change with an enabled change it also has to be a risk-informed evaluation. I guess the second one's automatic actually because you already have an enabled change. Okay.

And staff review will be required unless there's three conditions that are met. Okay. The licensee has a risk-informed process reviewed by the staff for making changes, that the change doesn't result in an increase in risk that's greater than minimum, which has some value that Steve can attach to it, and 50.59 still has to be satisfied. Okay? So if a licensee can meet all those criteria they can make changes on their own; otherwise it'll have to reviewed by the staff.

MEMBER BLEY: Tim, back to your first bullet. The first one, if I'm reading it right if I read the rest right, is if you bundle changes and one of them is enabled by the rule, then you have to risk-inform the whole set of them which is a little more than they would normally have to do?

MR. DINSMORE: Yes, that's correct. But

the only reason to bundle them really is if you need them to help you meet the risk acceptance criteria. So there's a link there.

CHAIR SHACK: Now, this is a reduction in scope for the process. Now why did you change the reduction in scope from the previous version of the rule which was based on the maintenance rule? That was sort of neither the SRM nor the ACRS told you to do that, that was your own idea.

MR. DINSMORE: Well, if we put back in minimum, see the way the draft final rule is written they had to do risk-informed evaluation for every single change at the plant, including stuff that was not previously regulated, which was one of the comments we got.

Now if you tack onto that also that there's a minimum change in risk--

CHAIR SHACK: Then you restricted that by saying you only had to do that for components that were under the maintenance rule. If the change affected a component that was under the maintenance rule, wasn't that the way the what is it the draft final version was written?

MR. DINSMORE: Yes, that was one of the criteria. Also the SRM that came back down when they

changed small to very small they said ensure that all changes are made under this rule.

CHAIR SHACK: All changes? So you didn't want to restrict it that way. Got you.

MR. DINSMORE: So again it was kind of well we have all these options and we effectively took refuge in 1.174 and just said, well, if we're going to do this at least we know how to do 1.174. And rather than change the whole characteristic of all the analyses, we thought we'll just try to go back to 1.174 and do what we know how to do.

MEMBER STETKAR: Are you going to go into more detail about this or is this our shot at--

MR. DINSMORE: No, it comes up. It'll come back.

MEMBER STETKAR: Okay. I was just looking forward to the slides and I wasn't sure where we had the opportunity to discuss this in more detail.

MR. DINSMORE: Yes, it comes back in different sets of bullets that actually we'll lay it out in a little more detail yes.

MEMBER STETKAR: Let me see if I can, just so I can think ahead a bit and understand. Two things I was struggling with is the second bullet there, or the converse of that, that a staff review is

not required as long as the licensee has submitted an acceptable process and the licensee has made the claim that the risk is indeed minimal and they've satisfied the 50.49 staff. Then the staff doesn't need to review any of the changes?

MR. COLLINS: Right.

MEMBER STETKAR: The issue I keep hanging up on is seismic risk. Within the context of the rule and the implementation of the rule, is seismic risk determined simply by the seismic-induced pipe failure frequency? In other words, demonstrating that my seismic-induced pipe failure frequency at the TBS or above is less than 10 to the minus five?

MR. DINSMORE: That would be an entry point into the rule. You have to do that to even take--

MEMBER STETKAR: But for me as a licensee to say that you don't need to review my submittal for some change if I can demonstrate to you that indeed my seismic-induced pipe failure frequency at the TBS is less than ten to the minus five, is that adequate for me to justify the fact that the increase in risk is minimal and I don't need to submit my analysis to you?

MR. DINSMORE: No, for each change that you were proposing to make, when you evaluated that

change you'd have to do a risk assessment evaluation of that change. That should also include the effect of seismic on that change.

MEMBER STETKAR: Simply limited to seismic break frequency? Or integrated risk?

MR. DINSMORE: Well integrated risk if you were making some change that's going to affect the capability of the plant to respond to a seismic event, regardless of whether you were breaking a pipe or not.

MEMBER STETKAR: Hard for me to believe then how anybody can pass that criterion. If I have a ten to the minus five seismic event I'm going to, with high confidence, fail most if not all of the mitigation systems for that event. And therefore my core damage frequency is going to be ten to the minus five. Ergo, it is not less than ten to minus six--

MR. DINSMORE: Ten to the minus seven.

MEMBER STETKAR: Seven, whatever. Very small.

MR. DINSMORE: No, that's minimum. There's three numbers.

MEMBER STETKAR: I'm sorry. Small, very small. I haven't got the step ladder right in my mind yet.

MR. DINSMORE: I guess it's not clear to

me how difficult or not difficult it's going to be but the parameters are that--

MEMBER STETKAR: I just wanted to understand how if I was going to make a submittal, it is not acceptable for me to simply show that the seismic-induced pipe break frequency is less than ten to the minus fifth and therefore I can make a determination as a licensee. Now I'm making the determination of whether or not I must submit this change to you for review. Right? I must claim that the increase in risk is minimal. So what criterion do I use? Because everything that I've read about seismic is simply seismic-induced pipe break frequency. It is not seismic--

CHAIR SHACK: That was to select the transition break size.

MEMBER STETKAR: True.

CHAIR SHACK: Now once you've selected the transition break size you still have to go through this risk assessment which is an integrated risk assessment.

MR. DINSMORE: I will give you another example perhaps. One of the things that we were talking about a long time ago for self approval is increasing the time for valves to open because now you

have a little more time. So you're going to increase the time for a valve to open.

Now once you're in this and you've had this approved process beforehand, there's really no seismic impact, well, they'd have to just determine the potential impact of seismic events on the sequences that they're going to change. I'm not quite sure I'm fully answering your question because I guess the idea was that they need to be bounded by the seismic transition break so they'd have to show that the frequency of seismically induced breaks is not greater than ten to the minus five.

MEMBER STETKAR: Okay, that's frequency. That doesn't--

MR. DINSMORE: But once they're in there, yes, then everything switches over to evaluating the specific changes that you're looking at. And when you evaluate each specific change you have to deal with seismic as you would normally deal with seismic in a risk informed 1.174 submittal. I mean that varies a lot depending on what's going on but however you deal with that--

MEMBER STETKAR: I guess what I'm struggling with is I understand what you're saying about changes but simply by invoking this rule I am

presuming that my seismic-induced core damage frequency is negligible compared to my non-seismic induced core damage frequency.

So, for example, I want to change valve stroke times which might not necessarily be directly affected by a seismic event. So I put my blinders on and I look at that very, very narrow issue and I show that the change in risk, on strictly that issue, is very, very small. And simply by invoking this rule I've now increased my core damage frequency by a factor of ten to the minus five because I haven't looked at the true seismic effect of this entire rule. Do you follow what I'm saying?

CHAIR SHACK: You lost me a bit at the very end there.

MEMBER STETKAR: The fact that the rule requires me to only look at seismic-induced LOCA frequency not seismic-induced risk, I can invoke the rule as long as my seismic-induced pipe break size is less than ten to the minus five per year to get a transition, a LOCA of the transition break size. Right?

MR. DINSMORE: Well, your LOCA frequency might be much less than ten to the minus five.

MEMBER STETKAR: But if may be ten to the

minus five and maybe it's ten to the minus six.

MR. DINSMORE: Let's say your pipe break frequency is ten to the minus six and your CDF from seismic is ten to the minus five. Again, are you going to change that by the change that you make? But that's covered here.

MR. DINSMORE: We try to keep them separate. One is just get in and the other is--

MEMBER STETKAR: I'll let you keep going. I was trying to get some things straight in my mind a little bit.

MR. DINSMORE: It gets complicated.

CHAIR SHACK: I mean, in all likelihood your likelihood of busting the pipe is going to be a lot lower than your seismic likelihood of busting a lot of other stuff.

MEMBER STETKAR: That's right, but I don't want to make that presumption because we're talking about a rule here.

CHAIR SHACK: No, I want to allow the fact that the likelihood of a seismic event, because we're going to apply this to every plant from here on out, so there might be, I might harden my equipment in the future such that there's an equal likelihood of breaking the pipe and breaking the equipment. I

don't want to presume relative likelihoods here.

MEMBER STETKAR: If we think about existing nuclear power plants in the United States based on construction and design basis accelerations, you're absolutely right. But if you talk about new plants being built that will operate under this rule that may not necessarily be true.

CHAIR SHACK: But even if it isn't I think they're still covered.

MEMBER STETKAR: That's what I just want to make sure. The words "risk" and "frequency" are used a little bit sloppily in the rule itself. And I just want to make sure that when we're talking about risk we're talking about risk and when we're talking about frequency we're talking about frequency as part of it.

MR. COLLINS: Shall I continue? The last bullet on this slide is a new addition as well. When licensees come in and subsequently make changes to their plant, they have to confirm that those changes don't invalidate the applicability of the elicitation report of the seismic studies that got them in the door in the first place as well.

If somebody comes and decides they want to change the seismic support or something, that could be

problematic. Okay.

Now risk-informed plant changes, those that basically are enabled or bundled will have to meet criteria in the rule, which are basically mirrors of what's in Reg Guide 1.174. They need to maintain defense-in-depth and safety margins. They have to have monitoring programs in place and the risk increases have to be acceptable, although they have to be very small.

And then the licensees are also required to periodically update their PRA and confirm that they haven't exceeded the very small cumulative risk estimate.

Referring to these here as other requirements, although I think I've addressed them already in the previous discussion, the analysis methods for LOCAs has got to be approved by the staff now and have to be able to connect any non-safety equipment to onsite power.

PRA methods must be of sufficient scope and quality; there's no change there from the previous version of the rule.

The leak detection one is brand new. Basically, this is a nudge to have people pick up the practices that were described in Reg. Guide 1.45 which

was developed after the Davis-Besse event. I think that's where the Commission decided that this was not--

CHAIR SHACK: The 1.45 is much older than Davis-Besse but it was revised.

MR. COLLINS: It was revised, right. Right. It was called Guidance on Monitoring Response to Reactor Coolant System Leakage and currently the Commission would be happy to have people adopt that as an acceptable means of maintaining leak detection in breaks larger than the TBS.

CHAIR SHACK: Good.

MEMBER BROWN: I take it for not the big stuff. Is there a leak detection? You mentioned earlier that that was an addition that the Commission added so I was taking it from that that we don't have leak detection methods?

MR. COLLINS: No, there's nothing in 50.46, which addresses leak detection right now. Okay? There's other regulations.

MEMBER BROWN: So this would be an added capability?

MR. COLLINS: This would be an enhancement in your leak detection capability.

MEMBER BROWN: You have to add capability.

You have to add equipment to do that.

MR. TREGONING: You have to demonstrate that you have sufficient capabilities to meet these enhanced detection requirements. You may or may not have to add equipment to do that.

MEMBER BROWN: You mean you may have something that's already there that can fulfill that requirement?

MR. TREGONING: You may be adequate already.

MR. COLLINS: And then the last bullet is the backstop which is not an LCO but it's an LCO-like backstop for assuring that the plants operate in an analyzed condition. The original Commission SRM said that you must maintain your ability to mitigate breaks up to the largest, the double-ended guillotine of the largest pipe. And in interacting with the industry we found out that that could be a killer for the rule. They could really take advantage of the rule because if they had to take a second pump out for service at some point it would be meaningless. And the risk implications of that should be very low. Okay? So we put a backstop for 14 days in there.

MEMBER STETKAR: Tim?

MR. COLLINS: Yes?

MEMBER STETKAR: Since this whole rule revolves around a kind of risk-informed framework if someone's going to adopt it, why impose a fixed negotiated -- I'll use that word -- 14 day de factor LCO, when indeed each individual licensee could use their risk information to you know we're moving in the direction of risk-informed tech specs and we have a process in place to indeed justify LCOs based on a plant-specific risk assessment, why in this particular case 14.000 days is appropriate for absolutely everyone where certain licensees might be able to justify longer times, other licensees might indeed be restricted to much less durations if they have less redundancy and so forth.

MR. DINSMORE: There is another difference between this and normal LCOs. With normal LCOs you could still mitigate the accidents. In other words, you have two LPIC pumps, you need one and you take one out. You still have one left, unless that happens to fail.

Well, in this case this 14 days you could not mitigate that large break LOCA.

MEMBER STETKAR: I understand that but philosophically we're still talking about a risk metric in terms of determining what that appropriate

number is. We're accepting the risk of core damage in this case, known core damage, for a certain period of time. In the other case we're accepting a risk of reduced margin to core damage.

MR. DINSMORE: Yes.

MEMBER STETKAR: Philosophically it's no different.

MR. COLLINS: I mean that's been debated as long as the world's been going on. What should we do about that? The Commission wants us to put a backstop somewhere; when we talk to the industry we originally had a seven day period in there. The industry said, look, we need more time to get equipment fixed and analysis done, you know, and we can do just about anything we need to do in a 14 day period so let's put a backstop at 14. That's kind of how we got there. Steve's got a more sophisticated way of getting there.

MEMBER STETKAR: I read that.

MR. COLLINS: But the fact of the matter is the Commission wants us to have mitigation capability and they want to put a backstop which is not overly burdensome so we kind of arrived at a 14 day number.

MEMBER STETKAR: But does the rule have

to specify a specific number or does the rule have to specify a requirement for a licensee to (a) have a tech spec and (b) have a justification for the tech spec?

MR. COLLINS: The rule can be written any way--

MEMBER STETKAR: Or a climate for a licensee to provide a tech spec with an LCO and justification for that LCO also satisfies the criterion for a backstop doesn't it? I mean in that--

MR. COLLINS: It could be done that way. It probably could be done in a lot of different ways, this is just one way that we've come up with.

MR. DINSMORE: We discussed that specifically and it became an extra analysis that had to be done and provided and reviewed.

MEMBER STETKAR: Again, but it's a licensee, this is a voluntary acceptance on the part of the licensee. If they don't want to do the analysis they don't have to.

MR. DINSMORE: Yes. Right.

MR. COLLINS: It's just one way of doing it. Okay.

MEMBER RAY: I've been pondering this readily connect onsite power to safety equipment

that's credited. Is there any more guidance or anything specified other than it has to be able to readily connect in terms of what you do to connect it?

MR. COLLINS: Not at this point. We'll probably have to develop that as part of the Reg Guide.

MEMBER RAY: Okay. John has been asking a lot of questions about seismic. Are there any requirements on this non-safety equipment at this point?

MR. COLLINS: Well, it has to be available. And another thing we have to put in the tech specs, that opens the door to us to ask them about it, okay, because we have to review a tech spec change. Now we haven't put any specific requirements on it but you know it's something that we'll look at and if we think it's squirrelly we'll deal with it at the time.

MEMBER RAY: Well that's not satisfying.

MR. DINSMORE: Also, if the non-safety rated equipment is extremely sensitive to seismic events, some big tank on the top of something or other, then when you do your change in risk to make the change that you're going to credit that, then you would need to include the risk of the seismic event--

MR. COLLINS: Disabling.

MR. DINSMORE: Yes, disabling, thank you, of that equipment. So it's not completely disappeared. It's treated as part of the process.

MR. COLLINS: This is an area we had trouble with all along. I mean supposedly we're dealing with the very low risk contributors already and how much attention do we want to pay to the equipment associated with the low risk events, you know, and it's a constant debate. If we go too far in one direction we're back into the normal 50.46 again putting all the requirements on for the equipment that we had low TBS, and if we go the other way it's like well at what point do you stop putting requirements on things and just ignore it all together.

MEMBER RAY: Yes, those are points I can recognize. It's the part in-between that I'm thinking kicking the can down the road has maybe got some problems. Maybe that's all we can do at this point but I just think, you know, to say well we'll worry about that when we get to it might not be the best way to handle it. Seems like an afterthought I guess is what I'm saying.

MR. COLLINS: Well, it certainly would be

nicer if we had nice clean criteria for all the equipment. I mean I'm in agreement with that, I mean it's just that I think we'll work it out in the reg guide.

MEMBER RAY: Okay.

MEMBER STETKAR: One thing I'd just like to mention again is that this is a rule that will be in place for not only current existing operating reactors but all future reactors, and it's quite likely (a) most of the equipment in this plants will be non-safety related and (b) it's quite likely that seismic events will be the dominant risk contributor in those plants. I'll just make that statement.

The concept that we're dealing with a very low risk contributor as a fraction may indeed apply for existing operating reactors. As a fraction of the total risk, the seismic issue in particular, may not apply as a small fraction of the total risk. Absolute risk may still be very, very low but being careful about the seismic part of the problem may be more important for new reactors than it is perhaps for existing reactors, just because of the nature of the way that they designate their systems, most of which are non-safety related.

MEMBER RAY: Well, I mean you're going to

have to do a seismic analysis on this non-safety equipment.

MR. COLLINS: Yes.

MEMBER RAY: Okay. If that's what you say. Why is it non-safety-- I mean I don't know. We'd better move on I guess. It seems very strange.

MR. COLLINS: Okay. Now as far as future reactors go, the rule doesn't say all that much about it other than the 50.46(a) can be used if similarity in design and operation is demonstrated and if an appropriate TBS is specified.

Now this is going to be a design-specific review which is really going to require a lot of development in reg guide space but the Commission wanted to leave the door open to future reactors so we've included it in the rule.

These next two slides are simply a summary of what we think the changes have been relative to defense-in-depth since the draft final rule that you reviewed in the past. Nothing changed with regard to single failures. Loss of offsite power, this is why we require now that they provide onsite power for any non-safety equipment, that gets credited in the analysis. Non-safety equipment now has to be identified in the tech specs and it's got to be

maintained available if they want to take credit for it because of the 14 day backstop. As far as the ECCS analysis methods go before we had no prior approval of ECCS methods, now prior approval is required. And instead of just giving us a reasonable representation of the system response we want a demonstration of high probability that the criteria will not be exceeded.

With regard to the criteria though there's something I didn't mention. We added a question in the FRN as well with regard to the coolable geometry criteria for breaks larger than the TBS. The question we put in there was whether we thought it was practical to try to develop implementation criteria for coolable geometry for breaks larger than the TBS, as opposed to just using the same criteria we used below the TBS.

And the reason we added that question is just because of our history in trying to modify 50.46(b) right now with the oxidation criteria we've been trying to do that for years and years and years, and is it really practical to try to slice the bologna further now and define coolable geometry differently for beyond TBS. So we added a question to the FRN to say that we think this is, you know, are we wasting

our time doing that?

MEMBER POWERS: My response to it now you put it up was that we've been trying so hard to get 50.46(b) done that why are you inviting this headache on yourself here?

MR. COLLINS: Exactly.

MEMBER POWERS: I mean my personal feeling is we've got it pretty please. But it's not a radical change in the definition of the coolable geometry. Now maybe somebody wants to come in with a more realistic analysis. I mean 50.46 is a fairly conservative approach to the world just because nobody can figure out how to do it any other way. I mean it follows the logic that you've got to maintain geometry and the way to do that is don't break anything, don't break anything, it's got to be ductile as though as it has to survive. I mean that's a pretty conservative approach.

MR. COLLINS: Okay. Well that's the end of my presentation unless there's more questions. And I'll hand it over to Rob.

MR. TREGONING: Thanks, Tim. I'm Rob Tregoning from the Office of Research and I'm just going to present a brief overview of efforts that our office have undertaken to initiate the development of

a regulatory guide so that applicants coming in under this rule, provide some guidance so that they could use or demonstrate that the transition break size that's been developed under this rule is applicable to their plant.

So just a brief description of what I'm going to be covering in the next few slides. For those of you that haven't followed every twist and turn of the TBS development I'm going to provide a brief summary, a very brief summary of the research that was conducted to support the development of the TBS, discuss the motivation and objectives for developing the regulatory guidance and then in just a very few slides present a high level overview of the scope, philosophy and the general framework that is currently envision for this regulatory guidance.

And then, finally, I'll touch on the status and schedule for the development and then also discuss interaction with the ACRS as part of the schedule that we've drafted for the guidance development.

So a little bit of a background. I think we've already touched on these NUREGs during this meeting, at least conceptually. There were two NUREGs that were developed, NUREG-1829, which covered the

expert elicitation which developed LOCA break frequencies for what was called normal operational loading, so that was normal loading and transients that would be expected over a 60-year life of a plant.

And then once the TBS was picked, primarily from that work as well as other considerations, there was an additional study done summarized in NUREG-1903 which looked at estimating the seismic LOCA frequencies associated with breaks greater than TBS. So we didn't consider seismic explicitly when we picked the TBS, but what we did is after we picked it we went back and did some work to make sure that the seismic LOCA frequencies were still below our ten to the minus fifth per year metric that we were given by the Commission as guidance for basing the TBS.

And this work really started, this technical basis work started in an SRM in 2002 where the Commission directed us to provide a comprehensive LOCA failure analysis and they further indicated that we should use expert elicitation to convert service data and PFM results.

MEMBER BROWN: Let me-- I want to try to make sure that I understand. You talked about the ten to the minus fifth seismic break; now is break due to

seismic? I'm just trying to get the wordsmithing.

MR. TREGONING: Yes, again there were two NUREGs. The first, NUREG-1829 did not consider seismic initiating events. Okay. And essentially a risk metric of ten to the minus fifth associated with those breaks was used as the starting point for choosing the TBS.

Now once the TBS was selected then we did the subsequent study, 1903, to ensure or to demonstrate or to understand if the seismic risk would invalidate the TBS selection that we had made.

MEMBER BROWN: And the numbers would come out too large?

MR. TREGONING: We wanted to demonstrate that the seismic frequency and therefore risk for breaks greater than the TBS was acceptably small.

MEMBER BROWN: You use the word seismic frequency, you mean seismic induced?

MR. TREGONING: Seismic-induced LOCAs.

MEMBER BROWN: Okay. All right.

MEMBER STETKAR: Rob, to be clear again because I get hung up on the words "risk" and "frequency" because they're different things; 1903 was a demonstration that the seismic induced pipe break frequency was less than ten to the minus fifth per

year. It made no assertion whatsoever on risk from those events, is that correct?

MR. TREGONING: That is largely correct. The one aspect that would look at risk was it did look at indirect failures of piping, right, so you would look at the frequencies associated with other events such as support failures and what the implication was.

MEMBER STETKAR: But that was still, it wasn't a great frequency.

MR. TREGONING: Yes, it wasn't a CDF risk per se. It was related to--

MEMBER STETKAR: --the pipe break frequency.

MR. TREGONING: Right. But the difference with the indirect is it wasn't an initiating event within the pipe break. The pipe break itself wasn't the initiating event.

MEMBER STETKAR: Seismic two over one type?

MR. TREGONING: Right.

MEMBER STETKAR: But still pipe break frequency not the--

MR. TREGONING: Consequences.

MEMBER STETKAR: But it says on the side,

verify that the risk associated with seismic induced breaks greater than the TBS are acceptable. NUREG 1903 says nothing about that statement.

MR. TREGONING: That's true in terms of, risk define in terms of CDF, that's true. Although 1903 made very crude assumptions about how frequency would translate to risk.

MEMBER STETKAR: Okay, if damage frequency of ten to the minus five is acceptable then indeed one can infer--

MR. TREGONING: Right. So there were risk inferences made in 1903 but they were usually made by assuming that a pipe break went directly to CDF, so a consequence of one essentially. So a very crude metric was used.

MEMBER STETKAR: Thanks.

MR. TREGONING: Briefly, I wanted to summarize 1829, the elicitation was used to estimate generic and I've highlighted that because that's really the main reason for developing this regulatory guidance to ensure plant-specific applicability of these generic BWR and PWR passive system LOCA frequencies and again it developed these frequencies associated with material degradation, or aging within passive system components.

We had a number of panelists. We had roughly 12 panelists on the elicitation. They provided quantitative estimates that we then analyzed to develop frequencies associated with each panelist, and they supported those estimates with qualitative rationale. And we did a combination of group meetings to ensure that all the experts had sufficiently equal background in terms of the issues that we were eliciting, but then the elicitation themselves were done individually to address the underlying technical issues.

And as people that have followed this are very aware, with the next few statements we had generally good agreement among the experts on the qualitative LOCA contributing factors. But, not surprisingly, there was large individual uncertainty and by that I mean how certain each panelist was associated with their quantitative number.

And then also there was substantial variability in estimates between panel members, which we called the panel variability.

So that results in a fairly wide total uncertainty associated with these estimates.

Another aspect of 1829 which was discussed quite a bit is the results themselves are very

sensitive to the method used to aggregate the individual panelist's estimates. So we developed point estimates of specific frequencies both mean, 95th and then we developed confidence bounds associated with each of those percentiles within 1829. And we published that a little over a year ago.

And the way 1903 was done was really a compilation study. The first aspect of the study looked at the experience and all the prior work that had been done, a very large body of prior work that had been done on seismic analysis of piping and other passive systems failures. So it reviewed prior PRA seismic study, component testing and experience as well.

It also looked at analyzing direct piping failure associated with rare seismic events, so these are the ten to the minus fifth, ten to the minus sixth per year initiating seismic events. So these are at stresses that are much larger than an SSE or a Safe Shutdown Earthquake type of analysis that would be required under a design using ASME code rules.

And the focus again, because we were trying to determine the frequency associated with breaks greater than the TBS, the study was only focused on piping systems with diameters larger than

the TBS, at least the study that was done on 1903 although the methods weren't unique, the study itself only examined PWRs and that was really only a function of the fact that we had the most complete information in terms of seismic hazard assessment as well as piping stress information available for the PWRs.

So with the P's it ended up that the only systems that needed to be considered based on the TBS were hot legs, cold legs and crossover legs. So essentially the main reactor coolant piping.

The other thing that it did look at it was at least one mode of indirect piping failure analysis and that was essentially a failure associated with large component support failure. And the results that were summarized in 1903 with respect to unflawed piping, there was a determination, and this is fairly well known and I don't think very controversial at all based on the experience that we've had internationally on earthquake experience, the failure frequency associated with unflawed piping is much lower than ten to the minus fifth per year. In general those pipes are very robust.

For flawed piping, the way the study was done it didn't come up with a frequency per se, but what it did do was associate it with these rare

earthquakes so that the flawed size is associated with failure. And primarily what it demonstrated was that you needed to have for long circumferential flaws and theta over pi essentially means you've got a flaw that's about almost halfway around the circumference of the pipe and these are all circumferentially oriented flaws.

And what it did for flaws that were that long, the study calculated critical flaw depths and what the study demonstrated is that these are generally large flaws even under these very rare large earthquake loads that are required to cause failure in at least the main circulation loop piping.

And then it did look at, again this one failure mode for indirect failure in the two cases, and I say two cases, it looked at two specific plants, a Westinghouse and a CE plant that had been previously analyzed in a Lawrence Livermore study and it essentially just updated that prior study using revised piping stress information as well as revised seismic hazard information.

And for those two cases the prediction was that the mean piping failure probability was on the order of ten to the minus sixth per year. And NUREG 1903 was published, again a little over a year ago in

February 2008.

MEMBER CORRADINI: I remember you being here describing all this to us before in much more detail, but just to understand the connection so is it the intent of when you did 1829 that one of the initiating reasons, potential reasons for a flaw or a break in a piping was seismic in 1829 and this subsequent study just verified that it was a small subset? Or was it a view there's two independent ways of looking at how failure would occur in a piping?

MR. TREGONING: They're essentially independent. When we started 1829 we didn't necessarily preclude consideration of seismic failure. In fact, we actually had elicitation questions developed that asked the experts about seismic failure frequencies, or frequencies associated with seismic events.

What we quickly found though was that we would have needed an entirely different panel of experts to really adequately address that problem.

MEMBER CORRADINI: But to say it differently though, so the panel of experts in 1903 were different than those for 1829, or the study was done different than 1829?

MR. TREGONING: Yes, it was a totally

different approach; 1829 used the elicitation, 1903 was more of a standard analysis. More of a standard piping component integrity type of analysis. But it was also informed by prior studies and operating experience that had been done on the seismic question predominantly back in the 80s when a lot of this work was initially done.

So hopefully this clarifies your question. They were entirely different approaches that were chosen to look at each of these questions somewhat independently. But the seismic question was a little bit easier because the seismic question we had presumed or assumed the TBS so it really allowed us to limit or refine the scope of that analysis to only these failures within very large pipes. So that made dealing with the seismic question easier in a sense because we had limited the scope of the analysis by that amount.

MEMBER CORRADINI: Right. Thanks.

MR. TREGONING: Does that-- it doesn't look like it clarified.

MEMBER CORRADINI: I don't know if I'm asking the right question.

MR. TREGONING: Well you can think about it and then come back at me with me.

CHAIR SHACK: You know, since you don't really compute a frequency out of that, you just get a warm comfortable feeling out of that, that's an awfully big flaw not to be detected. How small would a flaw have to be before you'd worry about it? What's your acceptance criteria for you know a ten to the minus five or a ten to the minus six seismic event flaw?

MR. TREGONING: Yes, that's-- we've struggled with that very question in many contexts within the NRC not just this question, in terms of what's an acceptable demonstration related to an ISI reliability and accuracy and how do we credit that? So we've struggled with that question as an agency for years now.

And if you look at the regulatory guidance, there is a requirement in there, and this is more detail than maybe I wanted to get into in this meeting, but one of the things that we're essentially thinking is that when a plant looks at the seismic analysis for their plant, they would essentially have to do their own plant specific critical flaw size calculation.

And the way that bars are set is that if they demonstrate that their flaws are bigger than

1903, which are pretty big you know 30 to 40 percent through-wall, I think there's a notion in the staff that we have pretty high confidence in those kinds of flaws. So if they can meet that bar they're okay.

So the next question is let's say they fall below it. Well the next criteria that's in there is they compare the flaw that they find with their ASME code allowable flaws which do set inspection limits. And the notion there is that if the inspectable flaw is greater than what their requirements are for code inspections, then there should be at least, if we haven't taken any conditions on those code requirements, that that at least implicitly says that there is a comfort level or an agreement that those flaws are reasonable or are going to be found reasonably using an ASME-qualified inspection.

So that's the next bar they can meet that's a little bit more rigorous.

Now the third bar, let's say they're below that, and that's really the challenge and really what we've said at that point or where we've gone there is to say, okay, if your flaw is smaller than this then you have to demonstrate to us why you can find that flaw reliably in whatever your critical location is.

So then they would have to come in and demonstrate to the NRC that they could reliably and accurately detect those flaws. And I would predict that that's going to be a fairly rigorous argument that would have to be presented.

CHAIR SHACK: How about a cast stainless steel pipe?

MR. TREGONING: Well, that would make it all the more challenging. So certainly when they do their analysis, whatever the critical location ends up being and if it's associated with a cast stainless steel pipe per se, that's going to make their inspectability demonstration that much harder. So, yes, material will clearly play into that demonstration.

CHAIR SHACK: But they can't use an experience thing, there really hasn't been much cracking in cast stainless steel pipes.

MR. TREGONING: Well, we don't-- do we know that?

MEMBER CORRADINI: I don't think I appreciate-- I just have one other question, you guys went back and forth on this. So if I understood the conversation, the smaller the flaw the more you're going to ask them to prove they can find it?

MR. TREGONING: Exactly.

MEMBER CORRADINI: So the absence of finding something makes them guilty before they're-- I'm not understanding, that strikes me like you're going down a, it's not provable.

MR. TREGONING: No, the flaw that they come in with is a flaw that's developed by analysis only so it's not like they've done an inspection. And you know this flaw says this is the biggest flaw they can live with at that location, right, and that's determined by analysis.

MEMBER CORRADINI: Okay.

MR. TREGONING: So the inspection bar would be okay how comfortable are we or how certain are we that they can really find that flaw? And the bigger that flaw is, that level of certainty is increased. So the larger that flaw is, the more relaxed the requirements are that they would have to demonstrate for us.

MEMBER CORRADINI: Okay. I understand that.

MEMBER SIEBER: The big question at least in my mind is it's very hard to find flaws in cast material. So is the detectability and characterization sufficiently good in cast materials

to make this whole exercise practical?

MEMBER ARMIJO: Good question.

MR. TREGONING: Well, again that's what would have to be demonstrated.

MEMBER SIEBER: Well but you ought to have some kind of a guess at it now right?

MEMBER CORRADINI: You don't want to have something that's not usable and that's what I think you're asking.

MEMBER SIEBER: That we're doing a lot of work--

MR. TREGONING: Well, but if you're limiting location as a cast component, right, let's say that is your limiting location to a seismic analysis. Right now that's problematic and we're working on developing better inspection techniques. But the rule itself can't get ahead of that, right, I mean that's a problem that we're going to continue to work.

MEMBER SIEBER: You can spend five years writing a rule that doesn't have an application if the technique to show compliance with a fundamental part of the rule isn't there.

MR. TREGONING: Right. But again if there was a determination that every plant was going

to be limited by cast that would be a different situation. There may be a subset of plants and I couldn't put a number on it but my guess would be it's not going to be, I would say it's probably less than half, maybe significantly less than half, that are going to be limited by their cast.

And still if they did an analysis under this rule and demonstrated that they had a very large flaw even in a cast component they would be okay. It's only flaws that would be smaller than were developed for 1903 that they would have to have sufficient proof that their inspections were sufficiently adequate.

MEMBER SIEBER: Is that sufficiently conservative in your view?

MR. TREGONING: Yes. Given the size of the flaws in 1903, yes,

MEMBER SIEBER: Okay.

MR. TREGONING: These are big flaws right? Big flaws.

MEMBER SIEBER: Cast is tough stuff to look into.

MR. TREGONING: Tough stuff to look into but in general it's got pretty good toughness and we haven't seen much service-induced, in fact we haven't

seen any service-induced degradation associated with cast. And you might argue that's because we can't inspect very well.

MEMBER SIEBER: That's because you can't inspect it.

MR. TREGONING: But at least visually it's inspected and there's been no visual documentation and you know even research-wise there hasn't been degradation modes or mechanisms that have been really identified as being of potential concern at this point. But it's something that we're always looking at.

MEMBER SIEBER: I'll quit asking questions. Hopefully you'll not identify the peak of my intelligence.

MR. TREGONING: Okay. So a little bit of background. Shall I move on?

MR. SHUKLA: Yes, this is Girija Shukla from staff. We have looked at these NUREGs and we have written a letter about end of 2007 on these.

MR. TREGONING: Yes, and thank you for clarifying that.

Okay. So the regulatory guidance itself and, as Tim had mentioned, this was a recommendation that was also made at the ACRS and when we had prior

meetings with the ACRS I think this was always the staff intent that this was something that we generally agreed on was a good idea. And the Commission agreed with everyone on that and essentially said yes, staff, go forth and develop some guidance.

And, as Tim had mentioned, in the SRM they specifically only mention guidance for 1829 but we've interpreted their direction as saying we need to develop guidance associated with all of the tech basis that used to develop the transition break size. So that would include both 1829 and 1903. So we proceeded with developing guidance on that basis and based on that interpretation.

Okay. So again, like I said, a very brief overview. This is a teaser in that I'm going to be back with a lot more detail at a date to be determined. But I at least wanted to give you a sense of what some initial thoughts are on the plant-specific applicability and how we've gone about developing what at this point is I'll call a pre-draft reg guide.

So when we tackled this thing the first thing we did is we really looked deeply into 1829 and 1903 and tried to identify all the generic aspects associated with those studies. And we looked at the

assumptions itself, what generic assumptions we had in both of these studies, the approach that we used, what were generic aspects associated with the approach and the analysis. So we tried to look at all aspects of each of those studies and identify issues that we thought were important or critical that plants would need come to in and demonstrate applicability.

So we identified as part of this initial evaluation several areas where the LOCA frequencies could be affected by plant-specific factors. And with respect to NUREG 1829 applicability, there were issues associated with safety culture. Of course, we know that individual safety culture can potentially have a large effect on LOCA frequencies and I think Davis-Besse is the most cited example of that.

We looked at applicability related to continued operation and then we also looked at applicability related to changes in plant operation that may affect LOCA frequencies. And while we were specifically thinking about changes that would be enacted by the 50.46(a), we really wanted to encompass all changes. So if a plant does a power uprate, even if it's not associated with 50.46(a), we want to ensure that that power uprate if they're going to come in and apply for 50.46(a) is not having an impact on

their LOCA frequencies. So that's what we mean when we talk about changes in plant operation.

With respect to NUREG 1903 applicability, and I use the word risk, I'll strike that and use frequency to make sure that we're not confusing piping failure risk with CDF risk, so the frequencies associated with direct piping failures caused by seismic loadings, so these are direct failure frequencies, and then the frequencies associated with indirect piping failures. So we looked at developing guides in all of these areas.

What we settled on in the draft guide, the areas that are italicized, continued operation, changes in plant operation and direct piping failure risks or frequencies, those are the areas that are specifically addressed or that will be specifically addressed within the regulatory guide itself.

We've developed a white paper that will be used essentially as the basis for this draft regulatory guide and that white paper describes how we are handling safety culture and indirect piping failure frequencies outside of at least the explicit regulatory guides.

MEMBER BROWN: What's an indirect piping failure?

MR. TREGONING: Something else failing that turns around.

MEMBER BROWN: Okay. All right.

MR. TREGONING: Either a support which then cause the pipes to fail or a--

MEMBER BROWN: I guessed that. I just wanted to make sure I had it.

MR. TREGONING: That was the right guess.

MEMBER POWERS: I'm wondering a little bit about how a licensee, what you expect a licensee to do when you ask him to go look at the applicability of 1903. And the reason is I look at what we're requiring people to do with respect to seismic hazard on things like Early Site Permits and things like that. And because the USGS has changed the return frequencies of earthquakes, of significant earthquakes substantially relative to what was in vogue when the plants were licensed, we typically require the licensee to do quite a lot, or an applicant do quite a lot for those Early Site Permits for a plant on a site where there are existing reactors.

Do you have that magnitude of effort in mind when you're talking about the applicability of 1903 or are you saying, okay, this plant was licensed under this seismic hazard, go ahead and use that

seismic hazard?

MR. TREGONING: I would say it's between those two bounds that you've talked about, not the same bar as possibly new reactors they're looking at now for Early Site Permits. But NUREG 1903 really laid out a very explicit approach and method for analyzing direct piping failure. And it made various assumptions using the best available data in terms of the seismic hazard information that was used, for instance, all the soil-structure interaction and plant response factors that were applied in those results. Right?

And actually 1903 evaluated a fairly large number of plants, I think on the order of 24, 25 plants were actually evaluated, using the information that we had at the time.

MEMBER POWERS: These were the plants that had done seismic PRAs?

MR. TREGONING: Not necessarily. These were plants that we had seismic hazard information and that was drawn from the Lawrence Livermore study in 1995, so not the most up to date but it was the most recent publicly available seismic hazard information.

And we coupled that with information that we had for plants on LBB where they had done SSE

evaluations as well as we had information related to design stresses associated with the piping. So those were the plants that we went and we analyzed because we had sufficient information. Because at the end of the day all you need with respect to the seismic event is an understanding of the stresses that are applied at your limiting location.

So the way the regulatory guidance is going to be set up because so many different plants were evaluated, what we would ask a plant to do is look at each of those pieces and if you can demonstrate that what was used in the reg guide is still applicable, or conservative for your plant in each of those pieces, you don't have to do a new analysis.

But if they're areas that have been updated and we tell them specifically that the most recent or updated seismic hazard information should be used and we give them two approaches. We give them multiple approaches for determining component stresses, they can either use like an SSI factor type approach, as was done in 1903, of if they so choose they can do direct plant modeling, right, using computational methods to predict what the component stresses are.

MEMBER POWERS: It is the most updated seismic hazard information that causes pause because the hoop we force them to jump through in connection with site applications, requires not only to look at what's published on the USGS because that's getting, I mean it's not as old as I am certainly, but there has since that was published been an intervening period of quite a lot of academic theses and whatnot. A license is called upon to go survey that literature and in some cases do their own geo-technical work and things like that.

And I mean if they have to do that, that's a reasonably difficult undertaking.

MR. TREGONING: Yes, and I would agree. And I think at this point there's some room for discussion here but the way the draft reg guide is set up now it essentially says use your most recent up to date, what you consider your most accurate seismic assessment data.

Now what would happen essentially if they came in for review and approval under 50.46(a) and they said this is our most recent and this is how we developed it, if there were concerns that that data was essentially conservative or representative then there may need to be some iteration involved at that

point.

So we haven't provided, there was no intent to provide specific requirements or guidance to say this is how you have to develop that data. We could. We could have chosen to do that but we haven't yet.

MEMBER POWERS: But your expectation is what I would characterize as reasonably high for that input and that chore of saying that 1903 is indeed applicable to me.

MR. TREGONING: Yes. And one of the reasons we haven't been as explicit because we're aware of the continual churning that's going on in early site licensing space. So we don't want to get ahead of that either, so we'd like to see where that shakes out and, hopefully, some of that information or the procedures that are developed there may be applicable at that point.

MEMBER POWERS I mean you're quite correct that it's as dynamic as that particular field ever gets right now. I mean it's geological and it takes a while to churn and things like that. But it certainly is, I mean the USGS they've certainly changed the perceived hazard relative to when most of these plants were originally licensed.

MR. TREGONING: Sure. And certainly that's an issue that needs to be addressed and it's been identified which is why again the guidance itself is very vague but there's a notion that there would have to at least be some demonstration that these are applicable seismic hazards.

MEMBER POWERS: I would suspect that your indirect failure is also affected by the American Society of Civil Engineers' new approach to seismic damage.

MR. TREGONING: Yes. Now that's the one area at least we're not-- indirect failures, because we didn't have a basis because we only looked at a limited number of failure modes in a couple of plants so we felt like we didn't have enough of a technical basis to allow any generic changes in I'll say seismic qualification or testing requirements associated with things that are seismically qualified that could fail and then lead to a direct piping failure. The reg guide itself is pretty definitive, it says you know that you're not allowed to make changes in those areas under this rule unless you want to do a full-scope PRA to demonstrate the acceptability of any change that you would like to make in that area.

So I think for those very reasons, some of which you've just discussed, we decided to stay away from that. And I don't think that was ever the intent of 50.46(a) to begin with so it just seemed like a reasonable limitation to put on, it's not a limitation because a plant could still come and justify it but it would be a fairly high bar to meet if they wanted to make those sorts of changes.

MEMBER BLEY: Rob, I would like to go back to not to seismic but to 1829, back a couple of years ago when you brought a draft of that to us. We had urged that when to comes to regulatory decisions that they be based on the totality of the results from the sensitivity studies rather than the arithmetic manipulations. Does that show up in like your second bullet there on how to use that information in specific cases or did you do anything along those lines?

MR. TREGONING: Well that showed up explicitly in how the TBS was selected. There's no notion that you know plants are going to be developing quantitative frequencies under this program. All that have to do is demonstrate that within the confines of what was considered in 1829 they're a typical plant.

MEMBER BLEY: Okay.

MR. TREGONING: There's nothing unique about that plant that would cause them to stand out in terms of their LOCA frequencies. So it's really just a relative assessment, it's not an absolute assessment in any way.

MEMBER BLEY: But they'd have to be within the ranges of things that were evaluated?

MR. TREGONING: That were considered in 1829, that's exactly right. And if they fell outside those ranges then they potentially, well they would have to justify why being outside that range was not significant if they still wanted to use 50.46(a).

Okay. So again just one slide if I can move on, on the philosophy and the framework associated with the applicability guidance. Again, this only addresses breaks larger than the proposed TBS and again that's largely the primary loop typing and the pressure boundary structural components themselves so the big structures, the vessel, the pressurizer, steam generator manway, RCS pump--

MEMBER ARMIJO: Could you refresh my memory on the actual dimensions of the TBSs for the BWRs and PWRs that came out of these studies?

MR. TREGONING: Yes. The BWR ends up and again it's plant specific because they're all tied to

the system but the nominal pipe dimensions end up being about 18 to 24 inch range for the Bs and about 12 to 14 inches for the Ps. And, as we mentioned earlier, the Ps are typically, in fact I think in almost every case associated with the surge line.

MEMBER ARMIJO: Okay. What are the largest PWR pipes?

MR. TREGONING: They're about 30 inches.

MEMBER ARMIJO: So those things are clearly up?

MR. TREGONING: Yes, they're well above, right. And then there's a big jump from them down to the surge line size so there's a pretty big gap in pipe sizes there.

MEMBER ARMIJO: Thank you.

MR. TREGONING: Okay. The other philosophies that we've tried to as much as we can leverage what a licensee would have to submit to information that's already been developed for other applications they may have come in with wherever possible. And specifically the three things that we looked at that we thought were most applicable were any power uprate applications, certainly license renewal, and then prior LBB submittals. So we really wanted to develop this guidance to build off of

the philosophies that are inherent in these other processes that are ongoing at the NRC.

The evaluation to address 1829 applicability I think I touched on this, it's intended to be largely a qualitative analysis and primarily they're looking at considering plant-specific effects on the variables that affect LOCA frequencies, and ideally demonstrate that there's nothing unique about their plant that would cause an elevation in their LOCA frequencies.

The other thing that they need to do is they have to demonstrate the adequacy of existing plant conditions and operations and also, if they propose any plant changes, they have to demonstrate that the plant changes themselves will not cause an elevation in the LOCA frequencies.

So if someone wanted to let's say do a power uprate under 50.46(a), they would have to demonstrate that the power uprate would not result in increased LOCA frequencies due to I don't know increased pump speeds that might increase you know a vibrational component of loading within these piping systems. So that would be something that they would need to look at.

We talked a little bit in detail, due to

Dana Powers' question about the 1903 applicability, and this is a multi-faceted or it will be a multi-faceted with various options for licensees to potentially use, it can get fairly complicated but what we've tried to do is provide a range of options to allow a more simplistic analysis all the way down to a very complete analysis of piping failures under seismic loading.

And the other thing that we're doing, because there's so many options and it can get relatively complex, we have very detailed guidance related to 1903 and then we'll also have some very specific examples about how one would actually do the analysis, if they needed to do the analysis for their particular plant.

So where are we in developing this guidance? We have completed the development of a white paper and the white paper will serve essentially as the basis for this proposed regulatory guide. We put the ADAMS number in the white paper for the white paper in the slides

if anyone's interested in previewing that white paper. It is available. We made it available in February of this year.

We had a public meeting in February also

to get some initial feedback on the white paper itself. We've received at least one round of informal comments from stakeholders which we just got a few weeks ago in April. And we've also used the reg guide development work to also provide some information to feedback and support the rule-making FRN. So some of the language in some of the requirements you see in the rule are directly related to the work that's gone on in developing this applicability guidance.

The plan is now that we've got at least some initial stakeholder feedback we're going to use that, along with the white paper, to develop a draft regulatory guide which we've started to work on now and hopefully we'll complete that, maybe not this month but hopefully by next month.

And once we are at that stage then you know as part of the normal regulatory guide process I think ACRS has the option of reviewing any regulatory guide that you so choose prior to releasing it for public comment. So that's why I have a tentative date there. I know what typically works is we would send you a letter that would say, this reg guide's been prepared, we're proposing to send it out for public comment, would you like to review it? And you get the chance to review it or not.

And, depending on what we do there, then we'll publish the draft guidance for public comment some time in the late summer. We envision at least a couple of month public comment period. We like to give people a long time to look at this guidance and to give them a chance to comment, so we're thinking on the order of 60 days right now. And then we'll address the public comments toward the end of the year and the plan would be some time in early 2010 we would be, if we're not here talking about the proposed reg guide, we would be back talking about what at that point would be the draft or the proposed final reg guide which would also have considered all the public comments that we got.

And in terms of publishing the fina, guidance, the requirements in our schedule is that we're not going to publish this until six months after the final rule has gone to the Commission. And we're not going to publish it because we want to make sure that we've got final Commission direction to go ahead with this rule. There's no sense in having reg guide out in advance of the rule itself. It gets us in enough trouble.

So that's it for my prepared remarks. If there are any other questions?

CHAIR SHACK: Is there any plan to develop additional regulatory guidance for the thermal hydraulic piece of this?

MR. COLLINS: We will develop some guide but we don't think it's particularly complicated. I mean with the change in requirement for approved methodologies, it's hard to imagine that it's going to be a whole lot different guidance than exists for today's methodologies. So I wouldn't expect there to be much of a reg guide--

CHAIR SHACK: I guess it's conceptually possible but not likely.

MR. COLLINS: Yes. We'll see what happens at the end of the comment period.

CHAIR SHACK: Just the notion, you know, just to sort of if you're willing to accept the size of a flaw as essentially a decision point for you know that it's sufficiently low that you believe it's ten to the minus five, could a BWR come in and show that, you know, it's got a pi over 8 theta flaw that has to be 35 percent through-wall and essentially get a lesser transition break size?

MR. TREGONING: You mean get a-- wait a minute let me understand. Would they be able to come in and demonstrate that they could use the rule? Or

would they be able to come in and argue for a smaller TBS?

CHAIR SHACK: A smaller TBS in the rule.

MR. TREGONING: The TBS has been fixed.

MR. COLLINS: I don't think we have any intent in changing the TBS. We've been through this with the BWR owners group a few times in previous comments and I don't think there's any new information that they're going to present to us to make us change the size in TBS.

CHAIR SHACK: Any other questions? Well I suggest we take a break then before we go off to Steve and the risk-informed process which is the other major piece of the rule. Be back at 3:35.

(A BRIEF RECESS WAS TAKEN)

CHAIR SHACK: Come back into session. Our next topic is essentially rule changes related to the risk assessment process, and a number of my members have pointed out to me that I should point out to you that it's not the Advisory Committee on Reactor Safety, it's the Advisory Committee on Reactor Safeguards.

MR. DINSMORE: Yes sir, I'd like to apologize to everybody for that and you notice I left the paper off. It does, Mr. Chairman, raise question

raise reliability about the rest of it.

However, my name is Steve Dinsmore and I am the senior risk analyst in the Office of Nuclear Reactor Regulation Division of Risk Assessment, and I guess the three of us up here have been working on this rule since its inception. And I think we're the last three that are left.

MEMBER POWERS: So we conclude from this the probability of accuracy is .5 percent.

CHAIR SHACK: 33.

MR. DINSMORE: That just went up. Okay. Well what I'm going to do is--

CHAIR SHACK: I'm glad you identified by the way for the industry that it was an SRM that required you to go to a very small increase in risk. We normally get blamed for these sort of things.

MR. DINSMORE: Okay. I'm going to give you an overview of the risk informed change control process and during that overview I'm going to also identify the major changes that we made to the process that was described in the draft final rule to get to the one that you have today. Most of those are a direct result of the ACRS and/or Commission direction.

In general, what we do is we remove the

deviations from reg guide 1.174 risk informed process that were in the draft rule and so I think the process in the revised proposal rule is much more closely in line with reg guide 1.174, and this first slide is just a quick overview of the risk informed control process as it is in the proposed rule. There's a slide on each one of these bullets as I go through.

The first thing is the risk informed evaluation must be performed for all facility changes made under the rule. The second thing is submittals are required for all changes under the rule unless self approval is authorized. If you want self approval you have to come in and request it and once you get self approval you can make changes on your own if they're less than minimal. Or you can simply come in and request changes like a normal risk-informed 1.174 process.

CHAIR SHACK: Oh I see, this is an additional step that you go through.

MR. DINSMORE: Yes. It simplifies life a lot for people who just want to do one or two things.

MEMBER BROWN: Did I miss that nuance?

MR. DINSMORE: Well, the draft final rule said everybody had to be able to make changes on their

own. So everybody who implemented the rule had to come in initially and explain to us and provide us all the processes they were going to use to be able to make self approved changes.

If you don't want to do that you don't have to. If you want to just make a couple of changes you just come in like you do normally do for a risk-informed submittal, tell us what the changes are, tell us how you did the change in risk evaluation, and we'll evaluate that submittal as it is.

MEMBER BROWN: As you have normally done.

MR. DINSMORE: As we have normally done.

MEMBER BROWN: Okay.

MR. DINSMORE: As we have normally done. There's two different pieces.

MEMBER BROWN: That's new in the revised proposed as opposed to the draft, as opposed to the original?

MR. DINSMORE: Right. There then also will be the change in risk acceptance criteria and estimates, the PRA updating and reporting requirements, the risk acceptance quality requirements, the defense-in-depth safety margin and performance monitoring requirements.

Okay. Next slide. Risk-informed

evaluation for changes made under the rule. The draft final rule set a staff review and endorsed risk-informed evaluation process is required for all facility changes after implementation of the rule.

The revised proposed rule says the risk-informed evaluations required for all facility changes made under the rule and that's defined as changes that are enabled by the rule which, as Tim defined earlier, changes that satisfy the revised ECCS analysis in the new rule but not the requirements in the old rule, and other changes that licensees choose to bundle together to get an acceptable risk estimate.

MEMBER BROWN: If you don't mix them say you make a set of changes you want to do it under the old rule 50.46 but you can do that still. Correct? I mean if you haven't asked for anything. Are you saying once you do a 50.46(a) every change you make after that has to be a 50.46(a) or if you want to come in with one that's not--

MR. COLLINS: That's the way the rule was. The way it is now--

MEMBER BROWN: In the draft final rule?

MR. COLLINS: That was the draft final rule, yes sir. And the way it is now--

MEMBER BROWN: Okay, I think I might not

be asking it-- if you come in with a change and somebody says I want to use 50.46(a) for this set of changes; now he finishes all those, you all are satisfied he does the work. A couple of years later he decides he wants to make another change. Can he come in under the old 50.46? He has to do all subsequent changes under 50.46(a)?

MR. COLLINS: That's correct. That's correct.

MEMBER BROWN: Okay.

MR. COLLINS: Unless he switches his licensing basis back to 50.46.

CHAIR SHACK: Undo.

MEMBER SIEBER: He has to undo the old changes.

MEMBER BROWN: Oh okay. He has to reevaluate the old--

MR. DINSMORE: Yes, he would have to reevaluate the old changes.

MEMBER BLEY: So he's locked into doing risk-informed changes from then on?

MR. DINSMORE: Sure.

MEMBER BLEY: I didn't get that out of reading the thing.

MEMBER SIEBER: Unless he rolls back the

original change.

MR. COLLINS: Well he's likely to do risk-informed changes if they are enabled by 50.46(a). Every change would not necessarily have to be a risk-informed change just because he went to 50.46(a).

MR. DINSMORE: I think the answer to your question as I understand it is he could use the old rule if he wanted to.

MEMBER BROWN: If he can pass the old rules--

MR. DINSMORE: He doesn't need the new one.

MEMBER BROWN: Therefore he doesn't need the enabling relaxation?

MR. COLLINS: That's correct. That's correct.

MEMBER BROWN: So the answer to my question is he can do a 50.46 if he doesn't need the new rule to get him to meet the criteria? He doesn't need the new criteria in order to get--

CHAIR SHACK: But if he's gone to 50.46(a) and made a change that doesn't satisfy the original 50.46 he would have to undo to get back there.

MR. COLLINS: No, it's not. What you're

saying is correct because once you switch to 50.46(a) you will always meet 50.46 the way it was. Okay?

MEMBER BROWN: No, that's not right.

MR. COLLINS: I'm sorry. I'm going the wrong way, I'm going the wrong way. Once you meet 50.46(a), okay, if you want to make a change that would have met 50.46 it will certainly meet 50.46(a).

CHAIR SHACK: Yes. But you may not want to go through all the drill for it.

MR. COLLINS: And you may not have to if it wasn't enabled by going to 50.46(a).

CHAIR SHACK: That's what I said.

MR. COLLINS: Any change you want to make you can make without going to 50.46(a). The other changes you made you couldn't have implemented without doing 50.46(a). Once you've made your licensing basis 50.46(a) you're going to have to do 50.46(a) forever until you go back.

CHAIR SHACK: That's right.

MR. COLLINS: But that doesn't mean every change needs to be risk-informed. That's all we're differentiating here. Every change does not need to be risk-informed. It only needs to be risk-informed if it's enabled by 50.46.

CHAIR SHACK: Got you. Got you.

MR. COLLINS: You still have to meet 50.46(a) forever, but that doesn't mean every change request has to be a risk-informed change request. That's the idea of things being enabled by the term enabled, that's the key to that term enabled.

MEMBER BLEY: And that means you couldn't do them without 50.46(a).

MR. COLLINS: Correct. But there are changes which after you've done 50.46(a) you could have made under 50.46.

MEMBER BLEY: And you can still do that?

MR. COLLINS: You can still do that without a risk-informed amendment.

MEMBER BLEY: Okay.

MR. COLLINS: Okay.

MEMBER SIEBER: Okay. Got it.

MR. DINSMORE: This actually simplifies, well it simplifies life in the future because the way that the draft proposed rule was is every change in the future was a risk-informed submittal, which was a big change from what they do today.

And, as Dr. Shack pointed out, there wasn't anybody who actually came out and said don't to do this. However, it has to kind of hang together with everything else that goes on and one of the

reasons that we were told to make every change in the future a risk-informed change was because it might be difficult to figure out which ones are enabled and which ones are not.

But then the new SRM came down and said, well, make sure the changes made under this rule are very small, so we have to figure that out anyway.

And then it just was a lot simpler to lay it out according to 1.174. So you're right, there was no direct comment you shouldn't make them do a risk calculation for every change in the future. On the other hand they already so that, they do risk-informed ISI, they're always updating. So they kind of do that anyway.

But as far as the rule is concerned we simply brought it back to 1.174, changed the scope of the analysis as described up there.

The next step the submittal requirements. The draft final rule there was an initial submittal to implement the rule which included quite a description and everything of your risk assessment process. However, afterwards the submittals were only required for facility changes that must otherwise be submitted for review or changes to the SSCs within the scope of the maintenance rule.

The ACRS comment on that was licensee should submit all changes that cause greater than very small increases, I'm paraphrasing that comment. We certainly understood the comment so we--

MEMBER SIEBER: That's a first step.

MR. DINSMORE: So we went back and we changed the rule but right now a submittal is required for each change enabled by the rule of course unless you have the self approval authorized. If you want self approval you have to come in and request it. If you have authorized self approval submittal required for each more than minimal risk increase and submittals are always required if you want to bundle unrelated changes into the change and risk estimate.

So if you have your self approval process approved you can make individual changes that rely on this rule without coming in. There's a reporting requirement but that's--

Now you guys said greater than very small, in our terminology that's ten to the minus six for CDF. We changed it to more than minimal in part because having a guidance for self approval that's less than what we would normally have to review means that we can be a little more confident that when that

calculating number is that small they probably really are small so we don't really have to review them.

And then the Commission directed us to use very small as the total increase and so if we'd have simply stuck with very small instead of minimal here, they could do as much risk increase as they could do under the rule without ever coming in.

MEMBER BROWN: Where's the word minimal?

MR. DINSMORE: It's on the second from bottom bullet. More than minimal risk increase. I hope that's right. Yes.

MEMBER BROWN: My eyes are obviously not working well. So more than--

MEMBER ARMIJO: It means different.

MEMBER BROWN: What does the word seven--

MR. DINSMORE: Ten to the minus seven for CDF. Increase is less than ten to the minus seven for CDF and ten to the minus eight for LRF. In practice that's--

MEMBER BROWN: Of less than ten to the minus seven?

MR. DINSMORE: An increase less than ten to the minus seven would normally be considered minimal.

MEMBER BROWN: Minimal.

MR. DINSMORE: We need the numbers. I mean you can argue about the numbers but we need the numbers to keep this moving through.

MEMBER STETKAR: Does the industry-- Since I just learned what very small and minimal mean and I've written that down so I'd remember it, does the industry understand what minimal means?

MR. DINSMORE: Yes.

MEMBER STETKAR: Okay. So they know that you're really talking about ten to the minus seven frequency?

MR. DINSMORE: Yes. It's actually the same number that we're proposing to use for the self approval for the new fire protection rule. Industry doesn't like the number obviously.

MEMBER STETKAR: No, no, I just wanted to make sure that you know--

MR. DINSMORE: They understand it.

MEMBER STETKAR: That's it not very vague and qualitative, that indeed there's been enough communications in the meetings and things that they understand what that number is.

MEMBER SIEBER: Why didn't you put the numbers in the rule?

CHAIR SHACK: It's in the FRN.

MR. DINSMORE: It's in the FRN yes. We don't put them in the rule because then in order to change them then we have to change the rule, whereas if we put minimal then we can change guidance later on that says now we call minimal.

MEMBER SIEBER: I understand.

MR. DINSMORE: I think we do it a lot.

MEMBER BROWN: Where in the rule is the minimal stated?

MR. DINSMORE: It should be (f)(1)(ii).

MEMBER BROWN: Okay. Go on and I'll do my searching while you're talking.

CHAIR SHACK: I think it's just under (f)--

MR. DINSMORE: (f)(1)(ii).

MEMBER BROWN: Oh okay. I even had it red-lined. Still couldn't find it.

MEMBER BLEY: You need a new color.

MEMBER BROWN: No, I need new eyes.

CHAIR SHACK: That's why you do PDS and just put minimal into the search box.

MR. DINSMORE: Okay, that's the second attribute and now we've changed it.

This one I guess I you could argue might have increased the burden, depends on how big the

changes they're making, but the burden wasn't really on our mind. We were just trying to make things fit together here.

CHAIR SHACK: Well it's also consistent with 1.174.

MR. DINSMORE: Well, 1.174 doesn't have self approval.

CHAIR SHACK: No, but I mean you would be in for very small changes you would have to come in to the staff.

MR. DINSMORE: Well 1.174 I always have to come in.

CHAIR SHACK: Yes. I mean so why do you get a one times ten to the minus six free anywhere else if you have to come in under 1.174 for a one times ten minus six. I mean if you're going to have self approval it ought to be less than--

MR. DINSMORE: Right. It's not inconsistent, yes. That was our working goal.

MEMBER SIEBER: Sounds like 50.59.

MR. DINSMORE: Yes. The words come out of 50.59. They have a very nice definition of minimal in 50.59.

Change in risk-acceptance criteria, this is another hot topic on the draft final rule. It said

the total increases in CDF and LRF from all facility changes are small and the overall risk remains small. The ACRS comment was this is a significant departure from current risk informed guidance which should be reviewed for its implications. We reviewed its implications and we changed it again based primarily on this direction from the Commission to say total increases in CDF and LRF for changes made under the rule are very small, and the overall risk remains small.

And that very small, that's an interesting, if you read his note sheet it directed any changes under this rule be further restricted to very small increases because its important safety benefit is emphasized over the burden reduction. So the knew what they were doing and some of these sentences you kind of, you have to interpret but they really meant it so we put it in there exactly as they meant it.

MEMBER BROWN: You changed from "all facility changes" to "for changes made under the rule."

MR. DINSMORE: Right. There's two changes in that sentence, yes sir.

CHAIR SHACK: But the very small one is a

biggie.

MR. DINSMORE: Yes. So all facility changes originally again when they transitioned to 50.46(a) they had to transition their whole process, their whole facility change process to a risk-informed process. And then over time they had to make sure that the total increase in risk from all changes--

MEMBER BROWN: Today's tomorrow is next year's five years from any subsequent changes?

MR. DINSMORE: Yes.

MEMBER ARMIJO: Lifetime limit?

MR. DINSMORE: Yes. Which is why there was a significant departure from current risk-informed guidance.

MEMBER ARMIJO: So the lifetime limit increase is a factor of ten from where they are?

MR. DINSMORE: Well it's ten to the minus five.

MEMBER BROWN: And now it's ten to the minus sux.

MR. DINSMORE: Now it's indeterminate. The lifetime limit for changes made under this rule is now ten to the minus six, but other changes they make to the plant that have nothing to do with this rule they're still in that current licensing regime.

There's no risk--

MEMBER BROWN: The 50.46?

MR. DINSMORE: Well, they could make changes because of other reasons.

CHAIR SHACK: No, he could come in for 1.174 changes and make up the ten to the minus five presumably?

MR. DINSMORE: But probably not using the new acceptance criteria for the ECCS because then he'd have to rely on this rule.

CHAIR SHACK: Suppose he goes to 50.46(a) in this and now he makes another risk informed change that has nothing to do with 50.46, he would then get the ten to the minus five presumably?

MR. DINSMORE: Yes. He'd be in a different world, right. They'd be disassociated.

MEMBER BROWN: Would you repeat that? Or can you repeat that?

CHAIR SHACK: If the change is related to the 50.46(a) it is limited to be very small, ten to the minus six, but if he had another risk-informed change that had nothing to do with 50.46, it would then be subject to the typical staff limit of small, which is ten to the minus five.

MEMBER BROWN: A risk-informed change

under 50.46--

CHAIR SHACK: No, no.

MEMBER CORRADINI: It's under something else.

CHAIR SHACK: Completely divorced from 50.46.

MEMBER BROWN: All right. All right. That's beyond my knowledge level at this point. Go ahead.

MEMBER SIEBER: Well that fits the box in 1.174.

MR. DINSMORE: Yes.

MEMBER SIEBER: Okay. That's where that one comes from.

CHAIR SHACK: Well, the original comment there was this was the first time at least some of the members recognize that the staff was imposing a total limit on delta CDF in 1.174.

MEMBER SIEBER: Right.

CHAIR SHACK: And that still may be a matter of some internal debate.

MEMBER SIEBER: Well, the box is sort of fuzzy as I recall it.

CHAIR SHACK: Yes, but the question is whether you consider that as a box for a change or a

cumulative change.

MEMBER SIEBER: I always thought of it as cumulative.

CHAIR SHACK: What it says is that the cumulative differences will be considered in approval. I don't believe that it actually has a strict limit. When you get to ten to the minus five let's say the regulatory attention increases exponentially.

MEMBER SIEBER: I think that's right.

MEMBER POWERS: Certainly that was my understanding was it's just that as the cumulative effect becomes bigger and bigger you're going to get a little more scrutiny.

CHAIR SHACK: Right. In fact the scrutiny will become so high--

MEMBER BROWN: We'll have two different acceptance criteria for accomplishing changes of delta CDF, ten to the minis 5. Ten to the minus 6.

CHAIR SHACK: It comes down to the vote sheet that he was reading from. Some of the Commissioners, this rule change was originally proposed as being a safety beneficial rule change and so the notion is that if it's a safety beneficial rule change you don't need much increase in risk under it, so it becomes very small.

MR. COLLINS: In fact, we met with the Office of Research yesterday and they had not yet concurred on the FRN package. And they are contemplating adding a question to the FRN which says should we require that implementation of this rule result in no net increase in risk. That's a question to put out with the FRN. Just because, you know, thinking back to the original intent of the Commission was isn't this going to be a safety benefit? Then why should there be any net decrease in risk. So that may appear as a question in the FRN.

It's not in the copy that you have because just as of yesterday they were thinking of adding that as a question.

CHAIR SHACK: We know the answer.

MR. COLLINS: They don't know whether they're going to ask it?

CHAIR SHACK: No, what the response will be.

MEMBER SIEBER: We can make it a recommendation to be considered.

CHAIR SHACK: We still can write a letter, yes that's true. Write a letter.

MR. DINSMORE: Well, when we went back to 1.174, we went back to some of the unclarities, the

unclearness in 1.74 including this cumulative. So the change in risk estimate it used to say the total cumulative risk increase estimate was required, which was actually pretty easy to do. You just take your current CDF and you subtract your original CDF and LRF and you get the estimate.

It's a little more complicated when you talk about the cumulative effect of changes over time for a specific subset of changes. The ACRS comment again was this was a significant departure. Now the revised proposed rule, the cumulative effect of previous changes made under the rule that have increased risk but have met the acceptance criteria shall be evaluated.

We took that from the 50.48©) from NFPA 805. They also ran across this problem, and we're trying to use the same language because we're hoping, naturally, to use whatever, we want the two wheels to run the same. So we simply took as much of that language as we could and stuck it in here.

We're not entirely sure how to do it yet, we're still working on figuring it out for the other rules but however we end up doing it we want to do it the same.

And actually those were the major changes,

PRA update and reporting, there was no substantive changes, they have to do their update no less than every two refueling outages. After the update they need to take appropriate action to ensure the acceptance criteria are met and the reporting is just if you exceed the acceptance criteria you have to tell us on how you're going to fix it.

And then every 24 months if you have a self approval process approved you just have to tell us which changes you made.

Risk assessment quality requirements, here also no substantive changes although we made couple of small ones. The PRA must address all initiating events and all operating modes, that's a pre-standing thing. And the PRA must, and the draft final rule said calculate CDF and LRF because that was in the 50.69 for example. We simply took it out because they all do that anyway and then we had this question about LRF so we just took it out. And I don't think it really makes any difference.

And then the last one, the risk assessment other than PRA must be developed using an integrated systematic process. The draft final rule said non-PRA risk assessments shall produce realistic results, and we had a big internal discussion about what would

we do if somebody came in with a conservative analysis? If the rule says it's realistic and they come in with conservative. So we changed it to be consistent again with 50.69 to an integrated systematic process that quickly deflects the plan from all that stuff. But nobody commented on that but Tim.

Maintain defense-in-depth. There's some things going on. We included the specific defense-in-depth attributes from 1.174 to make them criteria. We did that on purpose. And the revised proposed rule it still includes them plus there's additional criteria which Tim talked a lot about earlier and I won't go into again. However, again research has indicated to us that they might be redefining a good defense-in-depth attributes and they express some reservations that if we put these in the rule now we'll be fixing these and then installing them and so we're considering taking them out. I think we're moving down the path, we would just say defense-in-depth must be maintained.

And then the last two maintain adequate safety margins. No substantive risk assessment changes although some of the other changes might have affected both of these.

And then implement adequate performance

measurement programs. The ACRS did comment that they thought that we should increase the special treatment requirements and the availability of the non-safety related equipment relied on to mitigate. Other than what Tim was talking about we didn't put anything in the rule to directly say that. We kind of, well if you put it in tech specs it's going to be at least listed in there.

And we do have this monitoring performance measurement program criteria that the program should be designed to detect degradation before plant safety is compromised, and we would interpret that to be if they're relying on this non-safety related equipment and its reliability started to degrade to such a point that when they do their update they're going to not meet the acceptance criteria, if there was a really badly degrading situation we'd catch it, and if it's not really badly degrading then maybe it's not really risk significant.

So in that way we kind of tried to encompass that comment without actually putting something in the rule to deal with it.

MEMBER SIEBER: When you say put it in tech specs that means there's going to be surveillance requirements?

MR. COLLINS: No.

CHAIR SHACK: SIEBER: No?

MR. COLLINS: No.

MEMBER SIEBER: What does it mean?

MR. COLLINS: It just means it's going to be identified there. It's going to be like a list, this is equipment which we may credit in our analysis of breaks larger than TBS. That's all it's going to say.

CHAIR SHACK: And if they remove it they'll have to come back and talk to--

MR. COLLINS: If they want to remove it they have to come back.

MEMBER SIEBER: What good does that do?

MR. COLLINS: Well, all it really does it alerts us when they want to say we'd like to take credit for this equipment. And it gives us a shot at reviewing that when they make their initial submittal and we can, you know, attach conditions on that if we're worried about it at the time of their submittal.

MEMBER SIEBER: But they have no obligation to maintain a certain degree of reliability or to surveille or to do anything?

MR. COLLINS: Well, I believe their maintenance rule still apply.

MEMBER SIEBER: Yes, but--

MR. COLLINS: Aside from the maintenance rule I don't think there's any other specific requirements.

MEMBER SIEBER: If it's non-safety and the maintenance rule--

MR. DINSMORE: Well, there is always this thing that they have to do a change in risk evaluation and they have to do an update periodically. And if the stuff that they're crediting really gets unreliable--

MEMBER SIEBER: So it's not really good?

MR. DINSMORE: It's really not, well if it becomes not good enough such that it's endangering their meeting the acceptance criteria.

MEMBER SIEBER: So you're looking back to the reliability assumptions that went back into the risk evaluation?

MR. DINSMORE: Well, I would assume when they did the initial study obviously the reliability was sufficient. But if over time it degrades for some reason--

MEMBER RAY: Yes, but the inspectors will never know how to interpret that, neither will the people in the plant.

MEMBER SIEBER: Well, you aren't going to know when you're violating it.

MEMBER RAY: Exactly. That's what I'm saying.

MEMBER STETKAR: This criteria is just deterministic though. If I have a certain minimal complement of equipment I maintain core cooling. It doesn't have anything to do with reliability.

MR. DINSMORE: No, this would be the change in risk acceptance criteria.

MEMBER STETKAR: The change in risk?

MEMBER SIEBER: Without action statements there's no penalty if it doesn't work.

MEMBER RAY: Everybody's going to think this is not going to work. To just say well it's a list but nobody knows how to interpret the list unless you notice that the availability of the equipment is inconsistent with the assumptions in the risk analysis that you submitted. I mean you're talking about different worlds.

MEMBER SIEBER: Well that means you've got to reach really far to figure out what your goals are.

MEMBER RAY: Yes, I mean the people in the plant are clueless about what that says.

MEMBER SIEBER: Some will worry about it, some will ignore it.

MEMBER RAY: Hopefully that's true. Everybody will ignore it I think.

MEMBER SIEBER: Well there's got to be some conscientious guy out there somewhere.

MEMBER RAY: Well no, you've got to have something that is both capable of demonstrating compliance or consistency, I won't call it compliance if you don't like that. And I don't know how the heck you would do that. We are getting way out of bounds of what's reasonable.

MEMBER SIEBER: I can see waiving special treatment but I can't see waiving surveillance and performance indicators.

MEMBER RAY: Yes, and you've got to translate the assumptions in the risk analysis into something that people in the plant can actually do.

MR. DINSMORE: Well, but the assumptions in the risk analysis is mainly the unreliability or the unavailability, and they can check that. They do check that for the maintenance rule.

MEMBER SIEBER: But they aren't required to.

MEMBER RAY: Yes, but you don't match it

up with the analysis you're talking about. That's what I'm talking about.

MR. DINSMORE: When they do their periodic update they're supposed to take the plant-specific data, update the failure rate and the unavailability data that they're using in their PRA, re-do the calculations to see what the change in risk is for the changes that they've already--

MEMBER SIEBER: You don't tell them to do that though any place.

MR. DINSMORE: It does. It tells them in here. The PRA has to be updated every two refueling cycles to adequately--

MEMBER RAY: No, no, no, no, no. I mean we're just in different worlds here I think.

MEMBER CORRADINI: I think what Harold's asking for is something on a practical level that the operating staff can look at monthly, quarterly, something, so they know whether it's something that's up or down.

MEMBER RAY: You can't come out of the plant and say you know I've just updated my analysis. The two years has gone by and you know what? You've violated the assumptions in the prior analysis because you had this damn thing out of service and they

couldn't get the parts for six months and it wasn't even there. Nobody cared.

MR. COLLINS: Well the availability is covered by the 14 day backstop. It's the reliability that is at issue I think.

MEMBER STETKAR: Not necessarily if your analysis takes credit for one low pressure injection pump and a fire pump and you've had two low pressure injection pumps the whole time and you've never had a fire pump. You still meet your 14, you don't fall under your 14 day because you either need two low pressure injection pumps or one low pressure and a fire pump to meet your deterministic success criteria.

MEMBER SIEBER: If you don't do a surveillance you don't know if it works or not.

MEMBER STETKAR: And you've always had two low pressure injection pumps but for the last two years your fire pump, forget fire protection, your special LOCA pump you know. Your alternative LOCA pump. That hasn't been thee for the last two years.

MR. COLLINS: Well let's say it's been in pieces on the floor

MEMBER STETKAR: It's been in pieces on the floor.

MR. COLLINS: But if you've had two LPICs

available then you're okay.

MEMBER CORRADINI: Then you don't need to credit it.

MR. COLLINS: You don't need to credit that other one. You're all right. There's a whole bunch of configurations that could meet the deterministic criteria.

MEMBER STETKAR: Right.

MR. COLLINS: And you can't be out of any one of them for more than 14 days but he can analyze-- He's got to always have at least one available.

MEMBER BLEY: You must be out of all of them before the 14 days.

CHAIR SHACK: You have to be outside of the analyzed.

MR. COLLINS: Right. You have to be out of the analyzed condition for more than 14 days.

CHAIR SHACK: That's when the clock comes on.

MR. COLLINS: Right.

MEMBER STETKAR: But your special LOCA pump could have ben in part and pieces on the floor for the last two years?

MR. COLLINS: Right. As long as both LPIC pumps were working.

MEMBER SIEBER: Or you could have taken credit for it and it could have been together but not perform because you didn't test it.

MEMBER CORRADINI: I think what Harold, not knowing as detailed as they in operation I think what they're reflecting on is you could have a big disconnect because one group is not necessarily talking to the other group with the frequency and you could just be off separately, total disconnect.

MEMBER RAY: Well, yes, I mean it was sort of glib when he said well it'll just be a list in the tech specs but there's nothing other than identifying it as a list and making it part of the maintenance rule that's a consequence of that.

And I'm saying, you know, no, if this stuff is being credited, somebody somewhere needs to do the job of surveillance, or demonstrate that it is available for the time periods that are assumed in the analysis. And nobody in the plant knows anything about what's assumed in the analysis. Now you may be assuming that they will be told as sort of an extra tech spec piece of information, by the way these are the assumptions in the analysis for this non-safety related equipment that's listed in the tech specs. Maybe that's what you're thinking.

But you can't ask them to come back and tell you that they violated their assumptions in the analysis after it's happened.

MEMBER SIEBER: You'll find out during the aftermath.

MEMBER RAY: That's a sure fire trip to the Region. He's damn right.

MR. DINSMORE: We were helping the maintenance. The maintenance process somehow runs and we were kind of under the impression--

MR. COLLINS: This is a funny situation because with plants the way the operate today and with the current requirements for below the TBS, you're already covered by two trains of safety grade equipment. This part of the rule would come into play if somebody went to a power uprate for example and needed two pumps. That's the only time this would really come into play right?

MR. DINSMORE: No, that's the 14 days. We're not talking about the 14 days.

MR. COLLINS: Always have two trains available because of the requirements below TBS.

MEMBER RAY: I thought you were talking about listing the non-safety equipment.

MR. COLLINS: Yes. Yes.

MEMBER RAY: Okay. And Jack asked you well does that mean they'd have surveillance requirements, and you said oh no.

MR. COLLINS: No, and that's correct.

MEMBER RAY: But buried in some analysis somewhere there are assumptions about that non-safety equipment. And we'll find out if we violate them every two years.

MR. COLLINS: That's what I said it's a risk-informed--

MEMBER BLEY: You get your fine.

MR. DINSMORE: No, well then you just have to come in and tell us we found it we're fixing it. It's the reporting requirement.

MEMBER RAY: Okay, I'm sorry. But mean you can't violate some important assumption at least without knowing about it.

MR. DINSMORE: But this equipment is for a very unlikely, I mean unlikely event, and so there is some flexibility that we were willing to take on for mitigating this.

MEMBER RAY: The real question is how do you translate from what's in the analysis and what's written somehow in the tech specs to what some poor guy in the plant's going to be able to check and say

yeah I'm meeting the criteria. And that's something new.

MR. COLLINS: And how do you inspect against that.

MR. FLACK: This is John Flack with the ACRS. I just want to point out that I started reading the white paper that was just discussed earlier and talks about safety culture. And there's a lot of assumption in there about how the staff will react to certain things with respect to the safety culture that's going on in the plant.

Now I don't know if this is the answer but certainly it seems to put more of a burden on the inspector and how he goes about assessing the safety culture at a plant based on that discussion and the assumptions that are going into that, recognize that it's not going to get you into something that's locked in but there is going to have to be something going on there that's going to probably be more important at this point if they go down that road.

MEMBER RAY: Well, I'll tell you right now as somebody who ran a plant for a long time, like Jack or Otto, I would say okay we're going to add to the tech specs something that'll keep us out of trouble. I don't want to find out I got in trouble

later after I take the data and somebody way over in engineering grinds it through some analysis some day. I want to stay out of trouble.

MR. COLLINS: But you are not alone in that. I mean we debated this exact issue internally, right and we got beat down. We had originally proposed it would be included in the tech specs, the non-safety equipment with testing and availability requirements.

MEMBER RAY: That's what the ACRS is for.

MR. COLLINS: And we got beat down. Yes.

MEMBER STETKAR: Tim, let me ask you a question because I'm not as familiar with all the integrated thinking. For new reactors, you know, we look at the new designs coming in and typically they've identified classes of non-safety related equipment called RTNSS, Regulatory Treatment of Non-Safety Equipment. And this is the area that I'm not familiar with, how will that equipment be treated in the technical specifications for those new reactors? And is this conceptually parallel to that?

MR. COLLINS: I don't know the answer to that.

MEMBER STETKAR: And it seems to me that whatever decisions are being made regarding the

treatment of that equipment for all new reactors in the tech specs for those reactors, the treatment of this equipment should be equivalent. I mean it's essentially the same thing. We're talking about non-safety related equipment being inserted in the tech specs and it's not clear. There will be reliability requirements and it's my understanding that there will be for that RTNSS equipment somehow imposed either in the tech specs or through formal maintenance requirements or formal performance indicator monitoring or whatever, it would seem that this is in the same area.

MEMBER CORRADINI: It seems actually very similar. If anything, you'd want to make the requirements consistent.

MEMBER STETKAR: Right. It would be, for example, the active low pressure injection systems that the passive plants are taking credit for to keep the risk below a certain line.

MEMBER CORRADINI: Yes. Exactly. That's the best example.

MEMBER STETKAR: And it's my alternate LOCA pump here.

MEMBER SIEBER: It's an economic thing too you know because the way to make all the gravity

stuff work is to make a big LOCA.

MEMBER STETKAR: Well, yes, but I mean in terms of regulatory consistency if we're writing a rule today for this particular little area it seems that--

MR. COLLINS: My recollection is the written stuff is not going to actually be in the tech specs.

MEMBER CORRADINI: I don't know, I mean that's what I was asking.

MR. COLLINS: I think it has to be identified and there has to be some sort of surveillance of it in the tech specs.

MEMBER BLEY: There are requirements.

MEMBER CORRADINI: I will go back myself but I think so.

MR. COLLINS: I understand the consistency but I didn't think that that stuff was going to be in the tech specs.

MEMBER SIEBER: You take credit for in risk base then you have to have some kind of surveillance to show that you meet the conditions you assumed in the risk analysis. And if you don't do that, don't take credit.

MR. DINSMORE: Well, that's what's

written in this rule that you have to monitor it to make sure that--

MEMBER CORRADINI: But I think the spirit of what Harold is saying is as a good operator you just don't monitor it, you determine some deterministic set of checks so that you don't get in trouble post fact.

CHAIR SHACK: The operator is certainly free to do that. The question is what do we require them to do?

MR. COLLINS: This goes back to the whole problem of supposedly we're dealing with equipment which is very low risk significance, right. And we're trying to relax requirements on stuff that is of low risk significance and how far do you go in relaxing it you know.

MEMBER SIEBER: You're trading that risk significance against a margin that you want to--

MR. COLLINS: Exactly. Yes.

MEMBER SIEBER: So that risk significance becomes more important as you go on.

MR. COLLINS: I mean you've got single failure and you got rid of loss of offsite so that means you've got to in-post some sort of requirement on these pieces of equipment that have to be there in

this list.

MEMBER SIEBER: Otherwise, the risk evaluation is no good.

MR. COLLINS: We're on your side.

MEMBER SIEBER: We just don't know it yet. So we're all for you.

MR. COLLINS: That's fine. I've got no problems with any of this. I'm just telling you this is the debate we're in constantly.

MR. FLACK: Well, the question I'm rolling around in my own mind is that if you didn't give any credit for any of the non-safety related equipment in the PRA, what would your CDF look like? And that goes without saying, I mean you do give credit for this equipment to begin with. The question is you know what is it really? Because there's a lot of credit taken in the PRA for equipment that's not safety related. I mean nobody knows, I mean I haven't seen any calculations to say don't give credit for any non-safety related equipment and then look at the CDF. I mean I have never seen that happen.

It could be pretty high I would think because there's a lot of recovery actions stuff that they put in there, at least I'm going back to the IBE days when they put in a lot of, there was over 500

enhancements and none of that was safety related equipment.

So I mean that raises a bigger question about how much of this is out there, you know, that's not controlled basically by tech spec. So I don't know, you know, I think it comes down to safety culture at the plant myself. I think it's having to stay on top of these things know when you have stuff there on the corrective active for a long time that it begins to raise questions by the inspectors. Are they given enough time to do that?

We've got to I guess talk about that in a future subcommittee.

MR. DINSMORE: Well, I've completed my presentation. I'll turn it back over to Tim. Do you have a closing--

MR. COLLINS: No, we have no further presentation.

CHAIR SHACK: Questions or comments?

MEMBER RAY: I don't know how to articulate it Bill, I don't want to repeat it. It's been pretty well summarized by the people on the other side of the table I think. If you're going to take credit for it you've got to have some way of avoiding non-compliance in retrospect.

MEMBER SIEBER: You're right.

MEMBER RAY: Period.

MEMBER SIEBER: You have to continuously validate your analysis or periodically do it.

CHAIR SHACK: And like the bullet three adequate performance measuring programs are implemented to ensure the risk-informed evaluation continues to reflect the actual plant design and operation? These programs shall be to detect degradation of systems, structure of component before plant safety, provide feedback timely and monitor systems structures. I mean it's there.

MR. DINSMORE: It does permit you to come in, I'm not sure it's a violation until you found it and didn't tell us.

MEMBER RAY: It is. Trust me.

(Laughter)

MR. COLLINS: I do have, well you look like you're ready to say something.

CHAIR SHACK: I'm trying to think, you're going to have to give a shortened version of this for the forthcoming--

MR. COLLINS: That was my question, right.

MEMBER SIEBER: Don't skip this last

part.

MEMBER POWERS: I thought it was just perfectly adequate.

CHAIR SHACK: Actually I think most of it probably comes out of Rob's hide on the white paper because that's really not part of the rule.

MEMBER CORRADINI: You mean ways to cut it down?

CHAIR SHACK: Yes, and obviously to have less time. And I think you know we have the notion that we have the white paper and we're planning regulatory guidance but we probably can shorten that.

MEMBER POWERS: Again, your introductory comments seemed to cover everything that the full Committee needs to know about it. I mean Steve and Rob's stuff goes into the gory subcommittee kind of details that the full committee doesn't really need to know.

CHAIR SHACK: Well, I'd be less inclined to throw away Steve's stuff.

MEMBER POWERS: Why, you just like to see him tormented by Apostolakis?

MR. TREGONING: Well a lot of Steve's stuff really elaborates on points that are made in the overview presentation.

MEMBER CORRADINI: Yes, but if anything you can insert those.

CHAIR SHACK: Since this is a risk-informed piece though that risk-informed process is important.

MEMBER POWERS: They're asking for a letter here.

CHAIR SHACK: Yes, that's true. Well they're not asking for a letter, the question is whether we want to write one. It's a totally different question.

MEMBER POWERS: That is a different question.

CHAIR SHACK: I don't see now pillorying Steve is going to contribute to the decision.

MR. DINSMORE: I'm actually kind of used to it. If you start with it didn't happen. If you'd like we could cut two or three of these big changes out and replace--

CHAIR SHACK: Yes, that's what I think would be good.

MR. DINSMORE: You could combine I think expand a little bit on Tim's but I think Dana's got it about right, that that probably is pretty much the level. And the same with Rob's you know what we need

is the idea that we're going to have a program or a way to essentially ensure their compliance.

MR. TREGONING: I think that's going down to a bullet or two essentially because I agree it's detail that's not required.

MEMBER SIEBER: Nobody argued with you much.

MEMBER BLEY: That was here. I suspect we'll get back into what we did two years ago and start asking about the two NUREGs in some detail.

CHAIR SHACK: I hope not. We've revisited it so many times. Well as long as we stay within the allotted time. I guess my bigger question to the subcommittee is does anybody feel that we have issues that we probably do need to write a letter on?

MEMBER BROWN: I don't know that it's an issue to write a letter on except just as the new guy reviewing and reading all this stuff and at the end as I walk through and knowing that this is trying to get a handle on how much defense-in-depth you have and how far you can push it, it just looked to me back under the general design criteria we've literally ripped away every layer of defense-in-depth, because there's no single failure either for electric plants, ECCSs, emergency core, I mean containment heat removal,

containment atmospheric clean up, cooling water and then the containment design basis is done on a realistic basis. It's not a design basis for any change made or expected.

And that seems to me that every layer has been stripped out and the final barrier, the containment integrity, has been stripped back also from a design basis to a realistic analysis basis.

And so all I did was stack all of those six items up in my mind and say how far do you go? I mean if that's the consensus of the Committee that we want to agree with something like that, I'm a defense-in-depth guy, okay, and I don't mind risk informing evaluations. I'm not saying you shouldn't do that. The point is how far is too far.

And it's relative to the discussions we had on a number of the points as we went through here. And I just kind of choked at the last one. I mean I kind of bought off saying okay I can understand that, but then when the integrity, containment integrity went down the tubes, I kind of stepped back and said why would we do that? That just seems to be a step too far. That's just my observation.

MEMBER BLEY: I guess, you know, just for a comment on that, Charlie. There's no way you get

through the risk analysis side of this and the liability calculations if you you've got many single failures lying about. You just won't make it.

MEMBER BROWN: I understand that, that's why you want to get rid of them.

MEMBER BLEY: Well, yes, but there are double failures that might be more-- so you're really taking failures by their likelihood rather than just by the count. And so I think when events have recovered.

Now on the containment side I haven't thought a whole lot about that but we're going to realistic analysis which is as far as I know including uncertainties. It should cover some here.

CHAIR SHACK: And, again you know there's the defense-in-depth, we're talking about challenging the containment on its design basis, there's also the ultimate strength of the containment. So I mean we're looking at this in multiple kinds of levels. I don't think that we have stripped the defense-in-depth to the extent that you think we have. We're just treating it more like other beyond design basis events.

MEMBER BROWN: We have removed, before the design basis events were covered, I mean not

design, no, the large break was covered based on the past licensing--

CHAIR SHACK: That large break with a single failure and a loss of offsite power.

MEMBER BROWN: A loss of offsite power. That was covered before. Now we thrown that out because of the low risk or low probability of its occurrence. You don't want to devote more resources, you'd rather take care of those that are more likely. I understand, I read all the letters, but I don't say I understand them all. But I did get the track as you went forward.

So there was some rationale to do in that. It just seems to me how far do you walk that puppy back down the path? That's all.

CHAIR SHACK: Well, I think the Commission has tried to address that by saying that this really is not intended to be so much a burden-reduction rule as increase in safety. You know it gives, I mean we know that the intent of the design basis wasn't completely successful although you could mitigate the single failure large double-ended break loss, you core damage frequency was a lot more likely than that event was.

And so this actually gives you the

flexibility, hopefully, to address events that are more likely and more risky while giving up an extremely unlikely event. And that's not a bad tradeoff and they've sort of pushed that into the rule by capping the amount of risk increase they're willing to accept from this rule to a very small amount.

MEMBER BROWN: It does emphasize it as a safety change rather than a burden reduction.

CHAIR SHACK: Yes, but how do we see this as an increase in safety?

MEMBER SIEBER: It could be small.

CHAIR SHACK: We don't know what changes are going to be made. It could be that those changes will result, you know, that you'll be able to make changes in the way that will in fact result in a reduction in risk.

MEMBER BROWN: Yes, but normally those aren't going to be made unless you do, I mean let me step back. You have a power operate, somebody can go do the power operate in accordance with this rule. Without the rule, the old way, they would have to update the systems potentially. Similar to the top routine.

MEMBER CORRADINI: But let me--

MEMBER BROWN: Let me finish. Okay.

With this rule now it would enable them to pass through those with no changes, and making assumptions that single failures don't-- In other words, you have to have both, if you've got two trains you've got to have both of them. If you've got three you may have to have all three, whatever that combination is. And you've walked that through every one of the systems that you've got in there.

So I have a hard time envisioning that as quote "an increase in safety," because you've actually increased the power uprate where you've got more energy that you're taking out of the plant. Higher temperatures more than likely, I mean it's hard to do it without higher delta Ts and more fuel loadings in order to achieve your refueling outages.

So that's why I was asking the question: how do we envision this? I mean it's a nice thought that you're getting increased safety, it's not apparent when you walk through it to neophyte walking through these, but you cannot, somebody or anybody be able to say write down why this is an increase in safety if you apply these rules as you take some of these potential changes into consideration.

MEMBER CORRADINI: But I don't know if I would necessarily support the rule because of increase

safety. I guess I'd support the rule based on reduced burden.

MEMBER SIEBER: Safety impact should be minimal.

MEMBER CORRADINI: But I mean I don't think you can argue, I think Charlie has a very good point that I don't think you can argue that this increases safety. I think it shifts where you worry about safety.

MEMBER SIEBER: Well--

CHAIR SHACK: It could increase safety.

MEMBER CORRADINI: It could but I think within the uncertainty of the calculation, I guess the only thing Charlie I would disagree with is right now the applicants can come in under the realistic LOCA under 50.46, not the Appendix K version but the realistic, and if they wanted to submit and spend the money to do so, to do a risk calculation for a small break, they probably would then find margin they could uprate. No change in the rule.

And so this is just simply identified in a different way to analyze the system and--

CHAIR SHACK: And they will not evaluate the changes they make to see what they do to the risk. If they make any change they will cap it at one times

ten to the minus six.

MEMBER CORRADINI: Right. But to repeat what you're saying, that the current rule if this didn't exist at all, they can take option B and use a realistic calculation with uncertainties and never investigate how that affected risk. Here they're required to.

MEMBER ARMIJO: What if they voluntarily--

MEMBER CORRADINI: Yes of course.

MEMBER ARMIJO: What's their incentive to voluntarily use this rule? What's their benefit?

MEMBER CORRADINI: Economic.

MEMBER ARMIJO: There is no economic.

MEMBER BLEY: To get a change they couldn't get the other way.

MEMBER SIEBER: Well let's go back to the question that Bill asked which is, is there something we ought to write about? And one of the things we ought to write about is--

MEMBER CORRADINI: The last point--

MEMBER SIEBER: --the last point on use of non-safety equipment in systems and how reliable is it and should you keep track of that? And if you want to look for a safety benefit right now you get no credit

for those who have no requirements to keep them operable. If you impose the rule--

CHAIR SHACK: And you take credit for them as John says in the PRA.

MEMBER SIEBER: Yes, on the other hand, what good is the PRA if it doesn't reflect what's in the point.

CHAIR SHACK: Well that's why you have the measurements rule.

MEMBER SIEBER: My point is with these non-safety systems it you have some surveillance requirement and can demonstrate that it actually does impact and perhaps reduce the probability of an accident, there is the safety benefit. But without imposing some kind of surveillance then you can't show that. And so to me if you're going to give credit in risk base for non-safety equipment, not only do you have to list it in tech specs but you have to set performance goals and you have to surveille it to make sure it meets it.

And if you do that you may end up with a safety benefit.

MEMBER ARMIJO: That's a new category or reclassifying old equipment into an existing safety grade category.

MEMBER SIEBER: That's right. You know without all the paper work.

MR. BESSETTE: The transition break size it still pretty big; for PWRs it's what, 10 or 20 percent break. You've still got to have a blowdown that takes about 100 seconds or less, you still need the accumulators, you still need low pressure injection. You have to inject borated water, if you have one source as a borated water source tank, you only have four pumps that connect to that, two high pressure injection, two low pressure injection. So it's not as if you can take a fire pump and help out the situation because the fire is connected to an unborated water so practically speaking a lot of these considerations are just you know exercises in futility.

CHAIR SHACK: I mean if the break were six inches it would be a different story.

MR. BESSETE: Yes. Yes.

And containment, all the energy from the primary system is still going to end up in containment. You have your peak containment pressure is going to be the same with the 10 percent break as it was before. Yes.

MEMBER SIEBER: Take forever to get

there, a few seconds. Anyway, that will be my suggestion about what to write about and there's two aspects to it. It depends on how everybody feels, of course, but that's where I--

MR. BESSETTE: The most significant difference that I see is you're not going to fail any fuel most likely for design basis accident.

MEMBER SIEBER: Probably not.

MR. BESSETTE: And you don't have to deal with the gap at least on the--

MEMBER RAY: Well, to make one comment on Charlie's point. I believe that this kind of analysis should result in a greater safety because you eliminate arbitrary constraints on what conditions can exist. You go beyond what was a previously truncated set of things. Multiple failures for example. And worst case conditions than are in the design basis.

So in principle it can do that, and it should do that. Unfortunately, I think too many people look at it as a burden reduction vehicle and so they get wrapped up in these things like we were talking about which is well gee whiz, this is really a low probability thing. If I had taken credit for some non-safety thing I shouldn't have to pay attention to its reliability as well, other than what I already do

under the maintenance rule.

It seems to me that if it's the right thing to do it's the right thing to do, and that ought to be the reason why we do it.

Now in a practical world that, of course, isn't what governs. And I understand that. But nevertheless safety should be enhanced by a more comprehensive look at what might happen and what responses to what might happen we can rely on. And the deterministic design basis that we've used up until now eliminates some things that ought to be considered it seems to me.

MEMBER BROWN: Then we ought to be able to write it down. Somebody ought to be able to write that down as to why this is a benefit instead of just chatting about it.

MEMBER RAY: Well you just said you'd read a lot of letters.

MEMBER BROWN: I just read them all and I mean none of them answered that question. None of them stated why are you doing it. And what you have the potential to talk about the reduction in this and the reduction in that. And flexibility for various things.

But it didn't say anything about you get a

better overall evaluation of the risk associated with operating plant for the following reasons: bang, bang, bang. It's not written down. It's ad hoc, you have to make it up as you go and if you don't want to do that that's a big change. If somebody implements this it's a big change.

The only thing people know today about nuclear power plants is TMI and Chernobyl where stuff broke. In one case a lot of people got hurt, in another one--

MEMBER SEIBER: A lot of the stockholders got hurt.

MEMBER BROWN: Exactly.

CHAIR SHACK: Well, with Chernobyl not a lot of stockholders, only one. And neither one of them was a double guillotine break.

MEMBER BROWN: No, I understand that. I understand that. It's just they were both stupid.

MEMBER CORRADINI: So I guess I want to ask the staff question because I guess I would agree with Jack's final comments that if we were to write something down, the last discussion about connecting the practical aspects of surveillance of this additional equipment with the why it should be surveilled or why it should be worried about doesn't

appear to be in there enough and I sense the staff has--

CHAIR SHACK: Well, if you're going to pick this non-safety equipment why not go back to the maintenance rule and look for the most risk significant non-safety equipment. Do a full 50.69. Why do we pick this particular piece of non-safety equipment over what may well be more risk significant non-safety equipment.

MEMBER SIEBER: You can do that if you want.

CHAIR SHACK: Well you know that's always the trouble with risk informed regulation when you bite off a piece of something and you don't take the whole thing.

MEMBER SEIBER: All in one string.

MEMBER CORRADINI: But just to finish my thought, if there was something to write down in an interim letter that would be the only thing I think rises up to a thing. But I guess I'd ask the staff if they get the warm feeling that I think uniformly this troubles at least a lot of us, is that enough for them to reconsider some of what they're thinking about? Or do they need something from us in that regard? Tim made a point that he was, he used the term "beaten

down."

I mean if we have a letter from you sure it's a lot more weight--

CHAIR SHACK: If we want a hammer we put the hammer down. We don't depend on them getting the message back.

MEMBER CORRADINI: But I guess let's put it differently, if the rule reappeared whenever their schedule is and it's exactly the same in this one frame, then I think a lot of us would have a problem.

MR. COLLINS: I recognize now that's important information.

We'll put this out for public comment so we're going to get written comments to the contrary of what you're arguing here I'm sure. Okay? And we'll be modifying the based on the comments we receive.

MEMBER RAY: Okay. I bet you something, okay, I bet you you will not get a comment from the industry in any way saying yes I want you to list this in the tech specs, but I don't want to have any requirements placed on it I just want to find out later if I violated my analysis assumption. That's not going to happen.

MR. COLLINS: They're going to say there's no need for this to be in the tech specs at

all.

MEMBER RAY: That's right. That's not the same thing we say.

MR. COLLINS: No, agreed. I understand. Oh I understand.

MR. DINSMORE: But to clarify this I wouldn't expect that we're going to change the rule that we're proposing to issue for public comment to include this unless you effectively tell us. I mean I don't know if the schedule, the schedule right now is we've had all offices concur with different comments and that we're going to go and put those comments in. And this particular comment is not one.

MEMBER CORRADINI: I understand that. I'm just trying to sense the level of need to write something down versus communicate it verbally.

CHAIR SHACK: No, I mean we could send out a letter sort of like the one we sent last time, don't send this thing out for public comment. We could write a letter that says send it out for public comment but we still think--

MEMBER SIEBER: We have reservations.

CHAIR SHACK: And do this, this and this. Or consider this as part of the comments. Consider this as you know our part of the public comments on

it. There's a whole variety of ways that we could comment on it. But that is a Committee decision.

MEMBER SIEBER: Actually there's been a lot of progress I think by the staff.

CHAIR SHACK: In fairness to the staff we threw out ping pong balls to tell you the truth.

MEMBER SIEBER: Trust us we'll get to cloture.

MEMBER POWERS: That's good, there's ping pong balls. And they bounce back. It's when you feel like you're throwing like a raw egg that you get to worry.

MR. DINSMORE: I wonder if we can take it back and talk to management as we go through the process and make sure that they're they're aware of it. But I personally would suspect that it's kind of ahrd to change these things at later dates. And it will not work its way in there unless--

CHAIR SHACK: No, I would not rely on you to carry on a message back. If we want to send a message we send a wire. It works very well.

Any further comments or questions?

MEMBER SIEBER: Good meeting.

CHAIR SHACK: Thank you very much, it was a very helpful presentation. Thank you.

MR. COLLINS: Tomorrow then I'm just going to present my stuff. Is that what we decided?

CHAIR SHACK: Yes and maybe you know grab a couple of points from Steve and maybe a point or two from Rob. Go back through it again just to check but I think you've got most of the important stuff.

(Whereupon, the meeting of the Subcommittee on Regulatory Policies and Practices, having been concluded, went off the record at 4:46 p.m.)

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

§50.46a Rule to Risk-Inform ECCS Requirements (Redefinition of Large-break LOCA)

ACRS Meeting
May 7, 2009

Tim Collins, Senior Level Advisor
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Overview of Staff Presentation

- Summary of §50.46a rule concept
- Rule background and schedule
- Overview of revised proposed rule and changes made in response to ACRS comments
- Questions/discussion

§ 50.46a Rule Concept

- Alternative to current ECCS req'ts (50.46)
- LOCAs divided into 2 groups based on break frequency
- Mitigation must be demonstrated for all LOCAs but requirements are relaxed for lower frequency breaks
- Plant changes should be evaluated using a risk informed process

§50.46a Rule Background

Rulemaking initiation

- Commission SRM (March 31, 2003) directed staff to prepare proposed rule
  - Technical basis not completed
  - Staff sought additional guidance (SECY-04-0037, March 2004)
  - Provided in July 2004 SRM
- Proposed rule to Commission (March 2005)
- Commission directed significant changes
- Published November 7, 2005 (70 FR 67598)

§50.46a Rule Background

Original Proposed Rule

- 13 commenters, 11 from nuclear industry
- Most felt process was too burdensome to be cost-effective
- Staff held 3 public meetings;
  - address public comments and reduce rule burden
  - posted revised rule language on website
- Provided draft final rule to ACRS October 16, 2006
- Met with ACRS subcommittee (Oct. 31); full committee (Nov. 1)
- ACRS views in November 16, 2006 letter

§ 50.46a Rule Background

ACRS Letter

- Rule to risk-inform§50.46 should not be issued in its current form
  - Insufficient defense in depth for pipe breaks larger than the TBS
  - Concerns with risk-informed assessment process
  - Concerns with plant specific applicability of expert elicitation and seismic analysis

§50.46a Rule Background

Response to ACRS Letter

- Staff requested additional Commission guidance (SECY-07-0082, May 2007)
  - on issues and rule priority
- Commission SRM - August 2007
  - continue rulemaking on reduced priority basis
  - increase overall defense-in-depth for breaks >TBS
  - elicitation results must be shown to be applicable on plant specific basis
  - Seek ways to enhance leak detection for large pipes
  - Total risk increases limited to “very small”

§50.46a Rule Background

Recent Staff Efforts

- Work resumed early 2008
  - Final rule requirements drafted based on new Commission guidance
- OGC review
  - Need to re-notice portions of rule
  - Because of inter-related requirements, staff to re-publish entire rule

§ 50.46a Rule

Status and Schedule

- Revised rule language made public April 16, 2009 (www.regulations.gov)
- ACRS meeting May 6 -7, 2009
- EDO to sign re-notice – late June 2009
- 45 day comment period
- Public meeting(s)
- Meet with ACRS on final rule (ACRS letter)
- Final rule to Commission nine months after close of comment period (June 2010)

Overview of Revised Proposed Rule

- Transition break size (same as original rule)
  - PWRs – largest attached pipe to the main coolant piping
  - BWRs – largest feedwater or residual heat removal line inside containment
- Mitigation must be demonstrated for all LOCAs

Initial Conversion to 50.46a

- Demonstrate applicability of Elicitation Report
- Demonstrate applicability of staff seismic study or provide a plant specific study
- Describe process for risk informed evaluation of plant changes
- Add to Tech Specs any non-safety equipment that is credited in analysis of breaks >TBS
- Provide revised ECCS analyses

ECCS Analysis Requirements

- Breaks ≤ TBS
  - No change from current 50.46
- Breaks > TBS
  - No single failure assumption
  - Credit for offsite power
  - Credit for non-safety equipment
  - Alternative metrics for “coolable geometry” may be used if justified

Subsequent Plant Changes

- Must be risk informed if:
  - Enabled by the rule, or
  - Bundled with enabled changes
- Require staff review unless
  - Licensee has an approved review process, and
  - Increase in risk is ≤ “minimal”, and
  - 50.59 satisfied
- Must not invalidate applicability of elicitation report or seismic studies

Risk Informed Plant Changes

- Meet criteria consistent with RG 1.174 (defense-in-depth, safety margins, monitoring program, and acceptable risk increases)
- Confirm “very small” cumulative risk increase via periodic PRA update

Other Requirements

- Analysis Methods for all LOCAs must be approved by staff
- Ability to readily connect onsite power must be provided if nonsafety equipment credited in analysis

Other Requirements (con't)

- PRA methods must be of sufficient scope and quality
- Maintain leak detection capability for piping larger than TBS to reduce likelihood of breaks > TBS
- Operation is limited to < 14 days per year if breaks > TBS have not been shown to meet acceptance criteria

Applicability to future reactors

- Rule may be used if
  - "similarity" in design and operation is demonstrated
  - appropriate TBS is specified
- NRC design-specific review
  - must approve similarity
  - must approve proposed TBS

Defense in Depth Considerations for Breaks >TBS

Draft Final Rule	Proposed Revised Rule
No single failure	same
No loss of offsite power	Provide onsite power for accident management to any credited equipment
Use of non-safety equipment with no special treatment	Equipment must be identified in TS and its availability supported by plant specific data

Defense in Depth Considerations for Breaks >TBS (con't)

Draft Final Rule	Proposed Revised Rule
No prior approval of ECCS methods	Prior approval required
Methods give reasonable representation of system response	Must demonstrate "high probability" that criteria will not be exceeded

Risk-Informed Revision of 10 CFR 50.46

Developing Regulatory Guidance for Applicants to Demonstrate that the Transition Break Size is Applicable to Their Plants

Robert L. Tregoning
NRC\RES

ACRS Subcommittee on Regulatory Policies and Practices
May 6, 2009

Presentation Objectives

- Provide brief summary of the research conducted which supported the development of the transition break size (TBS)
- Discuss motivation and objectives for developing regulatory guidance to ensure applicability of the research findings
- Present the scope, philosophy, and general framework envisioned for the regulatory guidance
- Provide the status and schedule for regulatory guidance development

Background: NUREGs-1829 & 1903

- Commission direction (SRM-02-0057)
  - "The staff should provide the Commission a comprehensive 'LOCA failure analysis and frequency estimation' that is realistically conservative and amenable to decision-making … with appropriate margins for uncertainty …".
  - "The staff should use expert elicitation to converge (whenever possible) service-data and PFM results …".

- Application in 10 CFR 50.46a
  - NUREG-1829: Develop part of the technical basis for selecting TBS
  - NUREG-1903: Verify that risk associated with seismic-induced breaks greater than the TBS are acceptable

NUREG-1829: Executive Summary

- Elicitation used to estimate ***generic*** BWR and PWR passive-system LOCA frequencies associated with material degradation.
- Panelists provided quantitative estimates supported by qualitative rationale in individual elicitations for underlying technical issues.
  - Generally good agreement on qualitative LOCA contributing factors.
  - Large individual uncertainty and panel variability in quantitative estimates.
- Group results determined by aggregating individual panelists' estimates.
  - Uncertainty reflected in 5th and 95th percentiles about median estimates.
  - Confidence bounds used to quantify panel variability.
- **NUREG-1829 was published in April 2008.**

NUREG-1903: Executive Summary

- Reviewed prior PRA, seismic studies and earthquake experience
- Analyzed direct piping failure associated with rare seismic events (i.e., 10^{-5}/yr & 10^{-6}/yr) in piping systems with diameters larger than the TBS
- Analyzed large component support failures that may lead to piping failure (i.e., indirect piping failure) associated with rare seismic events
- Results
  - Unflawed piping: Failure frequency is much lower than 10^{-5}/yr
  - Flawed piping: Critical flaws for long, circumferential flaws ($\theta/\pi = 0.8$) are generally large
  - Indirect failures: Two cases analyzed have a mean piping failure probability of approximately 10^{-6}/yr
- **NUREG-1903 was published in February 2008**

NUREG-1829 Regulatory Guide: Commission Direction

- SRM-08 10 on SECY-07-0082
  - "The final rule should require licensees to justify that the generic results in the revised NUREG-1829, 'Estimating Loss-of-Coolant Accident Frequencies Through the Elicitation Process,' are applicable to their individual plants."
  - "The staff should develop regulatory guidance that will provide a method for establishing this justification."

- Staff has interpreted that this guidance extends to NUREG-1903, "Seismic Considerations For the Transition Break Size"

Plant-Specific Applicability of NUREG-1829 and NUREG-1903 Results

- Consider issues and implications associated with generic aspects of NUREGs
  - Assumptions
  - Approach
  - Analysis
- Guidance has been considered in several areas that may be affected by plant-specific factors
  - NUREG-1829 Applicability
    - Safety culture
    - *Continued operation*
    - *Changes in plant operation that may affect LOCA frequencies*
  - NUREG-1903 Applicability
    - *Risk associated with direct piping failures caused by seismic loading*
    - Risk associated with indirect piping failure caused by seismic loading

Applicability Guidance: Philosophy and General Framework

- Addresses breaks larger than the proposed TBS (i.e., primary loop piping and pressure boundary structural components)
- Use information submitted under other programs wherever possible (e.g., power uprates, license renewal, LBB submittals)
- Evaluation to address NUREG-1829 applicability
  - Intended to be largely qualitative
  - Consider plant-specific effects on variables that affect LOCA frequencies
  - Demonstrate adequacy of existing plant conditions/operation and insignificance of proposed plant changes
- Evaluation to address NUREG-1903 applicability
  - Provides options to maximize applicability of NUREG-1903 analysis
  - Provides detailed guidance and examples for conducting plant-specific analyses

Applicability Guidance: Status and Schedule

- 2009
  - Developed white paper for proposed reg. guide (ML090350757): Feb
  - Held public meeting to solicit feedback on white paper: Feb
  - Received stakeholder feedback: Apr
  - Provided information to support rulemaking FRN: Apr
  - Prepare draft regulatory guide: May – Jun
  - Brief ACRS on draft regulatory guidance: Jun – Jul, tentative
  - Publish draft guidance for public comment: Jul – Aug
  - End public comment period: Oct – Nov
  - Address public comments: Nov – Dec
- 2010
  - Brief ACRS on final regulatory guidance: Jan – Mar
  - Publish final guidance 6 months after final rule to Commission: Dec

Technical Areas where Explicit Guidance is Not Warranted

- Safety culture
  - NUREG-1829 identified that plant-to-plant variability can be significant; deficient safety culture may greatly increase LOCA frequencies.
  - Significant enhancements have been made to reactor oversight process (ROP) since NUREG-1829 elicitation was completed.
  - Current ROP is expected to identify deficiencies before plant safety or LOCA frequencies are affected.
- Indirect piping failures due to seismic events
  - NUREG-1903 only considered one failure mode.
  - NUREG-1903 only evaluated two plants and piping configurations.
  - Generic changes to seismic design, testing, analysis, qualification, and maintenance requirements will not be allowed under 10 CFR 50.46a.
  - Plant-specific analysis required to justify any proposed changes.

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Advisory Committee on Reactor Safety

May 6-7, 2009

Stephen Dinsmore
Senior Reliability and Risk Analyst
Office of Nuclear Reactor Regulation

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Overview of the risk-informed change control process

- Risk-Informed evaluation must be performed for all facility changes made under the rule
- Submittal required
  - For all changes made under the rule (unless self-approval is authorized)
  - To request optional self-approval authorization
- Change in risk acceptance criteria and estimates
- PRA update and reporting
- Risk assessment quality requirements
- Defense-in-depth, safety margins, and performance monitoring

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Risk-informed evaluation for changes made under the rule

- **Draft final rule**:

  A staff reviewed and endorsed risk-informed evaluation process required for all facility changes after implementation of rule

- **Revised proposed rule**:

  Risk-informed evaluation required for all facility changes made under the rule

  - Changes enabled by the rule – i.e., all changes that satisfy the revised ECCS analysis under the new 10 CFR 46a but do not satisfy the ECCS requirements under the original 10 CFR 46.
  - Other changes licensees choose to bundle in the change in risk estimate

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Submittal requirements

- **Draft final rule**:
  - Initial submittal to implement the rule - including risk-assessment process
  - Afterwards, submittals only required for facility changes that must otherwise be submitted for NRC review or changes to SSC(s) within the scope of the Maintenance Rule

- *ACRS Comment: Licensees should submit all changes that cause greater than very-small risk increases*

- **Revised proposed rule**:
  - Submittal required for each change unless self-approval authorized
  - Submittal required to request optional self-approval process
  - With authorized self-approval, submittal required for each more-than-minimal risk increase
  - Submittal required to bundle unrelated changes into the change in risk estimate

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Change in risk acceptance criteria

- **Draft final rule**:

  Total increases in CDF and LERF [from all facility changes] are small and the overall risk remains small.

- *ACRS Comment: significant departure from current risk informed guidance which should be reviewed for its implications.*

- **Revised proposed rule**:

  Total increases in CDF and LERF [for changes made under the rule] are very small and the overall risk remains small.

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Change in risk estimates

- **Draft final rule**:

  Total cumulative risk increase estimate required - which could be estimated from the "current" CDF and LERF minus the CDF and LERF at time of rule implementation

- *ACRS comment: significant departure from current risk informed guidance which should be reviewed for its implications*

- **Revised proposed rule**:

  The cumulative effect of previous changes made under the rule that have increased risk but have met the acceptance criteria shall be evaluated

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

PRA update and reporting (no substantive changes)

PRA update

- No less than every two refueling outages
- After the update, licensee shall take appropriate action to ensure that the acceptance criteria are met

PRA reporting requirements

- Corrective actions and schedule if acceptance criteria are exceeded after an update
- Every 24 months, a short description of all self-approved changes since last report (if applicable)

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Risk assessment quality requirements (no substantive changes):

- PRA must address internal events, external events, full power, low power, and shutdown that would affect the regulatory decision in a substantial manner
- The PRA must
  - (Draft final rule: calculate CDF and LERF)
  - reasonably represent current configuration and operational practices
  - have sufficient technical adequacy and level of detail
  - have been subjected to industry peer review process
- Risk assessment other than PRA must be developed using an integrated, systematic process (Draft final rule: non PRA assessments shall produce “realistic results”).

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Maintain defense-in-depth:

- **Draft final rule**

  Includes specific defense-in-depth attributes from RG 1.174 to make them criteria

- **Revised proposed rule**

  Includes the specific attributes plus additional criteria for credited non-safety-related equipment

  - Identified in TechSpecs (TechSpec change precludes self-approval)
  - Described in the submittal
  - Readily connected to onsite power

10 CFR 50.46a Rulemaking

Risk-Informed Change Control Process

Maintain Adequate Safety Margins (no substantive risk assessment changes)

- Adequate safety margins are retained to account for uncertainties

Implement adequate performance-measurement programs (no substantive risk assessment changes)

- Programs shall be designed to detect degradation before plant safety is compromised

Backup slide
10 CFR 50.46a Rulemaking Comments

- Issue: Operating restriction when in a configuration not demonstrated to meet the ECCS acceptance criteria for breaks>TBS
  - Proposed rule: prohibited operation in this configuration.
  - Public Comment: Restriction not commensurate with safety significance of configuration and could increase risk by reducing permitted on-line maintenance.
  - Re-proposed rule: Operation in this configuration not to exceed 14 days per year.

Backup slide
10 CFR 50.46a Rulemaking
Comments Issue:

Issue: Operational Restrictions (Cont.)

- Guidance directly addressing issue does not exist but related guidance exists
- RG 1.177, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications “
  - Acceptance guideline integral conditional core damage probability <= 5E-7
  - 1E-5/year frequency with no mitigation yields allowed AOT of 18 day
- SRP Chapter 2.2.1 and 2.2.2 identifying design basis events (that need to be mitigated) as those with a frequency >1E-7/year
  - 1E-5/year frequency could exist for 3.6 days before exceeding annual frequency of 1E-7