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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FUKUSHIMA SUBCOMMITTEE

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TUESDAY

DECEMBER 4, 2012

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ROCKVILLE, MARYLAND

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

COMMITTEE MEMBERS:

STEPHEN P. SCHULTZ, Chairman

J. SAM ARMIJO, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR. Member

HAROLD B. RAY, Member

JOY REMPE, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

GORDON R. SKILLMAN, Member

JOHN W. STETKAR, Member

DESIGNATED FEDERAL OFFICIAL:

ANTONIO DIAS

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Adjourn

P R O C E E D I N G S

8:31 A.M.

CHAIRMAN SCHULTZ: Good morning. I'd like to call the meeting to order this morning. This is a meeting of the Advisory Committee on Reactor Safeguards Subcommittee on Fukushima. I am Stephen Schultz, chairman of the Subcommittee.

ACRS members in attendance today are Jack Sieber, Dick Skillman, Harold Ray, Dennis Bley, Sam Armijo, John Stetkar, Mike Ryan, Bill Shack, Charlie Brown, and Joy Rempe.

The purpose of today's meeting is to review and discuss the NRC staff's development of a notation vote paper with possible options for addressing the Near-Term Task Force Recommendation 1 which is establishing a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations. This paper is due to the Commission in February, 2013.

Our first subcommittee meeting on the subject was held on August 15th. We also have another subcommittee meeting scheduled for January 18, 2013. By that time, we should be able to discuss in more details the proposed notation vote paper.

The entire meeting today is open to the public. Rules for the conduct of and participation in the meeting have been published in the Federal Register as part of the notice for this meeting.

Today, the subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full committee.

Antonio Dias is the Designated Federal Official for this meeting.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register notice. It is requested, therefore, that speakers first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's meeting. However, I understand that there may be individuals on the bridge line who are listening on today's proceedings and will have an opportunity for public comment later in the meeting.

Again, we have an opportunity today in this meeting to discuss the topics of interest. This

is a report that's being provided as a result of work having been done on this topic. I understand much work has been done by the staff in this area and it is a progress meeting in their deliberations in preparation for the February paper.

We'll now proceed with the meeting. I call upon Dr. Sher Bahadur, Deputy Director of the Division of Policy and Rulemaking in the Office of Nuclear Reactor Regulation to open the presentations this morning.

Sher?

DR. BAHADUR: Thank you, Mr. Chairman. I'm Sher Bahadur, Deputy Director, Division of Policy and Rulemaking in NRR. And this is the second of the three subcommittee meetings that we plan to have on Recommendation 1.

When we met last time in August, we described 3 options and we also gave 12 regulatory framework improvement activities that we call framework building blocks.

Now those options that we described at that time were extremely vague, as I remember. The first option was do none of the improvement activities. The second option was do certain high value improvement activities. And the third option,

of course, was to do all the improvement activities.

Now as I recall, the subcommittee was not very pleased. And we weren't really sure ourselves at that time as we presented to you whether we brought the stuff that we needed to bring to the attention of the subcommittee.

The staff has come a long way since then. We have evolved in a number of ways. One of the reasons the evolution took place was a series of presentations that we made to a number of senior management in the Agency, including the individual commissioners, and that really helped us to identify which improvement activities to pursue and why.

So we now have converted those improvement activities into more clearly-defined options. And the options that we have defined have been described in a document, about a 50-page document, which really takes you through the options and then gives you the details as to what those options are.

So we now have additional cost estimates, also for those options. And we released those options document for public comment. So we received public stakeholder review and we discussed those options in the public meeting and saw some public comments and the due dates for the public comments, as I

understand, is December 14.

So although all these activities have been going on, the staff has not selected a particular option that's going to be recommended to the Commission. So today's briefing, as you will see, is not so much as to present to you the recommendation that we're going to give to the Commission, but to present those options to you and get the feedback from the members so we can go back and then mull over these options.

So with that, I would say we welcome all the comments that you'll receive today from the subcommittee. And the staff is open for discussions and open for suggestions. And with that as a background, I'd like to turn it over to Dick Dudley who, along with his team, is going to provide the detailed description of all the options that the staff has developed.

MR. DUDLEY: Thank you, Sher.

DR. BAHADUR: So if you have no other questions for me, then I'll say Dick, please start.

MR. DUDLEY: Good morning. I'm Dick Dudley, I'm the NRR Rulemaking Project Manager that's leading this interoffice working group on Recommendation 1. I'm going to go to Slide 3.

But before I start, why are we here? Well, we're here to keep the ACRS informed of the activities we're doing in response to the Near-Term Task Force Recommendation 1. And the objective, of course, is to get an ACRS letter with the committee's views on the staff's proposed response to Recommendation 1 and to provide that to the Commission so that the Commission can factor that into their deliberations.

Just an outline of my presentation, I'm going to give a brief overview of Recommendation 1. I'll review a little bit of actions we've taken and we have planned. I'll discuss the options that we're considering. We'll discuss then the cost estimates and I'll summarize and we'll lay out the path forward to complete this activity.

So now I'm going to go to Slide 11. A lot of this is background. It's a full package, but you've heard some of this before, so I'm going to skip through a lot of these slides to make sure we can complete this in the right amount of time.

But in a number of Commissioner briefings and other management briefings associated with Recommendation 1, people have asked the question well, what's the problem? And the working group's view is

that -- well first, the Near-Term Task Force made it clear that the NRC's existing power reactor regulatory framework does not have a logical and systematic way that it addresses the need or the existence of requirements that reduce the risks of beyond design-basis accidents and severe accidents.

The existing regulatory framework for power reactors, the NTTF believed and the working group also believes adequately addresses design-basis events, but for beyond design-basis events, the working group believes that the existing regulatory framework could be improved and we think this would facilitate more consistent, efficient, timely, and transparent Commission decision making when we need to address new issues or when we need to address new information that comes up on issues that we've already addressed.

So we believe that improvements would allow the existing framework to provide an improved structure and set of criteria to identify and categorize unanticipated events or accidents that might require regulatory action. We think we can put together a structure and criteria to predictably and consistently evaluate how we should balance risk and defense-in-depth when we're making decisions for NRC

regulatory responses to unforeseen events. And we believe that we could also improve the regulatory process to better ensure licensee implementation and consistent long-term maintenance of initiatives that are currently associated -- of activities that are currently addressed by voluntary industry initiatives.

MEMBER RAY: Do you think that the concept of design basis would be affected by this? In other words, are we really extending the design basis without saying so?

MR. DUDLEY: One of the options will do that. Yes. And one of the options would also allow us to modify the design basis to use risk information to move activities or sequences events out of the deterministic design basis and into another category that would allow different treatment requirements and less severe mitigation requirements.

I'm going to go now to Slide 13. And Sher has talked a lot about this already. We originally had three options. Don't do anything. Do just the right amount of cost effective activities. And then fix everything. And then we backed off from that and we had these 12 framework building blocks.

Today, we've taken those building blocks and gotten management direction on the improvement

activities and we put together what I'm going to list, I'm going to say right now are four options, but that's not really true because many of the options have sub-options among them. And these four options are by no means a full set of options. They're intended to represent a very broad spectrum of options from which the Commission may choose, but there are numerous other options could be crafted that would fit in between these options in this spectrum, so to speak. So it's not an exhaustive set of ways to address regulatory framework improvements.

But anyway, today, we're going to talk about Option 1 which is to maintain our existing regulatory framework. We'll talk about Option 2 which is to clarify the role of voluntary initiatives. Option 3 is to establish a decision-making process and criteria that would allow us to more effectively and predictably make decisions balancing risk, defense-in-depth and safety margins. And Option 4 would be to establish an additional regulatory category for requirements that would address beyond design basis events and severe accidents. And of course, you can do that two ways. Option 4a, we would do that on a generic basis. And Option 4b, we would do that on the plant-specific basis.

And also, the applicability of the activities we'll discuss today, applicability is to light water power reactors. This would be operating reactors, evolutionary LWRs, and I think since we were here last, we've had a public meeting and -- well, we've had some public feedback and based on that, we believe we can also include small modular light water reactors in these same framework activities.

MEMBER SKILLMAN: When you identified Option 4, please, a new regulatory category, what do you envision that category to be?

MR. DUDLEY: We'll go -- there will be a long presentation on this.

MEMBER SKILLMAN: Thank you.

MR. DUDLEY: We'll specifically address that.

MEMBER SKILLMAN: Thank you.

MR. DUDLEY: And if we don't do it adequately, you'll make sure we do.

MEMBER SKILLMAN: Thank you.

MR. DUDLEY: We released on November 2nd, a draft option summary document. We provided that to the ACRS at that time, also where we described in detail the descriptions of the options, the key issues, the products, preliminary cost estimates and

our very first assessment of pros and cons of the various options.

We had a public meeting on November 8th, where we discussed these options. We answered questions . We solicited feedback both from the industry on industry implementation costs and from all stakeholders on the various views that they might have on the pros and cons of the various options.

We are accepting public comments on that. We're using regulations.gov. The federal rulemaking website is the tool to accept those comments. And that will be open through December 14th. And we'll review all the comments, but it's not like a rulemaking activity. We're not going to formally evaluate and disposition comments like we have to do, are required to do on rulemaking.

At our November 8th public meeting, we got some feedback from the folks that were in the room.

CHAIRMAN SCHULTZ: Excuse me, Dick?

MR. DUDLEY: Yes?

CHAIRMAN SCHULTZ: With regard to the comments that are coming in there and we've seen the activities associated with the public meeting, the number of attendees and there's a lot of involvement that you generated related to this topic and I'm sure

there are going to be many, many comments that are going to be coming in, but although you're not going to have a formal process to respond to that, what is the plan to assure that the public comments are all considered in the document? You have a formal process by which that's going to be formulated?

MR. DUDLEY: Well, we will keep a log of each of the comments with a very brief summary and like the first comment came in already and it says your cost estimates are too low. Well, okay. You write that down, but it provides no information. So we'll just keep a log of that sort.

And the ones from the initial screening indicate need further evaluation and further consideration, we'll make sure that those are distributed to the entire working group and we will go through them, discuss them, in a working group meeting and decide whether or not we think we should adjust or make changes to the plans that we have.

CHAIRMAN SCHULTZ: Thank you.

MR. DUDLEY: So at the public meeting on November 8th, I believe it was Union of Concerned Scientists said hey, if you select or recommend Option 1 which is the existing framework, aren't you just relying on luck, in other words? If Fukushima hadn't

happened, would we be improving hardened vents like we're doing now?

Another comment from industry was that they were spending millions of dollars on the FLEX mitigating strategies program and the question was will FLEX be revisited under Option 4a? And that's a good question. And although the commenter didn't mention it, the same question would apply to Option 3 and Option 4b also. Those would be issues that we would have to decide. If the Commission selected any or all or several of those options, we'd have to figure out how those would interact with the FLEX, on-going FLEX program.

Another commenter wanted to make sure that we made sure the Commission knew that Option 4b would take a long time to implement. I believe that's because Option 4b requires a plant-specific PRA and I believe the commenter was referring to the limited availability of actual PRA practitioners that could perform those improvements of the existing PRAs up to the level they would need to be.

Another comment was that under Option 4a, the commenter believed that the NRC already had the tools that it needed to take action without rulemaking. A representative from the Office of

General Counsel responded to that one though and I think the answer was you can't use regulatory guidance or regulatory guides without an over-arching regulatory requirement and so we didn't at that point think that that was an option. We think we would need rulemaking under that activity.

And of course, there was a comment by industry that cost for the PRA that were required in Option 4b that the estimates are too low and they stated by an order of magnitude. But to support that, NEI who made the comment committed to provide improved PRA cost estimates to us by December 14th.

MEMBER SHACK: Do you really think you can do Option 4 without Option 3?

MR. DUDLEY: I don't. I don't. I really don't. I mean you could do it much better. You could do a much better job of it.

MEMBER SHACK: We still have to make decisions. Whatever you decide to do with Option 4, you have to decide how to put things into it.

MR. DUDLEY: And Option 3 would be the perfect tool to use to populate the category, I believe.

MEMBER SHACK: I can't see them as separate options.

MR. DINSMORE: This is Steve Dinsmore from the staff. But you could do 3 without 4.

MEMBER SHACK: I could do 3 without 4. Okay, so that's the way you're thinking about it.

MR. DUDLEY: So we're going to evaluate the stakeholder feedback when the public comment period ends. Right now we're working on the details and the integration of the options, just like you said.

We're refining our cost estimates. And we're trying to make sure that the pros and cons are done on a consistent and balanced manner and we'll again meet with the ACRS subcommittee in January. We'll finalize our SECY paper. We'll meet with the full committee in early February. And the Commission paper is due to the Commission in mid-February. And the ACRS letter would be probably received about the same time the Commission gets our SECY paper.

Are there any questions on my introduction? Any more questions?

Now Steve Dinsmore will discuss Option 1, maintain existing regulatory framework.

MR. DINSMORE: Good morning. My name is Steve Dinsmore and I'm a senior reliability and risk analyst in the PRA Licensing Branch in NRR. I have

the pleasure of presenting to you Option 1.

Option 1's title is kind of carefully crafted. Maintain existing regulatory framework. So it's actually not a do nothing option, nor is it really an status quo option insofar as status quo implies that nothing will be changed.

Our rules and guidance are constantly changing to some degree. Option 1 mainly means we would not strive towards a goal of creating a new category of components in the new regulatory framework. That wouldn't be a goal which we would be striving for if you chose Option 1.

You could choose Option 2 and 3 and 1. The only one you couldn't choose together is 1 and 4 because 4 would be a goal of creating this category. So that's kind of where Option 1 fits in.

MEMBER SHACK: But 3 would give you a new decision criteria which to me would seem to be quite different than Option 1. I mean Option 1, I look at as you're not changing the way we make decisions now about --

MR. DINSMORE: You wouldn't change the framework. You have design-basis events and you have the whole process that revolves around that. Then you have beyond design basis and you add things as you

need out there, but you wouldn't -- so the framework -- but you could change how you make decisions moving stuff around. But the framework would remain.

MEMBER ARMIJO: So Option 3 could be part of Option 1?

MR. DINSMORE: I believe so. I guess there's some discussions internally as to how that all would work together, but it would seem to me you could do Option 3.

MEMBER ARMIJO: We sort of do that now, right? We try and balance risk and defense-in-depth right now in some ad hoc way.

MS. DROUIN: Right, Option 3 would give you, you know, the actual formal process and the decision criteria for doing it. Instead of doing it on an ad hoc basis each time, we would have a formal structure. So does it change how we do business? No. But it would give you the mechanism so that you aren't doing it on an ad hoc basis every time.

MEMBER ARMIJO: So you could have an Option 1 including Option 3 as a way of going forward.

MR. DINSMORE: As a way of helping you make decisions in the future, yes, sir.

MEMBER ARMIJO: Yes.

MR. DINSMORE: Yes.

MEMBER SKILLMAN: Does that make Option 3 an option that needs to be implemented no matter what occurs here? It sounds like if Option 3 is a common denominator, then it's kind of a no brainer that that's one that ought to be implemented no matter what happens.

MS. DROUIN: That gets into what we're going to recommend in the paper. And right now, we're still deliberating within the working group. But it's a good point.

MEMBER SKILLMAN: Thank you.

MR. DINSMORE: Then real quick, a summary of Option 1, we retain the current regulatory framework --

MEMBER BROWN: Can I ask one question?

MR. DINSMORE: Sure.

MEMBER BROWN: Excuse me, the Option 3 thing is tantalizing. Being a relatively new guy, only four or five -- sat in on all these meetings, it seems like almost every decision process that you all bring forth or new regulation or new comments or whatever in the Reg Guides, all embody some amount of balancing risk, defense-in-depth, and safety margins in the process. And we have those discussions over and over again every time.

All I'm trying to do is get a calibration on your comment, Mary, and that today if you went and said how do we do that, you just kind of do it. But if all that looks like is you would be saying okay, now here we're going to lay out a formal structure for doing that as opposed to just kind of letting it happen as part of the overall decision process. Did I get that out of your comment which to me means that to be any place in all of these?

This is not a singular one off option per se. You would not pick Option 3 by itself. It would always be in concert with every other thing you do. That's what I get out of your discussion.

MS. DROUIN: You could do Option 1 without doing Option 3.

MEMBER ARMIJO: Sure.

MS. DROUIN: You don't have to go -- you do it right now. Option 2 which is the voluntary initiatives, you could do that without Option 3. Where you really see the tight nexus is between Option 3 and Option 4. But you could do, as we said, Option 3 without doing Option 4.

MEMBER BROWN: But it is the formal structure aspect that you mentioned before that's the key, that's the main difference from what's been done

in the past.

MS. DROUIN: Yes.

MEMBER BROWN: Okay, all right. I'm just slow. Thank you.

MS. DROUIN: You're welcome.

MR. DINSMORE: Then I'll speed up. Retain the current regulatory -- summary of Option 1 is to retain the current framework. The current framework can add rules and requirements, address issues as they arise. We use these fundamental concepts of design-basis events and defense-in-depth. And we can apply these concepts to develop new approaches or rules as we need.

Backfit rule provides a structured means to judge whether the proposed rule or mandated change is consistent with principles of regulations and when significant issues arise, the NRC process is in place to issue immediately effective orders.

The existing framework also includes risk-informed, performance-based changes to the regulations. So we've got a mandatory 50.65 maintenance rule implementation. We have reg analysis guidelines which use risk insights. We have the reactor oversight process and its significance determination process which both rely very heavily on

design basis and risk.

Then we have a number of voluntary alternative rules, 50.69 on special treatments; 50.48(c) on fire protection; and the infamous 50.46a which has been withdrawn while we figure out how to deal with this Recommendation 1 which was risk-informed definition of large break LOCA.

Then we have voluntary license application amendments. Amendment applications like 4b risk-informed completion time. So we have all these tools out there and we have that framework and so we would continue just to apply whatever tools are available.

And we could apply these tools without having this new population of events. That's the only --

MEMBER SIEBER: That's what you're doing right now?

MR. DINSMORE: That's what we're doing right now.

MEMBER SIEBER: Right.

MR. DINSMORE: But with Fukushima, we are using new tools and revisiting the hazards and cost benefit analysis. So we might change some of the tools that we have.

Next slide.

Okay, the relationship to the two reports, the Near-Term Task Force Report recommends establishing a logical dah, dah, dah, appropriately balance defense-in-depth. No new framework. It's kind of hard to say we're not going to really fulfill that recommendation because it sounds wonderful, but the current framework does somewhat balance and we would kind of retain the way we have been doing currently.

Articulate a risk-informed, defense-in-depth framework and initial rulemaking that includes extended design-base requirements. We wouldn't define this new set of components effectively and the requirements that would go with them.

Modify reg analysis guidelines, evaluate insights from IPEs and IPEEEs -- there's an E missing. We might do this anyway. This could be part of the current framework.

Risk Management Task Force has an Option A in Chapter 4. Efforts related to on-going risk-informed and performance-base initiatives and activities related to the follow up of Fukushima accident continue on their current course. That's pretty much consistent with Option 1, but it's -- the RMTF doesn't recommend that option.

So that was my presentation on Option 1.

MR. DUDLEY: If there are no questions, Bill Reckley will talk about voluntary initiatives, Option 2.

MR. RECKLEY: Good morning. Option 2 is related to voluntary industry initiatives and it's somewhat related to the overall framework and how the framework operates and it's also a little bit of an orphan in that it was in the Near-Term Task Force Report and people thought it should be addressed. And this was a convenient place to address it. So that's kind of why it's showing up here.

In terms of a summary of Option 2, the reg analysis guidelines, NUREG/BR-0058 has a convenient and accurate description of voluntary industry initiatives. And those are broken into three categories.

The first are industry initiatives that relate to an existing regulatory requirement and it describes a means of compliance, an agreement between the staff and the industry. And two examples that are given here are the BWR vessel internal program, and the PWR material reliability program. There's rules in place on reactor coolant integrity and these get into the nuts and bolts of how industry is going to

comply with existing rules.

The second category are those that are used basically in lieu of a regulatory requirement being put into place. And those have varied over the years. The primary examples, especially coming out of Fukushima or the severe accident management guidelines and the BWR MK-1 hardened vent. More recent examples could include hydrogen igniters for the ice condenser.

The third category are those voluntary initiatives that are undertaken by the industry, sometimes with or without the involvement of the NRC, but they involve matters for which we would be unlikely to put a new regulation in place. And an example of that is the ground water monitoring program. That was a big issue, but after many discussions, the NRC basically decided we weren't going to do anything in addition to what the industry was doing through their initiative.

So Option 2 would clarify the role of voluntary initiatives and how we put them into the regulatory requirements.

Just as a little bit of background, this issue has come up before. It has come up actually several times before. It was actually the subject of a direction-setting initiative back in the mid-90s,

DSI-13. We undertook over the next -- basically through the late '90s and the early 2000s, an effort to come to an agreement between the NRC, industry, and other stakeholders on how voluntary initiatives should work. SECY 01121 documented us giving up on that approach and basically maintaining the programs we had in place.

Fukushima Near-Term Task Force again primarily through the examples of the SAMGs and the hardened vents, we're revisiting that. They seem to come up a lot in the discussions, post-Fukushima, and yet they weren't firm regulatory requirements and when we did inspections of those through temporary instructions, we found inconsistencies in how they had been implemented, maintained, and in some cases how practical their use might have actually been under certain circumstances.

The Risk Management Task Force in NUREG-2150 had a slightly different take and it was more from an efficiency standpoint and that was you have through voluntary industry initiatives and other licensee-specific initiatives a delta that forms between the requirements and the regulations and the licenses and what's actually in place in the field. And then when an issue comes up through the reactor

oversight process, what do they evaluate against? And it was just constantly raising questions.

So again, I just basically went through the relationship to the two reports, the Near-Term Task Force Report, and the Risk Management Task Force. We can go to the next one.

So again, trying to work on the recommendation from the Near-Term Task Force, we decided to incorporate it into this effort and to set out a goal to clarify the role of industry initiatives. In doing this, there's two ways it could work. It could work as a stand-alone initiative. The Commission could say yes, go ahead and clarify voluntary initiatives, but do nothing else. Or just like the previous discussions, if you do some of the other options, they can influence and maybe even largely address voluntary initiatives without needing to do more.

So the stand-alone improvement would be implemented through revised guidance, for example, the highest level would be a Commission policy statement. It would reinforce existing guidance that says that a voluntary industry initiative shouldn't be used to resolve a matter of adequate protection.

We could come up with various factors for

the staff to consider when to incorporate what was up to that point a voluntary industry initiative into the rules. And those could be things like how important is it to safety or defense-in-depth or risk? What's its relationship to other requirements? Is there a governing regulatory requirement that you could hang your hat on if you needed to in an enforcement or licensing matter?

The duration of the event. Something like SAMGs or hardened vents that were going to be there for the whole remainder of the license life or facility and were somewhat important on revisiting. I think most people would say we probably should have done more back then.

So what else would be involved in the stand alone? Would be just to update guidance, revise the oversight process. The oversight process is one in which as a matter of practice, but not necessarily requirements, once a voluntary initiative was set and not incorporated into the rules, we tended to walk away in terms of the inspection and oversight process.

So SAMGs, being an industry initiative, but not required, weren't periodically reviewed. The inspectors didn't look at those. But we could, in addition to incorporating some things, also change the

inspection program to make sure even when we do accept a voluntary industry initiative that we monitor as to whether it's performing the way it was intended.

MEMBER STETKAR: I wanted to ask about that. I'm glad you brought up that example because as I read through this, does the NRC actually have the authority to inspect things that are not directly related to licensing comments?

I understand in the report you sort of subdivide voluntary initiatives that are taken to comply with regulatory requirements and voluntary initiatives that were adopted in lieu of the NRC imposing regulatory requirements which means it's like I change my oil every 2,000 miles instead of every 4,000 miles. Well, I decided to do that.

MR. RECKLEY: The answer is yes, we can look at it. The question becomes what can we do with it once we've looked at it and if we've identified an issue. And that is where we may need to clarify.

There's some issues back when we looked at individual licensee regulatory commitments back in the -- that was also in the mid-90s where we identified that we could go out and do audits of commitments. If we found that a commitment had been made and not met, we could issue what's called a notice of deviation.

MEMBER STETKAR: Is that a commitment in the plant's licensing basis?

MR. RECKLEY: Yes.

MEMBER STETKAR: Okay, but I think we're talking about --

MR. RECKLEY: And one of the things we would have to do -- one of the things we would likely have to do in clarifying how industry initiatives are incorporated is how to bring them into an individual plant's licensing basis.

MEMBER STETKAR: Okay.

MR. RECKLEY: So one easy way to do that, even if we did little else, would have been to make sure that every licensee had a commitment on their docket to actually adopt the SAMGs or the hardened vents which actually in those two cases, both of them did because they were generic letters.

However, exactly what they committed to, one can argue in retrospect because -- but anyway.

MEMBER STETKAR: So the process would be to ensure that whatever you're inspecting is indeed somehow incorporated on the docket.

MR. RECKLEY: Right, but again, the idea would be to focus on actually looking to see if it's effective. And as a secondary matter, you would

determine how it fits in to other things because the regions can always give feedback to headquarters on what they're observing, even if they're not able to write a notice of violation against a requirement.

MEMBER SIEBER: It seems to me that if it's an industry initiative that goes beyond the regulations, there's no criteria or standard to inspect against.

MR. RECKLEY: Right.

MEMBER SIEBER: And so you can't write an inspection procedure and you can't write an inspection report. And because you can't, you can't take credit for it as a safety feature of the plant because you can't inspect it to make sure that it's effective.

And so industry initiatives are nice from a regulatory standpoint and from an official public safety standpoint, they don't count.

MR. RECKLEY: Well, and that's some interpretations. But that question actually routinely comes up because when you do a significance determination process, the question comes up what are you able to credit?

MEMBER SIEBER: But then you've got to write it into a rule some place or into a licensee commitment.

MR. RECKLEY: Well, it's a question that comes up.

MEMBER SIEBER: Yes.

MR. RECKLEY: So I'll leave it there. Geary?

MR. MIZUNO: This is Geary Mizuno, Office of General Counsel as part of the working group. And I wanted to expand on what Bill Reckley was saying and to clarify that. First of all, regardless of whether there is a rule or a commitment or something in the licensing basis for a particular licensee, the NRC always has the regulatory capability to inspect or audit or to look into something if there is some potential nexus to radiological health and safety or common defense and security. Okay? So our inspection or audit authority exists regardless of whether it's actually reflected in a particular licensee's licensing basis. Okay?

But to look at something is not the same as being able to take action. There you have to understand, yes, if there is nothing in the current licensing basis or if there is no regulatory requirement, either in the form of an order, license condition, technical specification, or rule, the NRC has no authority by itself to enforce or require the

licensee to do something without taking the action, the additional regulatory action of imposing that regulatory requirement on the licensee.

So again, it would have to issue an order, issue a rule, modify the license to incorporate a particular license condition or some additional requirement. Okay? And we can do that, but the burden is on the NRC to justify that requirement, the imposition of that requirement. They may have to go through all of the necessary steps including preparation of a regulatory analysis dealing with the backfit rule or issue of finality for dealing with Part 52.

So we need to understand that our capability to take action is separate from our ability to look at an issue.

MEMBER SKILLMAN: May I ask a question, please?

MR. RECKLEY: Sure.

MEMBER SKILLMAN: Your last bullet, "should NRC reevaluate existing initiatives?" Does the NRC have the capability of identifying every initiative?

MR. RECKLEY: The NRC has the capability to identify the major industry initiatives, the

generic ones that have been sponsored by or oversaw by NEI or its predecessors. When you get down to the point of individual licensee commitments, that issue has come up over the years and we have trouble because of our record-keeping systems of identifying all of those.

MEMBER SKILLMAN: So that would be problematical at the individual plant basis?

MR. RECKLEY: Right, but the focus of this option is on the bigger industry initiatives, not individual licensee regulatory commitments.

MEMBER SKILLMAN: Let me ask one more question. When I came on this board a year ago, one of the thoughts that I had then and I continue to have is a fundamental difference between a Part 50 license and a Part 70 license because a Part 50 license depends on SSCs to achieve a safety outcome, the pump, pipe, valve, the heat exchanger, the scram system, whatever.

Part 70 licenses require IROFS, items relied on for safety. If you go into a centrifuge plant, there's no safety equipment at all. You either add heat or you remove heat, you add pressure, you remove pressure. You make a fire barrier. You provide a spray system. But there's no equipment that

is an SSC for safety. It's an IROFS.

The point I would make is I'm wondering if as you consider how to proceed, if maybe one of the tools that hasn't been considered on the Part 50 side is the use of an IROFS. For instance, the materials reliability program, someone signs up and says hey, we're doing this for our materials. Ultimately, that gets translated into the specifications for the material or for the manufacturing process. But perhaps the licensee is actually committing to an item relied on for safety. So also for the BWRVIP.

So I'm wondering if maybe as you are thinking how to proceed, there may be value in considering an IROFS-type approach on the Part 50 side. It's not there today. It's only on the Part 70 side. But this may be a way to approach this that is effective for the NRC, but also effective for the licensees. It could be a win-win. It's a way to approach this.

MR. RECKLEY: I think you'll get into a discussion of that especially Option 4b, but also 4a. So because the treatment of the equipment is a key item once you get into Option 4.

MEMBER SKILLMAN: Is the philosophy of how the equipment is used?

MR. RECKLEY: Yes.

MEMBER SKILLMAN: And that's the IROFS approach?

MR. RECKLEY: Right.

MEMBER SKILLMAN: Thank you.

MR. RECKLEY: That's kind of a good segue into the last slide on Option 2 which is that if you were to pursue Options 3 or 4, you could take an integrated approach and say that voluntary industry initiatives were going to largely be resolved by those two options.

Option 3, by providing additional clarity on balancing risk and defense-in-depth, and Option 4, as a specific way to implement that, sort of says we're going to make decisions on their merits. And so the equipment or the operator actions through SAMGs or some other things would be identified under Options 3 or 4 as being important for a particular reason, either they're addressing severe accidents or beyond design-basis accidents.

And because of their importance, they get brought into the licensing structure. And I use here as a potential example Chapter 19 of the FSAR. So this is bringing in basically what's been used for new reactors, the Part 52 concept, to say even for

operating reactors they may end up with a Chapter 19. And this thing gets brought in because of its importance. Whether the industry developed it as an industry initiative or not, it might be a good efficiency process, but in and of itself, doesn't matter in terms of whether it is or isn't brought into the licensing basis. That's done based on the logic in Option 3 or the handling of events in Option 4.

CHAIRMAN SCHULTZ: Bill, with respect to that, again, I wasn't sure you were going to come to the first bullet on this slide that it would rely upon the outcomes of 3 and 4. I wasn't sure, but I thought that's where this was going.

Does this mean that there is not an option that is -- that Option 2 is not being developed in a way that it could be a stand-alone option in combination with Option 1, setting aside completely Options 3 and 4?

MR. RECKLEY: No, we'll go ahead and develop that stand-alone option. It would just be more -- we would come up with guidance on the handling of voluntary industry initiatives and determining the importance -- using somewhat the logic of an Option 3 kind of logic, trying to come up with how important is it. And if it's important and meets these

considerations, then it should not stay as a voluntary industry initiative. The NRC should incorporate it into a rule or order or license.

So yes, we'll have those developed in Option 2a, if you will, stand alone. Actually, what we won't develop very much is Option 2b because it kind of just is subsumed into the other options.

CHAIRMAN SCHULTZ: But 2a will be an opportunity to address the level of effort to implement as well as the benefits that would be achieved if one were to pursue Option 2 without moving forward with 3 and 4.

MR. RECKLEY: Yes.

CHAIRMAN SCHULTZ: Other questions from the committee at this point related to Option 2? Thank you, Bill.

MR. DUDLEY: Next, Mary Druin will discuss Option 3, the decision process to balancing risk, defense-in-depth, and safety margins. And we're about ten minutes behind schedule so keep moving.

MS. DROUIN: Okay, no questions. Okay, just a quick summary of what Option 3 is envisioned is that it would establish the Commission's expectations with regard to what do we mean by balancing risk, defense-in-depth, and safety margins?

And establishing those expectations that would include defining what is the objective of defense-in-depth and safety margins and what are the principal elements and giving details on that.

It would also include developing a decision process that would include criteria for what do we mean by balancing. So the high level with setting the expectation, but then the lower level it's now developing the actual process with criteria for how you achieve it. And part of that process would include criteria for determining when have you achieve adequate? What have you gone far enough?

So now if we go to the next slide, there's been a lot of history on defense-in-depth, going all the way back to the 1950s. And you do see a commonality in the history that it all comes down to how do we deal at the highest level with accident prevention and accident mitigation?

There's also been a consensus over the years that defense-in-depth, the main purpose behind it is to deal with and to compensate with our lack of knowledge with uncertainties, that if we were absolutely certain we wouldn't need defense-in-depth and we wouldn't worry about it. But it's a recognition that there are unknowns out there and our

knowledge is not always as good as we think it is.

And up until the 2000 era, defense-in-depth was strictly looked at from a deterministic perspective that we wanted to deal with accident prevention and then the criteria from a deterministic view. But in around 2000 to now, a probabilistic approach has factored its way into defense-in-depth that it can play a major role. It recognizes that it can't compensate for the unknown, but it certainly can identify some unforeseen scenarios. It can identify uncertainties where they lie in the plant design. It can quantify the extent of the uncertainty.

So while PRA may not be helpful in reducing the uncertainties in and of itself, it can point them out and so therefore point us to where deterministic defense-in-depth can be enhanced.

Safety margin is also closely tied to defense-in-depth. Some people might consider it an aspect of defense-in-depth. So when you define defense-in-depth it includes safety margins. Other views are that they are quite separate.

Our view is is that when you deal with defense-in-depth you've got to deal with safety margins because safety margins can have a factor in your decision criteria when you're trying to determine

whether you have enough, whether or not you have enough margin in the design and therefore how much more defense-in-depth. So they do go hand in hand.

And the regulations require that your SSCs -- and I've just tried to list some of them there -- require that you have adequate margins of safety. So it is also embedded throughout our regulations, the use of safety margins.

Relationship to -- what happened to -- there it is.

MR. DUDLEY: Sorry, heavy finger.

MS. DROUIN: To the NTTF Recommendation 1, which states to establish a logical, systematic, coherent, blah, blah, blah for appropriately balancing defense-in-depth and risk considerations, of course, this option directly supports that recommendation.

With regard to the four sub-options from Recommendation 1, the Commission policy statement that articulates a risk-informed, defense-in-depth framework, Option 3 supports that one. Initiate rulemaking to implement a risk-informed, defense-in-depth framework. That still needs to be evaluated to determine whether from our perspective a rulemaking is necessary.

Modify the regulatory analysis guidelines.

Option 3 would support that sub-option. Evaluate insights from IPEs and IPEEEs. It doesn't directly consider this option, but it certainly could take advantage of the insights coming out of there.

With regard to RMTF, RMTF identified -- and this was one of the recommendations, both the high level and across all the program offices, was the need for to come up to be consistent with the definition of defense-in-depth. They repeatedly pointed out that there was no clear definition. And clarifying that would be a major step forward. So in that regard, Option 3 supports the RMTF.

Okay, now getting into a more detailed description, at a summary, what we're talking about is that Option 3 would issue a policy statement and that policy statement would articulate the Commission views on the need to balance risk, defense-in-depth, and safety margins. The policy statement would clearly describe the need for them and it would specify the actual levels of defense. As I said, the highest level, we said accident prevention and mitigation. And when you go across the many years, you'll see that people have sliced that pie many different ways. They have sliced it and so there's five levels of defense. Some have said there's only two, it's accident

prevention and mitigation.

Some have said it's four. But they all factor back up into accident prevention and mitigation.

But here, the policy statement would actually define the levels of defense. It would clearly describe the need for safety margins. It would define its objectives and the elements and principles related to safety margins. And this would be creating new stuff because this you don't find too much in the literature on safety margins.

Then along with the policy statement would be what I call the implementation guidance and this is where it would establish the decision process coming up with criteria for how you would implement the Commission's expectations, how you would implement these levels of defense and what that means.

MEMBER STETKAR: Mary, before you get into the actual details of the policy statement, there's a lot of verbiage in the description of Option 3 that is a very good marketing approach. There's a statement that really bothers me and I'll quote it. It says "The policy statement would clearly state that the deterministic criteria for defense-in-depth and safety margins must at the most fundamental level compensate

for all uncertainties, including those in the PRA models or other risk assessments."

How can one ever do that? How can one ever do that? And if you can't do that, don't say that the Commission will issue a policy statement saying that you can because all that does is placate people.

MS. DROUIN: I agree. Putting the word "all" in there is an overkill.

MEMBER STETKAR: Let's take -- it certainly is an overkill, so let's take "all" out.

MS. DROUIN: Yes.

MEMBER STETKAR: And just say "will compensate for uncertainties." How much uncertainty? Will the policy statement define that we want 95 percent confidence that any hazard will not cause core damage or containment breach or -- how is it going to compensate for those uncertainties? And if it does, we need to know what those uncertainties are, don't we?

MS. DROUIN: You cannot know what your unknowns are.

MEMBER STETKAR: You can't know what the unknowns are, but we know an awful lot about uncertainties about a lot of things that we've looked

at.

MS. DROUIN: Yes.

MEMBER STETKAR: And these are, for example, will this compensate for the uncertainties in a 2G earthquake that will destroy a containment building?

MS. DROUIN: I think if you bear with me I might answer it.

MEMBER STETKAR: Okay.

MS. DROUIN: Hopefully, I will.

MEMBER STETKAR: Okay.

MS. DROUIN: Because it depends on how much do you put in the policy statement versus how much goes into the implementation guidance.

MEMBER STETKAR: Exactly, exactly.

MS. DROUIN: And so right now, I'm going to deviate from this for a second. Right now, our working group is just looking at reactors. We've got the RMTF working group that's just started which looks across the whole program offices and so how you would deal with -- when you're thinking of writing a policy statement, are you just writing it to the reactors? Are you trying to write it to the Agency? Those are things that need to be thought about.

MEMBER STETKAR: I guess perhaps you

misinterpreted my question because I'm thinking about reactors. You seem to be thinking about things that happen inside a reactor like a pump breaking. I'm thinking about all of the hazards that are faced by a reactor which includes being struck by a meteorite, a large earthquake, flooding, all those types of things that have very, very large uncertainties and bring into question issues of the necessary level of deterministic now, defense-in-depth, and margins to provide assurance of adequate protection against all of those hazards.

MS. DROUIN: I understand that.

MEMBER STETKAR: And the associated uncertainties of those hazards.

MS. DROUIN: Yes.

MEMBER STETKAR: Okay.

MS. DROUIN: Let me just get back to this. Right here, this is just an example and the policy statement could include two major features, that it would actually specify the level of defense. Here's an example that it could define three levels, accident prevention, which is to ensure that they're stable operation to limit the frequency of events; protective systems, to ensure that the systems are adequately designed and perform adequately in terms of

reliability, etcetera.

A second level of defense is barrier integrity and that doesn't necessarily mean that your barrier is always a building. It could be also in the form of physical and chemical form.

Then the third level of defense is accident mitigation and that's to look at your emergency preparedness and getting more into your consequences.

And requiring the other part that would go into the policy statement is requiring that the levels of defense be maintained so that you don't -- you can't just rely on one level of defense. You have to meet all three of them.

Probabilistic elements which could be used in there to the extent possible to search for and identify unexpected scenarios, to establish adequate defense-in-depth measures to compensate for those scenarios and uncertainties; the ability to quantify and estimate uncertainties and PRA techniques were possible; and taking credit for defense-in-depth measure and risk analyses, of course, allows one to provide a better estimate of how much defense-in-depth is enough.

So the probabilistic elements are doing

two things in the sense of allowing you to search for additional things and allowing you to bring in the ability to measure whether or not you have adequate defense-in-depth.

MEMBER STETKAR: One of the questions I had, Mary, as I read through this, I couldn't quite understand, suppose that the Option 3 were adopted as a stand-alone option, not in concert with anything else. Would Option 3 require the existence of a plant-specific PRA for each plant? I don't want to get into whether it be level 3. You would certainly need a level or something or other I would think. That doesn't seem to be addressed.

The notion of PRA comes up in the context of this slide here and it says it would be very useful, but it's not at all clear how one would measure the acceptability of the margins or as you've characterized it, how much defense-in-depth is enough without that type of metric.

So is it envisioned that if -- does Option 3 inherently include the need to have a plant-specific fairly detailed level 3? I won't say level 3, fairly detailed level 2 at least PRA?

MS. DROUIN: A key issue and I'll just go ahead and talk about it right now, is when you look at

this is who is making the decision on whether or not you have adequate defense-in-depth. And we envision that this would be an NRC decision. And the criteria would be through SRPs or those kind of documents. But even though the NRC would be making the decision, you would still have to provide guidance to the licensee of here's what you need to be doing for the NRC in order to make that decision.

So the licensee could be using a PRA as part of the process and indicating that they have adequate defense-in-depth to the NRC. Now NRC is going to get risk insights from wherever they can, be it SPAR models, wherever. So how that's going to worked out, we still have to determine that.

MEMBER STETKAR: But that's the genesis of my question, actually is --

MS. DROUIN: Personally, I don't see how you can do this without a licensee having a PRA.

MEMBER STETKAR: Right. Okay, and reading through it, I couldn't understand that either, quite honestly, but that's my own opinion. I wanted to explore though whether you've thought through this enough because it could be an important criteria in the decision process about selection of Option 3 as a stand alone. We had some preliminary discussions

about well, Option 3 could actually morph with any of the other options and might be an element of any of them. But it was also stated that Option 3 could be considered as a stand-alone option.

MS. DROUIN: Yes.

MEMBER STETKAR: And if the implications of Option 3 is that the staff would expect every licensee to have a fairly mature PRA for all operating modes, level 2, whatever scope you felt was appropriate, that expectation, I think, ought to be better elaborated in the discussion, the presentation of this option. Because right now it's rather vague. There are these statements in here that seem to indicate that use of a risk assessment is the perhaps most reasonable in your and my opinion tool to use to evaluate margins or whether or not you have defense-in-depth.

MS. DROUIN: Right.

MEMBER STETKAR: It's fairly vague.

MS. DROUIN: Each level of defense, whatever levels of defense that get defined, you would have some type of quantitative criteria that in my mind would be best coming from a PRA. You would have deterministic criteria. You would have criteria for safety margins. And you would look at all of these,

you know, in balancing them and determining whether or not you have adequate defense-in-depth for that level of defense. So your decision criteria would walk through and be a series of questions and everything.

MEMBER STETKAR: I know how it would be done. I'm only saying that as the staff develops the final SECY paper that presents these options, if the staff expectation is really that PRAs would be needed to implement this as a stand-alone option, it should be clarified. Or if you believe it can be implemented effectively without PRAs, then that should be clarified.

The only reason I bring that up is that we heard earlier that you received some preliminary feedback, for example, on Option 4b from the industry saying well, this is onerous. It's going to cost ten times as much money to develop these PRAs within the context of 4b. If it's envisioned that PRAs are also a fundamental part of 3, it seems that ought to be clarified. Perhaps you're trying to actively avoid it, but I don't see --

MS. DROUIN: If we can skip to the last slide, the requirement for plants is still to be determined. What we mean by that is whether or not it would require the licensee or the licensee has the

choice of using a PRA versus whether it's required for him. And that's the deliberation we're trying to figure is whether or not the licensee can choose to use a PRA in terms of meeting the criteria or whether or not it's going to be required.

MEMBER STETKAR: Do you expect this to be fleshed out before February or is this going to be --

MS. DROUIN: We would expect to be able to explain the issue in detail by February, but maybe not necessarily the decision because that would get into the implementation criteria that hasn't been developed yet.

MR. MIZUNO: This is Geary Mizuno, Office of the General Counsel again. I just wanted to give ACRS -- first of all, we haven't yet decided on this. We're still looking at this, but you have to understand that right now, Option 3 could be implemented either as decision criteria for NRC to make a determination about whether a generic requirement for an order issued to all licensees or a set of licensees.

If you were to do generic regulatory action, you wouldn't necessarily need a plant-specific PRA to make that decision. It's like the existing situation where we have -- where the NRC is trying to

a make a determination as to whether to issue a rule.

We may have plant-specific information. It would probably be useful to help us further determine what the problem is and how it's manifested at specific licensees as an insight, but for purposes of making generic determinations, safety determinations in terms of a generic requirement, you wouldn't necessarily need the PRA.

However, if you were to implement Option 3 so that the NRC would expect licensees to address and to present information on defense-in-depth, safety margins, and risk and then proper balancing, then yes, it is highly likely that you will need to have a plant-specific PRA in order to do that. In fact, I personally can't see how you would do that although technically, I am going to leave that up to the staff.

MEMBER RAY: And if that were to be the case, and somebody said well, that's a backfit, how would the Agency respond?

MR. MIZUNO: Okay, keeping aside the technical issue about what is necessary or not, any requirement to do a backfit would have to be addressed by the NRC from a backfitting standpoint. Of course, how the NRC would address the backfitting requirements would depend upon what the Commission is looking at.

Would they consider the use of the PRA in implementing Option 3 on a plant-specific basis, for example? Would they --

MEMBER RAY: The mere existence of a plant-specific PRA.

MR. MIZUNO: Right. You could have -- the expectation is -- I mean one way you could implement Option 3 on a plant-specific basis is to require by rule that every licensee have a PRA of a certain kind a certain quality.

MEMBER RAY: Right.

MR. MIZUNO: The adoption of that particular rule would be -- have to be addressed for backfitting purposes, right?

MEMBER RAY: Right.

MR. MIZUNO: And so the question that the NRC would be faced with is is that rule an adequate protection matter or are we doing it for substantial -- because there's a substantial increase in protection to public health and safety and common defense and security. It would have to be one of those two things, or the Commission would have to decide that well, it doesn't really meet those tests, but like the AIA rule or I'm trying to remember which of those orders that went out, maybe it was spent fuel

pool implementation, they simply suspend or exempt that particular rule from the purview of the backfit rule.

So I'm not sure how the Commission would ultimately deal with that, obviously, and I'm not sure how even the staff would recommend to the Commission as to how to deal with the backfit rule. But clearly, any regulatory requirement would have to be subject to backfitting considerations. And would have to be addressed as part of the regulatory -- the promulgation of that regulatory requirement.

MEMBER RAY: Thank you.

MEMBER REMPE: But all the discussion of the criteria and the need, perhaps, for a PRA, this is the first time that I heard some talk about a particular quality of PRA and has the staff spent much time discussing about the adequacy of the tools that would be used to judge acceptability and is there anything you can share with me about what they've been thinking?

MS. DROUIN: Yes, I mean along with this is that we would have to look at to see whether the given standards for PRA quality are adequate to support this application of PRA.

MEMBER REMPE: The staff tools, are they

adequate or would they need to be approved to make appropriate decisions?

MS. DROUIN: Well, the main tool we're talking about is PRA here.

MEMBER REMPE: Okay, but the SPAR models or any other -- would there need to be some significant upgrades?

MS. DROUIN: Those we would have to look into, but yes, we have dialogue that and we are thinking about what is the quality of the PRA that's needed.

Now there's a different need when you're talking generic versus plant specific.

CHAIRMAN SCHULTZ: The other piece, Mary, associated with the use of the PRA in your slide sometimes it's referred to as all utilities should have, a licensee should have a PRA for their plants. But then you also indicate that it's going to be used, meaning that not only do you need to have the PRA developed, as a methodology, but you also need to have either the staff or purchase the process staff to perform analyses in order to investigate issues and so forth. So there is -- that's where the large expense comes in for the licensees to be implementing these analyses and examining issues, having the staff to do

that, either having or purchasing the staff to do that.

So I think we ought to be cautious when we say a utility should have a PRA and recognize that that brings with it the need to have staff or purchase consultants to examine issues on an on-going basis.

MS. DROUIN: Yes.

CHAIRMAN SCHULTZ: I think that's why the industry is making comments about perhaps underestimate by a factor of ten. You buy the PRA, have it put in place, but what we're talking about here is really strongly in the application and understanding mode.

MS. DROUIN: Yes.

CHAIRMAN SCHULTZ: Of application.

MS. DROUIN: Absolutely.

MR. DINSMORE: This is Steve Dinsmore of the staff. I guess at this point in time our general process is we have to figure out what they're going to use the PRA for and then we have to figure out how to make sure the PRA is good enough for what they're using it for.

So the main answer to your question is we have to figure out how we're going to use it. If they're going to use 4b to really drive the

operations, that's a certain use. If they're going to use it to maybe come back and argue against or discussions with the staff about potential fixes that they should use, that would be a different use.

So I personally -- and I think many of the PRA people think if we really go a long way towards relying on PRA, we are going to somehow adjust the way that we're currently reviewing them. But we have to wait until we get to the point where we kind of know how they're going to use it.

MEMBER STETKAR: Sorry, I forced you to skip over some slides, so you probably may need to go back.

MS. DROUIN: No, I wasn't going to.

(Laughter.)

CHAIRMAN SCHULTZ: Well, that's a good thing, too. The Committee will then quickly review slides 36, 37, and 38.

MS. DROUIN: It just gets into more detail on the implication and that we would be creating these decision processes with criteria and it would be done for each level of defense.

MEMBER SHACK: If you're going to go through that, you almost have to answer the first bullet here yes.

MS. DROUIN: That is true.

MEMBER BLEY: Given these are options put forward. Somebody else is actually doing that.

MEMBER SHACK: We made the argument already in filtered vents, right, that these are part of the regulatory analysis guidelines, at least the staff has made that argument. I'm not sure the Commission has accepted it. Just an observation.

MS. DROUIN: Any other questions?

CHAIRMAN SCHULTZ: Seeing none, Mary, thank you.

MS. DROUIN: Maybe we're back on time.

MR. DUDLEY: Next, Mark Caruso of the staff will talk about Option 4, one way -- different ways to establish a new event category.

CHAIRMAN SCHULTZ: Dick, while Mark gets settled as well, just to comment that we do have a break scheduled at around 10:15. I know we're not going to get through the next segment of the presentation before then and we have it on the agenda before and after, so we'll look for a convenient time to stop.

MR. DUDLEY: You'll raise your hand when you're ready?

CHAIRMAN SCHULTZ: I will.

MR. DUDLEY: Thank you.

MEMBER BLEY: Why not know?

CHAIRMAN SCHULTZ: Why don't we do that?

(Laughter.)

That will be better. Thank you, Mark, and we'll see you in 15 minutes, we'll reassemble at 10:10.

(Whereupon, the above-entitled matter went off the record at 9:55 a.m. and resumed at 10:11 a.m.)

CHAIRMAN SCHULTZ: We'll bring the meeting back to order and begin the presentation of Option 4, Mark Caruso. That's on, Mark.

MR. CARUSO: Yes, I'm Mark Caruso. I'm a Senior Risk and Reliability Analyst in the Office of New Reactors. And I think first I'll just give you a brief introduction to Option 4, and then I'm going to go through Option 4a in some detail.

I thought it would be good to start with this slide. I had this in my 4a package, but I think it goes better right here because it applies to both 4a and 4b. Just a brief, you know -- historically, the Commission has relied on design basis events and accidents to demonstrate the plant is robust. Over the years, I've been here for 30 years, and we've addressed different safety concerns in various ways,

some we've created requirements. Sometimes those requirements are cost beneficial safety enhancement requirements, sometimes they're adequate protection requirements like the requirements that were put in place for addressing the post 9/11 issues, 5054-H(h)(2). And sometimes we've used voluntary initiatives like NEI 9106 addresses events that can happen in early shutdown. And we did have proposed rulemaking activities in that area but they were not adopted. And in some cases we've used Generic Letters, so we've had all these different ways of doing things.

The NTTF and the RMPF have recommended that we look at trying to create a more systematic and logic approach to dealing with beyond design basis events, something different than what we've done before.

In addition, the European regulators and the IAEA, they recognized this idea also and are embracing it. You can find some discussion in IAEA safety standard about the need for a design extension category of events to deal with beyond design basis events, and they even talk about using best estimate methods to address things. So, this is what we're talking about here. Option 4 --

MEMBER RAY: Wait, I'm sorry. I know we're

in a hurry, but there was just an inconsistency in that statement, I thought, that I wanted to question.

Recommended design basis be extended, and then later on it refers to traditional design basis as these events, I think we're talking about the same events, are outside the traditional design basis. I'm troubled by the lack of clarity that I see here involving a lot of what we're talking about here, but whether we change the design basis or we don't. And having been involved in plants when the design basis was changed and the sky didn't fall, and we actually made changes to the plant to reflect a different design basis than what it was built to, I never see us providing that clarity about are we talking about changing the design basis, or are we talking about a change in the design basis now not being necessary because we've got all this other stuff that is beyond the design basis, and it goes by lots of different names. But which -- and I know we're not talking about one or the other necessarily, but I guess I'm just expressing frustration here because it isn't clear to me if we are abandoning the idea that yes, we need to change the design basis, or if we even know when we would change the design basis as opposed to dealing with this new era that's outside, now that's the first

time I recall seeing the word "traditional design basis." I don't know what we mean by traditional design basis. Well, I guess we mean deterministic methodologies.

MR. CARUSO: Yes, I think traditional design basis is the Chapter 15 events, the Chapter 6 events, large break LOCA. I do the analysis. I assume a single failure.

MEMBER RAY: Well, what about what the design -- the Sayshadon earthquake is, what is that?

MR. CARUSO: Design basis.

MEMBER RAY: Yes? And supposing it needs to increase? Do we say well, that's an event beyond the design basis. We'll deal with it that way? Or do we say well, we'll increase the design basis and modify the plant? Which is it?

MR. CARUSO: Well, you could certainly do it under Option 4, and you could probably do it under Option 1. I mean, you can -- if there are specific things you want to do you can still do them just as you've said. We have changed the design basis over time --

MEMBER RAY: But do we know when we want to move the design basis line and when we want to simply enhance our ability to deal with problems that are

beyond the design basis, like Fukushima?

MR. CARUSO: Well, actually, I think 4a goes to the first one you said. It's more about changing the design basis, extending it, bringing into the design basis events that we always felt were outside. I mean, station blackout is a multiple failures of safety systems. They were not traditionally a part of the design basis. You bring those events and --

MEMBER RAY: Okay.

MR. CARUSO: The other, 4b is a little bit more about a way to be more -- more options and look at specific things and fix them, I think.

MR. DUDLEY: If we proceed to discuss 4a and 4b --

MEMBER RAY: Then come back.

MR. DUDLEY: -- and we don't answer your questions, please raise your right.

MR. CARUSO: Right.

MEMBER RAY: All right. That's fine. Go ahead.

MEMBER STETKAR: Do you have slide -- I haven't looked ahead, but as you do that, the notion of how the concept of adequate protection is treated in each of those options?

MR. CARUSO: Yes, and that's --

MEMBER STETKAR: Okay, good.

(Simultaneous speech.)

MEMBER STETKAR: That may help --

MR. SNODDERLY: Some traditional design basis accidents under 4b may move into the design enhancement category, which would be for beyond adequate protection, additional protection. Under 4a, you would extend the current design basis and put some new events in there, but then we would be calling them adequate protection.

So, for example, under 4a current safety enhancement regulations like station blackout and ATWS made it into this extended design basis category, now you would be calling them adequate protection. In other words, we need those rules for adequate protection and they would get a certain set of treatment. Under 4b, station blackout and ATWS would be in the design enhancement category and we've get a different set of treatment. So, it's --

MEMBER RAY: Okay, those are categories accidents. I tend to think more about external events because they have a continuum of probability.

MR. SNODDERLY: Exactly, so we --

MEMBER RAY: So, it's hard to -- go ahead.

MR. SNODDERLY: So, for -- we would have a safe shutdown earthquake for design basis, and then we would have another earthquake that would equate to say 10 to the minus 6 earthquake that you would address as part of the design enhancement category, and we do have different --

MEMBER RAY: 4a or 4b --

MR. SNODDERLY: 4b.

MEMBER STETKAR: But under 4a, that 10 to the minus 6 earthquake would become -- mitigation of that would become an element of adequate protection.

MR. SNODDERLY: Not necessarily.

MEMBER STETKAR: Well, go through it because I want to understand the not necessarily or yes.

MR. SNODDERLY: The basis for my answer was, again, that anything that's in the design extension category and to the left would be for adequate protection. So, if you put that 10 to the minus 6 earthquake in there, it's adequate protection. If we say we're going to address those earthquakes between 10 to the minus 7^{th}, or 10 to the minus 5^{th}, or whatever we decide in the design enhancement category, they would be there for additional protection, and they would have an associated treatment.

MEMBER RAY: All right.

MR. SNODDERLY: And then that's really where we would get into the next stage of the nitty gritty and the implementation. So, what should that treatment be, and how much --

MEMBER RAY: Okay. Well, that's what I'm going to be looking.

MR. SNODDERLY: If we don't get to that by 11:30, then tell us and we'll either have to --

MEMBER RAY: That's all right. I'm not so much concerned about categories of events as I am, like I say, continuum. You've got to draw a line somewhere like you just did.

MR. SNODDERLY: But, yes, success for this briefing will be if that's clear to you guys.

MR. CARUSO: So, why don't you go to Slide 44, Dick. So, if -- 44. No, no, no.

MEMBER ARMIJO: 42, at least we know what you are --

MR. CARUSO: The first -- yes, summary of Option 4a. So, Option 4a is establish a category of events by rule that would -- a category where you would establish requirements to deal with events in this category, and those requirements would be adequate protection requirements.

You would establish the category and the criteria for scoping things into the category which as we've said is a very large issue. You would establish requirements for applicants to show that they meet acceptance criteria. They could be general acceptance criteria for all the events in the category, or they could be specific to the particular event and requirement that you're talking about. And as Mike was saying, you would establish in the regulation some requirements that would address treatment of SSCs that are credited and mitigating these particular events that spread across the category.

Now, what I meant by "not necessarily," was, is that this option doesn't do -- doesn't change the Backfit Rule. It doesn't take anything away from allowing you to still pursue cost beneficial safety enhancements. So, if you felt that some event didn't belong in this category, this is raising the bar of adequate protection. This is like doing -- looking at a systematic broader approach of doing what was done for loss of large area, which was to say this event needs to be addressed and that is to assure the public is adequately protected. And we came up -- there's a criteria in the rule that says what applicants have to meet. In effect, they had to do evaluations, show they

met it.

So, this is talking about trying to take that to a sort of a broader category to establish some requirements that would go across all the events in there. I think what it's trying to do is trying to say that, you know, when we get to situations like that where we think we have something that we should be addressing in a very systematic way, and it should be threat protection, we'd like to think about it in the broader sense than just, you know, we thought about B(5)(b), we thought about that particular event and we addressed it with stuff. And then Fukushima came along and we kind of looked at oh, yes, could we have used all that stuff for it? And there were questions about that because it wasn't designed for that event. So, I think that's what 4a is about.

MEMBER STETKAR: But to follow-up on Harold's kind of concern, because it bothers me, also. Let's take seismic events as kind of the poster child. What would you do? And this is going to be applied by rulemaking generically across the whole industry defining a set of extended design basis events, and I'll call them that.

MR. CARUSO: Well, you don't --

MEMBER STETKAR: Is it a each plant must

now meet a peak ground acceleration that is what, 1-1/2 times the current safe shutdown earthquake, 1.75 times, 2.0 times?

MR. CARUSO: You may not put anything in this category at all to begin with. You may say this is for the next thing we have to deal with. These are for the things in the future that we have to deal with.

MEMBER STETKAR: So, after a plant melts from one of these things, then we put it into one of those little --

MR. CARUSO: No, no, no, no. This is an issue comes up, how do we address it.

MEMBER STETKAR: But that's -- we've always been reactionary that way. I mean, that's part of the reason that we're in the situation we are, that once we think about something we say oh, yes, we need to go pack up something for that.

MR. CARUSO: Well, I mean, yes, I mean, we discover things from -- we do analysis, we have operating experience. Yes, that's not going to change. Now, we also -- in this option you can also go retrospective and say why don't we go back and think about should we have put station -- should station blackout be dealt with differently? Should it be for

adequate protection? Should it be part of the design basis? Should we do things differently?

Let's look at what about loss of RHR and decay heat removal during mid-loop operation. How do we feel about that?

MEMBER STETKAR: Why mid-loop operation? Only because someone once did a PRA that looked only at that and said hey, this might be important.

MR. CARUSO: I'm just using it as an example, I mean --

MEMBER STETKAR: Yes, but that's the whole point.

MR. CARUSO: I could have said reduced inventory.

MEMBER STETKAR: That's the whole point, is that you're looking at reactions to very specific issues. And when I raised the point of saying well, should a -- pick any multiplier, 1.235 times the current safe shutdown earthquake, should that be an event that falls under the guise of requiring enhanced regulations to assure adequate protection? You say well, no, that's not the purpose of this.

MR. CARUSO: No, I didn't say that. You -- part of this is to establish criteria for selecting events, part of it is decide if you want to go and

look for events retrospectively, but the criteria, like we said, could be Option 3 or whatever you want to make them in terms of putting things in. So, I can't -- I don't know what they are. That's a big issue for this option, that's a big issue, so I can't tell you. I'm not here to answer that question.

MEMBER STETKAR: I'm trying to understand kind of the philosophy because I understand what you're talking about when I can identify a very specific focused issue primarily associated with things that can fail inside the plant, pumps, and pipes, and valves, and electricity and all that good stuff. It's not clear to me how this approach addresses beyond design basis external hazards that are in Harold's notion continuing, whether it's seismic events, or flooding, or high winds, or --

MEMBER RAY: Seismic-induced fires.

MEMBER STETKAR: Fires.

MR. SNODDERLY: My understanding for Option 4b, which is based on --

MEMBER STETKAR: I want to understand 4a, first. I understand 4b.

MR. SNODDERLY: Okay.

MR. CARUSO: So, 4a is about having this category, coming up with criteria to decide what

should go in there and allowing us to address things we've addressed before in a more sort of siloized way to try and do it a better way, to try and make sure that if we address this event that we will address it in a way that it could capture other events, that it's done in a larger context of protection of the public as opposed to let's just -- here we have a problem, an event to deal with. What do we need to do, and how do we get it done, and what compromises do we have to make, and all that sort of stuff. This is about trying to get rid of that problem.

Now, how you -- the implementation of it I think is very difficult. And I think the criteria part is the big point about this one, because it's easy to talk about this philosophy and this approach, but when you start to think about the criteria, is it going to be frequency, is it going to be tox plants, is it going to be both? How do you do?

MEMBER RAY: All right. But are you putting enough emphasis on the problem that you've just described? That's the essence. And nobody's is expecting a solution at this stage, but as you say, it's easy to talk about, but hard to do. And, in fact, it's so hard to do that it's hard to imagine doing it. And that's where I think we need to understand the

difficulty and focus on that.

MR. CARUSO: Well, I have a slide on key issues, and this is the first one.

MEMBER RAY: Go ahead. All right.

MR. DINSMORE: Hi, this is Steve Dinsmore from the Staff. If I could try to answer Mr. Stetkar's question directly maybe, we wouldn't say you'd have to go to 1.2, your design basis earthquake. It would be more like your seismic risk has got to be less than 10 to the minus 6. You'd have -- somehow that would be related back through to the design basis earthquake. I believe that's -- so, when Mark is talking about the decision criteria, so you start at the decision criteria and you work backwards.

MEMBER STETKAR: But some of that, Steve, and maybe we'll get into it because we're going to run short on time here, some -- that, though, sounds to me more like 4b than 4a. So, I want -- what I'm trying to do is understand the distinction between 4a and 4b. I understand that 4a, whatever this box of things is, that box of things will be treated in regulatory space (a) generically, and (b) as a requirement to meet adequate protection. I understand that. What I'm trying to understand is how that box will be populated and how the framework will work to populate that box.

MR. CARUSO: Well, the biggest difference is that in 4a the decision about whether events are in there or not is the NRC's. The NRC is populating the category, so it develops criteria for that. It's done on a generic basis. It's all about generic requirements, not plant-specific. And that's -- some of the disadvantages of 4a are is that we might miss some important plant-specific things.

4b is more about the applicants going and looking, and having criteria, and using their PRA to do it. So, it's -- the implementations are very different. The idea of a new category and putting things in there that weren't -- that we dealt with sort of ad hoc before is a similarity.

MEMBER STETKAR: But if I step way back from this from the public's perspective, if 4a, if the goals of 4a and 4b, they might be implemented differently, the tools that you use and the methods that you're using, how you define the box and throw things into it are different. But if the goals are increasing confidence that we're managing public health and safety or risk for events that are beyond the current design basis, that ought to be consistent -- a consistent goal for both of those frameworks at a very high level. And I'm trying to understand -- I

understand how the -- I think I understand, maybe I'm wrong, how the box will be populated, the mechanics of it under 4b.

What I'm not so clear about is how this framework will achieve that same goal, essentially be populating that box that I now treat generically as something that's necessary to achieve a sense of assurance of adequate protection. I don't quite understand how that's going to work under 4a.

CHAIRMAN SCHULTZ: And one would expect in either case that the external event category would be extremely prominent in looking at beyond design basis. And we don't see much of it here until the last slide, it appears, but not in a direct way. And in terms of extension, but just consideration of seismic design basis. And, of course, external events goes far beyond that now in terms of both our consideration, as well as the public's.

MR. CARUSO: So, where are we, key issues or -- I think we've talked enough about 4a and implementation of 4a.

MEMBER STETKAR: Maybe not for the Committee, though, because I --

CHAIRMAN SCHULTZ: We jumped into one aspect of it, Mark, so I would recommend we go

through.

MR. CARUSO: Key issues. So, we just talked about the first one which is how -- you know, what are the criteria, how do you select them, is it Option 3 or something like Option 3, or do you, you know, need to think beyond that.

The second one is the acceptance criteria for these events. Do you do it, you know, generally like, you know -- do you need to be able to show that you can maintain and restore core cooling for any of these events, something like that, or is that plus some specific things that are event-specific, or is it all -- that has to be worked out.

The treatment of SSCs is a big issue here. There's no intent with this option to go back and revise the definition of safety-related, which is part of the -- I'll say the traditional design basis. So, you know, safety-related equipment is treated the same way it's always treated. So, if they're relying on safety-related equipment there's no issue.

Here you might imagine that for these events you would now also be relying on some non-safety-related equipment, so you need to decide how you would treat that. Would you say that they should treat it like safety-related equipment, or some graded

approach?

You know, we've sort of started to do this for the passive designs when we talk about, you know, an extended station blackout, an extended event of what's beyond 72 hours in the passive plants. We've said you need to have equipment to maintain key safety functions, and we want some sort of treatment of that, but we're not going to say it has to be safety-related because we know you may be using non-safety equipment to do that. But that's not a brand new concept, so that's an issue, as to the treatment of equipment, a big issue.

MEMBER RAY: A design extension event, just to be clear, is not an event that is now included in the design basis. It's not such an event. Correct?

MR. CARUSO: Well, there is no definition in the regulation of design basis event, or design basis accident.

MR. DUDLEY: Any event that's put into this category, it would be part of the design basis of the facility that is required to meet it. So, this is the -- that's one of the --

MEMBER RAY: Why don't we call it revising the design basis rather than a design extension event?

MR. DUDLEY: We chose to call it extending

the design basis, I guess. We thought perhaps revising it would imply that you should have the same treatment as the original -- the deterministic design basis.

MEMBER RAY: And that's not intended.

MR. DUDLEY: This is to establish the fact that you can have adequate protection requirements that do not need -- that can have specific mitigation requirements and acceptance criteria, but they could still be adequate protection.

MEMBER RAY: All right. So, Appendix B wouldn't apply, for example, to something necessarily.

MR. DUDLEY: No, we'd have to develop something else, another sort of criteria.

MR. CARUSO: Now, you would -- the idea was to do this in 50.2 to actually define what a design extension event or requirement is. Like I said, there's no definition in there of design basis accident or design basis event. Put that in there, too, and make it clear what are the distinctions, the similarities, how are they alike, how are they different. And in doing that, it would also allow you to look at the traditional events that we have and say do the treatment requirements and things that we have for them now, do they still really fit, or does that event really fit over here?

MEMBER RAY: Well, I think my original comment then is still correct. You're not talking about extending the design basis. You're talking about creating this category of design extension events to which different requirements in principle could be applied.

MR. CARUSO: That the plants are required to be designed, constructed and operated to be able to mitigate these events. That would be a requirement.

MEMBER RAY: Yes. No, I understand that. Yes, but the --

MR. CARUSO: That's a design extension --

MR. DUDLEY: To lesser degrees than the deterministic --

MEMBER RAY: But it's not as -- it's not just a simple all right, yesterday your SSC was this, tomorrow it's that. Nothing else has changed.

MR. DUDLEY: No.

MEMBER RAY: And the reason?

MR. CARUSO: well, I think to try and, you know, do this in a way that utilizes all the experience and knowledge we've gained about dealing with events. It has to recognize the fact that there's a whole fleet of operating plants already built, so —-

MR. DUDLEY: Most of these events would

have lower initiating frequencies in general.

MR. CARUSO: Right. Right. So, there's a number of issues --

MR. DUDLEY: So there's a basis for supporting some reduced treatment requirements.

MEMBER RAY: Well, I appreciate that, but let's just suppose that you learn that that's not the case; that, in fact, what you thought was 10 to the minus 4 event is now different --

MR. DUDLEY: Well, one of our initial decisions when a new -- a brand new event pops up, and I guess we've heard you don't have to look for them, they'll find you, too. And when that event pops up the first decision will be is that a deterministic design basis event? I mean, it is possible that that would happen, so that's our first decision. But then if we determine it's not, because perhaps it's a lower frequency event than some of the ones in the deterministic design basis, then we would be looking at it potentially belonging in category -- the extended design basis category of 4a.

MEMBER STETKAR: Rich and Mark, I'm going to keep bringing you back to the seismic events because I think that the public and the Commission, if this option is going to be presented for decision,

needs to understand that type of issue. So, I'll come back to something like 1-1/2 times the current safe shutdown earthquake that has a frequency, it's not 10 to the minus 30th, it's some frequency. It's different at each site. You can do generic things, but -- would something like that be a candidate for population under 4a of a design extension event? Yes or no?

MR. DUDLEY: It seems --

MEMBER STETKAR: I mean, you know, don't hold me to 1-1/2. It could be something else, it could be based on frequency, 10 to the minus -- you know, five times 10 to the minus 6 event per year or something like that.

MR. DUDLEY: I mean, the way you describe it, I mean, it's a plant-specific event.

MEMBER STETKAR: Right.

MR. DUDLEY: So, each --

MEMBER STETKAR: All of these are plant-specific events. Station blackout is a plant-specific event, but you're going to apply it generically across the industry, so let's not get into plant-specific versus generic.

MR. DUDLEY: I would think that perhaps on a plant-specific basis one could look at slowly increasing the size of the earthquake. And then at

some point you would reach a threshold at which you had major problems. And maybe at that point you would identify -- that's perhaps a way you would identify an event that you would then categorize, but this would likely be under Option 4b.

MEMBER STETKAR: Okay, I understand how it would be treated under 4b. I really do understand -- I think I do, maybe I don't, but I think I do.

MR. CARUSO: My answer to --

MEMBER STETKAR: Let me be naive and assume that for now.

MR. CARUSO: My answer is I would not put it in the category.

MEMBER STETKAR: You would not --

MR. CARUSO: Because it's plant-specific, I would --

MEMBER STETKAR: But, I'm sorry, station blackout is plant-specific.

MR. CARUSO: Yes, but we're talking about the seismic --

MEMBER STETKAR: ATWS is plant-specific.

MR. CARUSO: Well, not as much as seismic.

MEMBER STETKAR: ATWS is plant-specific. Station blackout, any of these single issue focused items is plant-specific, the frequency and the

consequences are plant-specific. But you're going to apply them generically and, okay, I can understand that.

I'm trying to understand how this whole other category of hazards would be treated under what is now being proposed as a regulatory framework. Remember this 4a is an option for a regulatory framework. It's how the NRC will do business, and the NRC business should cover all hazards, and all sources of risk. And if we can't explain how this -- how those sets of hazards would be treated under this regulatory framework, there seems to be a gap.

MR. CARUSO: This framework still includes the ability to have plant-specific backfits. It's still includes the ability to look at plant-specific issues and deal with them on a plant-specific basis. It doesn't take that away.

This is really not a large overarching new framework for regulation. This is a major change in how we do business, but it's -- there's still ways to do things that we've always done. And if something is plant-specific, this doesn't take away your ability to deal with plant-specific issues.

MEMBER SHACK: No, this gives you a way to turn things into adequate protection.

MR. CARUSO: And have criteria that makes sense for that.

MEMBER SHACK: So, I mean, it's that first bullet and that last bullet that, you know -- I understand how you can -- you've worked out all those problems in between, and I can understand how you do that. It's Option 3, again. It's the first bullet and the last bullet. How do you make the decision --

MR. CARUSO: Exactly.

MEMBER SHACK: -- for what you put into these things. And, you know, Steve's idea that you somehow have a residual risk that you're trying to deal with is certainly one way to do it, but it just seems to me back to Option 3 again here. We've just hidden it under a couple of different bullets, but putting these things into the bins is the tricky part. But then there's this magic that it turns into adequate protection at that point.

MR. CARUSO: That's the key distinction.

MEMBER STETKAR: Well, in some sense some of the requirements then to provide assurance -- I've forgotten what they're called, but things like seismic qualification. You know if, for example, you populated this with an event that's 1.5 times the current SSC, in principle any equipment needed to provide

mitigation capability for that event should be qualified to operate under that event.

Now, you can argue well, you can do best estimate calculations of its seismic capacity and so forth but, indeed, there would need to be enhanced seismic qualifications of the equipment, the structures, and so forth, which could become quite extensive.

MR. CARUSO: Or you could do -- like I say, for the regulatory treatment in safety systems, it says you -- it doesn't have to work during the earthquake, but what it has to do is be available and be ready to go after the earthquake. And I think there's a difference there in terms of seismic ruggedness. I think that we say that stuff that has to be seismic category one, and make sure that -- and work during LOCAs and stuff is working during the earthquake; whereas, if you're talking about, you know, acceptance criteria of maintaining and restoring core cooling for the event, which is -- I mean, that criteria in a boiler, I mean, you could have melted a few of the bundles, and then you get the core cooling back and things are okay.

MEMBER SHACK: Well, is your vision here something like the mitigating order where you're

supposed to do beyond design basis accidents, but they never tell you what the beyond design basis -- I mean, it's unlimited.

MR. CARUSO: No, no, I'm just --

MEMBER SHACK: But you leave the definition to the implementing guidance.

MR. CARUSO: I suppose that's a possibility.

MEMBER SHACK: Okay. So, that's not the way you're thinking at the moment, though, obviously. You're thinking that somehow you're binning will have defined what you mean by a beyond design basis accident.

MR. CARUSO: Yes.

MEMBER SHACK: And you probably should. I mean, we have this thing now that some things are suddenly adequate protection, but the criteria for it are not clear, so if you do the first bullet and the last bullet, you'll have a new -- a set of criteria for what becomes adequate protection, whatever that ---- you haven't done it for this many decades, but we're going to get it done -- this time is different. Right?

MR. CARUSO: That would depend on whether or not the Commission chooses to pursue this option. I suppose they could say bring in implementation and

I'll see if I like it, you know. I mean, bring me 4a and 4b and I'll choose. That's a possibility. And I'm not particularly a proponent of 4a or 4b. Just trying to explain as best as we can what they are, and I hope we're making progress.

MEMBER ARMIJO: I am more confused than when we started, you know. This hasn't clarified anything for me, so just keep going because we're bouncing around.

MEMBER STETKAR: Quite honestly, as I read through it I under -- I think I understand quite well how 4a would apply to those types of events like hardware-driven station blackout, like hardware-driven ATWS, like reactor vessel something or other, any -- what in PRA you normally consider as internal events in the plant. I think I understand how you populate it, that's sort of mechanics.

What I was missing is how it would apply to all of those other external hazards that Harold characterized that are kind of a continuum. And of necessity would require some type of line to be drawn and said that something on the lefthand side of the line, mitigation of that is necessary for adequate protection, and something on the right side of the line is not.

MR. CARUSO: Well, I haven't thought about this issue at all. And I think that I will and that we should as a working group, because you're talking about an issue that we should address in our paper about this particular option.

MEMBER STETKAR: Well, only in the context, as I said before, that if 4a and 4b, the decision makers say well, I don't like number 1, I don't like number 2, number 3 I'm going to fold into 3 and 4a, or 3 and 4b. Now I need to make a decision between 4a and 4b as a way of thinking about agency's regulatory framework. That framework needs to address internal events and external hazards.

MR. CARUSO: Yes. If one option does it better than the other, that should be brought out.

MEMBER STETKAR: That's fine, but at least there should be some information presented to the decision maker about the philosophy of 4a, how it would treat those types of events.

MR. CARUSO: I think --

MEMBER STETKAR: Not in detail, but --

MR. SNODDERLY: Another analogy that might help is it would be -- let's look at fire. So -- because I think we're doing a lot of this right now in NFP 805.

MEMBER STETKAR: Absolutely.

MR. SNODDERLY: Right? So, we have certain risk criteria from Reg Guide 1.174. And we say okay, so for this set of -- these external events, fire, we don't want it to contribute more than X, so you would go in and you would look at fires, and you would verify that yes, I have a sufficient set of structures, systems, and components to take me to hot standby and make sure I'm okay for major fires. And then now that I've identified that subset of equipment, I've got a reliability assurance program requirement or something, and I'm going to make sure that those things are being maintained and have the reliability that I'm expecting.

So, I think -- and, again, it -- and that's how I'd picture it in 4b. And I think the difference between 4a and 4b is how you're going to set up that rule. Who's going to make the decisions? But I think it's, again, going to get you to something like that. So, to me, I think NFP 805 is a good example of that idea of the Commission creating a rule, setting criteria, and then licensees going off using their plant-specific fire PRAs to identify that they have a sufficient set of structures, systems, and components to get them to hot standby.

And then I could also see that for -- so, instead of a fire you'd have some seismic event. Let's say related to 10 to the minus 6, so for your specific site, for an earthquake of 10 to the minus 6, you need to demonstrate that you have sufficient structures, systems, and components to get you to safe shutdown and maintain it.

MEMBER STETKAR: The only difference that -- yes, I mean there's some analogy, except that even in the fires, there's not that sense of continuum. You already drew the line. You already said 10 to the minus 6.

MR. SNODDERLY: Okay, and that's -- so then I would say that's the difference between 4a and 4b. 4a, someone is going to have to set that line in the sand; 4b would be more of the continuum.

MEMBER RAY: What you actually said was maximum credible. You didn't say 10 to the minus 6^{th}, or 10 to the mines 5^{th}, 10 to the minus 4^{th}. You said -- we can go look at right now in an updated FSAR for many, many plants, it'll say maximum credible. All right?

Now, I think we're talking about how to deal with conditions which we now have to interpret maximum credible, maybe apply a number to it. I don't

know. That's what I'm trying to understand. But even say about flooding, or I think external events are the most troublesome to us, not -- maybe station blackout. I don't know. But, you know, we shouldn't assume just because of IPEEE and Mary mentioned IPEEE experience. I think she's the one who often points out how it's not a change to the licensing basis because you did an IEEE evaluation to identify ways to reduce risk. That didn't change your licensing basis. It's still what it was.

I don't mean to get -- I'm off on a tangent now so let me just stop right there. I'm trying to understand how somebody who's got a maximum credible earthquake, and now we have had Fukushima and other things, how we're going to apply this. And I get the sense that we're going to create a new category. We're not going to change the design basis. It still is going to be what we thought 20 years ago was a maximum credible event, but now we're going to imagine other events more severe, and we're going to apply some new set of criteria to it. We're going to call it an extended design basis, I guess.

MR. CARUSO: Can we go to Slide 47. So, in 4a what would be the products that would be produced as part 4a? Well, that would be the revision of 50.2

to put the definition in there. We would revise 50.34 and Part 52 to require the event evaluations to be in the FSAR. We would need regulatory guidance for applicants and licensees for how you evaluate the methodologies for evaluating these events, and criteria, and all that sort of stuff. And we would need Standard Review Plan sections for our review of it. And, also, our review of their, you know, how they are addressing the treatment requirements. And for that, too, we would probably also have inspection procedures to go out and see -- it's more of an inspection activity. Next slide, Dick.

MEMBER SIEBER: That's about seven years worth of work. Right?

MR. CARUSO: It's a lot of work, yes.

MEMBER SIEBER: I mean, you've got to --

MR. CARUSO: I think we have --

MEMBER SIEBER: Take them one at a time.

MR. CARUSO: We have some cost estimates that we're going to go through in a minute. So, as we've talked about, the NRC would be selecting the events that go in here, would have to develop these criteria that we've been talking about. As I said, we could include events that we've already addressed by regulation. We could go back and look for other events

like I mentioned, and we would also be considering events in the future that we haven't seen yet.

The second bullet here is about this potential retrospective activity. And that was one of the things that the NTTF had recommended as part of Recommendation 1. I think it's Item 1.4, was to go back and look at IPEs and IPEEEs, you know, other issues like shutdown and, you know, bounce those off whatever selection criteria we come up with, and see if we want to change our perspective. So, that's something that could be done as part of this option. Next slide.

Applicants and licensees would be required to evaluate the events and show that they meet acceptance criteria, and identify the SSCs that they are relying on, and to demonstrate that they're treating them in accordance with whatever requirements we would put in place. And we would evaluate the results. So, yes, that's a lot of work. Next slide, Dick.

The treatment requirements. As I said before, you know, there's a desire here to look broader than our traditional, what we do for safety-related. And, basically, if we're not changing the definition of safety-related equipment, anything

that's relied upon to mitigate these events that's safety-related will not change. That treatment is there and that's what it is. You know, unless there was something specific about the event that wasn't being captured by the existing treatment, that would be a reason to do something in addition. The real issue here is non-safety-related equipment, fire pumps, that sort of thing. And, as I've said, we've done a little bit of this in implementing the regulatory treatment of non-safety systems for the passive designs, so we might use some of those concepts as a starting off point.

MEMBER STETKAR: Mark, even in the active designs they populate a design reliability assurance program --

MR. CARUSO: Yes.

MEMBER STETKAR: -- that's kind of analogous, so it's -- there is for the new reactor designs and analogy to this type of treatment for both active and passive in my mind.

MR. CARUSO: Yes.

MEMBER SHACK: Well, you've got the potential to do it for current plants. Nobody has exercised it yet.

MEMBER STETKAR: Yes, there's that, also.

MR. CARUSO: Now, this slide is just intended to provide a concrete description of what we mean by treatment in some of the areas. It's not intended to say these would be all the areas, or just to provide some more meat on the bones as to what we're talking about. And I don't intend to go through each of these boards. The last slide, Dick. That's it.

MR. SNODDERLY: Okay. My name is Mike Snodderly. I'm an ACRS Staff Engineer, but I'm currently on detail to NRR. And one of the assignments that I have in NRR is to participate on this working group. So, yes, let's summarize Option 4b.

Option 4b would implement Alternative 2 of Appendix H to NUREG-2150, a proposed risk management regulatory framework. This is the NUREG that documents the findings of the Risk Management Task Force that was chaired by Commissioner Apostolakis.

And, you know, this would be a -- I think it -- as Jack Sieber said, you know, this would be a lot of work. I think it would be a lot of work. It would be a major change in regulatory philosophy, but as I said, I think we need to keep in mind the example of NFP 805. And I think that that is a good example of where this 4b kind of concept is in play right now, and has been a great success in helping to resolve the

threat of fire to plants. Okay?

I'm sorry, go back to -- stay on 153 for just a second. So, this -- under Option 4b we would establish a design enhancement category, not extension, enhancement. This enhancement category would be for additional protection beyond adequate protection, so that's one of the things I wanted to emphasize today to the Committee. If I've made that point, then that's -- then I think that's important, because in our interactions thus far with our stakeholders, that's been something that there's been some confusion. So, we want to make sure that's clear.

Also, under this Option 4b --

MEMBER ARMIJO: Mike, when you say beyond adequate protection, exactly what do you mean there? That it's not an adequate protection --

MR. SNODDERLY: I would be an additional protection beyond adequate protection, a safety enhancement for beyond design -- beyond adequate protection that usually it would --

MEMBER ARMIJO: Somebody would --

MR. SNODDERLY: You would consider cost, you would consider other aspects beyond just adequate protection, and you would have to do it.

MEMBER ARMIJO: Okay.

MR. SNODDERLY: This option would require a plant-specific PRA, but that doesn't mean that you couldn't do this option without requiring a plant-specific PRA. But then the staff would identify the threats, kind of some of the things that we were talking about before, so that's a key difference between 4a and 4b.

MEMBER SIEBER: Does that require a rulemaking?

MR. SNODDERLY: Yes, sir.

MEMBER SIEBER: And what level PRA would you want --

MR. SNODDERLY: We're going to talk about that later. Right now the idea would be Level 1 and Level 2, and when Level 3s are available, the Commission could consider that. But at this time, the working group is not recommending that, because --

MEMBER SIEBER: Then that leaves out the Fukushima category of --

MR. SNODDERLY: No, no. I'm sorry. It would be fires, external events. I don't know about low power and shutdown. You'd have to make that decision, but clearly it would be external events and internal events, Level 1, Level 2. And you could even back it off some more and make it Level 1 and LERF if you

wanted to just maybe step into -- as your first step with the idea that maybe at the next time you come in for license renewal, or in 20 years, then you would meet all PRA standards in effect at that time, which is the way the current rule, 5071(h) is written for new reactors.

MEMBER STETKAR: I was going to wait until you got to your slide, but I might as well jump on the bandwagon. As I understand it, though, suppose -- another thought experiment. Suppose I have two identical plants, physically identical at sites that have the same characteristics for the sites, same site seismicity, same vulnerability to external flooding, high winds, so two identical sites with the exception that Site A is out in the middle of nowhere, and Site B is relatively close to a population center.

As I understand it right now since you're limiting the scope of the treatment to core damage and let's call it LERF.

MR. SNODDERLY: Okay.

MEMBER STETKAR: Both of those sites would identify the same precise set of events that populated this category, and would need to implement mitigative features and maintain those features for that set of events, the same set, even though the actual risk from

each plant is much different.

MR. SNODDERLY: Yes, and I think that that would be the argument for why maybe eventually you would want to go to the next --

MEMBER STETKAR: Okay.

MR. SNODDERLY: Then you require Level 3.

MEMBER STETKAR: But at the moment the Staff isn't willing to go --

MR. SNODDERLY: At the moment, our position is there's significant work that's ongoing at the Office of Research as part of -- and I've got in these slides, but SECY-95-123 for investigating the impacts of levels. The NRC Staff does not recommend that the Commission consider the societal risk measures at this time. The Staff is currently investigating possible impacts of Level 3 PRAs on the NRC framework as part of efforts associated with SECY-12-0123.

MEMBER STETKAR: I'm just talking about public health risk.

MR. SNODDERLY: Well, that could --

MEMBER STETKAR: I mean, forget the other societal risk elements.

MR. SNODDERLY: Yes, either one. I think Level 3s would help with that. So, until we have the Level 3 --

MEMBER STETKAR: But explicitly 4b does exactly what it is, stops it, some Level 2ish type thing.

MR. SNODDERLY: That would be the -- yes, that would be a limitation right now, but I think we're also trying to acknowledge that what's really feasible right now. And right now, most people have Level 1 and LERF. If it's Level 1 and a full Level 2, well that cost estimate, it's going to go way up. And Fred will talk about the specific assumptions. And, obviously, if you went all the way to Level 3 right now, that estimate of 100 million is going to be a lot more than that. So, I think we're trying to be practical, what's really realistic if we want to do something right now.

MEMBER SHACK: He's going to do cost benefit analysis, he has to have at least a pseudo Level 3.

MR. SNODDERLY: Right. And that's one of the things also we acknowledge, that the current regulatory analysis guidelines have estimates for estimating all site consequences. And that needs to be updated, because that's -- I mean, that's where you're addressing a lot of that, is using that type of a tool in the absence of a full Level 2 right now. And those

tools need to be updated. And that's not just from this activity, others have also recommended that.

Okay, sorry. The other thing on the summary is yes, we're also going to talk about treatment requirements for these SSCs and the design enhancement criteria. Next slide.

We've already talked about this one as part of Mark's presentation, so next slide, please. And here's a -- okay, relationship to the NTTF and the RMTF. The big difference between Option 4b and 4a is that the design enhancement category instead of a design extension category would add additional protection for beyond adequate protection, as we've talked about already.

And also, as we mentioned, really what 4b is, is we would implement the Alternative 2 as described in NUREG-2150, and you would use plant-specific PRAs as opposed to the Staff using SPAR models in our generic PRAs and our knowledge to identify what we think should be those accidents that should be addressed as part of 4a.

So, now, yes, design enhancement category description. Let's see. The NRC would specify the selection criteria. And, again, we could do that -- if we do Option 3, that would help inform us greatly, but

I think the feeling is, and my understanding of the RMTF is that there is a lot of guidance out there right now for how to do these things. So, we could use that existing guidance and implement 4b without Option 3. But Option 3, obviously would help inform that a great deal, so I think that's an important point for the Committee to keep in mind.

MEMBER SHACK: Would these be different selection criteria than you use for 4a?

MR. SNODDERLY: Don't know. I mean, I --

MEMBER SHACK: You have two levels of selection criteria, one that tells you it's adequate protection and the other says go off and consider it as additional protection.

MR. SNODDERLY: I think it would be more, Dr. Shack, that we would use -- we've got criteria that we use now for SAMAs, for regulatory analysis, for backfit analysis, license renewal, so we would use all that existing criteria, and Reg Guide 1.174, those -- and for reliability assurance program, so we'd use that existing criteria for right now. And then as we go forward and we learn more, we may adjust those design criteria. But for right now, that's what I believe the RMTF envisioned.

MEMBER SHACK: Where would you get the

criteria in 4a for the adequate protection decision?

MR. SNODDERLY: You'd have to ask -- I'm sorry, Dr. Shack. That's the $64,000 question right now, but that would have to be determined. That's the next step. And that's why we need to do -- that's why you need -- I believe would have to do Option 3 if you wanted to go down the 4a path, because we'd have to flush that out better, what exactly --

MEMBER SHACK: But wouldn't you want that for 4b also, because some of these things that you might identify might be adequate protection, some of them might be --

MR. CARUSO: We might have -- you know, I mean we do have criteria that we use for regulatory analysis decisions. I mean, you wouldn't have the cost stuff for adequate protection, but you might look at, you know, the significant safety improvement. I forget what we use, is it -- there's a core damage -- change in core damage, change in -- so, you might take something like that concept and just make the limits different. We used to have generic approaches to evaluating -- I mean, approaches to evaluating generic issues when we would use our own risk insights and even analysis to come up with these things. So, we have done these things in the past, where we've made

-- we've used -- come up with methods and criteria to make decisions about generic issues, so --

MR. SNODDERLY: I think we put a harder stop on the 10 to the minus 4 th limit in Reg Guide 1.174, so whereas now as it says something instead of considering plant changes to make -- to increase risk, you should be thinking about things to decrease risk. So, if we found events that were greater than 10 to the minus 4 th, that's something that I think would rise to say hey, maybe this needs to be in a design basis event. So, yes, under this option I clearly could see if we found such an event with that high of a frequency, that it could possibly move into adequate protection design basis category, and even get the full safety-related treatment. But I think from our experience thus far, we think we're talking more about events in the 10 to the minus 5 th, 6 th, 7 th type of area.

MEMBER STETKAR: I think the analogy with NFP 805 is also a good one because I suspect that there are folks out there who might be discovering those events and are implementing sort of protective features to take care of them before they submit them. It's a suspicion --

MR. SNODDERLY: Right. We have gotten to

some people -- right, there has been some sequences that have been identified, some instances where they think they may be in that area, and that has caused great concern. And they have done modifications to get under that bar in the short term.

MEMBER STETKAR: Thanks.

MR. SNODDERLY: Next slide, please. Yes, sorry, I should have gone to this slide. So, the NRC selection criteria thresholds -- so, yes, help me out -- keep me on line, Dick.

MR. DUDLEY: Okay, sorry.

MR. SNODDERLY: NRC selection criteria thresholds would as much as possible build upon existing practices, reg analyses, backfit analyses, SAMAs, Reg Guide 1.174.

MEMBER SHACK: As much as possible, of course, that's the thought.

MR. SNODDERLY: Yes, I mean we're not here for the final, you know -- but yes, I'm going to give us some flexibility, but the main point is we're not going to reinvent the wheel. We're going to use the existing risk metrics that we have. We're going to use the existing criteria that we have. And I have it in more detail in the Option Writeup if you care to look at it. So, if you have some more questions, when we

come back next time we'll -- we can talk about that in more detail.

Plant-specific PRA requirement. As I said, we would again build off of 50.71(h). Right now the vision is that we would limit it to Level 1 and Level 2, but that doesn't mean that it couldn't be Level 1 and LERF. Again, that's something that I'm sure the Committee can help the Commission in their deliberation, but they'll have to decide how far they want to go. And we don't think Level 3 is practical at this time, as we talked about.

MEMBER BLEY: Well, if somebody had a Level 3 PRA, we wanted to use that.

MR. SNODDERLY: Yes.

(Simultaneous speech.)

MEMBER BLEY: Is that something they have to come in separately?

MR. SNODDERLY: We would encourage that.

MEMBER STETKAR: Back to my two hypothetical sites, if they both had Level 3 PRAs and came in and said well, we -- given the fact that our analyses have identified out through LERF if you want to call it the same set of mitigating features, we -- Plant A out in the boonies feels that we don't need that same set, or the same st of controls, perhaps,

because we have th is Level 3 PRA.

MR. SNODDERLY: I think that's a great -- or a vision of a carrot and a stick. So, in other words, if you were to go and -- if you had this Level 3 tool and you could make that argument, then you could say I don't need to do that. So, that's another idea of how to maybe take us to --

MEMBER STETKAR: But this doesn't preclude somebody --

MR. SNODDERLY: Not only would preclude it, I think we want to make sure that we would encourage that.

MR. CARUSO: Well, there would still be difficulties, if you don't have a standard for it. I mean, theoretically, yes, they could do analysis and stuff, but --

MR. SNODDERLY: We're pretty close to a Level 3 standard.

MS. DROUIN: There is a draft Level 3 standard that is going through ballot right now.

MR. SNODDERLY: But one way -- you know, I'll call it 4b light, and 4b alternative, would be if we didn't require a PRA but maybe said here's types of events and sequences that licensees would have to address. And if you can't address them, you would have

to do certain actions, provide mitigative features, do some things. But if you had an adequate quality PRA, you could maybe demonstrate that that's not risk-significant for you and, therefore, you could address it that way. So, that's another vision -- another way you could do that.

And that's one of the difficulties we've had as a working group. There's a lot of ways you can skin this cat. We pretty much -- but to try to -- instead of having a multitude, we wanted to try to get more focused, so that's why we tried 4a and 4b, what would it look like if you had adequate protection line here, and did not require a PRA here, require PRA, and --

MEMBER STETKAR: But at a very high level, and maybe I'm naive, my understanding, I've sort of thrown 4a into generic populating a set of things that are necessary to assure adequate protection; b is plant-specific and populating a bin that's called, whatever it's called.

MR. SNODDERLY: Design enhancement.

MEMBER STETKAR: Design enhancement, or additional assurance, or something like that. Is that-- that's sort of --

MR. SNODDERLY: That's correct.

MEMBER STETKAR: -- a very basic --

MR. SNODDERLY: Yes, that's it.

MEMBER STETKAR: -- notion. Okay.

MEMBER SHACK: One thing -- you know, your slides I don't think anywhere in them have said anything about uncertainty. And yet it seems to me that a large reason for having a category that goes beyond here is, in fact, to address uncertainty and defense-in-depth.

MR. SNODDERLY: And that's why Option 3 and the defense-in-depth criteria, that's the idea.

MEMBER SHACK: Somehow I'm a little disturbed that your criteria don't seem to --

MR. SNODDERLY: That would be one of the challenges of doing this right now. I agree with you, Dr. Shack. We'd have to do a better job -- we'd have to provide specific guidance on how to address uncertainties, and there is guidance out there right now that Mary Drouin and her group have helped develop on uncertainty, but --

MEMBER SHACK: But what do you do with it?

MR. SNODDERLY: Well, I mean, yes, the --

MEMBER SHACK: It just seems to me that somehow there's a disconnect between the discussion we heard on Option 3, I think, where there was a great

deal of consideration of defense-in-depth and uncertainty, and yet this one doesn't seem to mention it at all explicitly.

MR. SNODDERLY: Well, I think right now I would speak to it as it would greatly -- I believe it would great -- Option 4 we would greatly benefit from Option 3, but I'm saying that you could theoretically implement it now without that, and that would be a disadvantage, but here's how you would do it.

I'm sorry, next slide, please. Treatment requirements. As was mentioned before about materials, licensees, and integrated reliability assessments, I believe the way we would do -- the Staff has addressed the adequate treatment of risk-significant non-safety systems as part of new reactors. And they've developed a lot of guidance. And, in fact, they have proposed and the Commission has endorsed how to appropriately treat that for new reactors. And, basically, they endorsed the following reliability assurance program for new reactors. And that is described in the following documents. So, the guidance is out there. That's what we would build upon.

It would also address structures, systems, and components beyond safety-related to include risk-significant components, as would be identified in an

IRA. So, I believe that this system would go beyond for materials licensees. It's similar but go beyond, because PRAs are more comprehensive than IRAs. But it's the same idea, that you're identifying some important equipment that are not necessarily part of the safety-related programs, and how would you treat them? And this is how we would do it.

MR. CARUSO: Can I note for the Committee's benefit that SRP 19.3 is new. You haven't seen it. It's out for comment, draft for comment, and we will be coming to you probably, I don't know, in a month or so, whenever we can get on the schedule to present that to you. It's basically trying to gather together all the policy of implementing passive designs and to use lessons learned from the reviews, so we put it in an SRP, and we'll be talking to you sometime --

MR. SNODDERLY: And one last thought on this before we have my last slide. The -- for treatment it would be a little tricky because what they did for new reactors, it talked about what sufficient quality requirements for non-safety risk-significant components, on how to procure, design, and the problem you would have with operating plants right now, all that non-safety stuff has been already designed, it is what it is. So, not a huge problem, I

just want to make sure the Committee was aware of it.

MEMBER SHACK: No, but you just may have to take different measures to insure reliability.

MR. SNODDERLY: Exactly. If I had to solve it today it would be I'd use the existing maintenance rule that says you either set certain reliability goals for it, or you have a specific preventive maintenance program for that structure, system, and component. I just wanted to make sure you weren't under the impression that we were going to backfit some additional quality procurement and design requirements.

MEMBER SHACK: You have programs?

MR. SNODDERLY: Yes, exactly. I would not envision D-RIP being imposed on operating reactors if we went forward with 4b now.

Last slide is key issues. We've talked about those in depth, and I think Dr. Shack is absolutely right. I'd add a bullet to that, would be how to address uncertainty. And, again, I'd use the current guidance as part of the graded QA program that was developed by the Office of Research for addressing uncertainty. Thank you.

MEMBER STETKAR: One last thing, Mike, and I'm just going to mention this. I think someone -- I

kind of beat up Mary about the way that Option 3 was presented in a very, very positive note. I'd recommend you look at some of the pros that are listed for 4b, because they're -- a lot of them are really, really self-serving, and they kind of go off message into other areas about gee, this is wonderful because, you know, we can solve world peace, and all of that sort of thing. So, before you package this for a decision, I'd suggest you go look at some of those from a --

MR. SNODDERLY: Okay. Thank you --

MEMBER STETKAR: -- full dispassionate --

MR. SNODDERLY: Yes. Thank you, Mr. Stetkar. Yes, and if you could provide some details -- you know, specific criticisms on those pros, yes, we'll definitely consider that.

CHAIRMAN SCHULTZ: We think you'll see them if you look.

MEMBER STETKAR: Yes.

MR. SNODDERLY: And we'll do that.

MEMBER STETKAR: One that really caught my attention says implementation of this recommendation would provide additional assurance that nuclear power plants can cope with challenges that were not considered in initial design and licensing. I agree with that. This includes challenges that have not yet

been thought of, for which analysis is problematic, for example, terrorist activities. Well, if we haven't thought of it, and it's not in the PRA, this option isn't going to do anything about it. I mean, you know, you might identify other things that you have thought about that might help, but -- so it's just -- you know, don't try to oversell it as something that it's not.

MR. SNODDERLY: Okay.

MR. DUDLEY: We decided it was really important that these pros and cons be balanced, and we had an entire working group meeting on it. And we didn't complete it, and that's why you don't see any here. We knew that what we had in that initial document needed work, and we were not -- we made a lot of changes but we don't have it quite ready to present yet.

MEMBER STETKAR: Yes, and in the same sense one of the cons says that the current combination of prescribed DBAs and selected beyond DBA rules -- it goes on. It says risk assessments have been performed for all U.S. nuclear power plants. This is -- there is likely little safety benefit to be gained from -- in creating this category. Well, meaning this design enhancement category. Well, if there isn't going to be

any safety benefit, maybe we ought not to be doing anything.

MR. SNODDERLY: Well, I think the idea --

MEMBER STETKAR: You know, that's a valid con.

MR. SNODDERLY: Well, I think what we were trying to say, sir, is that this is really -- you're going to benefit more from clarity and openness. In other words, when we have a new event like Fukushima, people could understand the process that the Staff is going to go through to try to determine whether this is an adequate protection problem, whether it's a design enhancement problem, whether it's a residual risk. And so, yes --

MEMBER STETKAR: I think Rich put it correctly, just look at those in kind of a dispassionate, both sides of the coin and see what kind of message they're presenting.

MR. DUDLEY: Different people put them together. We realize they're on different threshold, and we're trying to normalize them.

MR. SNODDERLY: We have modified them, and when we come back next time we'll let you guys have another shot at it, or see --

MEMBER BLEY: When you can say what we

really mean is -- well, sure, that's what you ought to say.

MR. CARUSO: Fred, are you ready?

MR. SCHOFER: I'm ready and I see I'm out of time, but --

MR. CARUSO: Nice try.

MR. SCHOFER: My name is Fred Schofer. I'm a Senior Cost Analyst in the Office of Nuclear Reactor Regulation in the Division of Policy and Rulemaking. And the first slide you'll see a summary of cost expressed in 2013 dollars, which model either the annual recurring cost basis or those items that are on a one-time implementation bases.

I want to point out that the resource estimates are preliminary. At this point, I have not included any of the potential benefits which we're still developing. And that the costs represent a guidepost in that they're used to evaluate the possible costs associated with each option, and as we further refine and finalize those options, I imagine these costs will change.

MEMBER SIEBER: A question. None of the costs that you reported in the following slides include any changes to the plant, physical changes. Right?

MR. SCHOFER: That is correct.

MEMBER SIEBER: It's assumed that you will make all these regulatory changes and everything will be perfect.

MR. SCHOFER: That is correct.

MEMBER SIEBER: Thank you.

MR. SCHOFER: Okay. Voluntary initiatives, you can see the cost estimate represent the incremental resource requirements above maintaining the existing framework, and you can see that for this option it's primarily to NRC implementation costs associated with developing the policy statement, developing guidance documents, and industry costs to prepare their procedure. And the way I've modeled that is that an organization would get together and develop a template which would then be rolled out to each of the licensees.

I assume all implementation costs are incurred in the first year which is conservative, and as I indicated, the generic industry procedure would be prepared. Roughly, you can see the implementation costs for industry, those for NRC, and then the average industry cost per unit is provided, so that's my standard format. As we go through, you'll see it again and again.

The second slide estimates costs in the case that follows the publication of a policy statement, and this is should the NRC perform a retrospective review of existing industry initiatives? That makes a finding that a regulatory action is required.

In this case, there would be rulemaking required, so some of the examples previously discussed where it is believed, you know, it is required for adequate protection, would go into rulemaking to make those requirements. There's an assumption that the industry's voluntary initiative programs were successfully implemented, and that they don't need to do modifications; however, they would do an inspection and review of their design documentation to insure that they conform with the rule.

MEMBER BLEY: I guess the -- you've had comments about people saying the estimates are too low, and this isn't my main focus here. But when I look at the estimates I see tabulated I think, gee, you're a utility and you're going to do this, you've got to have a plan. Then you've got to implement it, you've got to have people do it. Maybe these are kind of okay there, then you review them, then you deliver them to NRC, and there's an awful lot of overhead

costs that are involved in delivering something like this to get it approved and finished that don't seem to be picked up here at all. Is that true, or am I -- or do you think you've covered that kind of cost? I mean, just when you guys are going to come here and present to us, all of a sudden you add a heck of a lot of hours to your total hours, just to talk to us, so the other folks are doing that when they come talk to you. Well, they have costs associated with the rulemaking, as well, which aren't showing up, so it resonates with me when I hear these might be off by factors of 10 or more, when I think about things like that.

MR. SCHOFER: Granted these are incremental costs that will be above the -- our framework, you know, maintaining the framework, so they have some of those costs regardless. The question is whether to package a submittal to the NRC is that totally captured? Possibly not, but the issue is that it depends upon what that rule requires with regard to documentation submittals.

I assumed here that they would do a verification for their own purposes that NRC would possibly inspect to verify compliance, though not a formal submittal. So, with regard to the Paper

Reduction Act, I'm kind of going that way, but if they had to do a submittal, it's probably underestimated. You're correct.

MR. DUDLEY: And we made all of these cost estimates public the week before our public meeting and we I won't say begged, but we certainly asked for licensees to provide us input on the costs, and NEI has stated they'll provide us PRA cost estimates. So, we put out something and we seek comment on it, and we hope to get that, and we'll make adjustments as appropriate.

MR. SCHOFER: Yes, the biggest numbers are the same as what was presented public.

MEMBER BLEY: Okay.

MEMBER ARMIJO: As far as the NRC costs, you know your costs, and you know the workload, and that shouldn't be out for public comment. Right?

MR. DUDLEY: Well, we --

MEMBER ARMIJO: If you don't know your costs, nobody else -- better than anybody else. It's the industry costs I think that really need --

MR. DUDLEY: Right.

MR. SCHOFER: Okay. Defense-in-depth, there was quite a bit of discussion during Mary's presentation about whether a PRA should be required.

On this slide, which is the base case, it shows the industry costs associated with developing their generic industry procedure again, and that gets rolled out to each licensee for their specific unit. You can see the costs that the NRC would have in developing the policy statement, preparing a Management Directive, preparing new guidance documents, and revising existing documents.

There's quite a few existing documents that do address defense-in-depth and margins, so we have that as the last line item there. You can see the total cost for industry implementation as well as NRC implementation, but if you go to the next slide, I also -- we have this as, again, a guide that if we do require plant-specific PRAs, there is a significant cost involved.

Within the working group, we've talked about whether we're simply encouraging this to occur, or whether it would be required. Currently, it's more on the encouragement side, but we had -- we're considering this as a possible cost that may need to be included in that option. Currently, the summary does not have a -- if you go to the next slide, Fred.

MEMBER STETKAR: In the public meeting, was that element presented?

MR. SCHOFER: Yes, it was.

MEMBER STETKAR: It was? Okay.

MR. SCHOFER: Now, the real key to the PRA is where you're starting from.

MEMBER STETKAR: Yes.

MR. SCHOFER: And how much do you have to do to be sufficient to provide the needed confidence in how it's going to be used. So, I think there was some give and take during that public meeting with regard to that. For my purposes, in my model what I did was I looked at those plants that have already done quite a bit of work either for seismic, either have already done it or have a commitment, or have -- for fire, which have raised the quality of the PRA substantially. It's for those plants that have not yet done that, or have no commitment to do that that I specifically costed out to kind of get to the same standard. So, I think we'll have some discussion, or I'll get some feedback from industry with regard to that modeling, as well as the number of hours --

MEMBER STETKAR: And I noticed you used essentially the same bar on the PRA for 4b and 3. Right?

MR. SCHOFER: That is correct.

MEMBER STETKAR: Where indeed, in fact, you

might not necessarily need the same --

MR. SCHOFER: Well, and as you probably gained from the discussion we had, we haven't really finalized the level of PRA. Recognizing a seismic PRA may be like 600,000, I currently have a 300,000 type number. So, granted, I mean, it may move and that --

MEMBER ARMIJO: Where are the NRC costs for accepting the PRAs that would be developed by the industry?

MR. SCHOFER: The model that I used is the same as what's currently used for like the fire PRA program, using the NEI guidance where you do the peer reviews. So, what I did was I modeled the industry costs for performing those peer reviews, and don't have an NRC acceptance cost.

MEMBER ARMIJO: But there would be something, right, somehow you would have to do an inspection or do something.

MR. SCHOFER: Currently I have none.

MEMBER STETKAR: Have you talked to the NFPA folks, 805 folks? They're either not being paid for a lot of hours, or --

MR. SCHOFER: Granted. I mean, currently, I have none, other -- you know --

MEMBER ARMIJO: Okay. Maybe you want to

think about that.

MEMBER SHACK: What is the --

(Simultaneous speech.)

MS. DROUIN: That's a missing factor. We're going to have to adjust the cost because we do do spot check reviews, et cetera. There is some review costs from the NRC side that needs to be reflected here.

MEMBER STETKAR: And even on NFP 805 you went through a very extensive peer review, or a pilot plant process that helped an awful lot to inform the NRC Staff and also the industry that might or might not be implemented in this type of activity. But it is a substantial cost --

CHAIRMAN SCHULTZ: It would be a good benchmark for the level of effort. Even if you didn't move in that direction for this type of change, it would be a good benchmark just to gather the resources.

MR. SCHOFER: And then Option 4b follows along the same lines. You'll see the rulemaking --

MEMBER BROWN: Before you --

MR. SCHOFER: Yes?

MEMBER BROWN: I guess the question -- to me, there's a disconnect. You use the same labor rate for very high-skilled PRA type people as opposed to if

you go back to the earlier ones, you use the same labor rate, it's 105 bucks an hour for people who are developing a template, or processing or doing -- but yet people who do PRAs I presume -- everybody talks about how that resource is not readily available. There's not a lot of people around that really know how to do those, and do them well. And, therefore, they don't -- they're not cheap. Okay. And yet 105 bucks an hour does not sound like a very good cost for high-quality, plus the consultants you will probably have to bring in, they will have to bring in to probably do that at the same circumstance.

MEMBER ARMIJO: Yes, I think the peer reviewers are going --

MEMBER BROWN: That looks a little --

MEMBER ARMIJO: -- to be pricier.

MS. DROUIN: Fred, aren't these unburdened rates?

MR. SCHOFER: Well, in defense of that rate, that rate was established in accordance with the NUREG/CR-4627 which talks about labor rates. And what it does is -- I relied upon Bureau of Labor statistics to come up with the base rate, and then have a burden on that which was benefit plus some management burden, but it's not a fully burdened rate because it's an

incremental cost versus a total rate. So, you're right, if it was totally burdened it would probably be 200 bucks. But using that methodology, it's less. Now, I'm looking at that model and that probably will be adjusted upward, but the NRC rate will not.

MEMBER SKILLMAN: Fred, excuse me. Let me ask this. Industry costs for 4a and 4b, in each case the parameter of what equipment is necessary, the SSCs that are necessary expands, and included in the population of equipment is that equipment that is presently Maintenance Rule Section 3, Class 1, Seismic 1, Section 3, Class 2, Seismic 1, and so on and so forth in accordance with the existing NUREGs 126, 129 and the rest of the rulemaking.

4 Alpha and Bravo actually the perimeter of equipment, and my thought is that equipment now becomes ungradable or becomes vulnerable to the identification of new requirements, such as inclusion Maintenance Rule, EQ, and all of the other regulatory required programs that encompass what is now semi-safety grade or new safety grade equipment. Those costs don't seem to be included here. How do those get treated, because those are real costs to the plant and to the owners?

MR. SCHOFER: They are not here.

MEMBER STETKAR: That depends, if you have the perfect plant in the world, your incremental costs are zero.

MEMBER SKILLMAN: If your plant is perfect.

MEMBER STETKAR: If you have a really terrible plant, your incremental costs are going to be pretty doggoned high.

MEMBER SKILLMAN: Absolutely, that's exactly my point. So, here's --

MR. SCHOFER: But there's also the possibility that you may downgrade things, as well as -- some people have indicated that with the PRA, with the -- they can justify reducing --

MEMBER SKILLMAN: I guess it's hard for me to imagine that there would be a sufficient number of downgrades to offset what are likely a very large number of required upgrades.

MR. SCHOFER: In response to John's prior question, there is no plant modifications identified in any of these estimates.

MR. DUDLEY: I mean, if commentors or the industry wants to give us those figures, I mean, perhaps we could include them, but it's really hard to try to estimate what could happen on an average basis at these facilities, so we haven't attempted to make

those estimates yet.

MR. SCHOFER: And it would be somewhat speculative, I mean --

MR. DUDLEY: Quite a bit.

MEMBER SKILLMAN: Well, I can understand why some from industry would say these are underestimated by a factor of 10 because even a not terribly complicated plant change, depending on how many programs that affects the components or the controls gets very expensive very quickly.

(Off the record comments.)

MR. SNODDERLY: If you're concerned say about hardened vents and severe accident management guidelines, those actions weren't considered. And even though they may end up in the design enhancement category, they're going to be required under other programs independent of this action. In other words, you're going to have to do that to meet the orders and those other Fukushima requirements, so that's why we didn't include them here because you're going to have to do them --

MEMBER ARMIJO: You've assumed that those hardware changes that have already been ordered or will eventually develop, that are not included, that's already part of the existing framework.

MR. SCHOFER: Yes. I'm looking at costs above the --

MEMBER ARMIJO: Well, what about other equipment that have not been covered by the order that you determined there would be some upgrades required, further inspection, further -- better maintenance.

MR. SNODDERLY: We haven't identified any yet.

MEMBER ARMIJO: You have not identified -- you don't anticipate that that would be done.

MR. SNODDERLY: Yes, that's why I was -- when I was talking about the treatment requirements for 4b, I think it's going to be the existing Maintenance Rule, because we can't go back -- it would be too difficult to go back and say you have to --

MEMBER ARMIJO: I understand.

MR. SNODDERLY: -- go reprocure this with these additional quality requirements. We would just take that as going forward, you would either -- you would set reliability goals for those components, or you would have specific preventative maintenance program to address those SSCs.

MEMBER SKILLMAN: Actually, I was thinking somewhat differently than that. 4 Alpha and Bravo actually push the present design basis like Harold Ray

said an hour again. He said what you are contemplating here is actually extending what is the present design basis. A couple of examples, all of the river-based plants may be facing new water levels. Pick Browns Ferry, pick TMI, pick Peach Bottom, pick Susquehanna, pick the ones out in the Midwest, if you say by golly, your water level is now 5 feet higher, you can't raise the plant. You know that from Fort Calhoun, but you may have to build a moat, which is what they've done at Oconee.

MR. SNODDERLY: Correct, and --

MEMBER SKILLMAN: So, in building the moat you may also have to build water level alarm systems 30 miles upstream, 20 miles upstream, they might have to be safety grade.

MEMBER STETKAR: But, Dick, that doesn't apply to Palo Verde, so you can't do --

(Simultaneous speech.)

MEMBER STETKAR: -- do it on a generic basis like this.

MEMBER SKILLMAN: But, John, you're making a good argument, some plants will have that type of issue. Palo Verde and the ones in the northwest may have a different set.

MR. SCHOFER: But for those issues --

MEMBER SKILLMAN: But those costs are not included, and that's my point.

MR. SCHOFER: But that's part of the existing framework in that 2.1 and 2.3 is evaluating seismic and flooding, and the requirements for that will be coming explicitly from those recommendations. Therefore, it is not as a result of revising the framework that's causing those changes, it's because of those particular activities. Therefore, they were excluded because they're part of the existing framework.

MR. CARUSO: Any particular issue here -- any particular item that would go in the category say 4b, has to go -- it's a cost justified safety enhancement, may not be cost justified if you have to build a moat, but that has to be addressed. So, I think those costs are included in the sense that we're just talking about the framework part here. That part will happen automatically. Right? I mean, you've got to deal with that.

MEMBER SKILLMAN: I think the diamond that's coming out of this discussion is the recognition that this 4 Alpha and Bravo are really independent from 2.1 and 2.2 recommendations.

MR. SCHOFER: This is to revise a framework

that is to evaluate a particular situation and resolve it.

MR. SNODDERLY: But 4b would help you with -- if you have 4b in place theoretically, you would be evaluating okay, Browns Ferry, I'm now -- I underestimated my risk from flooding. I may now have to look at the cost of building that moat. How tall would that moat have to be? You know, how far do I have to reduce risk? And then that would be -- the check and balance would be then we as the Staff would go in, could look at those analyses and then could challenge to say, you know -- and eventually come to a conclusion that says either yes, we agree with the cost beneficial fix that you're proposing, or no, we think it needs to be greater. But it would provide that vehicle for helping to determine whether you need to do something or not; whereas, with 2.1 or 2.2, it's a I want you to go address it and do it no matter what. So, it's --

MEMBER ARMIJO: I'm still trying to see if there are no hardware changes or no plant changes, or no greater level of inspection or maintenance on equipment, what's the incremental safety benefit of all of this stuff on NTTF Recommendation 1? Is it just all administrative and documentation?

MR. SCHOFER: Regulatory efficiency, along those lines.

MR. DUDLEY: More openness so the public can see the process of --

(Simultaneous speech.)

MR. DUDLEY: -- how decisions get made and why the result of a decision --

MEMBER ARMIJO: There is a lot of work of Staff and the industry, and the incremental safety improvements are being done by the orders and the things that the Commission has already initiated. And I'm just trying to --

MEMBER STETKAR: Sam --

MEMBER ARMIJO: This seems like an awful lot of effort to kind of improve the way the regulations are set up and making consistent -- these are all good things. I'm not criticizing, but I don't see where they really --

MEMBER STETKAR: Sam, why do we have specific treatment of ATWS events that might be a 10 to the minus 8 per year event in the regulations and ignore the effects of perhaps 10 to the minus 5 seismic events that might be much more important than an ATWS event? Why do we do that?

MEMBER ARMIJO: John, I don't know --

MEMBER STETKAR: Well, it's because the regulatory framework that we have right now don't treat those in a coherent manner. And that's sort of the impetus for why doing this.

CHAIRMAN SCHULTZ: Yes, so therein lies your benefit. Now, how to quantify that is perhaps very difficult to do --

MEMBER ARMIJO: Yes, I missed that.

MEMBER STETKAR: Perhaps if you'd had this 30 years ago, we wouldn't have been so myopically focused on ATWS, ATWS, ATWS, and spent all of the money.

MEMBER SIEBER: Might have built the plants differently.

MEMBER STETKAR: Or some strainer plugging for that matter.

PARTICIPANT: Could have put the money on cap credit, right?

MEMBER STETKAR: Yes, there you go. I was going to say that.

(Laughter.)

MEMBER STETKAR: I mean, that I think is an action of tangible benefit going forward.

MR. SCHOFER: Okay. For the cost that I just was describing, the upgrade of the PRA, that was

a one-time implementation cost which is a conservative assumption because more than likely that would be done over years, and may not occur in year one. There are some costs associated that would be recurring, such as PRA maintenance, which would be an annual cost as well as PRA upgrades to incorporate new standards or methodologies on a four-year basis.

MEMBER STETKAR: By the way, quick somebody, where did the four years come from? I mean, what's magic about four years?

MR. SNODDERLY: That's currently in the --

MR. SCHOFER: That's what we --

MS. DROUIN: This is in the regulation.

(Simultaneous speech.)

MR. SNODDERLY: That's what's in 50.71(h) right now, but I can't give you a good answer for where that came from.

MR. SCHOFER: Next slide. So, the total estimated burden using the standard 3 percent, 7 percent discount rates and you have the total cost. So, that's a best estimate for 3 percent and 7 percent, I believe is on the front page. Yes.

MR. DUDLEY: Any more questions?

CHAIRMAN SCHULTZ: Dick, your summary.

MR. DUDLEY: Okay, I'm going to briefly

summarize where we are. Just as a little recap, this is a little matrix that shows how the individual options stack up with respect to Recommendation 1 and the sub-recommendations, just so you can see which of the sub-recommendations are addressed by which of the options.

Option 1, maintain the existing framework does not address any of the recommendations. Option 2 for voluntary initiatives also does not address any of the specific recommendations or sub-recommendations called out in Recommendation 1, but Bill already -- Bill Reckley explained why we included it as an option in the -- in our paper that we're preparing.

Option 3 identifies or would address three of the recommendations or sub-recommendations. The criteria for getting a check here was that you had to address any part of the regulation so Option 3 would address three of the sub-recommendations under Recommendation 1.

Option 4a would address four of the five sub-recommendations and recommendations. It would not do anything to modify the regulatory analysis guidelines. And Option 4b would address in one way or another portions of all the recommendations and sub-recommendations associated with Recommendation 1. And

under 1.4 in the bottom right-hand corner, I gave it a check+ because it would not -- although it would not evaluate the insights from the IPE and the IPEEE if you had the plant-specific PRAs, you would do that same review in a better way in a plant-specific manner.

So, we're preparing a SECY paper, and in the paper we'll describe the proposed options that we'll have to address the key NTTF and the Risk Management Task Force recommendations. We'll describe the key technical policy and regulatory issues associated with the options, and to the best of our ability we'll provide possible resolutions of some of those issues. We'll describe the actions and products that we need to implement each option. This would be policy statements, rulemakings, regulatory guides, management directives, other internal guidance, other housekeeping activities we'd have to do.

We'll estimate both NRC and licensee resources, we'll refine the estimates that we've shown you today, and we'll discuss the pros and cons that we hope to have on a better more consistent, normalized basis than in the initial draft document that you saw. And we'll provide a recommendation to the Commission in our SECY paper.

So, what are we doing now? Well, we're completing the description and the assessment of the proposed options. We will review feedback. We are reviewing feedback from the November 8th public meeting, and we'll review additional comments that we expect to receive on December 14th.

MEMBER SHACK: Are those comments on the regulation.gov site?

MR. DUDLEY: Yes.

MEMBER SHACK: Can we go look at them there?

MR. DUDLEY: Yes, there's just one comment available, but yes, there's a -- I had the docket number. One of the earlier slides has the docket number, and so you just go to regulations.gov and you type in that docket number and hit search, and it pops it right up.

We're also working to modify the option descriptions and cost estimates as appropriate. We'll probably consider external events in Option 4a, and we have multiple interactions scheduled with the JLD Steering Committee. We're scheduled to meet with them three times in the near future. We will meet again with the ACRS Subcommittee and full Committee with a goal of obtaining the ACRS letter with their views on

Recommendation 1. And we'll finalize our recommendation and provide it in a notation vote paper to the Commission.

And the last slide is just -- yes?

MEMBER STETKAR: Before you run down the dates there, you mentioned earlier that NEI had indicated they were going to provide their estimates of PRA costs. Are they doing it according to the schedule th at we're going to see here? For example, will we see those by mid-December time frame?

MR. DUDLEY: Yes, it was understood at the meeting that that was the case.

MEMBER STETKAR: Okay.

MR. DUDLEY: But I am going to contact --

MEMBER STETKAR: I just want to make sure that they don't -- coming in so late that they say see, we told you that you were wrong --

MR. DUDLEY: Yes.

MEMBER STETKAR: -- after February.

MR. DUDLEY: Right. I am going to contact them directly to make sure I know the schedule for that. And this last slide is just -- shows the precise schedule dates for some of the milestones that I've discussed earlier, with a paper due to the Commission on February 19th of next year. So, that completes our

presentation of where we stand on Recommendation 1.

MEMBER ARMIJO: Dick, would you go back to, I guess it's Chart 74, the one that's a table.

MR. DUDLEY: Yes.

MEMBER ARMIJO: Yes. In each of the categories where you have a checkmark, let's say just Option 3, 4a and 4b, how many years would it take to complete the work that's defined by a checkmark? In other words, I'm just trying to get an idea of when would this be finished? Is this --

MR. DUDLEY: Anything that requires a rulemaking is probably at least three years from now.

MEMBER ARMIJO: So, even Option 3?

MR. DUDLEY: Option 3 --

MEMBER ARMIJO: A couple of years?

MR. DUDLEY: The policy statement is almost as complicated as one of your most complicated rules.

MEMBER ARMIJO: So, it's three years minimum. What about 4b, which has got much more work?

MR. DUDLEY: Well, 4b is described in the Risk Management Task Force report as what, a 5 to 15-years implementation effort.

MR. SNODDERLY: Right. It was looking out 15 years, where do we want to be. And that -- now, where do we want to be in 15 years would be all modes,

all of the internal events, external events, and I think I'm going to say 5 years, though, for what I kind of described today, which is meaning to take the first step, CDF, LERF, and somewhere, 4 to 5 five years to do --

MEMBER SIEBER: At least.

MR. SNODDERLY: Yes.

MR. DUDLEY: But they're not short-term.

MR. SNODDERLY: Yes.

MEMBER ARMIJO: Yes, and 4a would be somewhere of similar --

MR. SNODDERLY: More than three, less than five.

MEMBER ARMIJO: 4a would be something similar?

MR. SCHOFER: Yes, I would say about that time.

MEMBER ARMIJO: Okay. And then you could actually put cost for each of these things when you have everything.

MR. SNODDERLY: Correct.

MEMBER ARMIJO: Okay, thank you.

CHAIRMAN SCHULTZ: Dick, because we're coming close to the noontime, I would like to take the prerogative to ask for public comments at this time.

As we understand, there are no participants on the telephone line, so if there are any public comments from members of the public in the room or any additional comments that anyone would like to make at this time for the proceedings. Thank you. So, hearing none, we can go back to comments of the Committee.

Could you go back to the schedule slide, Dick. I would just like to start with a couple of questions related to that.

MR. DUDLEY: This one?

CHAIRMAN SCHULTZ: Yes. So, we talked about the public comments and how we could gain access to it, and understand what has been provided. And we'll get some summary of that in the January 18th meeting, as well.

With regard to the JLD Steering Committee meetings, you mentioned that you expect several during the month of January. Will there be one or two before the time we meet again, January 18th?

MR. DUDLEY: Well, we're going to meet on December 18th, is the first one.

CHAIRMAN SCHULTZ: Okay.

MR. DUDLEY: We'll meet again on January 15th, I believe, with the JLD.

CHAIRMAN SCHULTZ: Okay.

MR. DUDLEY: So, that will be two meetings. And our meeting with you is the 18th of January.

CHAIRMAN SCHULTZ: That's right.

MR. DUDLEY: Yes, so we will meet with them twice, so we will have gotten feedback from the JLD Steering Committee.

CHAIRMAN SCHULTZ: And, optimistically, in the introductory statement that I made, I indicated that perhaps there would be some written materials associated with the SECY paper that we might be able to see before the 18th. Is that possible?

MR. DUDLEY: Yes, we will have an initial draft of our SECY paper in mid to late December. We'll need to get a certain amount of management review but we'll be able to provide you a draft sometime in January. I'm not sure when. Certainly we'll try to get it to -- we'll get it to you before the January 18th meeting, as soon as possible.

(Off the record comments.)

CHAIRMAN SCHULTZ: Unfortunately, that's the type of schedule we've been working toward with many, many projects over the last 12 to 18 months, but we appreciate that. We'd really like to have that opportunity.

(Simultaneous speech.)

MR. DUDLEY: -- have it at least a week ahead of time, at least. I know that's still not sufficient, but it's -- we're all working -- it's pretty hard to meet these deadlines.

CHAIRMAN SCHULTZ: Well, I mentioned the context, those two elements because I know it is important for you to meet with the Steering Committee, as well, and incorporate whatever you can from that interaction within the paper that we see in its draft form prior to the 18th of January. I appreciate that. Thank you.

Members of the Committee, comments related to today's presentation, or other questions? Jack?

MEMBER SIEBER: No comments.

MEMBER RAY: I guess, Steve, I just want to say I sit here and it's really going to have at some point for us to decide whether it's better to avoid an accident versus mitigate its consequences. I don't see that as emerging very clearly in all of this mass of philosophical discussion. And if there is a way to do that, I would be pleased to understand what it is.

CHAIRMAN SCHULTZ: Thank you.

MEMBER BLEY: Yes, several things. First, last time we met we were looking at 12 potential areas that were all mushed together, and congratulations,

you've come a very long way, and this has much more clarity for me. I guess I'd reiterate some of the things that were said on 4a, especially making it clearer. As you write the paper, one thing that strikes me, most SECY papers I can recall right now have options that are kind of mutually exclusive. This paper is quite different, and I think a fair discussion of that will be real important to make it clear.

Early today someone mentioned that gee, you kind of thought if you go to 4a or 4b there's, at least 4b there's -- well, both, an implication that you've really kind of incorporated 3 into that. Well, it isn't in the text. Right? So, we had questions about that later. To me, that makes sense that it's there and that would pick up some of the uncertainty in the other things. Instead of embedding all of that in 4a and b, if the text itself of the document lays out how these pieces fit together, and that if you're doing those, some others apply. I think it would be kind of helpful.

MR. DUDLEY: We'll try to clarify that.

MEMBER BLEY: Yes. I mean, there's a lot more to do, but it's starting to have pretty good substance, and just those philosophical things I think

are pretty important on how you arrange this. It also strikes me, it might be to advantage to tie even a little more closely than you have in the current document to some of the details that are in the Risk Management Task Force report. It might help support some of the things that you have in 4a and 4b. That's all.

CHAIRMAN SCHULTZ: John?

MEMBER STETKAR: I don't have anything.

MEMBER RYAN: Nothing additional, but I do appreciate Dennis' comments on some of the details of how it would better fit together down the line with some of the other documents we've seen. So, I second that. Thank you.

CHAIRMAN SCHULTZ: Charlie.

MEMBER BROWN: I would only second Harold's comments because I'm a big believer in accident prevention by mitigation of consequences. Clarity is not forthcoming on that. That's it.

CHAIRMAN SCHULTZ: Joy?

MEMBER REMPE: No comments.

CHAIRMAN SCHULTZ: Okay. I've got one comment, and then would like to wrap up. And that comment would be there are some elements associated with new plants, passive designs and so forth, that

were mentioned in the presentation, some of those elements are being drawn upon into defining a new process. But providing clarity associated with how this would apply, could apply to operating plants and separately how it would need to apply, and what impact it would have on already made decisions associated with new plant design, construction, and implementation would be necessary for me to draw that forward, because the time frame that we're talking about here in terms of application would be much more important for new plants than for operating plants, or could be more important depending on that time frame, and the time remaining for operations --

MR. DUDLEY: We explicitly discuss that.

CHAIRMAN SCHULTZ: And also just to second the comments that have been made by the Committee about the quality of the work that you've presented today, and the level of effort that we know it represents that you've applied between August and this meeting, we really appreciate, and we also appreciate that quality of the presentations that have been developed and presented today, so thank you very much.

With that, I'll adjourn the meeting.

(Whereupon, the proceedings went off the record at 12:06 p.m.)

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

Developing the Staff's Response to Fukushima Task Force Recommendation 1

Advisory Committee on Reactor Safeguards
Subcommittee Meeting

December 4, 2012

NRC Interoffice Working Group

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

Overview of Fukushima Task Force Recommendation 1

ACRS Subcommittee Meeting

December 4, 2012

Richard Dudley – NRR Rulemaking Branch

Outline of Presentations

- Overview of Recommendation 1
  - Review actions taken and planned
- Discuss options being considered
- Discuss cost estimates
- Summary – Path Forward

Acronyms

ACRS – Advisory Committee on Reactor Safeguards
ADAMS – Agencywide Documents Access and Management System
AIA – Aircraft Impact Assessment
ATWS – Anticipated Transients Without Scram
BWR – Boiling water reactor
BWRVIP – Boling Water Reactor Vessel and Internals Project
CDF – Core Damage Frequency
CFR – Code of Federal Regulations
CRGR – Committee to Review Generic Requirements (NRC)
DBA – Design-basis accident
DBT – Design-basis threat
DID – Defense-in-depth
DPR – Division of Policy and Rulemaking
DRA – Division of Risk Assessment
DSRA – Division of Safety Systems and Risk Assessment
FSAR – Final Safety Analysis report
GSI – Generic Safety Issue
IAEA – International Atomic Energy Agency

Acronyms (cont.)

INL – Idaho National Laboratory
IPE – Independent Plant Evaluation
IPEEE – Independent Plant Evaluation – External Events
JLD – Japan Lessons-Learned Directorate (NRC/NRR)
LWR – Light Water Reactor
MK-1 – Mark 1
NRC – Nuclear Regulatory Commission
NRO – Office of New Reactors
NRR – Office of Nuclear Reactor Regulation
NTTF – (Fukushima) Near-Term Task Force
NUREG – NRC report series
OGC – Office of the General Counsel
PRA – Probabilistic Risk Assessment
PWRMRP – Pressurized Water Reactor Materials Reliability Program
RES – Office of Nuclear Regulatory Research
RG – Regulatory Guide
RMTF - Risk Management Task Force

Acronyms (cont.)

RTNSS – Regulatory treatment of non-safety systems
SAMGs – Severe Accident Management Guidelines
SBO – Station Blackout
SDP – Significance Determination Process
SECY – Office of the Secretary (or Commission paper)
SER – Safety evaluation report
SRM – Staff Requirements Memorandum
SRP – Standard Review Plan
SSCs – Systems, Structures, and Components

Basis for Recommendation 1

- **Near-Term Task Force findings:**
  - NRC now relies on combination of design-basis requirements and “patchwork” of beyond design-basis requirements and voluntary initiatives to maintain safety
  - NRC’s safety approach is incomplete without strong program for dealing with the unexpected, including severe accidents
  - Continued reliance on industry voluntary initiatives for a fundamental level of defense-in-depth would leave gaps in NRC’s regulatory approach

Task Force Recommendation 1

- ***The Task Force recommends establishing a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations.***
- *Initiate action through the following steps:*
  - *1.1 Draft a Commission policy statement that articulates a risk-informed defense-in-depth framework that includes extended design-basis requirements in the NRC's regulations as essential elements for ensuring adequate protection.*
  - *1.2 Initiate rulemaking to implement a risk-informed, defense-in-depth framework consistent with the above recommended Commission policy statement.*

Task Force Recommendation 1 (cont.)

- *1.3 Modify the Regulatory Analysis Guidelines to more effectively implement the defense-in-depth philosophy in balance with the current emphasis on risk-based guidelines.*
  - *The Task Force believes that the Regulatory Analysis Guidelines could be modified by implementing some of the concepts presented in the technology-neutral framework (NUREG-1860) to better integrate safety goals and defense-in-depth.*
- *1.4 Evaluate the insights from the IPE and IPEEE efforts as summarized in NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," issued December 1997, and NUREG-1742, "Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program," issued April 2002, to identify potential generic regulations or plant-specific regulatory requirements.*

Commission SRM Direction

SRM-11-0093:

"Recommendation 1 should be pursued independent of any activities associated with the review of the other Task Force recommendations. Therefore, the staff should provide the Commission with a separate notation vote paper within 18 months of the issuance of this SRM. This notation vote paper should provide options and a staff recommendation to disposition this Task Force recommendation." (Due in February 2013)

What is the Issue?

- The NTTF noted that the NRC's existing power reactor regulatory framework for does not logically and systematically address the need for new requirements to reduce the risks of beyond design-basis events and severe accidents.
- The existing regulatory framework for power reactors effectively addresses design-basis events. But for beyond design-basis events, the staff working group believes the existing framework could be improved to facilitate more consistent, efficient, timely, and transparent Commission decisions to address new issues and information.
- These improvements would allow the existing framework to provide:
  - An improved structure and set of criteria for identifying and categorizing unanticipated events or accidents that may require regulatory action (e.g., extended station blackout)
  - A structure and criteria for consistently and predictably evaluating how risk and defense-in-depth should be addressed for an effective NRC regulatory response to new information or unforeseen events or accidents (e.g., filtered vents)
  - A regulatory process that ensures licensee implementation and consistent long-term maintenance of voluntary industry initiatives (e.g., SAMGs)

Risk Management Task Force (RMTF) Regulatory Framework

- Proposed risk management framework documented in NUREG-2150 (April 2012)
  - Preserve the design basis accident, but supplement with an enhanced design basis category by rulemaking
- Chairman's Tasking memorandum (June 14, 2012):
  - Consider regulatory framework recommendations for power reactors in RMTF report (NUREG-2150; April 2012) in developing options for Recommendation 1

Evolution of NRC Approach

- June 2012 public meeting – Three options: (1) Continue with existing framework, (2) Improve existing framework, and (3) Implement new framework (w/four new framework sub-options)
- August 2012 ACRS meeting – Described 12 framework improvement activities (framework building blocks)
- Today – Four options
  - Option 1 – Maintain existing framework
  - Option 2 – Clarify role of voluntary initiatives (2 sub-options)
  - Option 3 – Establish process and criteria for balancing risk, defense-in-depth and safety margins
  - Option 4 – Establish an additional regulatory category for requirements on beyond design-basis events and severe accidents (2 sub-options)
- Applicability of framework – light water power reactors
  - Operating reactors, evolutionary LWRs, and small modular LWRs

Draft Option Summary Document

- Released on Nov. 2 (ADAMS ML12296A096) and www.regulations.gov under docket NRC-2012-0173
  - Detailed descriptions of each option, key issues, expected products, preliminary cost estimates, and pros and cons
- November 8 public meeting
  - Discussed each option
  - Answered questions to clarify
  - Solicited feedback/comments on options
    - Industry implementation costs
    - Views on the pros and cons
- Through December 14, 2012 – Accepting public comments via www.regulations.gov, docket NRC-2012-0173
- NRC will review and consider all comments but will not provide written responses or formal comment evaluations

Feedback from Nov. 8, 2012 Public Meeting

- If you select Option 1 (status quo), you are just relying on luck. (i.e., if Fukushima hadn't happened, would we be improving hardened vents?)
- Industry is spending millions on FLEX. Will FLEX be re-visited under Option 4a? [Option 3? Option 4b?]
- Please explain to the Commission that Option 4b will take a long time to implement. [PRA improvement]
- Under Option 4a – it seems that the tools are already available for the NRC to take action without rulemaking.
- Estimated costs for PRAs are too low (factor of 10)
  - NEI committed to submit improved PRA cost estimates

Next Steps

- Evaluate stakeholder feedback
- Working on details/integration of options
- Refining cost estimates/pros and cons
- Meet with ACRS subcommittee (December and January)
- Finalize SECY paper
- Meet with ACRS full committee in February
- Commission paper due in mid-February 2013
- Receive ACRS letter

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Option 1 – Maintain Existing Regulatory Framework

Stephen Dinsmore, NRR/DRA

Summary of Option 1

- Retain the current regulatory framework and design basis event structure.
- Current framework can add rules and requirements to address issues as they arise
  - NRC uses the fundamental concepts of design-basis events and defense-in-depth
  - Backfit rule provides a structured means to judge whether a proposed rule or other mandated change is consistent with the principles of good regulation
  - When significant safety issues arise, NRC has processes in place to issue immediately effective orders
- Existing framework includes risk-informed, performance based changes to the regulations (i.e., regulation that considers risk insights)
  - mandatory 50.65 maintenance rule implementation
  - Regulatory Analysis Guidelines
  - Reactor Oversight Process (ROP) and its significance determination process
  - Voluntary alternative rules
    - 50.69 special treatment
    - 50.48(c) fire protection
    - 50.46a – (draft final) risk-informed redefinition of large-break LOCA
  - Voluntary license amendment applications (e.g., 4b risk-informed completion times)

Option 1 – Relationship to NTTF and RMTF Reports

- Fukushima Near Term Task Force Report:
  - "…recommends establishing a logical, systematic, and coherent regulatory framework ... that appropriately balances defense-in-depth and risk considerations."
    - No new framework
  - "…articulate[s] a risk-informed defense-in-depth framework [and initiate rulemaking] that includes extended design-basis requirements…"
    - No introduction of new extended design-basis and associated requirements
  - "..modify regulatory analysis guidelines…evaluate insights for IPEs and IPEEs.."
    - May be implemented if determined necessary/desirable
- Risk Management Task Force Report:
  - Option A Chapter 4, "…efforts related to ongoing risk-informed and performance-based initiatives and activities related to the followup to the Fukushima accident would continue on their current courses…"
    - Consistent with this description but the RMFT does not recommend this option

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Option 2 – Clarify Role of Voluntary Industry Initiatives

Bill Reckley, NRR/JLD

Summary of Option 2

- As described in NUREG/BR-0058, industry initiatives can generally be put into one of the following categories:
  1. those put in place in lieu of, or to complement, a regulatory action to ensure that existing requirements are met (e.g., BWRVIP, PWRMRP)
  2. those used in lieu of, or to complement, a regulatory action in which a substantial increase in overall protection could be achieved with costs of implementation justifying the increased protection (e.g., SAMGs, BWR MK-I hardened vent, Backup power for H_2 igniters)
  3. those that were initiated to address an issue of concern to the industry but that may or may not be significant regulatory concern (e.g., groundwater monitoring)
- Option 2 would clarify the role of voluntary industry initiatives in NRC's regulatory processes by defining when or under what circumstances the NRC would incorporate such initiatives into regulatory requirements

Option 2 – Background

- Direction-Setting Initiative 13 (SECY-97-303) resulted in decision to develop guidelines for using industry initiatives
- SRM-SECY-99-063 stated that regulatory framework allows voluntary initiatives **except in issues involving adequate protection**
- SRM-SECY-00-0116 – directed staff to publish guidelines for using voluntary initiatives (65 FR 53050; Aug. 31, 2000)
- SECY-01-0121- Responding to overwhelmingly negative public comments, the NRC abandons voluntary initiative program
- Fukushima Near Term Task Force Report
- Risk Management Task Force Report (NUREG-2150)

Option 2 – Relationship to NTTF and RMTF Reports

- Fukushima Near Term Task Force Report
  - Notes that "... voluntary industry initiatives should not serve as a substitute for regulatory requirements but as a mechanism for facilitating and standardizing implementation of such requirements." The NTTF further notes that "... NRC inspection and licensing programs give ... little attention to industry voluntary initiatives since there are no requirements to inspect against."
  - Examples include SAMGs and BWR hardened vents
- Risk Management Task Force Report (NUREG-2150)
  - "The extent to which licensee activities undertaken as part of voluntary industry initiatives can be credited has been a source of contention in the Reactor Oversight Process and has reduced the efficiency of that process."

Option 2 - Description

- Clarify the role of voluntary industry initiatives in NRC's regulatory processes by defining when or under what circumstances the NRC would incorporate such initiatives into regulatory requirements

- Could be implemented on stand-alone basis or with one of the design extension/enhancement category options

Option 2 - Stand-alone improvement

- Implement with Commission Policy Statement and revised internal guidance documents
- Adequate protection requires binding NRC requirements
- Factors to consider for safety improvements
  - Importance in reducing or maintaining plants' risk profiles
  - Importance in maintaining plants' levels of defense-in-depth
  - Relationship of initiative to other regulatory requirements
  - Duration of initiative (e.g., one time or for remaining life of plants)
  - Degree of safety improvement achieved
- Revise regulatory analysis guidance (base case treatment)
- Revise oversight processes (inspections, audits)
- Key issue – Should NRC re-evaluate existing initiatives?

Option 2 - Integrated improvement

- Relies upon the outcomes of Options 3 & 4 to address voluntary initiatives
- Importance of “voluntary initiative” addressed using same guidance as developed for Options 3 and 4
- Incorporation of actions (hardware, procedures, etc.) into appropriate licensing basis document addressed through guidance for Options 2 and 4
- Example:
  - Importance of SAMGs in mitigating some beyond design basis accidents captured through the design extension/enhancement categories (Option 4). Associated requirements include provisions for recordkeeping (e.g., FSAR Chapter 19) and change control (e.g., 50.59-like process)

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Option 3 – Decision Process for Balancing Risk, Defense-in-depth, and Safety Margins

Mary Drouin, RES/DRA

Summary of Option 3

- Establishes the Commission's expectations with regard to risk-informed regulatory decision process for balancing risk, defense-in-depth, and safety margins.
- Defines the objective of and the principle elements of defense-in-depth and safety margins.
- Establishes a risk-informed, regulatory decision process for balancing risk, DID and safety margins.
  - Includes the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant.

Background – Defense-in-Depth

- Since the beginning of licensing nuclear facilities, starting with WASH-740 in March 1957, the concept of multiple lines of defenses, has been consistently viewed for describing defense-in-depth and as an approach to address accident prevention and mitigation.
- There has also been a consensus in that defense-in-depth is needed to compensate for the recognized lack of knowledge (i.e., uncertainties
- A probabilistic approach to defense-in-depth came into the history in the 2000 to 2012 time period
- It recognized that although PRA cannot compensate for the unknown and identify all unexpected events, it could use risk assessment to:
  - identify some originally unforeseen scenarios,
  - identify where some of the uncertainties lie in the plant design and operation, and, for some uncertainties,
  - quantify the extent of the uncertainty.
- While the PRA may not be helpful in reducing uncertainties associated with the PRA itself, it can point out areas where “deterministic defense-in-depth” needs enhancement

Background – Safety Margins

- The concept of safety factor or safety margin is a key principle in balancing risk and defense-in-depth.
- By including margin in the design, it allows the SSC to perform past it operating limiting to a certain level without negative consequences.
- The Commission's regulations require that SSCs have adequate margins of safety.
  - The concept of margin is built in to the various engineering codes and standards in virtually all engineering disciplines.
  - The General Design Criteria 2, 10, 15, 26, 27, 31, 50 and 51 explicitly require that sufficient margin be provided in the design of specific SSCs.
  - Other regulations implicitly or explicitly call for safety margins in the designs of nuclear power reactors.

Relationship to NTTF Recommendation 1

- NTTF Recommendation 1 states: "The Task Force recommends establishing a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations."
  - Option 3 directly supports this recommendation
- NTTF also recommended four sub-options
  1. Commission policy statement that articulates a risk-informed defense-in-depth framework that includes extended design-basis requirements
     - Option 3 directly support this sub-option
  2. Initiate rulemaking to implement a risk-informed, defense-in-depth framework
     - To be evaluated to determine if rulemaking is necessary
  3. Modify Regulatory Analysis Guidelines
     - Option 3 directly supports this sub-option
  4. Evaluate insights from IPEs and IPEEEs
     - Option 3 does not directly consider this sup-option

Relationship To RMTF

- The RMTF notes in NUREG-2150 that
  - "After decades of use, there is no clear definition or criteria on how to define adequate defense-in-depth protections."
  - "the concept of defense-in-depth has served the NRC and the regulated industries well and continues to be valuable today."
  - "However, it is not used consistently, and there is no guidance on how much defense-in-depth is sufficient."
- The RMTF concluded that "clarifying what the U.S. Nuclear Regulatory Commission (NRC) means by defense-in-depth is a necessary part of the development of a holistic strategic vision."

Detailed Description of Option

- The Commission would issue a policy statement that would articulate the Commission's views on the need to balance risk, defense-in-depth, and safety margins.
- It would clearly describe the need for defense-in-depth, specify the actual levels of defense, their objectives and criteria for being met.
- The policy statement would also clearly describe the need for safety margins, and explicitly define its objectives, and the elements and principles related to safety margins.
- Along with the policy statement, the NRC would establish a decision process that would provide guidance for balancing risk, defense-in-depth and safety margins. This would include the NRC developing criteria for determining whether adequate defense-in-depth and safety margins have been addressed in the design and operation of a nuclear power plant while using risk insights.

Potential Policy Statement

- Specifying, for example, three specific levels of defense to ensure the risk would be acceptably low:
  - Level of Defense 1: Accident Prevention to ensure that there is (1) stable operation to limit the frequency of events that can upset plant stability and challenge safety functions and (2) protective systems to ensure that the systems are adequately designed, and perform adequately, in terms of reliability and capability, to satisfy the design assumptions on accident prevention during all states of reactor operation.
  - Level of Defense 2: Barrier Integrity to ensure that there are adequate barriers to protect the public from accidental radionuclide releases from all sources. Adequate barriers could include physical barriers as well as the physical and chemical form of the material that can inhibit its transport if physical barriers are breeched.
  - Level of Defense 3: Accident Mitigation to ensure that adequate protection of the public health and safety in a radiological emergency can be achieved should radionuclides penetrate the barriers designed to contain them.
- Requiring that the levels of defense be maintained; that is, independent of risk, in balancing risk and defense-in-depth and safety margins, each of the levels of defense need to be met.

Potential Policy Statement (cont'd)

- Probabilistic elements would be included which could consist of using the PRA,
  - to the extent possible, to search for and identify unexpected scenarios, including their associated uncertainties,
  - to subsequently establish adequate defense-in-depth measures to compensate for those scenarios and their uncertainties which are quantified in the PRA model.
- The ability to quantify risk and estimate uncertainty using PRA techniques, where possible, and taking credit for defense-in-depth measures in risk analyses, allows one to provide a better estimate of how much defense-in-depth is enough.

Implementing Guidance

- The guidance would likely include a Management Directive, other documents (e.g., regulatory guides, NUREGs, SRP chapters) for a process that would involve decision-based criteria for implementing the defense-in-depth strategy and for determining adequate defense-in-depth has been achieved.
  - Potential rulemaking will be evaluated
- The implementing criteria would involve examining each level of defense to identify key design and operational features for consideration (e.g., redundancy and diversity).
- The adequacy criteria would also involve each level of defense and would include both deterministic and probabilistic acceptance guidelines.
  - That is, for determining if adequate defense-in-depth has been achieved, there would be a blended deterministic and probabilistic process that defines both deterministic and risk criteria.

Implementing Guidance (cont'd)

- In determining whether adequate defense-in-depth has been achieved, the use of risk is an integral part; however, the extent of defense-in-depth that is needed can be impacted by safety margins. For example,
  - a tactic in achieving one of the levels of defense is a particular design feature. Whether this feature has safety margin and the extent of the margin can influence the degree to which the feature plays in defense-in-depth. Consequently, determining the adequacy of defense-in-depth can be dependent on safety margins and the associated risk. Therefore, the process for determining adequacy should balance risk, defense-in-depth and safety margins.

- Example process for balancing:
  - For a given level of defense, develop quantitative criteria.
  - Consider the Accident Mitigation level of defense, proposed quantitative criteria could be in the form of a frequency-consequence curve.
  - The risk would be evaluated considering the mitigation measures put in place against the curve.
  - The evaluation would consider any safety margins in the assessment, whether the uncertainties have been addressed.
  - If in the decision process, it has been determined that one of the criteria have not been adequately addressed, then plant defense-in-depth capabilities and the programmatic assurance could each be enhanced and the entire decision criteria would then be re-evaluated.

Key Issues

- Should the regulatory analysis guidelines and backfit analysis guidelines include defense-in-depth and safety margins as fundamental decision criteria?

- The requirement for plant-specific PRAs is still to be determined

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Option 4 – Establish New Event Category

Mark Caruso, NRO/DSRA

Option 4 – New Event Category

- New event category can be established on a generic or plant-specific basis
  - Generic approach (Option 4a): Generic criteria established by NRC to identify generic events/sequences as design extension events (adequate protection)
  - Plant-specific approach (Option 4b): Generic criteria specified by the NRC which are applied by licensees (as opposed to the NRC) to identify plant-specific events/sequences from PRA as design enhancement events (safety enhancement)

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Option 4a – Establish Generic Design Extension Category

Mark Caruso, NRO/DSRA

Summary of Option 4a

- Extend design-basis with events historically outside the design-basis (design-extension events)
- Establish requirements for the category of design-extension events
  - Inclusion in the design-basis
  - Acceptance criteria for mitigation
  - Event evaluation
  - Treatment of SSCs credited for mitigation

Option 4a - Background

- Commission has relied upon design-basis events/accidents to demonstrate plant design is robust
- Generic safety concerns related to events outside design-basis have been identified through operating experience and PRA and addressed with event-specific regulations or licensee “voluntary” actions
- NTTF and the RMTF have recommended design-basis be extended to address events historically outside the design-basis; current framework for design-basis events OK
- European regulators and IAEA taking actions to address events outside traditional design-basis
  - IAEA Safety Standard No. SSR-2/1, February 20, 2012

Relationship to NTTF and RMTF

- Option 4a would establish regulatory requirements for addressing the new design-extension events, as recommended by NTTF sub-recommendation 1.1
- Option 4a would establish “design-extension” events as requirements for adequate protection, as recommended in NTTF sub-recommendation 1.1
- Option 4a would include rulemaking, consistent with NTTF sub-recommendation 1.2
- Option 4a would specify generic requirements informed by a review of information already collected by the NRC, as recommended in NTTF sub-recommendation 1.4
- Option 4a would implement the recommendations of the RMTF report for operating and new power reactors as described in NUREG-2150, Appendix H.2.1.

Description of Option 4a

- Category of requirements for addressing specific events created by rule to extend the design-basis
  - Category definition included in 10 CFR 50.2
- NRC populates category with regulations that address specific events and apply generically
  - Selection criteria specified in 10 CFR 50.2
  - Regulations in category would be for adequate protection
- Applicants and licensees required by rule to:
  - Design, construct and operate facility in accordance with design-basis-extension categorization and special treatment designation requirements.
  - Evaluate events and show event-based acceptance criteria are met
- Special treatment requirements for SSCs credited in the evaluation will be established in the regulations

Key Issues

- On what basis must design-extension events be identified, and how should that basis differ, if at all, from the basis for identifying DBAs and beyond DBAs?
- What acceptance criteria must be met to show that the plant's licensing basis adequately addresses design extension events? For example, must design-extension events meet acceptance criteria with specified conservative assumptions (e.g., single failure, loss of offsite power); and, should the criteria be general or event specific?
- How will non-safety related SSCs that are relied upon to mitigate design-extension events be treated?
- Is it feasible to specify a common (or minimum baseline) set of design or operating requirements for design-extension events, or must different requirements be specified for each design-extension event?
- What methods will be used to evaluate design-extension events?
- How will the NRC review and approve each plant's licensing basis demonstrating that the design extension events (however they are specified or determined) are adequately addressed? What review guidance is needed?
- Are the criteria for balancing risk, DID and SM the same for design-extension events as for DBAs?

Option 4a – Expected Regulatory Products

- Revision to 10 CFR 50.2
  - Define DBA and design-extension events
- Revision to 10 CFR 50.34 and Part 52
  - Put design-extension event evaluations in FSAR
- Regulatory Guides
  - Implementation of design-extension requirements
  - Treatment of design features credited in evaluation of design-extension events
- Standard Review Plans
  - Implementation of design-extension requirements
  - Treatment of design features credited in evaluation of design-extension events
- Inspection Procedures
  - Implementation of special treatment requirements

Designation of Generic Design-Extension Category of Events

- NRC would determine the set of design-extension events
  - Selection criteria included in the regulations
  - Could include events already addressed by regulation (e.g., SBO, AIA)
  - Could include events not currently addressed by regulation
- NRC may review the following to identify new candidate events covered in the design-extension category
  - Individual Plant Evaluations and the Individual Plant External Event Evaluations
  - Analyses performed with NRC SPAR models
  - Accident Sequence Precursor Analyses performed by the NRC
  - PRAs: power plant licenses and design certification applicants
  - State-of-the-Art Reactor Consequence Analysis
  - NRC Level 3 PRA project (in progress)
  - Generic Safety Issues Program

Evaluation of Design-Extension Events

- Applicants and current licensees evaluate events
  - Show how acceptance criteria met
  - Identify SSCs relied upon to mitigate events successfully
- Evaluation methods may relax some or all conservatisms and prescribed boundary conditions required in design-basis event evaluation
- NRC reviews evaluation results

Treatment Requirements for SSCs

- Treatment requirements for design-extension category SSCs established by rule
- Goal: Strive for uniform treatment across category rather than event specific
- Graded approach to treatment based on safety significance could be considered
- Utilize applicable concepts from Regulatory Treatment of Non-Safety Systems (RTNSS) for passive designs

Potential Elements of Treatment

- Design requirements for independence, redundancy, and diversity
- Codes and Standards for design, material procurement, fabrication, construction, and operation
- Seismic design-basis
- Seismic qualification testing
- Equipment qualification testing
- Quality assurance and quality control
- Maintenance Requirements
- Availability Controls
- Materials surveillance testing
- Pre-service and in-service inspection
- Pre-service and in-service testing

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Option 4b – Establish Design Enhancement Category Using Plant-Specific PRA

Mike Snodderly, NRR/DRA

Summary of Option 4b

- Establish design-enhancement category
- Plant-specific PRA required
- Licensee designates plant-specific design-enhancement category events and accidents
- Includes treatment requirements for SSCs used to meet design-enhancement acceptance criteria

Option 4b – Background
(same as Option 4a)

- Commission has relied upon design-basis events/accidents to demonstrate plant design is robust
- Generic safety concerns related to events outside design-basis have been identified through operating experience and PRA and addressed with event-specific regulations or licensee “voluntary” actions
- NTTF and the RMTF have recommended design-basis be extended to address events historically outside the design-basis; current framework for design-basis events OK
- European regulators and IAEA taking actions to address events outside traditional design-basis
  - IAEA Safety Standard No. SSR-2/1, February 20, 2012

Relationship to NTTF and RMTF

- The NTTF envisioned a framework in which a new category of events would be established for adequate protection (i.e., Option 4a).
  - Differs in that the design-enhancement category would add additional protection beyond adequate protection
- Option 4b would implement the recommendations of the RMTF report for operating and new power reactors as described in NUREG-2150, Appendix H.2.2. (Alternative 2)
- Option 4b would implement the NTTF and RMTF recommendations for use of plant-specific PRAs

Design-Enhancement Category Description

- NRC would specify selection criteria for events/accident sequences
- Licensees would apply NRC criteria to determine which events should be included in the design-enhancement category
- This option “enhances” the design basis events/accidents to add “additional protection” that improves safety beyond the level required for reasonable assurance of adequate protection

Designation of Plant-Specific Design-Enhancement Category Events

- Licensee selects design-enhancement events/sequences using its plant-specific PRA, deterministic information, and criteria set forth in NRC regulations.
- NRC selection criteria thresholds would, as much as possible, build upon existing practices, such as:
  - regulatory analyses
  - backfit analyses
  - severe accident mitigation alternatives
  - Regulatory Guide 1.174

Plant-Specific PRA Requirement

- Each operating and new nuclear power plant would develop and maintain a plant-specific PRA
- Similar to the requirement for new reactors in 10 CFR 50.71(h)
  - Limited to Level 1 core damage Level 2 containment performance
- New regulation would require licensees to perform periodic PRA updates and analyses to identify relevant scenarios and determine appropriate actions to address identified design-enhancement events

Option 4b Treatment Requirements

- Treatment requirements for design-enhancement events would be developed similar to RAP for new reactors:
  - SECY 95-132, “RTNSS for Passive Plants,”
  - SRP 17.4, “RAP,”
  - SRP 17.5, “QA Program Description,”
  - SRP 19.3, “RTNSS for Passive Plants”

Option 4b – Key Issues

- Needed as part of adequate protection or additional protection?
  - Should existing requirements, such as SBO, ATWS and AIA, be designated as design-enhancement events?
- What selection criteria should NRC specify for identifying events/sequences?
- Determine how backfit rule would be integrated with this option.

Option 4b – Expected Products

- A requirement for licensees to periodically identify, assess, and address design-enhancement events meeting thresholds specified by NRC.
- A requirement for power reactor licensees to prepare, maintain, and upgrade a PRA meeting NRC-specified quality requirements.
- A rule specifying treatment requirements for design-enhancement events.
- Conforming rule changes to 10 CFR 50.34 and analogous provisions in Part 52 requiring various nuclear power plant applications to include information on compliance with the various design enhancement requirements.
- Guidance documents consistent with the new rules.

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Cost Estimates

Fred Schofer, NRR/DPR

Estimated Costs

Option 1 (existing framework) – no cost

Option 2 (voluntary initiatives) – $1.6 million

Option 3 (defense-in-depth) – $2.3 million

Option 4a (design extension) – $7.6 million

Option 4b (design enhancement) – $83 to $105 million

These resource estimates are preliminary, do not include any potential benefits, and are subject to change.

Option 2 – Voluntary Initiatives

Option 2 – Estimated Burden – One-Time Implementation Costs				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs				
Prepare generic industry procedure template to conform with policy statement	3120	1	$105	$327,600
Licensees adopt template for facility use	80	104	$105	$873,600
Subtotal				$1,201,000
NRC Costs				
Prepare a Policy statement regarding voluntary initiatives for public comment	1000	1	$119	$199,000
Resolve public comments and publish the final Policy statement	674	1	$119	$80,206
Revise existing NRC guidance documents to conform with policy statement	80	19	$119	$180,880
Subtotal				$460,000
			Total	$1,661,000
			Average industry cost per unit	$12,000

Assumptions:

1. All implementation costs are incurred in first year
2. A generic industry procedure is prepared and then implemented at each nuclear generating station.
3. No impact to existing industry initiatives

Option 2 – Voluntary Initiatives (cont.)

Option 2 – Estimated Burden – Additional One-Time Implementation Costs				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs				
Facility inspection and review of design documentation	160	104	$105	$1,747,200
Document verification results	80	104	$105	$873,600
Subtotal				$2,621,000
NRC Costs (if required)				
Rulemaking establishing requirements for previously voluntary initiative(s)	3348	1	$119	$398,000
Subtotal				$398,000
			Total	$3,019,000

Assumptions:

1. All implementation costs are incurred in first year
2. Retrospective review of existing industry initiatives results in a finding that regulatory action is required

Option 3 – Defense-in-Depth

Option 3 – Estimated Burden – One-Time Implementation Costs				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs				
Prepare generic industry procedure template to conform with NRC guidance document	3120	1	$105	$327,600
Licensees adopt template for facility use	80	108	$105	$907,200
Subtotal				$1,235,000
NRC Costs				
Prepare a Policy statement regarding risk-informed regulatory decision making for public comment	1000	1	$119	$119,000
Resolve public comments and publish final policy statement	674	1	$119	$80,200
Prepare a new MD for risk-informed decision making NRC guidance documents to conform with policy statement	500	1	$119	$59,500
Prepare and issue new guidance that provides criteria and methodology for using a blend of deterministic and probabilistic processes on a plant-specific basis.	3600	1	$119	$428,400
Revise existing NRC guidance documents to conform with policy statement	160	20	$119	$380,800
Subtotal				$1,068,000
			Total	$2,303,000
			Average industry cost per unit	$11,000

Option 3 – Defense-in-Depth (cont.)

The policy statement would provide the criteria for how defense-in-depth should be implemented. However, determining if an individual licensee has adequate defense-in-depth is determined on a plant-specific basis. The most efficient approach may be to use a plant-specific PRA. Below is the estimated burden for those plants which do not have a plant-specific PRA.

Option 3 – Estimated Burden – Additional One-Time Implementation Costs				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs (if required)				
Upgrade plant-specific PRA	3120	68	$105	$22,276,800
Peer review plant specific PRAs	624	68	$105	$4,455,360
NRC Costs				
Rulemaking establishing requirements for having and maintaining plant-specific PRA models	3348	1	$119	$398,000
			Total	$27,130,000
			Average industry cost per unit	$393,000

Assumptions:

1. New plants and existing plants with plant-specific PRAs have negligible work to upgrade their PRAs to meet these new requirements
2. All implementation costs are incurred the first year

Option 4a – Establish design-basis extension on a generic basis

Option 4a Estimated Burden – One-time Implementation Costs				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs	-	-	-	-
Prepare generic industry procedure template to conform with NRC guidance document	3120	1	$105	$327,600
Licensees adopt template for facility use	80	108	$105	$907,200
Licensees prepare submittal and resolve NRC comments	320	108	$105	$3,628,800
Subtotal				$4,864,000*
NRC Costs				
Rulemaking establishing design basis enhancement requirements on a generic basis	3348	1	$119	$398,412
Prepare new guidance document	2200	1	$119	$261,800
Review submittals and prepare and issue SERs	160	108	$119	$2,056,320
Subtotal				$2,717,000
			Total	$7,580,000
			Average Industry cost per unit	$45,000

Assumptions:

1. All implementation costs are incurred the first year
2. New categorization requirements would be imposed on existing nuclear power plants (including already-approved design certifications and combined licenses, as well as future plants (including applications currently in process)
3. Implementation details would be contained in a new guidance document that accompanies the rulemaking.
4. Licensee submittals and safety evaluation reports (SERs) are required

Option 4b – Establish design-basis enhancement on a plant-specific basis

Option 4b Estimated Burden – One-time Implementation Costs				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs	-	-	-	-
Prepare generic industry procedure template to conform with NRC guidance document to classify events and accidents	3120	1	$105	$327,600
Licensees adopt template for facility use	80	108	$105	$907,200
Licensees perform plant-specific assessments	500	108	$105	$5,670,000
Licensees prepare submittal and resolve NRC comments	240	108	$105	$2,721,600
Subtotal				$9,626,000
NRC Costs				
Rulemaking establishing design basis enhancement requirements on a plant-specific basis	3348	1	$119	$398,412
Prepare new guidance document	1465	1	$119	$174,335
Review submittal and prepare and issue SER	740	108	$119	$4,498,200
Subtotal				$5,071,000
			Total	$14,697,000
			Average Industry cost per unit	$89,000

Assumptions:

1. The requirement for a plant specific PRA does not impose additional burden on COLs holders or COL applicants [10 CFR 50.71(h)]
2. All implementation costs are incurred the first year
3. One-time upgrading of PRAs is required for those nuclear power plants that don't have a plant specific PRA
4. New categorization requirements would be imposed on all existing and future nuclear power plants license and design certification holders.
5. Implementation details would be contained in a new guidance document that accompanies the rulemaking.
6. Licensee submittals and safety evaluation reports (SERs) are required

Option 4b – Establish design-basis enhancement on a plant-specific basis (cont.)

PRA Upgrade to All Mode, All Initiating Events PRA

One-time cost to upgrade PRA to cover all modes and all initiating events.

Option 4b Estimated Burden – One-time Implementation Costs (cont.)				
	Hours per action	No. of actions	Labor rate	Implementation Cost
Industry Costs				
Upgrade plant-specific PRA	3120	68	$105	$22,276,800
Peer review plant specific PRAs	624	68	$105	$4,455,360
			Total	$26,732,000
			Average industry cost per unit	$393,000*

Option 4b – Establish design-basis enhancement on a plant-specific basis (cont.)

PRA Maintenance

Industry annual PRA maintenance per unit to incorporate new information could be fairly straight-forward, and has been modeled over a range to represent a low estimate, best estimate, and high estimate per year for existing operating reactors PRAs as shown below:

Estimate Type	Hours per year	Labor rate	Annual PRA Maintenance Cost	No. of PRAs	Annual Industry PRA Maintenance Cost
Low	40	$105	$4,200	104	$436,800
Best	200	$105	$21,000	104	$2,184,000
High	600	$105	$63,000	104	$6,552,000

PRA Upgrades Every 4 Years

Industry periodic PRA upgrades per unit to incorporate new standards or methodologies could be fairly straight-forward to complex. To model this variation, estimates were developed for a low estimate, best estimate, and high estimate as shown below:

Estimate Type	Hours per update	Labor rate	Maintenance cost per PRA update	No. of PRAs	Industry Periodic PRA Update Cost
Low	200	$105	$21,000	104	$2,184,000
Best	480	$105	$50,400	104	$5,241,000
High	1000	$105	$105,000	104	$10,920,000

Option 4b – Establish design-basis enhancement on a plant-specific basis (cont.)

Total Estimated Burden

To provide meaningful summations, the estimated burden is expressed on a present-worth basis using both 3 percent and 7 percent real discount rates. The 3 percent rate approximates the real rate of return on long-term government debt which serves as a proxy for the real rate of return on savings. Alternatively, the 7 percent rate approximates the marginal pretax real rate of return on an average investment in the private sector.

	Option 4b Estimated Burden (2012 dollars)					
	3% Discount Rate			7% Discount Rate		
	Low Est.	Best Est.	High Est.	Low Est.	Best Est.	High Est.
Total Industry	$53,858,000	$100,358,000	$202,358,000	$48,058,000	$78,358,000	$151,358,000
Total NRC	$5,071,000	$5,071,000	$5,071,000	$5,071,000	$5,071,000	$5,071,000
Total	$58,900,000	$105,000,000	$207,000,000	$53,100,000	$83,400,000	$156,000,000

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

Fukushima Task Force Recommendation 1

Summary – Path Forward

Richard Dudley, NRR/DPR

Comparison to NTTF Recommendation 1

NTTF Recommendation	Option				
	1	2	3	4a	4b
1. Regulatory framework for adequate protection; appropriately balance defense-in-depth and risk	–	–	✓	✓	✓
1.1 Policy Statement: Risk-informed defense-in-depth framework; include extended design-basis requirements	–	–	✓	✓	✓
1.2 Rulemaking to implement 1.1	–	–	–	✓	✓
1.3 Modify Reg. Analysis Guidelines: more effectively implement defense-in-depth in balance emphasis on risk	–	–	✓	–	✓
1.4 Evaluate the insights from the IPE and IPEEE	–	–	–	✓	✓+

Contents of SECY Paper

- Describe proposed options to address key NTTF and RMTF recommendations for power reactors
- Describe the key policy, technical, and regulatory issues and possible resolutions
- Describe the actions/products needed to implement each option
  - Policy statements, rulemakings, regulatory guides
- Estimate NRC/licensee resources
- Discuss Pros and Cons
- Provide staff recommendation

Path Forward

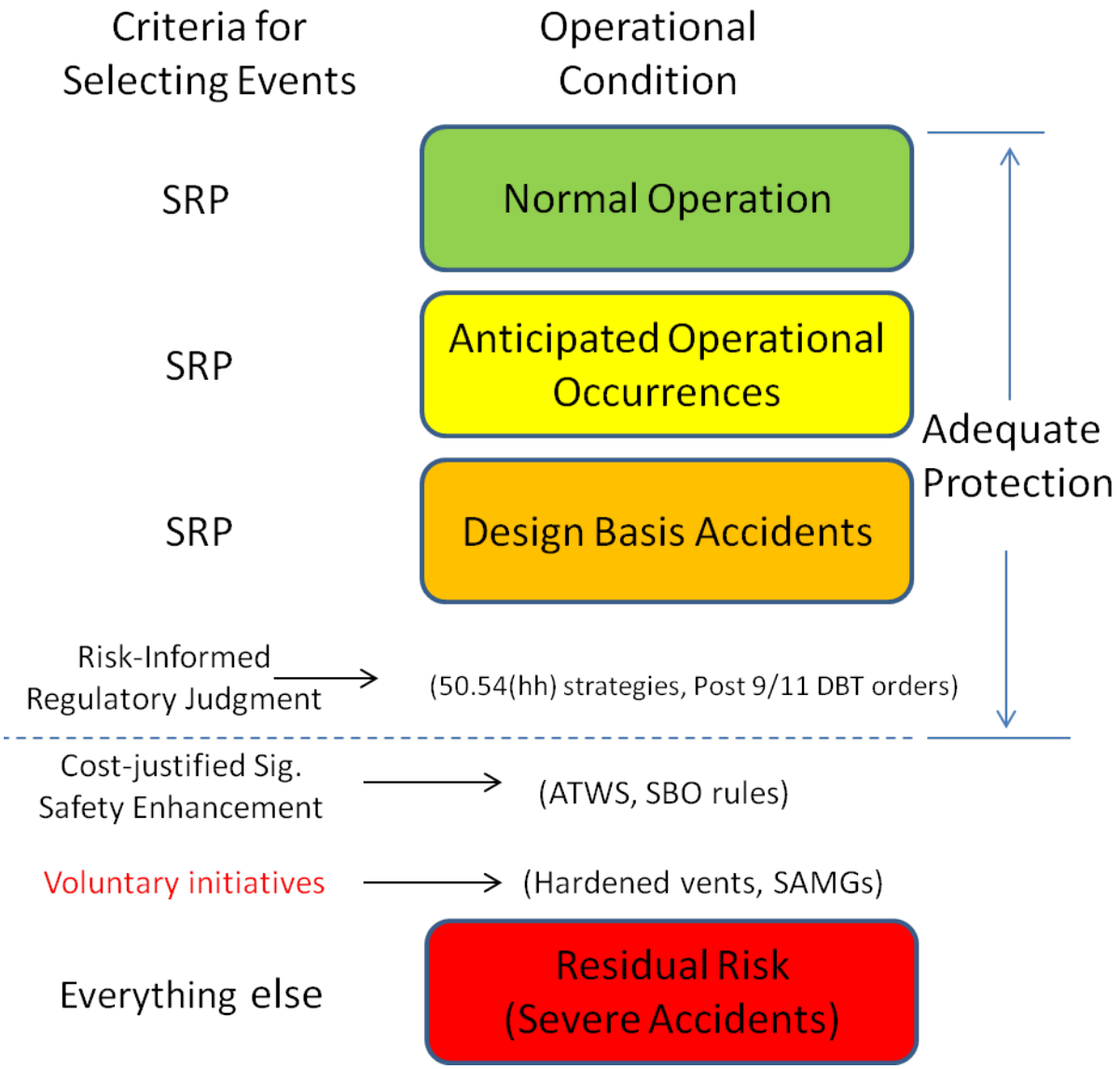
- Complete description and assessment of proposed options
- Review feedback from Nov. 8 public meeting (comments due Dec. 14)
- Modify options/cost estimates as appropriate
- Multiple interactions with JLD Steering Committee
- ACRS sub- and full committee briefings - letter
- Finalize staff recommendation and provide notation vote paper to Commission

Schedule

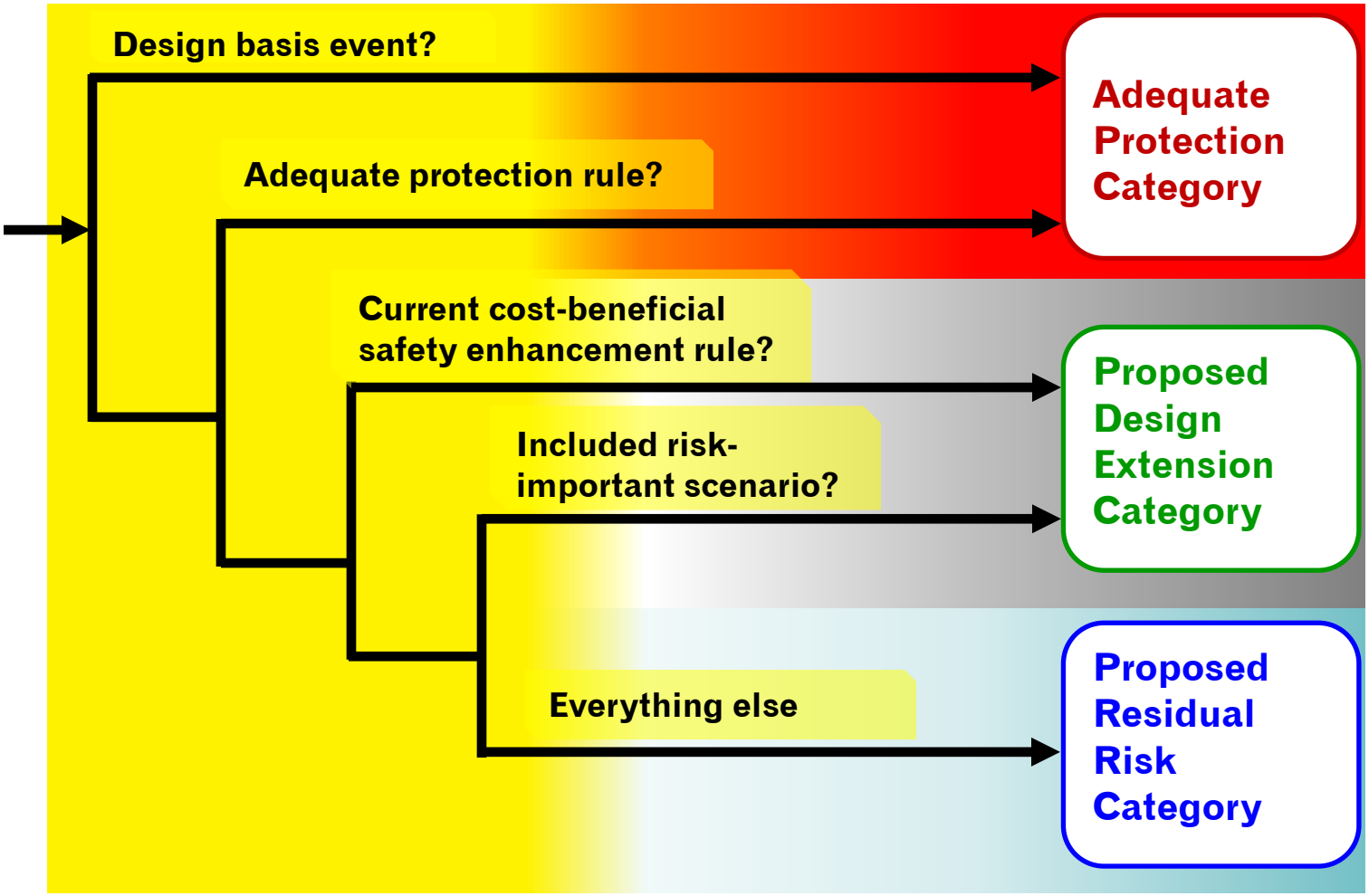
- November 8, 2012 – Second public meeting
- December 4, 2012 – Second ACRS subcommittee meeting
- December 14, 2012 – Public comments due (www.regs.gov)
- December 2012 – January 2013 – 3 JLD Steering Committee meetings
- January 18, 2013 – Third ACRS subcommittee meeting
- February 7 – 8, 2013 – ACRS full committee meeting
- February 12, 2013 – SECY paper due to EDO
- February 19, 2013 – SECY paper due to Commission

Backup Slides

Current Regulatory Approach for Events



Risk Management Task Force - Proposed Regulatory Framework: Power Reactors



The Current Framework for Events Compared to Options 4a and 4b

	Adequate Protection	Additional Protection	No Req'ts
Option 1	• Design basis events • Other Req'ts (50.54(hh))	• Cost-beneficial rules (50.63 SBO, ATWS) • Voluntary initiatives	
Option 4a	• Design basis events • Design extension events (50.54(hh))	• Cost-beneficial rules (50.63 SBO, ATWS) • Voluntary initiatives	
Option 4b	• Design basis events • Other Req'ts (50.54(hh))	• Design enhancement events • Cost-beneficial rules? • Voluntary initiatives	