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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FUKUSHIMA SUBCOMMITTEE

+ + + + +

WEDNESDAY

AUGUST 15, 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 1:00 p.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

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

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JOHN D. SIEBER, Member

GORDON R. SKILLMAN, Member

JOHN W. STETKAR, Member

NRC STAFF PRESENT:

ANTONIO DIAS, Designated Federal Official

MARY DROUIN

RICHARD DUDLEY

GARY MIZUNO

C-O-N-T-E-N-T-S

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

(1:02 p.m.)

1
2
3 **CHAIRMAN SCHULTZ:** Good afternoon. The
4 meeting will now come to order. This is a meeting of
5 the Advisory Committee on Reactor Safeguards,
6 Subcommittee on Fukushima. I'm Steve Schultz,
7 Chairman of the Subcommittee.

8 Members in attendance today are Jack
9 Sieber, Dick Skillman, Dennis Bley, Harold Ray, Sam
10 Armijo, John Stetkar, Mike Ryan, Bill Shack, and
11 Charlie Brown. Are there any members that are on the
12 telephone line? If so, please state your names.

13 Hearing none, that's the membership
14 present here in the room. The purpose of today's
15 meeting is to receive a briefing and hold discussions
16 with NRC staff on a proposed approach for developing
17 a Commission Paper addressing the Near-Term Task Force
18 Recommendation 1, which is to establish a logical,
19 systematic, and coherent regulatory framework for
20 adequate protection that appropriately balances
21 defense in-depth and risk considerations.

22 This paper is due to the Commission in
23 February 2013. This entire meeting will be open to
24 the public. Rules for the conduct of and
25 participation in the meeting have been published in

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1 the federal register as part of the notice for the
2 meeting.

3 The subcommittee will gather information,
4 analyze relevant issues and facts, and formulate
5 proposed positions and actions as appropriate for
6 deliberation by the full committee. Another
7 subcommittee on the same briefing is already scheduled
8 for early-December, followed by a full committee
9 briefing, tentatively scheduled for February 2013.

10 Antonio Dias is the designated federal
11 official for this meeting. A transcript of the
12 meeting is being kept and will be made available as
13 stated in the federal register notice. It is
14 requested that speakers first identify themselves and
15 speak with sufficient clarity and volume so that they
16 can be readily heard.

17 We've received no written comments or
18 requests for time to make oral statements from members
19 of the public regarding today's meeting. However, I
20 understand that there are representatives from the
21 public on the bridge line who are listening in on
22 today's proceedings and will have an opportunity at
23 the end of the discussions for comments from members
24 of the public.

25 As stated in the introduction here, this

1 is a process that is ongoing. This is the first
2 opportunity the subcommittee has had to hear the
3 current status of the work being done in this area.
4 There is a good six months before the paper to the
5 Commission is going to be developed and delivered, so
6 we have time to interact with those staff members that
7 are participating in its development and we look
8 forward to the presentations today.

9 We'll now proceed with the meeting. I'll
10 call upon Sher Bahadur, Deputy Director of the
11 Division of Policy and Rulemaking in the Office of
12 Nuclear Reactor Regulation to open to the
13 presentation. Sher, thank you.

14 **MR. BAHADUR:** Thank you, Mr. Chairman.
15 I'm Sher Bahadur. I'm Deputy Director Division of
16 Policy and Rulemaking in the Office of Nuclear Reactor
17 Regulation. And as he mentioned, today we're going to
18 be sharing with you the initial thoughts that the
19 staff has in response to the Near-Term Task Force
20 Fukushima Recommendation 1.

21 And that is to look at the framework and
22 see where the improvements could be made to make it
23 more risk informed. So in that light, you would hear
24 the work that has been done by the senior staff
25 members from various program offices. So the working

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1 group consisted of the folks from NRR and NMSS, FSME
2 and NSIR, OGC and others, including research.

3 And as you recognized, this is really the
4 initial thinking of this group. The material that you
5 see today and hear today has been shared by the office
6 management in various offices, but only the
7 information and there's no approval of any office
8 director behind the material that is going to be
9 presented to you.

10 The group is going to come back to you in
11 six months. And right now, it's pretty far away from
12 even thinking about a Commission paper. As you can
13 imagine, it's a topic of a number of complicated
14 issues which have philosophical consequences in the
15 regulatory philosophy of this agency.

16 So what you will hear is the initial work
17 by this group shared with the idea that peer review of
18 this committee would be of great help in developing
19 whatever options they would finally develop for the
20 Commission paper. So with that as the opening remark,
21 if you don't have any questions for me, I'll ask Dick
22 Dudley to continue with the presentation.

23 CHAIRMAN SCHULTZ: I thank you for that
24 introduction. Thank you very much. That's very
25 helpful.

1 **MR. DUDLEY:** Thank you, Sher. I'm Dick
2 Dudley. I'm a rulemaking project manager in the
3 Office of Nuclear Reactor Regulation and I've been
4 assigned the coordination role to lead this staff's
5 effort on Recommendation 1. And as Sher said, this is
6 still very much a work in progress.

7 At best, we can say that what we'll be
8 presenting to you today represents the working group's
9 current views, except for some of the areas where even
10 the working group is still not in agreement, but
11 that's what we're going to share with you today.

12 First, I'd like to outline my presentation
13 briefly. I'll first give a review of Recommendation
14 1 and the direction that we received from the
15 Commission. I'll talk about the approach that we are
16 taking to develop the Commission Paper. I'll discuss
17 the actions we've taken to date and the schedule that
18 we've used and that we will continue to use.

19 I'll provide an overview of the approach
20 and options that we're looking at to disposition
21 Recommendation 1. I'll talk, then, a little bit about
22 stakeholder feedback and talk about some next steps.
23 And that will complete my part of the presentation.

24 Following me, then, Mary Drouin has a
25 number of slides to go over, a very important topic

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1 that you'll see, from my outline, defense-in-depth.
2 That's a key activity as part of any regulatory
3 framework and so Mary will go over a history, the
4 literature, and the current understanding amongst the
5 various writers of the different elements of defense-
6 in-depth.

7 MEMBER BLEY: Dick?

8 MR. DUDLEY: Yes.

9 MEMBER BLEY: Can you give us an idea of
10 the breadth of your working group and maybe some of
11 the people who are on it?

12 MR. DUDLEY: Yes. I have a slide, but we
13 basically --

14 MEMBER BLEY: Okay. I can wait for that.
15 I didn't see it looking through. That's why I asked
16 you.

17 MR. DUDLEY: Yes, we have a member of
18 every program office. And certain offices have
19 multiple members that have more interest than others.
20 Mary Drouin from the Office of Research is a key
21 member. We have representation from the Office of
22 General Counsel. So, pretty much, this is all hands
23 on deck. I mean, we have everyone involved --

24 MEMBER BLEY: Okay.

25 MR. DUDLEY: -- on this effort. Well,

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1 Recommendation 1, as you've already heard, is to
2 establish a logical, systematic, and coherent
3 regulatory framework for adequate protection that
4 balances defense-in-depth and risk. This derived from
5 findings and observations of the Near-Term Task Force.

6 The Task Force observed that the NRC now
7 relies on a combination of design basis requirements
8 and a patchwork of beyond design basis requirements
9 and voluntary initiatives to maintain safety.

10 They said our safety approach is
11 incomplete without a strong program for dealing with
12 the unexpected, including severe accidents, and that
13 continued reliance on industry voluntary initiatives
14 for fundamental level of defense-in-depth would not be
15 appropriate and leave gaps in our program.

16 This next slide, it's my own graphic. A
17 lot of people in the working group don't necessarily
18 agree with it, but what I'm trying to do is depict the
19 patchwork. And if you look at the right-hand column,
20 you have normal operation, anticipated operational
21 occurrences, design basis accidents, and down at the
22 bottom you have the residual risk from severe
23 accidents.

24 But in the gap between design basis
25 accidents and severe accidents, we've populated that

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1 with a number of requirements. Some of those
2 requirements are necessary for adequate protection.
3 The 50.54(hh) aircraft impact strategies are an
4 inadequate protection regulation. Other rules, like
5 the station blackout rule, the current 50.63, is a
6 cost-justified significant safety enhancement that
7 fits in that same patchwork, if you will.

8 And that also includes, right now,
9 voluntary initiatives that we had that we're making
10 mandatory now with orders; the hardened vents and the
11 severe accident management guidelines. So that's
12 just, kind of, to depict the patchwork.

13 These next two slides give additional
14 findings and observation that the Near-Term Task Force
15 had in arriving at its Recommendation 1. The Task
16 Force said now is the time for us to increase the
17 level of safety that we associate with adequate
18 protection.

19 They said to draft a Commission Policy
20 Statement with a risk-informed defense-in-depth
21 framework, that that framework should include an
22 extended design basis category of requirements, and
23 those should be made necessary for adequate
24 protection.

25 The NTTF also said to modify the

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1 regulatory analysis guidelines to more effectively
2 implement the defense-in-depth philosophy and to
3 consider some of the concepts present in the
4 technology-neutral framework, NUREG-1860 that the
5 Office of Research prepared, to perhaps integrate
6 safety goals with defense-in-depth.

7 The NTTF also thought you could implement
8 this policy by rulemaking where you would take this
9 extended design basis group of requirements and put it
10 in a separate section of 10 CFR or perhaps a separate
11 appendix. And they also said you could consider
12 having treatment requirements other than safety grade
13 and the normal treatment requirements, but a different
14 set of treatment requirements for the regulations in
15 that category, and a change process similar to 50.59.

16 50.59 would not be applicable to rules
17 that go beyond the deterministic design basis. So you
18 could have both treatment requirements and a special
19 change process for the rules in that extended design
20 basis category.

21 And the Task Force said to also go further
22 and look for additional requirements to add to this
23 category. They suggested looking at the IPEs and the
24 IPEEEs to see if we could identify generic or plant-
25 specific requirements. They said to also go look at

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1 the severe accident requirements that we've imposed on
2 new reactors and decide whether those requirements
3 could also be applied to existing operating reactors,
4 but within reasonable limits.

5 The Task Force views on voluntary
6 initiatives were that, voluntary initiatives should
7 not take the place of needed requirements and that
8 voluntary initiatives should instead be a mechanism to
9 standardize implementation guidance. Sorry.

10 CHAIRMAN SCHULTZ: Thank you, Mary.

11 MR. DUDLEY: And also, regarding the role
12 of the PRA in the new framework, the Near-Term Task
13 Force said that they thought you could do it with a
14 full-scope Level 1 PRA, you'd need a containment
15 performance Level 2 PRA, and in certain alternatives,
16 you might even need to use a Level 3 PRA.

17 And they didn't say whether it would be a
18 plant-specific PRA or you could try to use generic
19 PRAs.

20 MEMBER STETKAR: Dick, since you brought
21 up that notion, have you thought very much, in your
22 group, about this idea of plant-specific versus
23 generic PRAs?

24 MR. DUDLEY: We're still trying to decide
25 PRA or no PRA.

1 MEMBER STETKAR: Thanks.

2 MR. DUDLEY: I mean, that's one of the
3 issues, but no, we haven't really gotten to that yet.
4 And finally, the Near-Term Task Force said that they
5 didn't envision the need to make any changes to our
6 current approach to the issue of land contamination.

7 Okay. So that's what the Task Force said
8 and then the Commission, in directing us to respond to
9 this recommendation in an SRM in August of 2011, told
10 us to pursue Recommendation 1 independent of the other
11 activities associated with the Task Force
12 recommendation and to provide a separate notation vote
13 paper in 18 months, and that the notation vote paper
14 should have options and a staff recommendation to
15 disposition this Task Force recommendation.

16 They didn't say implement it. They said
17 disposition, so we think that means that they would
18 like a wide range of options to choose from and that's
19 what we're trying to prepare in our effort.

20 In addition to the Commission SRM, another
21 report was issued recently, in April, by the Risk
22 Management Task Force, led by Commissioner
23 Apostolakis, that was NUREG-2150, and it proposed a
24 risk management framework in April of 2012.

25 And in response to that report, the

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1 Chairman issued a tasking memo, just this summer, in
2 which we were directed to consider the regulatory
3 framework recommendations for power reactors, just for
4 power reactors, that are better in the Risk Management
5 Task Force, we should consider those in our providing
6 and developing of options for Recommendation 1.

7 And clearly, we saw this coming and we
8 had, indeed, been working with the Risk Management
9 Task Force before to make sure that we were apprised
10 of what they were doing, so this was no surprise.

11 CHAIRMAN SCHULTZ: But members of the Risk
12 Management Task Force are not on your working group?

13 MR. DUDLEY: One is now.

14 CHAIRMAN SCHULTZ: One is, okay.

15 MR. DUDLEY: One is now. When that effort
16 ended, Bill Reckly, he was previously our liaison with
17 the Risk Management Task Force, but then when the
18 Commissioner's effort ended, Bill is not working with
19 us on the implementation side, or the response side,
20 so there is a little overlap.

21 Just to discuss, briefly, the Risk
22 Management Task Force regulatory framework, the RMTF
23 said that you should preserve the design basis
24 accident, but supplement it by creating an enhanced
25 design basis category by rulemaking. The RMTF said

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1 that the design enhancement category should use risk
2 as a safety measure, that it should be performance-
3 based, that it should include consideration of costs,
4 and be implemented on a site-specific basis, and
5 include treatment of associated SSCs based on the
6 frequency of initiating events.

7 And this is a graphic that I've stolen
8 from their report, but the important aspect of this
9 graphic that I'd like to point to is the box on the
10 very bottom, the decision making process where one
11 would identify an issue, identify options, analyze the
12 options, deliberate, make a decision, then you would
13 implement the decision, but you would then have
14 monitoring of that decision and determine how well it
15 worked out.

16 And then have feedback that could
17 identify, perhaps, issues, or adjustments, that you
18 would need to make in your regulation. So this
19 feedback loop was something new that was proposed, or
20 different that was proposed, by the Risk Management
21 Task Force that we believe will be important to
22 include in a regulatory framework recommendation to
23 the Commission.

24 MEMBER ARMIJO: Did they define what makes
25 a design enhancement category different than just an

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1 enlargement of the design basis? Eventually, wouldn't
2 it become the design basis?

3 MR. DUDLEY: Well, the deterministic
4 design basis, you know, is, I think, what they call --
5 well, anything that goes beyond the deterministic
6 design basis would be this extended design basis. And
7 if you establish that category, yes, any requirement
8 in that new category would be part of the design basis
9 of the plan.

10 But if you had a new category you could
11 stop calling this stuff beyond design basis
12 requirements. You could start calling them extended
13 design basis requirements and you wouldn't have that
14 inherently contradictory label that we give to things
15 like the station blackout rule, which is a beyond
16 design basis requirement that's in the design basis of
17 their plans.

18 MEMBER BLEY: I suppose it also means, and
19 correct me, or have you thought about this much, if
20 something ends up in this extended design basis, would
21 it necessarily be treated the same way as things that
22 were in the design basis originally?

23 MR. DUDLEY: With respect to treatment,
24 and quality control, and --

25 MEMBER BLEY: Yes, analysis. Well, you're

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1 saying it, yes, but I don't know -- well, change
2 control, but the requirements for what's done to --

3 MR. DUDLEY: No, not necessarily. This
4 would allow you to put in requirements for less
5 frequent events that wouldn't be so difficult to meet.
6 You wouldn't have to be redundant. You wouldn't have
7 to necessarily be safety grade; if that was what you
8 meant by your question.

9 MEMBER BLEY: That's kind of what I meant.

10 MR. DUDLEY: Yes. It's similar to
11 50.46(a) and what we did with the large-break LOCA.
12 We proposed to move it out of the deterministic design
13 basis category into -- well, we moved it into the
14 patchwork, or would have moved it into the patchwork,
15 but that is what would become the extended design
16 basis if this approach were implemented.

17 Okay. Well, Slide 13 has the approach we
18 took to develop the SECY paper. As you've heard
19 before, we put together an interoffice working group.
20 We have support from, pretty much, everybody. And so
21 this is truly and agency-wide effort. We're preparing
22 a Commission Paper evaluating, as I said before, the
23 very wide range of options.

24 We'll look at technical and policy issues,
25 we'll look at schedules, resource requirements,

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1 stakeholder concerns, and we'll put together pros and
2 cons of these various options, and we'll include a
3 recommended approach, and we'll explain why we made
4 our recommendation.

5 MEMBER SKILLMAN: Dick, I'd like to ask
6 about the pros and cons. When I think about the last
7 40 or 45 years, there are people around this
8 horseshoe, and probably in the audience, who remember
9 the early Appendix A to 10 CFR 50, the general design
10 criteria, when we finally ended up with Appendix B;
11 quality assurance; before that, in 845211.

12 To a very large extent, many experienced
13 people in the industry understand the patchwork and
14 how the pieces fit, for better or for worse, there's
15 a good understanding about how all these pieces fit
16 together. When you consider the pros and cons, to
17 what extent do you consider what might be lost if we
18 move to a, if you will, smoother, or more integrated,
19 or different type of approach?

20 MR. DUDLEY: What might be lost?

21 MEMBER SKILLMAN: Yes.

22 MR. DUDLEY: Experience. I mean, we've
23 used a lot of resources.

24 MEMBER SKILLMAN: It's experience,
25 knowledge -- well, there are individuals who have a

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1 kept inside knowledge of how the pieces of regulation
2 fit, and if one moves from regulation to,
3 particularly, the older plants, where some of them are
4 actually pre-general design criteria --

5 MR. DUDLEY: Right, and don't all comply.

6 MEMBER SKILLMAN: -- and they don't all
7 apply, and then you have the newer plants, or
8 modifications, or your change program that allows you
9 to modify those earlier plans, that integrated body of
10 knowledge is, to my mind, critical for understanding
11 the plant, the defense-in-depth, the capabilities of
12 that plant and that license.

13 So when you speak of pros and cons, how
14 will that be considered?

15 MR. DUDLEY: Well --

16 MS. DROUIN: Let me try. The question, I
17 think there's a misunderstanding, we would not be
18 undoing what already exists. So in moving forward and
19 when you look at the options that we have proposed,
20 it's not going to undo the relationship, you know, of
21 the general design criteria and how all that fits in.
22 So this more of looking at how do we deal with -- so
23 that we don't get surprised in the future and how do
24 we put a process in place to better handle that?

25 And I think as Dick goes through you'll

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1 understand better that, we're not going down the path
2 you're suggesting.

3 MR. DUDLEY: Let us come back to your
4 question after we go through the presentation. Well,
5 based on what you hear from us, then ask it again if
6 you think we haven't addressed it.

7 MEMBER SKILLMAN: Fair enough. Thank you.

8 MR. DUDLEY: Okay?

9 MEMBER SKILLMAN: Yes, that helps. Thank
10 you.

11 MEMBER ARMIJO: Richard? When you do
12 that, if you go back to your Slide 6 and show us these
13 various pieces, ATWS, station blackout, post-9/11,
14 where they would fit in the new idea? Would they fit
15 back -- some of them would move into design basis,
16 some may be into an extended design basis?

17 MR. DUDLEY: Well, let's see.

18 MEMBER ARMIJO: And then there'll be some
19 new stuff that's just Fukushima-unique maybe. I just
20 wanted to see how that --

21 MR. DUDLEY: I mean, if you did an
22 extended design basis, you could just take that white
23 space --

24 MEMBER ARMIJO: Yes.

25 MR. DUDLEY: -- and replace it with the

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1 extended design basis and all those requirements that
2 you're talking about would be contained somewhere in
3 that. Now, different from what the NTTF said, the
4 NTTF said that it would all be required for adequate
5 protection. It looks to me like the extended design
6 basis would have to have a portion that's adequate
7 protection, and of course then, it's not.

8 But, I mean, I think they would all go in
9 that box and then you'd have to make a decision; which
10 was adequate protection and which was a cost-justified
11 safety enhancement.

12 MEMBER ARMIJO: Well, wouldn't it make
13 sense that, if it's an adequate protection issue it
14 wouldn't just be design basis?

15 MR. DUDLEY: Well --

16 MEMBER ARMIJO: If it wasn't, it's
17 extended.

18 MR. DUDLEY: -- if you limit the design
19 basis -- if design basis accidents are limited to the
20 deterministic design basis, which is redundant in
21 safety grade and all of that stylized compliance
22 approach, I think it's realistic to think that there
23 are certain things that are adequate protection, but
24 that don't need -- you know, that are lower frequency,
25 higher consequence, that are still adequate protection

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1 requirements, but they don't need to be redundant in
2 safety grade.

3 MEMBER ARMIJO: So some of those things
4 that are currently, let's say, these patches, none of
5 them would move into the design basis category. They
6 have all the bells and whistles.

7 MR. DUDLEY: I don't think so. I don't
8 think so. It could go the other way too. I mean,
9 some of the design basis accidents could come out, you
10 know, that are low-risk could actually come out and
11 move down into the extended design basis, so that
12 could be a two-way boundary.

13 MEMBER SHACK: Like a large-break LOCA.

14 MR. DUDLEY: Yes.

15 MEMBER ARMIJO: Large-break LOCA. Okay.

16 MR. DUDLEY: Exactly.

17 MEMBER ARMIJO: All right.

18 MR. DUDLEY: Like we recommended.

19 MEMBER ARMIJO: Okay. Thank you.

20 MR. DUDLEY: Yes. Okay. I think that's
21 where we are. So just to give you an idea of what
22 we've done so far, we briefed the Fukushima Steering
23 Committee, the Officer Director's Steering Committee,
24 on our approach to Recommendation 1 twice; in March
25 and in May. We briefed the NRR executive team, in a

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1 significant topic briefing, of our plans in April.

2 We held our first public meeting on June
3 the 20th and in response to the public meeting, NEI
4 wrote a letter on July 16th with a number of comments
5 that they provided. We're meeting with you today and
6 we'll meet with you again -- well, then, after this
7 meeting, our next activity will be another public
8 meeting where we hope to have a much better
9 description of the options and the pros and cons of
10 the different options that we'll consider.

11 And we would hope to get public comment on
12 the pros and cons; some feedback. You know, are there
13 additional things that we forgot? Is this really a
14 pro? Is this a con? That sort of thing. And also,
15 one of the things we'll look at are costs. And at
16 that public meeting it would also be nice to see if we
17 could get feedback on costs of these different
18 approaches.

19 We have a second subcommittee meeting with
20 the ACRS in December and the full committee meeting
21 will be in February or March. It might even be after
22 we've delivered the paper. And again, the paper is
23 due to the EDO in mid-February.

24 Okay. So what did the working group do?
25 Well, first, we developed a working description of

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1 regulatory framework and that took months. I mean, we
2 were all talking and everybody called it, you know,
3 framework as being something that was different, and
4 we're still not completely aligned, but we're getting
5 a lot closer.

6 But what we did is, we looked at the Near-
7 Term Task Force observations. We looked at the Risk
8 Management Task Force recommendations. And decided
9 that a regulatory framework would include the safety
10 and regulatory policy criteria. It would include a
11 regulatory decision making process.

12 We decided it should include a monitoring
13 and feedback loop to judge the efficacy of the
14 decisions that we made, and make some corrections, and
15 that loop could also incorporate new technical
16 information or operational experience as it became
17 available.

18 And we decided that the framework, just to
19 be able to deliver a product, should be limited to
20 operating power reactors and evolutionary new light-
21 water reactor designs. It should be limited to
22 matters affecting radiological health and safety, and
23 perhaps NEPA compliance. There's some discussion
24 going on right now within the working group of whether
25 we should include NEPA issues in a framework or not.

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1 And it should also be limited to the
2 initial licensing and the operational stage of a
3 reactor. You would not have to follow that framework
4 -- it shouldn't need to apply during the de-
5 commissioning process when the fuel is gone.

6 So first we considered a number of
7 framework approaches. We first thought we had four
8 different framework approaches and we looked at those,
9 and then we decided to head down a slightly different
10 path, but nevertheless, we looked at four approaches.

11 The first approach was an extended design
12 basis categorization framework as describe by the NTTF
13 and the Risk Management Task Force, but the Risk
14 Management Task Force's framework was a little
15 different. It included a feedback loop and the way it
16 characterized adequate protection was a little bit
17 different than the way we described it, or at least we
18 had thought it might be done, for the extended design
19 basis framework.

20 And we also looked at a category-based
21 regulatory framework where you would categorize events
22 based on initiating frequency only. That was
23 described to us by a member of the Near-Term Task
24 Force, so we looked at that for awhile. And then we
25 looked at Research's technology-neutral framework in

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1 NUREG-1860.

2 So we looked at all of those four
3 framework approaches initially, and what we determined
4 was that all of those framework approaches and the two
5 reports, the NTTF and the RMTF, we think can be
6 summarized in a group of 12 potential improvement
7 activities to improve our regulatory processes.

8 And so we think by working on these 12
9 activities that we could accomplish pretty much
10 everything that people have thought frameworks could
11 include. So that's where we're headed right at this
12 point, but before I go through the 12 improvement
13 activities, I'd like to give you our basic options,
14 and these have changed since the public meeting on
15 June the 20th.

16 But basically, Option 1 is just about
17 always the status quo option. It's clearly possible
18 that the Commission may choose not to implement any of
19 these framework activities. So Option 1 is that we
20 would continue with our existing regulatory processes
21 and we would make no attempt to do an integrated
22 overall improvement activity.

23 Option 2 is to refine and make several --
24 to go through these 12 elements, these improvement
25 areas, and pick a number of high-value improvements,

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1 you know, the things that are most cost-effective or
2 most high-value activities, and not try to fix all 12
3 of these things and integrate that huge amount of
4 different concepts together, but pick the key four or
5 five of these items, and optimize them, and integrate
6 those.

7 And we might be able to do that and get a
8 lot of benefit, a lot of improvement, and spend a lot
9 less in terms of resources on that approach, so that's
10 Option 2.

11 MEMBER STETKAR: You're a slide behind.

12 MR. DUDLEY: I apologize. Thanks.

13 MEMBER STETKAR: Could you, since you've
14 thought about this a little bit, there must be some
15 subtleties between Option 1 and Option 2 that I'm not
16 appreciating.

17 MR. DUDLEY: Option 1 and Option what?

18 MEMBER STETKAR: Option 1 and Option 2.

19 MR. DUDLEY: 2, I mean, Option --

20 MEMBER STETKAR: I understand what the
21 status quo is, but I thought, perhaps, that the agency
22 probably does address, amid this patchwork, things
23 that the agency collectively believes are the most
24 safety beneficial things to address, and hence,
25 creates a patch and puts it into the quilt.

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1 What's the difference between that and
2 Option 2 where you identify high-value areas that you
3 need improvement and put those into the patch?

4 MR. DUDLEY: Well, let's go through the --
5 could we wait and go through the 12 improvement
6 activities --

7 MEMBER STETKAR: Sure, that's fine. Okay.

8 MR. DUDLEY: -- and then see if it's,
9 maybe, a little bit more clear at that point?

10 MS. DROUIN: And there's probably --

11 MR. MIZUNO: Can I answer that question?

12 MR. DUDLEY: Sure.

13 MR. MIZUNO: This Gary Mizuno in the
14 Office General Counsel. I'm on the working group. I
15 think what the working group sees as the difference
16 between 1 and 2, and which we're talking about, is
17 that, in 1, the status quo is not just do nothing, the
18 regulatory process continues and we might choose one
19 or more of those activities as things happen.

20 The difference between 1 and 2 is that,
21 under 1, we might do an activity, but we would do it
22 in a non-integrated fashion. We might do it
23 separately, we might do one or two of them together,
24 they would probably be coordinated with each other.

25 Whereas, in Option 2, if the Commission

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1 were to choose, let's just say, four activities to go
2 forward, those four activities would proceed and the
3 staff would ensure, and the Commission would affirm,
4 that all those activities were coordinated with each
5 other and logically consistent, coherent, so that
6 those four activities would work together and be
7 promulgated throughout our regulatory framework.

8 So that's the difference between 1 and 2.
9 1 is, we follow our regulatory process and make
10 changes as needed, but it wouldn't be done in an
11 integrated fashion. We'd do it just as circumstances
12 come up. Is that a good explanation or does everyone
13 understand that?

14 MEMBER STETKAR: That's an explanation.
15 Dick was going to try to help by going into more of
16 the details.

17 MR. DUDLEY: Option 1 is not just don't do
18 anything.

19 MEMBER STETKAR: No, no, I understand
20 that.

21 MR. DUDLEY: Option 1 is the status quo
22 and under the status quo, we occasionally, when it
23 strikes us, make changes to improve our processes.
24 That's all. But there would be no orderly integrated
25 effort to go out and seek things, but we still might

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1 decide to do something.

2 Option 2 is to go through these 12 items
3 and --

4 MR. BAHADUR: Excuse me, Dick.

5 MR. DUDLEY: Yes.

6 MR. BAHADUR: Perhaps the time has come
7 for you to introduce the 12 factors first.

8 MR. DUDLEY: Yes, you're right. Let's do
9 that.

10 MR. BAHADUR: At which time, the audience
11 would know better as to how you're going to treat
12 those 12 activities in various options.

13 MR. DUDLEY: Okay. So again, Option 3 is
14 to fix everything. You know, try to integrate all 12
15 -- improve everything, integrate everything, and try
16 to tie it all together. Okay. So here are our -- on
17 the next slides we have these areas of potential
18 improvement.

19 The first, and a very key one, and the one
20 that Mary will talk to you about later this afternoon,
21 is to establish key elements of defense-in-depth,
22 associated with defense-in-depth, and decision
23 criteria to determine when you have adequate defense-
24 in-depth.

25 Item 2 would be similar, but it would be

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1 to establish key safety margin elements in decision
2 criteria for determining whether you had adequate
3 safety margin. These are very difficult things to do,
4 but Item 3, improvement activity 3, is to determine a
5 methodology, select a methodology, to identify and
6 characterize accidents, and conditions, and events
7 that would define the regulatory requirements.

8 This would be a method to decide that, if
9 you had an extended design basis, what would you put
10 in that? What's the categorization scheme and how
11 would you select those activities?

12 Item 4 is a methodology to identify and
13 categorize conditions and events at multi-unit sites
14 that would affect regulatory requirements. The Near-
15 Term Task Force specifically called out, I think, the
16 need for some additional emergency preparedness
17 activities at multi-unit sites.

18 But there could be other requirements that
19 would need to be re-looked at because they, perhaps,
20 multi-unit sites would cause -- if you have a flood or
21 various things and you need manual actions, perhaps
22 that is something that needs to be looked at. So
23 taking a look at identifying and characterizing
24 necessary events at multi-unit sites is improvement
25 activity number 4.

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1 Activity number 5 is, not necessarily, to
2 establish regulatory requirements for PRAs, but to
3 make a decision on the need, and whether, and how, if
4 we do, to establish a regulatory requirement for all
5 licensees to perform MUs and maintain PRAs.

6 Activity 6 is to establish a regulatory
7 process to systematically re-evaluate and update the
8 licensing basis for all of our regulatory approvals.
9 Licenses for power reactors -- let's see, early site
10 permits, design certifications, and preliminary design
11 approvals. And this would also be a way to factor in
12 new information, or new experience, in updating and
13 re-evaluating those approvals.

14 Item 7 is to establish a regulatory
15 process to systematically re-evaluate and update the
16 regulatory framework for nuclear power plants. And
17 this, we're re-characterizing this a little bit to
18 include this regulatory feedback loop that the Risk
19 Management Task Force included in their recommended
20 framework.

21 Item 8 is to establish, this is very
22 difficult, an NRC concept of reasonable assurance of
23 adequate protection and to put forward decision
24 criteria, or other criteria, or indicators, to
25 determine when you have reasonable assurance of

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1 adequate protection. That's Item 8.

2 MEMBER BROWN: How can you say you don't
3 have that now? I mean, in the four years I've been
4 here we've had stuff presented --

5 MR. DUDLEY: Well, we generally --

6 MEMBER BROWN: -- if I'm wrong, where you
7 used the terms and we consider this to be reasonable
8 assurance of adequate protection. I've been listening
9 to that now for --

10 MR. DUDLEY: And we determine that based
11 on judgement, you know, an engineering judgement.

12 MEMBER BROWN: So you're looking for a
13 more concrete set of criteria?

14 MR. DUDLEY: Pardon me?

15 MEMBER BROWN: You're looking for a more
16 concrete set of criteria?

17 MR. DUDLEY: Oh, yes. If the Commission
18 selects Item 8, or Item, is it, 9? Okay. No, Item 8.
19 If the Commission selected Item 8, yes, we would try
20 to come up with either better criteria, better
21 indicators, or perhaps a process. Another way to do
22 it would be to determine that reasonable assurance is
23 not defined by an in-state, but that reasonable
24 assurance is defined by having gone through a well-
25 defined process.

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1 And this is OGC's analogy to justice. You
2 know, justice is a defined process and you'd get
3 justice, not necessarily what the answer comes out,
4 but the fact that you've gone through the process.
5 That's how you achieve justice and that's how it's
6 defined in the United States in the court system.

7 So it could be actual in-state criteria,
8 or it might be process, or it could even be a hybrid
9 of the two. I don't know. We haven't spent a lot of
10 time on it and we'll have to wait and make sure the --
11 you know, if we recommend to do it, we have to make
12 sure the Commission agrees before we spend a lot of
13 time trying to establish these criteria.

14 Okay. Next slide, Slide 20, is to
15 establish design criteria to balance risk, defense-in-
16 depth, and safety margins, and NRC decision making.
17 These improvement areas are not all independent. Some
18 of them rely on other improvement areas, and there's
19 probably overlap in some of these areas too, so it's
20 not a clean distinction, but this is the only way we
21 could figure out how to do it.

22 And we think we can work through some of
23 these. Obviously, if you pick Item 9, you'd have to
24 do Items 1 and 2, but that's Item 9.

25 Item 10 is to establish criteria to

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1 analyze the environmental effects that are directly
2 resulting from safety decisions that we make in the
3 licensing of nuclear power plants. The thought of
4 this item was that, if we change, through the
5 regulatory framework approach, the way that we make
6 safety decisions, or change the level of adequate
7 protection, maybe we need to go back and look at
8 whether the review that we've done in the past to
9 ensure compliance with NEPA, whether that needs to be
10 adjusted.

11 I don't know whether you increase it or
12 decrease it, but it's something that we think we might
13 need to go back and look at. But clearly, you
14 couldn't do that until you determined what your final
15 regulatory framework looked like, so this is, would it
16 best be to address NEPA? It would be a follow-up
17 activity after you've dealt with all the safety issues
18 first.

19 Improvement activity 11 is --

20 CHAIRMAN SCHULTZ: Excuse me, Dick.

21 MR. DUDLEY: Yes.

22 CHAIRMAN SCHULTZ: In this case, the word
23 chosen is that the criteria will be analyzing
24 environmental effects. I would have expected it would
25 be something like evaluating rather than analyzing.

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1 Is analyzing chosen because the criteria are already
2 in place with respect to NEPA and the decision making?

3 MR. DUDLEY: Well, I think analyze was
4 chosen because that's what NEPA requires. I think
5 NEPA just requires an analysis of environmental
6 effects, I believe. I'm looking for my attorney, but
7 I believe that's the basis for the use of the word
8 analyze. Did I get that right, Gary?

9 MEMBER SKILLMAN: I'm maybe not in my
10 league, but these wordings were not, at least for this
11 particular activity, done on that basis. NEPA
12 actually uses a bunch of different terms. You know,
13 it's an environmental impact statement. We have to do
14 an evaluation. We have to identify potential
15 environmental impacts, identify alternatives, and then
16 set forth reasonable alternatives, and the
17 accumulative effects.

18 I mean, these things are, sort of, well-
19 understood. The issue here is that, I would call that
20 an evaluation, but one could also call that an
21 analysis. Like I said, we didn't think about the
22 words and use them in a hyper-technical sense.

23 CHAIRMAN SCHULTZ: Okay.

24 MR. DUDLEY: Okay. Thanks, Gary. Item 11
25 is to go through and reconcile all NRC-mandated and

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1 defined licensee change control processes. Our
2 regulations have a number of change control processes
3 buried throughout them. There's 50.59 that people are
4 very well-aware of for design basis things. Things
5 that are describe in your FSAR.

6 But there are change processes for
7 emergency preparedness, change processes for security
8 plans. There are a number of change processes in our
9 regulations and if we made changes to our regulatory
10 framework, then we'd have to come back and take a look
11 at all those change processes and make sure that
12 they're still all consistent, and coherent, and
13 integrated with any other changes that we would make
14 to the regulatory framework.

15 And this would probably include, perhaps,
16 developing a new change process if we were to include
17 this extended design basis category in our
18 recommendation to the Commission to implement that
19 approach.

20 And then the final improvement activity is
21 to develop a consistent position on our consideration
22 and crediting of voluntary industry initiatives, that
23 would be the final improvement activity.

24 MEMBER BLEY: And I got to just make a
25 comment. This is an interesting set errata, things

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1 you'd like to have in the future. What I don't see
2 here, and maybe you're working on it somewhere and
3 maybe you'll show it to us later, is how all of these
4 fairly complex pieces, develop this, develop that,
5 establish this, and so on, fit into a logical,
6 systematic, coherent regulatory framework for adequate
7 protection that appropriately balances defense-in-
8 depth and risk considerations. There's nothing tying
9 these together.

10 MR. DUDLEY: That's right. And that's not
11 in our deliverable. We're not going to deliver --

12 MEMBER BLEY: I thought I was reading what
13 you were supposed to --

14 MR. DUDLEY: -- a framework. We are not
15 going to deliver a coherent, logical framework.

16 MEMBER BLEY: You can't deliver a
17 framework.

18 MR. DUDLEY: We're just going to provide
19 a recommendation to the Commission on how to pursue,
20 or whether to pursue, this recommendation. Even in
21 February, we are not going to have that. We may
22 recommend, you know, that the Commission direct us to
23 improve 6 of these 12 areas, or we may recommend that
24 the Commission direct us to improve all of these 12
25 improvements, or we could even recommend Option 1

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1 that, well, you know, things are really okay.

2 So we're not going to be able to do that
3 by February.

4 MS. DROUIN: As part of our evaluation
5 though, when we give the pros and cons, that would
6 have to come in and say, you know, how well is it
7 accomplishing what NTTF Recommendation 1 spoke of?
8 You know, if one of these options, you know, does
9 nothing to bring an integration to it, then, to me,
10 that would be a con.

11 These are things that we do think will
12 result, and improving, and achieving, to some degree,
13 the recommendation from NTTF, but there'll be varying
14 degrees to it and that will come into, you know, the
15 pros and cons that we'll have to lay out in the paper.

16 MEMBER BLEY: It sure seems to me that the
17 people are expecting you to deliver some kind of a,
18 you know, not the final product but, framework that
19 shows how these pieces work together to get to an end
20 rather than another catalog of disparate pieces.

21 MS. DROUIN: Yes.

22 MR. DUDLEY: Well, the Commission didn't
23 ask us to deliver that by February.

24 MR. CARUSO: Dick?

25 MR. DUDLEY: On Slide 9, that's what the

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1 Commission told us to do.

2 MR. CARUSO: Can I take a crack at that?

3 MR. DUDLEY: Sure.

4 MR. CARUSO: Yes, I think, you know, I was
5 just starting to say --

6 COURT REPORTER: Can you state your name,
7 please?

8 MR. CARUSO: Oh, Mel Caruso from NRO and
9 staff. I think if you consider what -- you know, the
10 NTTF made a recommendation, but the Commission didn't
11 tell us to come back with a plan for implementing the
12 recommendation. They said to come back to disposition
13 it. And so I think the working group considered this
14 very carefully as to what they were being asked to do.

15 And so, I think, in the working group's
16 mind, it was a lot more wide open than just coming up
17 with a plan for a framework. It was, there were
18 people that felt like the recommendation that was made
19 may not fix all the things that were lessons learned
20 from Fukushima and that we should do something else
21 besides that recommendation.

22 So that's why there's a broad set of
23 options from status quo to looking at other ways to
24 address the concerns, as well as have a framework. So
25 I think the working group considered very carefully

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1 what it was tasked with and felt that it was not to
2 come up with a framework or a way to implement a plan
3 to implement the near-term recommendation.

4 It was to consider that recommendation
5 within a broader perspective, and that's what's being
6 done.

7 MEMBER BLEY: I guess I'd say, on this
8 committee, sitting here as one member, if you don't
9 somehow tie this closely to Recommendation 1, it'll be
10 disappointing.

11 MR. DUDLEY: Well, we were directed, at
12 least in the paper due in February 2013, to address
13 the issues, you know, suggested by the Near-Term Task
14 Force and the Risk Management Task Force. So it's not
15 just the Near-Term Task Force that we're supposed to
16 look at in making our recommendations to the
17 Commission.

18 And I think if you look at all these 12
19 items and our Option 3, which is fix all of it, you
20 know, optimize each of these 12 activities, that
21 probably exceeds the scope of the NTTF and the RMTF,
22 and, you know, that's even larger than the scope of
23 what the NTTF wanted us to do. But we believe this
24 gives us the widest possible scope of options to
25 provide the Commission.

1 And under Option 2, the Commission could
2 even tailor the activities that they direct us to
3 undertake. We'll make some recommendations. Let me
4 go to the other options and I'm going to go through
5 the options again and describe them in a little bit
6 more detail, if that's okay.

7 CHAIRMAN SCHULTZ: Let's go through that,
8 Dick, but I agree with Dennis. We ought to come back
9 to this particular discussion later on.

10 MR. DUDLEY: Sure.

11 CHAIRMAN SCHULTZ: Because I think we
12 would like to discuss with you how we think the
13 options ought to be addressed.

14 MR. DUDLEY: Sure.

15 MR. BAHADUR: Dick, before you go to the
16 options, I just wanted to make one observation. And
17 the observation is, the existing patchwork of
18 regulatory framework is not broken. It's working.
19 And the new Recommendation 1, look at the direction
20 and look at ways by which it could be improved with
21 the risk considerations and defense-in-depth-type
22 moves.

23 So what the task, the way I understand it,
24 what the working group did was, they took the Task
25 Force recommendations, they took the Risk Management

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1 Task Force report, they cross-walked and found out
2 where the common factors were that required them to
3 incorporate them in their thinking, if they were
4 thinking about improving the framework one.

5 And they came up with what Dick described
6 as the 12 activities which could be the way to improve
7 the framework. So the question in front of the
8 audience is, are these 12 activities okay? Should
9 there be 13, 14? Should there be just six? That's
10 one question.

11 And if you think that these are the 12
12 areas in which the framework would be improved upon,
13 just forget whether activity 1 would take two years to
14 do it and activity 8 would take ten days to do it, but
15 are these the activities this working group should be
16 considering, or some of these are not worth doing?

17 And then look at the options, whether Dick
18 is going to tell you in Option 1 we don't reel out
19 these 12 activities. In Option 2 we just choose and
20 pick. And in Option 3 we go hog wild and take all 12
21 of those.

22 MEMBER BLEY: With one exception. I'll
23 wait till your finished to make a comment, but I sure
24 by the time you finish I see a way you've put some
25 order in this new patchwork of 12 things.

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1 MR. DUDLEY: I'm not sure I'm going to.
2 We'll see what we can provide.

3 MEMBER BLEY: I sure hope you can find a
4 way to organize these so that, as an entity, they make
5 some sense.

6 MR. DUDLEY: Option 1 --

7 MEMBER ARMIJO: But so far, the staff
8 hasn't set, let's say, any three, or four, or five of
9 them as being the highest priority.

10 MR. DUDLEY: No, no, and I'll explain.

11 MEMBER ARMIJO: You've deliberately not
12 done that.

13 MR. DUDLEY: Well, we're working on that
14 and I'll explain how we're going about that.

15 MEMBER ARMIJO: Okay.

16 MR. DUDLEY: Just to back up though,
17 Option 1, you know, we wouldn't change the structure
18 of the operation of our existing regulatory processes.
19 We continue to take regulatory actions and orders
20 under option 1 as the staff and the management deems
21 the issues warrant. Basically, are current response
22 to Fukushima is being undertaken under Option 1.

23 MEMBER ARMIJO: Sure.

24 MR. DUDLEY: And it's working. I mean,
25 you know, we're getting it done. Some of these things

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1 are difficult. How do you know it's adequate
2 protection? Well, it's hard and we don't have
3 definitive criteria, but we are getting it done under
4 Option 1 right now. We wouldn't have --

5 MEMBER BROWN: Can I --

6 MR. DUDLEY: Yes.

7 MEMBER BROWN: I just want to make one
8 other observation, if we're going to change something
9 in which we're going to establish a new framework, I'm
10 trying to establish criteria or methodologies walking
11 through your framework, and you got 50, 55 years worth
12 of experience at building plants, and you've got a
13 couple of, three, catastrophic events with various
14 consequences, and it would have seemed to me to take
15 your existing, whatever you want to call it, framework
16 of evaluations in determining adequate assurance, and
17 see how did our system -- where did it fail?

18 I mean, why did it not stop something?
19 You know, at least have some idea of where you were
20 going as opposed to generating a whole new list of
21 things, which, you know, establish new criteria,
22 provide another methodology, provide whatever, because
23 five or six of those are like approaches to doing
24 things; processes.

25 And if you don't have an understanding of

1 would our process fail? Did it fail and result in
2 these catastrophic events? And if you look at them,
3 at least the most recent one, it exceeded the design
4 basis. Well, I mean, it seems to me that that -- for
5 which the plant was designed.

6 So if a process is going to do something
7 for me to prevent some, whatever the catastrophic
8 consequences are going to be, you got to start
9 somewhere and say, what consequences do I want to
10 prevent and how is my process going to prevent those?
11 And in the case of Fukushima, we didn't define a
12 adequate set of consequences, this is personal opinion
13 now, this is not the committee's opinion, it's mine,
14 as such that they designed a plan that would withstand
15 those particular circumstances.

16 And you can argue about risk assessments,
17 or this assessment, or what have you, but it
18 significantly exceeded the design basis of the plant.

19 MS. DROUIN: And I think that when you
20 understand more thoroughly our 12 -- first, at a high
21 level, our three options, and then the 12 activities,
22 they are trying to attempt, you know, to fix, you
23 know, in your words, where we went wrong. You know,
24 why did these things occur and we weren't prepared for
25 them?

1 So it's not trying to be --

2 MR. DUDLEY: Like, safety margins would be
3 a good example. I mean, Fukushima, if they'd looked
4 at safety margins for their tsunami, you know, they
5 might have figured out that they weren't designed
6 properly. Maybe that's a way of keeping the book
7 right back.

8 MEMBER ARMIJO: They underestimated the
9 hazard. They had their margins against it, but they
10 estimated, likely, were fine.

11 MR. DUDLEY: Okay.

12 MEMBER ARMIJO: The hazard was huge.
13 That's the one single thing that --

14 MS. DROUIN: I mean, it is asking the
15 question, you know, why were they underestimated? And
16 given that you are going to underestimate things, then
17 how do you account for that? So, you know, we are
18 asking those kinds of questions in proposing the
19 recommendations that we are.

20 CHAIRMAN SCHULTZ: If the approach is to
21 identify 12 areas for improvement and then leave that
22 to a next step to figure out where things go next,
23 where the options are, do nothing or a few, do
24 several, or do them all, it seems to me that unless
25 you do them all, and not only just do them all, but

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1 also establish, number one, what the goal is for the
2 framework, as well as some description of what that
3 framework is and why, then you just continue to
4 extend, what we've heard so far is, a problem, which
5 is that the process right now is patchwork.

6 In other words --

7 MEMBER STETKAR: In my sense, it's a
8 reactionary-type thought process. You know, so far
9 we've regulated by reaction. Gee, we've identified a
10 problem. Salem had an ATWS problem. Oh, my God. We
11 never thought about that so we're going to implement
12 the ATWS. Gee, PRAs have shown that station blackout
13 is a problem. Gee, you should implement a station
14 blackout.

15 That's a very reactionary type of
16 regulatory process. Asking someone to pick and choose
17 among three or four things that they think are
18 important at the moment, continues that type of
19 reactionary thought process. Oh, I think that 1, 2,
20 and 7 are most important today, so we're going to put
21 high priority on that. That's why, you know --

22 MS. DROUIN: I agree with you. I think
23 that when you look at time to improve your regulatory
24 framework, what you're really trying to do is improve
25 your process. You know, what decision criteria do you

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1 do to be proactive to identify, you know, where you
2 may have vulnerabilities or weaknesses in your design,
3 and to deal with them in a proactive way instead of
4 being reactive.

5 MEMBER STETKAR: But I think that's why,
6 you know, that Steve expressed it much more eloquently
7 than I can, rather than just having a set of bullets
8 and saying, you know, yay, Commission, you are all-
9 knowing today, whoever you are, go select these
10 things. Providing a more coherent framework with an
11 order would seem, at least and Dennis mentioned it
12 too, but what I thought Recommendation 1 was conceived
13 to do.

14 CHAIRMAN SCHULTZ: Well, this is getting
15 a bit out of bounds in a sense, but if we're going to
16 move forward on this recommendation, then, as already
17 stated, the current process, we believe, has worked.
18 The conclusion of the NTTF was just that. However,
19 they continued with Recommendation 1 to suggest that
20 there is opportunity for improvement.

21 They didn't define what that picture
22 looked like. The working group has tried to identify
23 that, or define it, with the pictures that we've
24 already seen. The first one, the patchwork, and then
25 the second one, which is some element of improvement

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1 there. But to identify why we're doing this would be
2 a value.

3 And we talked about it being something
4 that's somewhat connected, or connected somehow, to
5 new plants, or connected to existing plants in a
6 different fashion, those elements would be very
7 valuable to identify, I think upfront -- it won't move
8 forward with Option 3. It would be a, I think,
9 tremendous undertaking by the staff, the industry, all
10 that are involved in the nuclear endeavor.

11 One reason one might want to do that would
12 be to determine whether, or what value, that would
13 provide to the future nuclear energy program within
14 the country. In other words, to be able to present to
15 the Commission, this is why we think that one would
16 move forward with this endeavor, I think, is very
17 important to do, and early on, that is, in February.

18 So that then these pieces might be better
19 dealt with in terms of the decision making as to where
20 one goes next, and what elements would be selected,
21 and so forth.

22 MR. DUDLEY: Let me at least get through
23 Slide 23 --

24 CHAIRMAN SCHULTZ: Good.

25 MR. DUDLEY: -- and then we'll really have

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1 the feedback, because then we'll have presented,
2 pretty much, where we're headed; 23 and 24. So let me
3 do that and then we'll continue this discussion, so
4 that's Option 1. No new categories. NTTF said that
5 the current framework has served us well in the past.

6 Option 2, again, is -- what we're using is
7 a quantitative evaluation process. We're trying to
8 use a decision matrix and some weighting criteria, and
9 value criteria, and that sort of thing to put these 12
10 items in order. And I'll describe that to you later.

11 But we're hoping that by using this
12 evaluation process, we can maybe find, sort of, a
13 natural break point and say, well, you know, these
14 first four have high value and there's a knee in the
15 curve, you know, and the value drops off after these
16 first four, or something like that, so who knows.

17 We haven't really gotten the numbers yet
18 through the process, but that's how we would hope to
19 be able to determine the high-value improvement areas;
20 by an actual quantitative process.

21 CHAIRMAN SCHULTZ: It's recognized also
22 that these 12 improvement areas are not distinctly
23 separate.

24 MR. DUDLEY: That's correct.

25 CHAIRMAN SCHULTZ: There's opportunities

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1 and there are cross-connects between and among them.

2 MR. DUDLEY: Right. And the math might
3 say, you do Items 1 through 4, but we might know that
4 we still had to do 7 also to be able to fully do 1
5 through 4. So, you know, it isn't clean. It's not,
6 you know, the textbook example of how you would go
7 through and design an evaluation process.

8 But Option 2, again, we would select high-
9 value activities and we would recommend that the
10 Commission direct us to implement those activities in
11 an integrated approach, but we hope to give the
12 Commission enough information about all 12 of these
13 items so that if the Commission disagrees with our
14 assessment of high value, that the Commission could
15 select their own other improvement areas if they would
16 like to do so.

17 So we're going to specify a certain group
18 and the Commission could agree with that or could
19 specify other improvement activities. At least we
20 hope to give them enough information to make that a
21 possibility. Okay.

22 So this next slide shows the quantitative
23 evaluation process that we're looking at. We're
24 trying to weight these improvement activities with
25 respect to safety, with respect to a criterion as to,

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1 does this activity balance defense-in-depth safety
2 margins and risk with respect to stability, clarity,
3 efficiency, and risk-informed?

4 But I think we're thinking that Items 2
5 and 6 are going to need to be combined. We don't
6 really think that they're separate evaluation
7 criteria, at least that was, I think, the last working
8 group decision we made on criteria 2 and 6, so we'd
9 probably combine those.

10 Item 7, performance-based. It would be an
11 evaluation criterion. Item 8 is feasibility. Some of
12 these things are going to be so hard to do that even
13 if we're directed to do it, there's a, you know,
14 likelihood that we may not succeed. So feasibility of
15 each of these items will be an evaluation factor.

16 And then we'll also try to estimate the
17 costs of each improvement activity. And we would try
18 to put in NRC development, NRC implementation, and NRC
19 operation. There could be operational cost savings,
20 theoretically, right? You fix the framework to make
21 it easier to do things in the future.

22 So if you really did that and you spent
23 the resources now, maybe you would save some resources
24 in the future by a more efficient operation for the
25 NRC in the future. And we'll also try to estimate

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1 licensee implementation and operational costs
2 associated with these various improvement activities
3 as an evaluation criterion.

4 And again, Option 3, I guess we've really
5 gone over this. Option 3 is, we'll try to fix all 12
6 improvement activities at the same time in a totally
7 integrated approach. And that would be a very big
8 challenge because we would have to conform and
9 harmonize many, many NRC regulations, lots of
10 regulatory guidance, lots of infrastructure,
11 management directives, we would need training, I mean,
12 that would be a lot of additional implementation
13 activities that would be necessary if you selected
14 Option 3.

15 MEMBER BLEY: It would especially be a lot
16 if you haven't found a way to organize these and show
17 how they work together. Then it becomes impossible
18 and it's almost silly to write it down; really. I
19 mean, nobody could recommend this. These 12 are all
20 equal and do them all or completely.

21 MEMBER ARMIJO: You know the answer before
22 you start.

23 MEMBER BLEY: Well, of course, but to give
24 somebody the opportunity to pick them on these in a
25 reasonable way before you're done, you just have to

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1 find some way to talk about how they relate to each
2 other and how they'd fit together.

3 MEMBER ARMIJO: Could we go back to your
4 chart of the 12 areas? I'm trying to understand where
5 you address the issue of inadequate evaluation of the
6 hazards. You know, my view is, Fukushima was caused
7 -- the root cause of Fukushima was an underestimation
8 of a tsunami hazard triggered by a massive seismic
9 event, which was also underestimated.

10 And everything else, but for that, you
11 know, had that been estimated properly, you wouldn't
12 have had the flooding events; you wouldn't have been
13 so overwhelmed. And which of these 12 points give us
14 a better ability to evaluate hazards?

15 MR. DUDLEY: Well, maybe Item 7.

16 MEMBER ARMIJO: Is that where it's
17 covered?

18 MR. DUDLEY: The regulatory process to re-
19 evaluate and update the regulatory framework for an
20 individual plant based on new information and
21 experience. They had information about this increased
22 earthquake level. They've had that for years, right?

23 MEMBER ARMIJO: They had bits and pieces,
24 but, you know, everybody keeps dumping on the
25 utilities and the regulators in Japan for not

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1 adequately anticipating the tsunami, but nobody else
2 in Japan did.

3 MEMBER BLEY: That's not quite true.
4 There's a plant up the road from them that, over the
5 years, had made two substantial improvements to their
6 flood protection based on their own estimates, and
7 others, along the way.

8 MEMBER ARMIJO: But the 20,000 people that
9 died were subject to the seismic and tsunami
10 regulations for all the civil structures, the cities,
11 the towns, where people lost their lives, was done by
12 a national consensus, really, inquiry. Some
13 individuals may have had some insights to do something
14 better, but, you know, somewhere along the line we got
15 to do a much better job of evaluating the hazards;
16 otherwise, we have surprises.

17 And I just want to make sure that in
18 these, at least from my point of view, is that,
19 somewhere in these 12 items, that's a key element.

20 MS. DROUIN: Well, I think it comes out in
21 several places. Re-evaluating, you know, the adequacy
22 of your safety margins. You know, your safety margins
23 are there to, you know --

24 MEMBER ARMIJO: You can have margin for a
25 hazard that is underestimated.

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1 MS. DROUIN: Right.

2 MEMBER ARMIJO: I want to have plenty of
3 margin on the hazard.

4 MS. DROUIN: Yes, but part of setting that
5 safety margin is having a better understanding of the
6 hazard and looking at the uncertainties associated
7 with it.

8 MEMBER ARMIJO: Fine.

9 MS. DROUIN: So that's just one place.
10 Doing a good PRA. A good PRA, you know, requires you
11 to, you know, evaluate the hazard. The PRA is going
12 to tell you what system, structure, component, is
13 critical and keeping that risk acceptably low. So a
14 good flood analysis combined with a good hazard
15 analysis should point out insights there.

16 So I think in answering your question, a
17 lot of these different 12 address that when you get
18 into the details of what we're really saying behind
19 them.

20 MR. DUDLEY: Maybe if the safety margin
21 analysis, and this is just off the top of my head, so
22 slap if this isn't making sense, looked for cliff-edge
23 effects, and if you did that and you determined that,
24 gee, you know, all my protection is at an elevation
25 such that if I had an over-topping event, I'm going to

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1 lose everything.

2 And so if the safety margin caused you to
3 look for cliff-edge events first, and you found one,
4 then you might go back out and look, gee, didn't I
5 hear something about an earthquake? You know, maybe
6 you could work it backwards that way. I don't know.

7 MEMBER ARMIJO: I'd like to start with a
8 hazard, then have the design reflect what hazard we're
9 trying to protect against, rather than --

10 MR. DUDLEY: I don't know. That's just a
11 thought.

12 MEMBER RAY: Do any of these provide for
13 periodic re-assessment of the external event hazards?

14 MR. DUDLEY: Well, yes, 7 could; Item 7.
15 And even --

16 MEMBER RAY: Well, okay. That's based on
17 new information.

18 MR. DUDLEY: I'm sorry. Wait a minute, I
19 misspoke. When I said Item 7 I should have said Item
20 6. Item 6 is to re-evaluate an individual facility,
21 its design basis, because Item --

22 MEMBER RAY: Okay. But it's based on new
23 information and experience --

24 MR. DUDLEY: Yes.

25 MEMBER RAY: -- but, you know, it's

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1 awfully hard, and I speak from experience, to say
2 there's new information, because there's always people
3 out there with new information. And that's why I
4 think a periodic reassessment, as opposed to something
5 that manages to knock the door down and say, you got
6 to look at this, is, maybe, more useful.

7 You know, because, like I say, you just
8 can't go back and reassess every day that somebody
9 comes and says they've got some new hazard, right?

10 MR. DUDLEY: Right. You would do it
11 periodically and then you would collect all of that
12 information every so many years.

13 MEMBER RAY: Yes, but the benefit of
14 periodically is that you don't have to do it every
15 day, but you can't put it off forever.

16 MR. DUDLEY: Right. Okay.

17 MEMBER RAY: And, you know, without that,
18 one of those two extremes is most likely. You know,
19 you'll be forced to do it every day, which is not very
20 likely, and you'll put it off forever, which is what
21 you'll try and do. Like I say, I can tell you that is
22 the way it works, having done it myself. So that's
23 what I'm more interested in, I guess is, do any of
24 these produce -- because what Sam referred to, I think
25 if they were forced to reassess, the way you do

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1 originally, what the hazard was at Fukushima, they
2 would have inevitably had to come to grips with what
3 could happen, hopefully, before it did happen.

4 MEMBER SIEBER: I have a couple of
5 questions I'd like to ask.

6 MR. DUDLEY: Sure.

7 MEMBER SIEBER: And I guess I need to ask
8 them carefully. One situation is, some older plants
9 have a licensing basis that differs from the post-TMI
10 licensing basis for plants. Would any of the actions
11 that are forthcoming from this activity affect the
12 licensing basis where it doesn't all conform to the
13 standard that's across the TMI standard?

14 For example, there are plants that were
15 built before Appendix A was written and upstanding and
16 so forth. Would you comment on that? Would you
17 change the regulations to try to bring these older
18 plants more into conformance or do you consider that
19 not to be a safety hazard at this time?

20 MS. DROUIN: Go ahead.

21 MR. MIZUNO: I don't know. I guess that
22 is a key question.

23 MR. DUDLEY: It's a really hard question.

24 MR. MIZUNO: We have already identified
25 that as a key issue to raise to the Commission,

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1 whether you're going to apply this framework forward
2 or backwards. If the Commission chooses to apply it
3 backwards then we would have to do that re-analysis
4 for existing plants and the Commission would probably
5 have to change the back-fit rule to exclude this
6 activity, you know, the application of their revised
7 framework activity to the existing plants.

8 Obviously, that's going to have
9 significant impacts upon licensees, and that's a
10 policy issue that the Commission is going to have to
11 address, but we will bring it to their attention.
12 It's already been identified as something that we are
13 --

14 MEMBER SIEBER: Okay. It's been around
15 for a long time.

16 MR. DUDLEY: With many of these individual
17 improvement areas, that's a key issue associated with
18 it; if you do this, will it just be forward fit, or
19 will you go backwards to try to do this? Right.

20 MEMBER RAY: Is that in your presentation
21 anyway, because I didn't see it? Excuse me, John.
22 The back-fit rule and how that affects --

23 MR. DUDLEY: No.

24 MEMBER RAY: It's not.

25 MS. DROUIN: We have not identified

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1 anywhere in the presentation, what are all the policy
2 issues that are going to come out of this? And
3 there's going to be quite a few policy issues.

4 MEMBER RAY: I'll tell you, that's true,
5 Mary, and I guess we're sort of craving to --

6 MS. DROUIN: Know what they are.

7 MEMBER RAY: -- identify those. Yes,
8 right.

9 MEMBER SIEBER: I was disappointed to hear
10 you say that that was a tough question, because that
11 was the easiest of the ones I wanted to ask you.

12 MR. DUDLEY: Keep going.

13 MEMBER SIEBER: Another question that I --
14 there is no definitive place, to my knowledge, in the
15 regulation where it talks about the three-barrier
16 theory or the design principle of three barriers being
17 independent of one another, but we know that
18 independence is not exactly there. The fuel only
19 maintains the integrity of the reactor cooling system,
20 it does not maintain its integrity to a sufficient
21 extent to provide cooling.

22 Another one is the relationship between
23 the reactor cooling system or the fuel itself and the
24 containment itself. For example, containments are
25 designed to take a LOCA, but some containments will

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1 not take the added pressure increment due to oxidation
2 of the cladding, but that's the part of the design
3 basis when those reactors were designed.

4 Now when we think about putting a vent on
5 the reactor, you ask, you know, the reason why the
6 pressure is so high is because you have a LOCA, or
7 something similar to a LOCA, plus the added effect of
8 a lot of hydrogen generated from the fuel cladding,
9 and so you need to reduce the pressure.

10 So you ask yourself the question, is the
11 hydrogen vent that I'm going to install to protect the
12 containment, is that going to be able to handle the
13 hydrogen which caused the pressure to go up in the
14 containment? And the answer to that is, no, that's
15 not in the licensing basis.

16 And so I have conflicts about licensing
17 basis versus the practicality of a full analysis of
18 actions, but do you plan to address that in any way?
19 For example, one of the outcomes of the Fukushima
20 examination, action examination, may be a requirement
21 to install vents on the containments. If the way
22 things would go right now, the design basis for the
23 vents does not contemplate deflagration of detonation.

24 And therefore, I could make a seismic-
25 hardened containment vent by designing the supports

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1 properly and still make it out of sheet metal, which
2 would not take that explosion or a rapid burnup. How
3 does this deal with questions like that?

4 MR. DUDLEY: I don't see how a regulatory
5 framework -- we're not going to get into that level of
6 detail --

7 MS. DROUIN: Correct.

8 MR. DUDLEY: -- I don't think.

9 MS. DROUIN: No, we are at --

10 MR. DUDLEY: You would answer those
11 questions as you went to apply a framework that had
12 been established, but those questions, I think, are
13 going to exist no matter what.

14 MEMBER SIEBER: Yes, but you can't pick
15 and choose which plants you think you ought to have
16 more protection and less protection unless you have a
17 framework. And I suspect that I know my house isn't
18 seismic, so the infrastructure around power plants is
19 probably not as seismically-qualified as the plant is.

20 MS. DROUIN: But our work is not to
21 provide guidance or options for how to do the
22 technical basis behind some decision under
23 consideration.

24 MEMBER SIEBER: Okay. Well, I feel this
25 internal obligation to say something because I'm

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1 really struggling with it.

2 MS. DROUIN: There is a separate working
3 group that's come out of Fukushima that is looking at
4 the technical issue associated with containment
5 venting on that particular issue.

6 MEMBER SIEBER: Right.

7 MS. DROUIN: But, you know, at a high
8 level, you know, we're talking about providing options
9 for a framework for decision making. We're not
10 providing the details of how to perform the technical
11 basis for making a particular decision. That's not
12 part of our scope.

13 MEMBER SIEBER: Okay. Thank you.

14 MEMBER SKILLMAN: Richard, I think you've
15 gotten to the point where you asked me to come back if
16 I'm not satisfied.

17 MR. DUDLEY: Yes. And you're back.

18 MEMBER SKILLMAN: But I'm not unsatisfied.

19 MR. DUDLEY: Okay.

20 MEMBER SKILLMAN: I can understand how the
21 two of you may feel as we ask comments, and it may
22 feel like an attack, and it isn't. We're asking
23 questions.

24 MR. DUDLEY: Understood.

25 MEMBER SKILLMAN: Another way to approach

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1 the framework is to say, the framework that exists
2 today, albeit flawed, is successful. Now back to my
3 point 45 minutes ago, many people in the industry,
4 including, I'm going to suggest thousands that are
5 within the current organizations of the owners and
6 operators, understand 10 CFR 50, Appendix A, 50.59,
7 50.72 and 73 on the reporting.

8 They know how to operate the plant; change
9 the plant. They know when to talk to the NRC about a
10 licensing change. They've borne the brunt of the TMI-
11 2 changes after NUREG-737, station blackout, EQ,
12 maintenance rule, and so all --

13 MEMBER ARMIJO: Aircraft impact.

14 MEMBER SKILLMAN: -- aircraft impact, and
15 all of that is deeply steeped in the current culture
16 in which most of us live in the industry. So another
17 way to implement this in an integrated fashion is to
18 identify the themes that need to be changed as a
19 consequence of Fukushima and attach that change to the
20 presently understood regulations that we work so
21 commonly with.

22 For example, one might say, good old
23 Appendix A, the general design criteria, back in '68
24 and '69 there were 70 of those. Today, I think there
25 are just 64. But one might say, you know what,

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1 general design criteria umpty-ump, if we added this
2 piece to that general design criteria for all reactors
3 after a certain date, then that would be the patch on
4 the general design criteria.

5 And right now we have 18 elements in
6 Appendix B, our QA program, one of those criterion 3
7 design control. Maybe design control needs an add-on
8 that has to do with what Harold just mentioned? He
9 used a, not a systematic, but a --

10 MEMBER RAY: Periodic.

11 MEMBER SKILLMAN: --periodic update to go
12 back and make sure that the plant is designed for the
13 natural phenomena and other known events that threaten
14 that plant. So maybe another way to approach this
15 that achieves the objective of Recommendation 1 is to
16 identify the areas in our current regulations that,
17 when enhanced, really give us what we want in terms of
18 robust defense-in-depth and protection, that it keeps
19 everybody on pace, these thousands of people that deal
20 with this every day, you say, oh, yes, we don't have
21 to do a whole new systematic change to the
22 regulations, we are going to improve cardinal
23 regulations with which we deal every day.

24 And at least from this practitioner of
25 many years I would say, you know what, that makes a

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1 whole lot more sense to me because I understand now
2 how that particular change fits into my license, into
3 my change process, into how I deal with the region,
4 and how I deal with the PRA expert in the region, and
5 it could be that the NRC individual would say, you
6 know what, that gives us a great deal of confidence
7 because we know that all of the underlying pieces
8 still fit, but by making this change, what we had
9 before, albeit imperfect, worked pretty good, but it's
10 even better now because we added that.

11 MR. DUDLEY: What you're describing to me
12 is not really a framework approach. What you're
13 describing is a problem-solving approach where you go
14 out and find out what were the problems at Fukushima,
15 the specific problems, and then identify those, and
16 then take those back and look at our current
17 regulatory processes and just make whatever fixes or
18 change is necessary to our existing regulatory process
19 to prevent those problems, or preclude those problems,
20 that occurred at Fukushima. That's what you're
21 describing, isn't it?

22 MEMBER SKILLMAN: Well, it can be that.

23 MR. DUDLEY: Okay.

24 MEMBER SKILLMAN: It can be much more
25 broadly applied, but what it does is, it retains --

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1 no, the recommendation is a regulatory framework and
2 I would submit you have a regulatory framework that's
3 pretty good. And so when you suggest Option 3, which
4 is 12 new pieces, I can hardly fathom the time,
5 talent, treasure, investment by the utilities, the
6 learning by everybody who is involved, in order to
7 pull that off.

8 And I can hear you say, well, we're not
9 going to do all 12 we're going to recommend 4. Well,
10 I would say, well, which four and why not the other
11 eight? And why not 16 more that we hadn't thought of?

12 MR. DUDLEY: We're hoping that our
13 evaluation of the 12 criteria, and the costs, and the
14 values, and all that, that that evaluation process
15 will make it clear, you know, how much harder this
16 thing gets when you start adding more and more items
17 to it.

18 MS. DROUIN: Let me --

19 MEMBER SKILLMAN: But please just
20 understand that there is a large population of highly-
21 qualified people that understand the current framework
22 and processes very, very well, and they have, with the
23 Commission, with the staff, operated a 104 plants
24 fairly well. And so making changes to that, at least
25 in my mind, brings up the whole question of change

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1 process, and if you spent life at a nuclear power
2 plant, change process is critical to continued safety.

3 And so when you begin to move the process,
4 you've got to be very, very careful that you don't end
5 up throwing away the baby with the bath water. That
6 almost always occurs.

7 MR. DUDLEY: Yes, unintended consequences.

8 MS. DROUIN: I would suggest that, you
9 know, we have not done a good job in explaining, you
10 know, some of this stuff, because I would suggest that
11 our 12 issues are not throwing away the current
12 process and putting something new in place. It really
13 is achieving, or going down the route that you're
14 suggesting. It is looking at, where are we lacking
15 and it would improve what we have.

16 So I don't think it's taking away how we
17 currently do business, and I think we just have to do
18 a better job characterizing, you know, what it is that
19 -- how each of these 12 things are fixing something,
20 in the sense, that's broken or that's missing? And
21 would ultimately improve our current regulatory
22 framework.

23 You know, because it comes down to, and I
24 think we're back to, what is a framework and trying to
25 explain that, and, you know, I'm sure if that we went

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1 around the room, we would get a different view from,
2 you know, each of the members here what a framework
3 is.

4 MEMBER ARMIJO: I'm sure you would.

5 MS. DROUIN: And, you know, it's something
6 that we've struggled with, you know, on the working
7 group in trying to explain and what we end up finding
8 out many times that we're talking across each other
9 because it's trying to grapple with a common
10 terminology so that we're communicating better.

11 And so we struggle with that because, in
12 my mind, I don't see these 12 things as -- you know,
13 when somebody says something new, then that means
14 they've thrown the old away, this is my interpretation
15 of the word new, and that's not what we're doing.
16 We're not throwing the whole thing away.

17 To me, we're fixing things where we have
18 identified problems and that's what these 12 do.

19 CHAIRMAN SCHULTZ: If you took what Dick
20 --

21 MS. DROUIN: So I think we're closer
22 aligned here, we just have not done a very good job in
23 communicating that.

24 MEMBER SKILLMAN: Thank you.

25 CHAIRMAN SCHULTZ: If you took what Dick

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1 described at first in terms of the process improvement
2 associated with, as you've described it, Dick, take
3 the current regulations and go in in detail and look
4 for those areas that would be affected by lessons
5 learned from Fukushima and made improvements there.

6 If you did that, how would that fit in
7 your recommendation? Is that Option 1?

8 MR. DUDLEY: Yes.

9 CHAIRMAN SCHULTZ: If you described it in
10 detail, is that Option 1? Would you pick it as Option
11 1?

12 MR. DUDLEY: I think it's a hybrid between
13 Option 1 and Option 2.

14 CHAIRMAN SCHULTZ: That's where I would
15 have put it.

16 MR. DUDLEY: I think it's a combination fo
17 the two.

18 MEMBER ARMIJO: Option 1 with
19 embellishments.

20 MEMBER SKILLMAN: Yes, and I hesitate to
21 suggest it's fixing, because I hold fairly strongly --

22 MR. DUDLEY: Improving. I used the work
23 improving I thought.

24 MS. DROUIN: Improving. I like that word
25 better.

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1 MEMBER SKILLMAN: It's improving and there
2 are probably some areas where we should make some
3 changes, and that's Option 2. But by and large, I
4 think that the body of regulation is effective, we
5 learn our lessons and we've managed as an industry to
6 respond to the lessons, and I would say quite
7 effectively.

8 CHAIRMAN SCHULTZ: I'm trying to work
9 toward having that formulated as an option.

10 MEMBER SKILLMAN: So it's a hybrid between
11 1 and 2. It's fixing what Fukushima pointed out as an
12 obvious deficiency and it's, perhaps, identifying some
13 surgical areas that could benefit --

14 MEMBER SIEBER: What is the obvious
15 deficiency, Dick, that Fukushima pointed out?

16 MR. DUDLEY: Failure to understand the
17 natural phenomenon.

18 MEMBER SIEBER: Okay. So it's not
19 updating for external event hazards that are known to
20 exist.

21 MR. DUDLEY: Correct.

22 MEMBER BROWN: The difference in Option 1,
23 if you talked about it Steve and I might have just,
24 that has a listing of bullets of no new event
25 categories would be developed. I don't think that's

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1 valid under the Option 1. You'd always think about if
2 there is something new that's coming along.

3 MR. DUDLEY: That's right.

4 MEMBER BROWN: I wouldn't have excluded
5 new event categories. That says, I'm going to kind of
6 ignore stuff and only pick on the little things that
7 come up every now and then. But, I mean, largely,
8 that was -- we actually said somewhat the same thing;
9 felt that looking at what our problems were, see what
10 we can do with it. Option 1 is, I mean, if we've said
11 the current processes have served us well, I really
12 get concerned about throwing out or trying to re-
13 establish a whole new set of processes.

14 You say it doesn't, I understand your
15 comment, but when you read the language and then you
16 go look at how that would be executed from the
17 development of positions and new regulatory mandates,
18 or whatever you want to call them, I mean, that can
19 really throw monkeywrench into the gears in terms of
20 how people are operating.

21 MS. DROUIN: I think we need to do a much
22 better job on our language because when we say there
23 will not be any new event categories, that doesn't
24 imply that if something occurred that we wouldn't
25 consider it, of course we would.

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1 MEMBER BROWN: Oh, I would think you would
2 have just thought of some without occurring --

3 MS. DROUIN: Yes.

4 MEMBER BROWN: -- you'd do something.
5 This would say, even if I've thought about it, but it
6 hadn't occurred, that you would -- I got the
7 impression you wouldn't do anything with that,
8 necessarily, if it hadn't occurred.

9 MS. DROUIN: And then that was not meant
10 to be the implication.

11 MR. DUDLEY: Yes, we just meant that we
12 wouldn't implement a new extended design basis
13 category. That's what I should have said, but that's
14 shorthand.

15 MEMBER BROWN: Maybe that's necessary
16 though. Maybe an extended design basis category is
17 necessary.

18 MR. DUDLEY: But just under Option 1.

19 MEMBER BROWN: Under Option 1, yes. I
20 wouldn't have excluded a new extended design basis
21 category if that raised its head. It may raise its
22 head as a result of a periodic re-evaluation that
23 Harold was talking about. You just don't know what
24 would fall out of that.

25 MS. DROUIN: And that could potentially

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1 occur under Option 1.

2 MR. DUDLEY: Under Option 2.

3 MS. DROUIN: No, under Option 1.

4 MEMBER BROWN: Oh, under Option 1, but --

5 MS. DROUIN: Because, under Option 1,
6 remember, we're just not doing something in an
7 integrated fashion, so, you know, we could still do
8 these things, but they would be, you know, picked and
9 choosed.

10 MEMBER BROWN: Oh, I don't agree that it
11 wouldn't. It'd be integrated into the existing
12 processes. So I think you're not giving yourself
13 enough credit, I don't think, for what you've got in
14 place and how you would then put something new into
15 it.

16 MS. DROUIN: Well, and it's showing us
17 that we're not using, somehow, the right language when
18 we explain to you what we mean that it's not
19 integrated.

20 MEMBER BROWN: Okay.

21 MS. DROUIN: So we're going to have to do
22 a better job in communicating that, because I don't
23 think that we're really far off. I think we just have
24 a language barrier and we're just going to have to
25 struggle with that to --

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1 MEMBER SHACK: Maybe if people thought
2 about it in terms of generic issues, which is the way
3 new things sort of come up in the current process, and
4 how would your new framework deliver something
5 different than the GI process?

6 MS. DROUIN: Right.

7 CHAIRMAN SCHULTZ: That would be a very
8 practical way of proceeding.

9 MEMBER SHACK: I mean, to me, that is the
10 way we accommodate new things in the current
11 framework.

12 MEMBER SKILLMAN: In a reactionary sense.

13 MEMBER SHACK: And that's, you know, one
14 point.

15 MEMBER STETKAR: What I still come to, and
16 I put numbers down here, how did we get to the point
17 where our design basis high winds and tornados we say,
18 as an agency, the design basis frequency is 10 to the
19 minus 7? How did we get, for something I stumbled
20 over the other day, the frequency of rail accidents
21 and road accidents that release toxic gases that will
22 incapacitate the operators at 10 to the minus 5?

23 Aircraft crashes, 10 to the minus 7, but
24 it's okay to get up to, kind of, 10 to the minus 6
25 because maybe you can't get it to 10 to the minus 7.

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1 External floods are, kind of, you might see numbers
2 that are 10 to the minus 6, but they're based on 100-
3 year flooding events or probably maximum
4 precipitation, which is neither probable nor maximum.

5 Now we're going to a risk-informed
6 performance-based fire protection, that framework NFP-
7 805, that really doesn't have a fixed-frequency
8 criterion. Those are symptomatic of this kind of way
9 of reacting to particular events over time as they
10 occur, as people think about them, without any
11 coherent sense of an integrated regulatory policy.

12 To me, it makes absolutely no sense that
13 we design plants to a 10 to the minus 4, but tell
14 people that you have to design it to a 10 to the minus
15 7 wind event, and then divine that the 10 to the minus
16 7 wind event can be derived from a 100 years worth of
17 storm data. You know, that's how you get to a point
18 by reacting to things. That's how you get to a point
19 by, you know, generic issues, as they come up, put
20 something in place.

21 MR. DUDLEY: Okay.

22 MEMBER STETKAR: And that's what I'm
23 struggling with. I don't have the answer, obviously.
24 You know, they're just symptoms, but a lot of the
25 things that you hear around here -

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1 MR. DUDLEY: That would be improvement
2 activity 4, right?

3 MEMBER STETKAR: That, I believe, it's --
4 yes.

5 MEMBER ARMIJO: Add to conditions and
6 events.

7 MR. DUDLEY: Yes, it could be 3.

8 MEMBER STETKAR: Yes, it could be 3, see,
9 the problem is, it could be bits and pieces of a lot
10 of these things.

11 MR. DUDLEY: Oh, no, it would be 3. It
12 would be 3. Yes, right.

13 MEMBER BLEY: Let me try something else
14 too, but I'm not objecting to the 12 items you've got.
15 I mean, they all are potentially important things, but
16 they're kind of a catalog of everything anybody might
17 want to make better. It seems to me the kind of
18 things that triggered what the NTTF folks had to say
19 in this area were things that fall, to me, under two
20 categories.

21 One is, inconsistent protection against
22 environmental events and, perhaps, catastrophic system
23 failure and not keeping those as current as you can,
24 but that's kind of the second-order thing. And the
25 other is, inconsistencies with respect to regulatory

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1 additions beyond the design basis. And what somebody
2 else said, maybe it's generic issue responses aren't
3 really generalized.

4 We get an event, we try to figure out
5 something about it, we do that one thing, and we don't
6 say, gee, is this symptomatic of something across the
7 board that, you know, we ought to look at in many
8 different places? And the way the station blackout
9 came about was a little bit that way.

10 And you can embed those. They're in here
11 somewhere. But if that was really an important thing,
12 it's now kind of submerged in a sea of lots of other
13 stuff.

14 CHAIRMAN SCHULTZ: Philosophical issues or
15 process issues.

16 MEMBER BLEY: Yes. And actually, some
17 other -- there's some spaces where we might have some
18 holes, but they haven't been pumped up as big deals
19 yet.

20 MS. DROUIN: But to me, that is the
21 implementing of Issue Number 1 and Number 9, because
22 I would suggest that they did not have adequate
23 defense-in-depth of safety margins and they certainly
24 weren't looked at in an integrated balanced way
25 between deterministic and risk insights, and criteria.

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1 MEMBER BLEY: I think that's true, but
2 that issue is now kind of submerged in a sea of other
3 things here.

4 MS. DROUIN: No, I think that you have a
5 mixture and I do agree that, you know, we need to show
6 the relationship better between these, because you
7 have some that are more higher level and broad, such
8 as Issue Number 1 and Number 9, and then you have some
9 that are very specific.

10 MEMBER BLEY: I forget what 9 is, Mary.
11 This is the first time I saw your numbers.

12 MEMBER ARMIJO: Decision criteria,
13 defense-in-depth, and safety margins in decision
14 making.

15 MEMBER BLEY: Okay.

16 MS. DROUIN: The 1 through 12 are not in
17 any order. Don't interpret --

18 MR. DUDLEY: There's no priority or
19 ranking.

20 MS. DROUIN: There's no priority.

21 MEMBER BLEY: But I mean, we're calling
22 them by numbers.

23 MS. DROUIN: Right.

24 MEMBER BLEY: I have no idea what Number
25 9 is.

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1 MS. DROUIN: And it would have been easier
2 if --

3 MR. DUDLEY: Number 9 is decisions of
4 balancing risk.

5 MS. DROUIN: -- we had put 9 right after
6 1 because they're so closely related.

7 MEMBER BLEY: I get your point. Anyway,
8 that's what kind of strikes me, is that, those were
9 the things driving them to say, maybe we ought to do
10 a new framework, something more consistent, come up
11 with these broader events, but it was really the
12 places they saw these inconsistencies crop up that are
13 really vulnerabilities.

14 MR. DUDLEY: Perhaps what you're
15 suggesting is that when we recommend certain of these
16 improvement areas to the Commission and in that
17 recommendation we give them additional details on, if
18 we were to go down this area, you know, this is what
19 might result. We would have to do this, this, and
20 this, and we'd have to deal with this particular
21 issue, and maybe we can call that out more clearly
22 when we describe these activities to the Commission in
23 our SECY paper.

24 MEMBER BLEY: To me, if you put some
25 structure into this list and looked at it across some

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1 different issues I think you'd see links that tie
2 things together that would make it a more coherent
3 presentation.

4 CHAIRMAN SCHULTZ: The piece that I was
5 looking for for each of these improvement
6 opportunities is, why would we do this and what would
7 the result be? I don't know where you are with regard
8 to evaluating the improvement opportunities with the
9 attributes, but I would think that if each of the
10 improvements are done properly and to the right level,
11 that is, they're designed to be success-driven, and
12 when you look at the attributes to where you think the
13 improvement will lead you, you'd be hard-pressed to
14 differentiate between them using these attributes,
15 except for, perhaps, feasibility and costs, which is
16 quite a ways down the road of what we would really be
17 focusing on.

18 But with regard to safety, balancing,
19 stability, clarity, efficiency, you'd expect that you
20 would have those things, and so to differentiate
21 between them, I think is going to be difficult. But
22 instead, you laid out first, this is what this
23 improvement is going to achieve with respect to
24 current regulation, then you might have a better
25 opportunity to differentiate one to the other.

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1 And so I think, Mary, you said --

2 MEMBER BLEY: And I think you'd see
3 structure coming up if you started doing that.

4 CHAIRMAN SCHULTZ: Which connect together.
5 Some of these you need to do together in order to have
6 the success that you want, but then again, define what
7 that success is so that you could choose to do it.

8 MS. DROUIN: Right. I mean, there's
9 certain goals that, if you choose to go down this
10 path, they have to achieve, and they all have to
11 achieve it. But the thing is, they can achieve it to
12 different degrees. And so in that sense, you do use
13 them both as a goal you're trying to reach to
14 determine whether it even gets on the plate for
15 consideration.

16 If it can't achieve that goal, then it's
17 off, but then in the comparison, you know, one may do
18 a better job than the other, but the one that does a
19 lesser job might still be adequate.

20 MR. DUDLEY: What we're going right now
21 for each of these 12 areas is, each of these
22 improvement areas has its own write-up, the total
23 document is over 40 pages, but each of the areas is
24 defined in detail with key issues, challenges,
25 expected, you know, where did this come from? Did it

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1 come from the Near-Term Task Force, the Risk
2 Management Task Force? What are the expected
3 products? What are the expected challenges? What are
4 the costs?

5 So we're working on the details of these
6 12 improvement areas. We found that as we started the
7 ranking -- we started the ranking process too soon and
8 we couldn't reach that much agreement on the
9 evaluations because we weren't that aligned as to what
10 each of these 12 activities were. So we had to go
11 back and redefine each of these 12 areas in more
12 detail.

13 And it's a shame that we didn't have that
14 paper further along and were able to provide that to
15 you, because I think that would have made it a little
16 clearer that some of the detailed issues that you're
17 talking about that might be camouflaged in just the
18 title that I'm giving you, will show up later on in
19 our detailed write-ups of what these improvement
20 activities would consist of.

21 MEMBER BLEY: We'd love to see that. To
22 me, I can't believe that when you went through these
23 and started coming up with ways to establish
24 methodologies to establish new requirements in some
25 areas, establish processes that risk, defense-in-

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1 depth, and margins didn't crop up in every one of
2 those approaches.

3 You know, to me, that's a thread that's
4 got to be coming through the whole thing and --

5 MR. DUDLEY: Well, it didn't take long to
6 figure out that you had to do all three.

7 MS. DROUIN: We recognize that the
8 defense-in-depth is a cross-cutting issue.

9 MEMBER BLEY: And risk is too.

10 MS. DROUIN: And risk is too.

11 MEMBER BLEY: I mean, those are your
12 evaluation tools and measurable criteria. So there
13 are a different order of things in some of these
14 others.

15 MEMBER ARMIJO: Yes, they're not all of
16 the same kinds of things.

17 MEMBER BLEY: They're not all the same
18 kinds of things. That's right. Anyway, probably
19 enough.

20 MEMBER STETKAR: Well, but what I'm
21 hearing is, there seems to be an undercurrent here, at
22 least among the subcommittee members, of looking at
23 these 12 as not 12 individual write-ups, you know,
24 gee, we had to write these 12 things and now we're
25 going to study each one of those 12 things, but more

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1 looking at them as a whole and seeing, you know, what
2 degree of overlap are there?

3 And I don't hear back -- maybe we don't
4 appreciate what you're actually doing, but, you know,
5 what you just said, Dick, is we have 12 write-ups and
6 we had to go define, very carefully, each of these 12
7 things before we could rate each of those 12 things.

8 MR. DUDLEY: Correct, yes.

9 MEMBER STETKAR: So that's still what I'm
10 hearing as compartmentalized into, you know, a
11 spreadsheet of 12 things that each have, you know,
12 numerical ratings that you can then rank and --

13 MS. DROUIN: No, no, each write-up also
14 talks about its relationship --

15 MR. DUDLEY: To the other activities.

16 MS. DROUIN: -- to the others.

17 MEMBER BLEY: That's cross-connected.

18 MR. DUDLEY: Right. Yes, sure. That's
19 identified.

20 MEMBER BLEY: If you got that, I bet
21 you're pretty far along the path to this thing I've
22 been calling an organization. And I think it'd really
23 help you communicate and make sense of it all.

24 MR. DUDLEY: It doesn't take long to see
25 that certain things are inherently linked. You know,

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1 I mean, that's reflected in the descriptions of the
2 items; in the detailed descriptions.

3 CHAIRMAN SCHULTZ: Dick, could we do the
4 following, in the interest of schedule, for a moment,
5 could you go to your stakeholder feedback slide? I
6 think that's the next section that you're going to
7 discuss.

8 MR. DUDLEY: Yes.

9 CHAIRMAN SCHULTZ: And if you could just
10 walk through the remaining three slides of your
11 presentation.

12 MR. DUDLEY: Sure.

13 CHAIRMAN SCHULTZ: And then we'll take a
14 break, then we'll come back and see if there's a
15 reaction to the last three slides.

16 MR. DUDLEY: Okay.

17 CHAIRMAN SCHULTZ: And if so, we'll work
18 through that and then move to Mary's presentation.

19 MR. DUDLEY: Okay. Comments, just a
20 summary of a few comments that we got at the June 20
21 public meeting. There were a number of folks that
22 spoke against using PRA in the licensing basis, or
23 questioning its use. The Union of Concerned
24 Scientists didn't want PRA to be used in the licensing
25 basis because of their belief that PRAs are inherently

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1 defective, that they don't properly calculate core
2 damage frequencies. There were --

3 CHAIRMAN SCHULTZ: Did they suggest a
4 better approach?

5 MR. DUDLEY: No.

6 CHAIRMAN SCHULTZ: Okay.

7 MR. DUDLEY: A reporter actually said,
8 well, you know, if you do this, if you use the PRAs,
9 it will reduce the transparency of the licensing
10 process to the public because PRAs, most are
11 proprietary, and even if you have access to them,
12 they're so hard to understand that this use of PRA
13 will make the licensing process less transparent to
14 the public.

15 And then some industry representatives
16 said, well, are you going to apply Appendix B to my
17 PRA? What are you going to do if you use it in the
18 licensing process? What will be the QA requirements
19 that would apply to the PRA? So those were just some
20 comments that we got on June 20th.

21 And there was another concern that our
22 framework is applying to existing operating reactors
23 and evolutionary LWRs, which are all large reactors,
24 and there was a concern that, by developing this
25 framework separate from other licensing activities

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1 associated with small modular and other sized
2 reactors, that we would have some preferential
3 treatment of one versus the other. I think we already
4 have that problem and that the framework's not really
5 what's causing it, but that was a comment.

6 And then there was the comment that
7 regulation itself is an inherently patchwork process.
8 And that's how you write laws. Each law is a patch on
9 some sort of a problem that you see as you go through
10 life, or go through the regulatory process, or
11 whatever, and the implication behind that is that
12 there's really nothing wrong with a patchwork.

13 And there was another comment too that,
14 and this was true, the slides we presented back on the
15 public meeting really only focused on adding
16 requirements, because the NTTF only focused on adding
17 requirements. And so we really didn't make it clear.
18 But if you use certain PRAs in the licensing process
19 and actually establish this extended design basis
20 criterion, you know, you could move things two ways.

21 They could go from the design basis into
22 the extended design basis based on risk and they could
23 go the other way too. So those were the comments that
24 we got at the June 20 meeting. NEI wrote us a letter
25 in July, and I believe we've transmitted that to you,

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1 you know, they said they thought the schedule was too
2 aggressive. They thought we should be focusing,
3 instead, on Tier-1 activities.

4 They said that the problem statement needs
5 to be better defined before we go off and try to fix
6 -- you know, you need a better description of what's
7 broken. They suggested that we consider lessons
8 learned from past risk-informed efforts. We had a
9 number of risk-informed initiatives that didn't get
10 too far and some that went pretty far and still aren't
11 being used.

12 And so they suggested that we look at past
13 risk-informed efforts. And there was another comment
14 that we should look at cumulative resource impacts.
15 And we think we're doing that in our estimation of
16 costs and other things as we try to evaluate and rank
17 these individual criteria.

18 And if it were decided by the Commission
19 that we should implement a new regulatory framework,
20 that would be through regulation. And when we get in
21 regulations, we have a cumulative impact process that
22 we're following now based on the new direction from
23 the Commission.

24 So that's what NEI told in their letter of
25 July 16th and is that -

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1 CHAIRMAN SCHULTZ: Let's hold this slide
2 until the end of the program today.

3 MR. DUDLEY: Okay, fine.

4 CHAIRMAN SCHULTZ: And with that, I'll
5 call a break until 3:15.

6 MR. DUDLEY: Okay.

7 (Whereupon, the above-entitled matter went
8 off the record at 3:00 p.m. and resumed at 3:15 p.m.)

9 CHAIRMAN SCHULTZ: I'll bring the meeting
10 back into session and the next portion of the
11 presentation, Mary, you're going to describe your
12 work, or you're going to report on the work of the
13 working group associated with the staff concept of
14 defense-in-depth, so welcome.

15 MS. DROUIN: Thank you.

16 MEMBER BLEY: Mary, before you get
17 started. A year and a half, two years, maybe it was
18 longer ago, that you brought a draft on defense-in-
19 depth, the draft NUREG, is this at all related to
20 that, or as an extension, or is it similar?

21 MS. DROUIN: I'm going to answer that in
22 the presentation. Are you talking about --

23 MEMBER BLEY: Your NUREG on defense-in-
24 depth.

25 MS. DROUIN: Right, yes.

1 MEMBER BLEY: Yes.

2 MS. DROUIN: This will get into that.

3 MEMBER BLEY: Okay.

4 MS. DROUIN: So this is the easy part of
5 the presentation.

6 MEMBER BLEY: Okay. We'll see.

7 MS. DROUIN: I'm trying to set the tone.

8 MEMBER BLEY: Good for you.

9 MR. DUDLEY: It's worth a shot, yes.

10 MS. DROUIN: Yes. The first couple of
11 slides is just going through and bringing you up to
12 speed of what the NTTF said on Recommendation 1 in
13 regards to defense-in-depth. They were looking for
14 more balanced application using risk insights. So
15 they brought the risk part, and right away, the
16 application could be strengthened by including
17 requirements for beyond design basis events, so go
18 past just staying at DBAs.

19 And to re-examine the definition of level
20 of protection, regarding whether it's adequate, by
21 considering the low-likelihood and high-consequence
22 events. And they also felt that, even though the
23 defense-in-depth as a philosophy is useful, and can be
24 broadly applied, they don't feel, and I want to point
25 out they because I don't think that we're going to

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1 agree to that, that it's not susceptible to a rigid
2 definition because it's a philosophy.

3 And we're not talking about, necessarily,
4 a rigid definition, but to a place where we can come
5 to a better understanding of adequacy of defense-in-
6 depth to make it a lot less subjective.

7 MEMBER RAY: Mary, just in case you're
8 using this someplace else. In your third bullet there
9 I think the word is regarded. I'm just trying to help
10 you with -- I can read it, but --

11 MEMBER SHACK: Third word from the end of
12 the bullet.

13 MEMBER RAY: Third bullet; third word from
14 the end. That is regarded.

15 MS. DROUIN: I'm sorry. I'm on the wrong
16 reference.

17 MEMBER RAY: Yes, I figured you were.

18 MEMBER SHACK: Regarded on 29.

19 MS. DROUIN: Yes.

20 MEMBER RAY: Somebody might read that
21 someday and --

22 MS. DROUIN: Yes, thank you. This like
23 the fourth time we've used these new graphs, so thank
24 you. Now, on this slide, this is the NTTF's view in
25 terms of what you should be accomplishing, you know,

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1 in terms of the application of the concept; have
2 protection from external events that could lead to
3 fuel damage, being able to mitigate the consequences
4 of these kinds of accidents, and focus on preventing
5 core and spent fuel damage and uncontrolled release,
6 and have emergency preparedness in place to mitigate
7 the effects of releases to the public and the
8 environment should they occur.

9 So this was a very narrow identification
10 in terms of what you should be achieving and
11 accomplishing with defense-in-depth. So now, how did
12 we approach looking at defense-in-depth? So we wanted
13 to stand back first and educate ourselves really well
14 over the history of defense-in-depth and what can we
15 learn going back?

16 And this is just some of the list.
17 There's other sources here. In fact, looking at WASH-
18 740, which was published in 1957 under the Atomic
19 Energy Commission, there's also some regulations that
20 aren't listed here. There was actually also a, I
21 think it was a subcommittee with the ACRS where the
22 whole ACRS meeting was on defense-in-depth and you had
23 Tom Cress, you had Dennaro, I'm trying to remember
24 everybody who spoke at that meeting, but there were a
25 lot of insights that came out during that

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1 presentation.

2 We've gone back and pulled that and added
3 this to it. So you can see there's been a real wealth
4 of sources here when you're looking at defense-in-
5 depth that, you know, spans over a 45-year period and
6 what can we learn about it? So in reviewing it, how
7 could we approach the review, or how should we
8 approach the review, to really get something useful
9 out of it?

10 And trying to get to what I would say to
11 establish, ultimately, a defense-in-depth
12 infrastructure. And what I mean by that is looking at
13 it from this perspective, why is there a need for
14 defense-in-depth, and given that need, what is the
15 goal or the objective, what is it that we're trying to
16 accomplish?

17 And then having a good understanding of
18 what it is we're trying to accomplish, how should we
19 approach? You know, what strategy should we be using
20 to approach trying to address the need and the
21 objective? And so these first three bullets are
22 really trying to setup, you know, what would be our
23 expectations regarding defense-in-depth?

24 And then given those expectations, you
25 know, coming up with a decision criteria, or a

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1 process, to implement that approach and that strategy,
2 and to come up with decision criteria and a process
3 for determining whether or not we've achieved adequate
4 defense-in-depth.

5 Have we accomplished that objective such
6 that we've addressed the need for it? So trying to
7 approach this in a hierarchal cohesive integrated way.
8 And so those were the things that we were looking to
9 get insights on by looking at the history of defense-
10 in-depth.

11 So what we found, and I'm going to get
12 into more details on what we found and where we're
13 planning on going is that, you know, you've heard over
14 the years that there's no agreement on defense-in-
15 depth. Well, I would offer that there's a lot of
16 agreement and there is a lot of tremendous common
17 themes on defense-in-depth.

18 When you get into this idea that, you
19 know, there's no agreement, it's going to be when I
20 see, is because of language. And I will use an
21 example of multiple barriers. That's a very big
22 common theme. Now, some people, when they talk about
23 it, they will say, okay, they'll define it as an
24 objective, or they'll say, this is the definition, or
25 somebody else may say, this is the criteria, or this

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1 is how you decide you have adequate defense-in-depth.

2 But if you move that aside and just say,
3 everybody agrees we should have multiple barriers. We
4 have a common theme there. So that's why, in looking
5 at them, we were trying to go back and look at the
6 history and see, do we have common themes in each of
7 these things? Do we have a common theme for the need?
8 Do we have a common theme for what the objective is?

9 And if so, then can we then build
10 something cohesive there? So if we start out with the
11 very first one in terms of the need, what you see here
12 are just quotes across all the different sources. I
13 wouldn't say every single one, because then it would
14 have just been pages here.

15 And we don't need to go through all of
16 these, but this is what you see when you look at the
17 history of defense-in-depth in terms of what has been
18 said that you would classify that that's the need.
19 You know, guard against unwanted events, related to
20 the issue uncertainty, et cetera.

21 And so when you do look at what has been
22 said on defense-in-depth for the need of it, there
23 does appear to be, you know, a common theme; a general
24 consensus. And that consensus is that there is a
25 common recognition that there is a lack of knowledge,

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1 or uncertainty, you know, with regard to, you know,
2 the performance of the plant, that we aren't quite as
3 sure as we think we are in terms of how the design
4 will really work the way it is, et cetera.

5 So there is a good agreement, you know,
6 over history that we have uncertainties, and we have
7 a lack of knowledge, and we need to do something about
8 it. And that's the lack of knowledge in the basic
9 design. So then given that we have this lack of
10 knowledge, then how do we go about, you know,
11 determining what is our goal and how do we keep our
12 risk, you know, acceptably low?

13 Is that what we're wanting to do given
14 that we have this lack of knowledge? And again, when
15 you look at it in the literature, what's written up in
16 regulations, what's written up in regulation guides,
17 you know, what has been written up by this committee,
18 et cetera, there is, again, you know, a very common
19 theme that, you know, given that we have this lack of
20 knowledge, these uncertainties, we want to do
21 something to make sure that our risk is acceptable.

22 MEMBER ARMIJO: Mary, when we have lack of
23 knowledge, engineers throw in margin so that the
24 design, as they designed it, should work. But I
25 thought defense-in-depth was totally separate from

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1 that. It's an additional theme that's different that
2 backs up something that shouldn't work, but may not.
3 So is margin and defense-in-depth the same thing?

4 MS. DROUIN: We're going to get to that.

5 MEMBER ARMIJO: Okay.

6 MS. DROUIN: We're going to get to that,
7 because that's now getting into, given that we want to
8 keep the risk to a low level to deal with
9 uncertainties, and again, I'm repeating myself that,
10 there's a common recognition that the objective is to
11 avert damage to the plant by preventing mitigating
12 accidents, thereby, ensuring protection of the public
13 health and safety while maintaining an acceptable low
14 probability of accidents.

15 But that's the goal there, is to keep your
16 risk low.

17 MEMBER ARMIJO: Right.

18 MS. DROUIN: And to do that in the face of
19 uncertainties and how do you achieve that? So then we
20 went through and looked at, what are people saying,
21 you know, are the strategies for achieving that? And
22 you see people say, well, there's three lines of
23 defense; prevention, protective systems, engineered
24 safety features, successive protective barriers,
25 prevent accidents, and if prevention fails, limit

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1 their consequences.

2 Three layers of defense; maintaining
3 multiple barriers. And you can see here that no one
4 has proposed, outside of 1860, and they're the
5 outlier, but everyone else has not proposed safety
6 margins as part of defense-in-depth, even though,
7 personally, I do view it as defense-in-depth. You
8 have safety margins there to take care of your
9 uncertainty.

10 So you do see a common theme in terms of
11 a similar concept of a strategy for defense-in-depth
12 and it involves, you know, basic protections, which,
13 at a high level, is prevention of accidents and it's
14 mitigation of accidents. Now, when you go in, you
15 know, you'll see different definitions of prevention
16 of accidents, which, you can see, they defined it as
17 preventing the occurrence of an event to preventing
18 the actual progression of the event.

19 And mitigation, some people define it very
20 narrowly, saying that it's ending the progression of
21 a severe accident, to containing a severe accident, to
22 mitigating the consequences. But no matter how you
23 look at it, it's encompassing that whole gambit from
24 trying to keep your challenges to a minimum to,
25 ultimately, dealing with the consequences from a

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1 health perspective.

2 And some people define them in two levels,
3 some people define them in five levels, some people
4 define them in three levels, but they're all trying,
5 you know, what if this doesn't happen, then what you
6 have in place next to pick up?

7 So in terms of what I would call these as
8 the expectations, you know, not a whole lot of
9 difference in, really, what people are saying. It's
10 the words they are choosing, but if you get past that,
11 again, you see very much a common theme. So we aren't
12 all over the place on terms of defense-in-depth.

13 Where we begin to come --

14 MEMBER RAY: Well, I'm not so sure. I
15 mean, I think, obviously, all you said, I wouldn't
16 disagree with, but I would say, over time, we are
17 getting a more broader definition. When you refer to
18 flex, for example, as a part of defense-in-depth,
19 because it is intended to mitigate or halt the
20 progression of a severe accident, for example.

21 I don't think 15 years ago people would
22 have thought that that was defense-in-depth; whereas,
23 today --

24 MS. DROUIN: I didn't hear what you said
25 at the beginning.

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1 MEMBER RAY: Oh, the flex program to use
2 responses that can consist of a variety of different
3 things that we didn't used to think of as defense-in-
4 depth, today we do, right? You're referring to that,
5 I think --

6 MS. DROUIN: Well, but what I would argue
7 with you on this is that, that is how you would
8 implement defense-in-depth, that is not, in and of
9 itself, defense-in-depth. Defense-in-depth is trying
10 to put something in place so --

11 MEMBER RAY: Well, all right. Fine. But
12 in any event, the things that you would credit as part
13 of your defense-in-depth, today, I think are broader
14 than they were in the past.

15 MS. DROUIN: Absolutely. And that's
16 getting into the next part, the implementation. But
17 I think at the high level, in terms of what we expect
18 them to do, that has been a common theme. In terms of
19 how you achieve it has been inconsistent.

20 MEMBER RAY: All right. I'll keep
21 listening.

22 CHAIRMAN SCHULTZ: But on the other hand,
23 Mary, as you went through the earlier part of the
24 presentation, some of those slides had 20 different
25 ways to describe defense-in-depth and its

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1 implementation, and its parameters, and so forth.

2 MS. DROUIN: Yes, but I would suggest that
3 when you look at the 20 different ways, they all came
4 down to dealing with accident prevention and accident
5 mitigation.

6 CHAIRMAN SCHULTZ: Could have come down
7 to, but they were expressed differently.

8 MS. DROUIN: When you go into the details
9 and you read in-between the lines, it really came down
10 to that. You know, we have written up a 50-page
11 summary of all of this, and I think that when you read
12 that -- you know, I'm trying to summarize quite a bit
13 of dialog that's in the literature.

14 CHAIRMAN SCHULTZ: Right. What you're
15 saying and concluding, I believe, is excellent, but
16 wouldn't it have been nice if one didn't have to read
17 in-between the lines in order to demonstrate that
18 everyone meant the same kind of thing?

19 So I would hope what would come out would
20 be that crystallized definition of what defense-in-
21 depth is, what it intends to do, so that the
22 implementation could be more uniform and the
23 understanding could be more uniform going forward.

24 MS. DROUIN: Well, I would suggest that,
25 when you read is, how do you try to put your hand

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1 around defense-in-depth? And so the way I've tried to
2 do that is to say, again, why do you need it? And get
3 away from whether people are saying that a particular
4 item is defense-in-depth or, I'm not saying this very
5 well, trying to take what they've said and put some
6 sense to it instead of getting marred down into the
7 details of it.

8 What are they really trying to
9 communicate? So when they talk about, you know, let
10 me try and pick one, quality and quality assurance.
11 You know, to me, that's not a strategy. So I'm
12 saying, you know, I'm not going to say that's not part
13 of defense-in-depth. What I've done is, I've come and
14 categorized this is, that's how you implement defense-
15 in-depth.

16 So I have tried to look at the history and
17 then categorize it into these five bins of trying to
18 say, are they really talking about the need for
19 defense-in-depth here or are they really talking about
20 how you implement it? Are they really talking about,
21 you know, whether or not you've achieved adequacy of
22 defense-in-depth?

23 And so when I try and put that
24 interpretation on what has been written, then I start
25 seeing some good common themes. Where I stop seeing

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1 the common themes is the implementation of it. And
2 you do see some common themes. You know, there is
3 agreement among some people that quality assurance is
4 defense-in-depth. Other people don't talk about it.
5 They may talk about something else, but it's still,
6 you know, an implementation of it.

7 It's the outcome of saying, I need
8 defense-in-depth. So the outcome, if I apply this
9 process and this strategy, then that should lead me
10 into, okay, this is what I'd end up having. I would
11 have quality assurance.

12 MEMBER BROWN: I guess from a component
13 standpoint I wouldn't really agree with that. I mean,
14 if I build a system that's supposed to protect me and
15 I got another thing, if that fails, that's going to
16 protect me, and then I got another thing of something,
17 that's going to protect me, I've got to ensure those
18 work. Engineering design, I've got to crank that in.
19 That's not a defense-in-depth.

20 That's make sure the piece I designed is
21 going to work. The quality assurance, make sure they
22 put it together to make sure it's going to work. All
23 I'm saying, whoever said all that, the three pieces
24 are the defense-in-depth. The other things are there
25 to make sure those pieces work, whether it's

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1 maintenance, whether it's design practices, otherwise
2 you could say, well, gee, we built it out of good
3 materials.

4 That's defense-in-depth, or, the designers
5 are really good guys because they've got Master's
6 Degrees vice Bachelor's Degrees and they've designed
7 14 things. And I think that's muddying the waters
8 when it comes to barriers that have to execute, or
9 operate, to protect you.

10 So I mean, I read through all your list
11 here, two or three pages worth of stuff, and
12 understand it.

13 MS. DROUIN: I'm not suggesting our
14 putting any kind of interpretation, whether these are
15 things that should be included as part of defense-in-
16 depth. All I'm trying to say is that, this is what
17 the views are. Now, I think that when you start and
18 you can agree to, you know, here's the need, here's
19 the objective, and here's your strategy, then you can
20 develop a process with the decision criteria of how
21 you go about making changes in your design an
22 operation to ensure that you have defense-in-depth.

23 MEMBER BROWN: I just think if NRC buys
24 into all these little caveats along the way as part of
25 it, then you start to lose sight of what the actual --

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1 MS. DROUIN: Well, I would not -- to me,
2 this is just showing that you're all over the place
3 and you should have a process in place with decision
4 criteria that would lead you to, that if we had
5 different people looking at those decision criteria,
6 hopefully they would come to the same thing.

7 MEMBER ARMIJO: Mary, maybe if you would
8 just define what is not defense-in-depth, for example,
9 in a given design. Design margin, you put in there,
10 quality assurance, you put in there, the maintenance,
11 all of those things are not defense-in-depth. That
12 thing should work as is --

13 MS. DROUIN: Okay. Again --

14 MEMBER ARMIJO: -- and all of those
15 features make it work.

16 MS. DROUIN: Okay.

17 MEMBER ARMIJO: Defense-in-depth is in
18 addition to that.

19 MS. DROUIN: I agree. All I've given you
20 here is what other people have said.

21 MEMBER ARMIJO: Yes, and you should tell
22 them, don't say that anymore.

23 MS. DROUIN: Well, this is not where we're
24 going to end up.

25 MEMBER BROWN: You should just say no.

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1 MEMBER ARMIJO: Should say no.

2 CHAIRMAN SCHULTZ: I think we're going to
3 wind up in the same place and my feeling is that
4 you've done a great job describing why we need to --

5 MS. DROUIN: Yes.

6 CHAIRMAN SCHULTZ: -- move to clarity in
7 this area so that we can get the benefit that is
8 expected and deserved from defense-in-depth, and I
9 think we'll get there based upon what you've done.

10 MS. DROUIN: Right, and so this was just
11 trying to give you, you know, here's what people have
12 said. You know, do we agree with this? Of course,
13 some people who said, of course, they're going to
14 argue violently that that's what it is.

15 But I think if we go back and we can agree
16 to the strategy and then come up with the process with
17 the decision criteria, then you have the grounds where
18 you can debate because, you know, once you have your
19 decision criteria in place, then either you meet those
20 decision criteria or you don't, or they have no
21 relevance to the decision criteria.

22 But I think it's very important that, you
23 know, we come up with, you know, this process for, how
24 do you implement it.

25 MEMBER BROWN: I think that's a danger.

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1 You either have three barriers or you don't,
2 regardless of all the other shifafa that you throw in
3 there. So I mean, I understand people making these
4 arguments, but you've either got three layers of depth
5 of component hardware, you know, fuel barriers,
6 containment, reactor vessel, coolant system, whatever
7 it is, those are things that are your barriers.

8 But if you get wrapped up in saying, now
9 I've got to evaluate those in terms of all these other
10 miscellaneous strategies and tactics, I think you're
11 setting yourself up to have a lot of arguments with
12 people and you get lost in the --

13 MS. DROUIN: Well, now, as you say when
14 you say three barriers, how do you interpret what
15 those barriers are? What do you mean by that?

16 MEMBER BROWN: Well, it's easy. It's a
17 fuel barrier, or it's a reactor vessel, or it's a
18 containment, or it's five different instruments that
19 you have to have work that only need two of them.
20 That's defense-in-depth. Redundancy and effectively
21 is defense-in-depth because you only need two of them,
22 out of the four, to work.

23 That has nothing to do with all this other
24 stuff that people want to say, well, gee, I only have
25 to have two channels because we designed them really,

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1 really well and my software is perfect, and it'll
2 always work right, which is blatantly wrong. So you
3 start arguing about stuff like that.

4 MS. DROUIN: I think that saying defense-
5 in-depth is your barriers is your strategy, but I
6 think, you know, in implementing it, I just am going
7 to have to disagree because I do think you need some
8 kind of process with decision criteria to come to,
9 well, how do you know you have enough barriers?

10 MEMBER BROWN: You can argue about whether
11 you got two, three, four, or five, but that's the same
12 as the argument --

13 MS. DROUIN: Somebody is going to come in
14 and say two is enough. Another person is going to
15 say, no, you need five. You know, how do you make the
16 decision when you have enough of that in place? How
17 do you make a decision that, you know, one barrier is
18 enough as opposed to, you know, another barrier? You
19 need some kind of way, and right now, we're all over
20 the place and it's very subjective. It's very
21 subjective.

22 MEMBER BROWN: Well, I don't see these
23 other items as being in the way or making those other
24 ones subjective. I think it muddies the waters. I
25 mean, that's a personal thing.

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1 MS. DROUIN: No, but again, I will have to
2 reiterate, we're not agreeing or disagreeing. We're
3 just showing you what other people's views have been
4 on this topic and why it's all over the place and
5 inconsistent. And to me, that shows very clearly, at
6 least in my mind, why there is a need to finally
7 establish for the Commission to come out and say, you
8 know, here's what we mean by defense-in-depth at a
9 high level, and then developing the guidance for
10 establishing for how do you achieve the Commission's
11 expectations in making a determination you have
12 enough?

13 Because everything that's been written up
14 there, when you get down to determining it has enough,
15 people are either very specific by saying it's quality
16 assurance. Well, do we really think that that's part
17 of QA? I mean, sorry, part of defense-in-depth? You
18 know, they'll say it's the fuel barrier, it's the
19 containment, it's this, and that's all it is.

20 CHAIRMAN SCHULTZ: And so today we, and
21 I'm looking forward to this slide, don't get there.
22 I mean, is it the intention of the working that, by
23 the time February comes, there will be a clear and
24 clean description, definition, of defense-in-depth
25 assimilated from all of this information?

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1 MS. DROUIN: Well, we've done enough and
2 we haven't come to an agreement on the working group
3 yet, but in my mind, we've done enough that we can
4 give the Commission a good idea for what we should be
5 saying in terms of, you know, the need, objective, and
6 the strategy. But in terms of the process, coming up
7 with the decision criteria for implementing and
8 determining that you have adequate defense-in-depth,
9 no, that's going to have to be the Commission coming
10 back and telling us to go develop that guidance.

11 I mean, part of defense-in-depth, you
12 know, I would argue, is EP.

13 MEMBER BROWN: What's that?

14 MS. DROUIN: Emergency preparedness. I
15 think, you know, now some people will argue that's a
16 barrier. Not everybody argues that a barrier is
17 something physical.

18 MEMBER BLEY: Well, by design, you don't
19 need it, if your design works right.

20 MS. DROUIN: Right. And some people would
21 come and say --

22 MEMBER BROWN: Something bad is different.

23 MEMBER ARMIJO: I don't see that as
24 defense-in-depth.

25 MEMBER BROWN: Emergency preparedness is

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1 getting the people out of the way of what didn't work
2 because otherwise it's going to have a bad result. So
3 I would have never perceived that as a defense-in-
4 depth.

5 CHAIRMAN SCHULTZ: Well, one of the issues
6 that you see and what you've assembled, one of the
7 elements, is that, some people look at defense-in-
8 depth in what I would call vertically, where you have
9 the fuel, the vessel, the containment, emergency
10 planning, on and on, until you protect the -- all the
11 barriers to protect the public.

12 And others look at it as Charlie was
13 describing is, you also have defense-in-depth that
14 goes horizontally, which is component A, B, C, D, all
15 of which may intend to do the function, and then you
16 have diversity, which is, I have a component that
17 works with electricity and I've got a component that
18 works with steam, and both should be there independent
19 of what my PRA says because defense-in-depth is
20 intended to, as you've already described, at least in
21 some philosophy, to account for the uncertainty that
22 we know we have in PRA; can't get rid of it.

23 So in addition to the low risk, we also
24 apply defense-in-depth.

25 MS. DROUIN: Right. And --

1 CHAIRMAN SCHULTZ: So those are the
2 features that I think you're talking around. I'm just
3 a little concerned that, if the endpoint in February
4 is, we're providing a lot of -- we've demonstrated
5 that there's a lot of information out there on
6 defense-in-depth and it's not where we want it to be,
7 and therefore, we want you, the Commissioners, to tell
8 us that we ought to do something next is a shortfall
9 to what I think the Commissioners' expectations would
10 be, which I think --

11 MS. DROUIN: Well, we are going to go
12 further than just say, okay --

13 CHAIRMAN SCHULTZ: Thought you would.

14 MS. DROUIN: -- you need to state, we're
15 going to give them some ideas.

16 CHAIRMAN SCHULTZ: Yes.

17 MS. DROUIN: But we do need the Commission
18 -- we cannot, right now, in this SECY paper, because,
19 just through the concurrence process, we would never
20 get there by February, trying to get everybody to
21 agree, you know, on this. This is not a trivial thing
22 and it's going to have to be more than just a small
23 working group that comes into play.

24 All the offices are going to have to have
25 a major role in dealing with this, but I can tell you

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1 right now, from looking at all the literature, most of
2 the views in terms of what's been written down on
3 defense-in-depth, very little of it defines defense-
4 in-depth as the fuel --

5 MEMBER BROWN: The reactor; cooling
6 system.

7 MS. DROUIN: The reactor vessel and
8 containment. Now, I can tell you, 30 years ago when
9 I was first in this field, that was my view of
10 defense-in-depth, but that view has been long gone for
11 a long time.

12 CHAIRMAN SCHULTZ: And maybe it should be.

13 MS. DROUIN: You know, I'm not saying
14 what's right or wrong, I'm just saying, you know, this
15 is what, you know, the views have been and here's
16 where we've been for the last 20 years, and just
17 trying to --

18 MEMBER BLEY: Wasn't there an SRM several
19 years ago telling you to clean-up morass? Seems to me
20 now you're just saying, you're right, it's a morass.

21 MS. DROUIN: That was a policy issue that
22 was raised to the Commission back in 2003. The
23 Commission did come back and say, they like the idea
24 of a policy statement moving forward, but think about
25 maybe changing the PRA policy statement. We got input

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1 from the public and we went back to the Commission, we
2 said, that wasn't a good idea. It should be its own.

3 And we told them that we were going to do
4 the technical basis work for that under 1860.

5 MEMBER BLEY: Well, okay.

6 MS. DROUIN: I forgot to bring this back
7 to 1860, so, you know, 1860 did look, you know, at a
8 lot of these views in coming up with their
9 recommendation, but, you know, ultimately, the
10 Commission is going to have to -- you know, the
11 Commission may well come back and say, defense-in-
12 depth is the fuel; the vessel; the containment.

13 I mean, they may well say that, I don't
14 know, but, you know, we're trying to now -- I think
15 we're at a point where we need the Commission to come
16 in and say what they feel is defense-in-depth and
17 we're going to give them our recommendation for what
18 we think it is, and to --

19 MEMBER BLEY: So before you submit this
20 you will have a recommendation, or some options, on
21 ways they could respond?

22 MS. DROUIN: Some ideas, yes, but that
23 won't get into developing the guidance. I mean, we
24 will tell them the guidance will take this into
25 account, it would look at these kind of criteria, but

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1 we cannot develop actual guidance. You know, that
2 goes beyond the scope of what we've been asked to do
3 under this working group. And to be quite frank,
4 there's not the time to do it. You know, it's not
5 going to be a trivial exercise.

6 MEMBER BLEY: Said another way, are we at
7 the spot that there's no way there's going to be
8 consensus within the staff and you're looking for the
9 Commission to put some definition on this?

10 MS. DROUIN: I just briefed Commissioner
11 Magwood on this and he did like the idea and he was a
12 little bit skeptical about that we could actually come
13 up with a process. And what I reminded him as an
14 example of why I strongly believe we can get there is
15 the SALP process. There was nothing more subjective
16 than that.

17 And when it was, you know, first argued,
18 well, we could never come up with something that would
19 be structured and formal, and quantitative, it's
20 always going to be subjective, and, you know, it was
21 fought to change the SALP process, but look what a
22 great advancement we've made with the ROP. You know,
23 does that mean that there's not room for it, but I
24 mean, my gosh, nobody would ever want to go back to
25 the SALP process.

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1 You know, the ROP, you know, was a
2 tremendous improvement. So I don't see why, you know,
3 to me, you can't do the same thing. You know, when
4 people talk about things being subjective, they really
5 aren't because you have some kind of criteria you're
6 using when you make a decision, so it's just getting
7 everybody to tell us, well, I don't think that's
8 defense-in-depth. They can't do that because of
9 defense-in-depth. Well, what is it?

10 MEMBER BLEY: Maybe you can go through the
11 rest of your slides. Maybe you're going to get
12 somewhere. So far, it's a catalog.

13 MS. DROUIN: Well, we pretty much, you
14 know, that was kind of the slides.

15 MEMBER BLEY: Have you defined this
16 process for the Commission?

17 MEMBER ARMIJO: But, Mary, at the end, are
18 you going to help us define how much defense-in-depth
19 is enough and how do we know?

20 MS. DROUIN: Yes.

21 MEMBER ARMIJO: To me, that's a useful
22 thing.

23 MS. DROUIN: Yes. I mean, you know, these
24 were the slides that we showed to the public meeting,
25 so, you know, we said, should the staff make the

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1 recommendation? I mean, we are going to make a
2 recommendation.

3 MEMBER SKILLMAN: Mary, let me ask this,
4 is there a definition of defense-in-depth from
5 aerospace, or from commercial aviation, or from
6 pharmaceutical, or dangerous chemical industries where
7 one would say, yes, that's really what we mean by
8 defense-in-depth as a way to cut through all the fog
9 and get to the, I think, real philosophical difference
10 between the hardware approach, which was Charlie's,
11 and the vertical approach that Dr. Schultz mentioned;
12 a series of programs?

13 It seems that there probably is a
14 definition of defense-in-depth that a wide swath of
15 high-level professionals would say, yes, that's what
16 we mean when we say defense-in-depth, and it would
17 have the intended consequence of marshaling some
18 discipline around the discussion.

19 It seems as long as there are 25 or 30
20 different ways of looking at it, and by pandering with
21 those 25 or 30, the discussion just never ends.
22 Whereas, if we might say, high-tech industries that
23 deal with dangers every day have developed a momentum
24 around this idea of defense-in-depth and here's how
25 it's handled. Might there be a success path there?

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1 MS. DROUIN: Well, the problem is, and I
2 can tell you, you know, as part of this working group,
3 I didn't go there. Now, the reason I didn't go there
4 is because, when we were doing 1860 and looking at
5 defense-in-depth, we did try to go outside of the
6 nuclear community, and, you know, where do you start?

7 You know, you start Googling the word
8 defense-in-depth and the problem is, there's probably
9 a lot of good thoughts out there, but they haven't
10 called it defense-in-depth, so how do you find it?
11 You know, a lot of the things that we have on our list
12 that we've looked at, they actually don't use the term
13 defense-in-depth, but they talked about multiple
14 barriers.

15 And so the concept of what defense-in-
16 depth is trying to achieve is out there. Personally,
17 I look at it and I say, you know, English dictionary
18 is a pretty darn good place to go look for defining
19 words. And so when you go back and you look at, you
20 know, what does defense mean and what does in-depth
21 mean? To me, you are adding something on, you're
22 doing something extra, to protect something.

23 MEMBER BROWN: You know, I really hate to
24 have that thought process saying, hey, I'm only
25 thinking about a hardware approach, because that

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1 doesn't really adequately describe the thought
2 process. You have multiple circumstances of defense-
3 in-depth. This is, in my mind and what I've dealt
4 with for years, you have the basic operating medium of
5 the fuel, the reactor vessel, and containment.

6 That is, if the fuel breaks down, you've
7 got the reactor vessel and the primary coolant system
8 that contains it. If that fails, then you've got the
9 other part. If you have a breach in the coolant
10 system, you've got a safeguard system to make up water
11 to try to minimize and mitigate that. You have, to
12 make sure that system is okay, redundant pieces.

13 Those redundant pieces are, in fact, a
14 defense-in-depth for the safeguard system. You want
15 to make sure the reactor shuts down. So what do you
16 do, you have multiple channels, of which at least two
17 have to operate, that's a defense-in-depth to ensure
18 the reactor trips and shuts down.

19 So you have to look at the specific design
20 basis events and look at what is the sequence of
21 things that could happen and what things do you have
22 in place to provide more than just one barrier to
23 having bad consequences. So it's not just one set of
24 things. You know, that's the way I've always thought
25 about it.

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1 MEMBER BLEY: I think everybody kind of
2 gets that, but I guess I'd challenge us all, from the
3 things I've heard us say, try to write down a real
4 clear definition and then see if it's restricted to
5 the thing you'd like it to, and it's pretty darn hard
6 to write that down and not get the ones you'd say, oh,
7 that's not defense-in-depth.

8 MEMBER BROWN: I don't disagree.

9 MEMBER BLEY: In fact, the one you gave
10 us, Charlie, then a couple of the things you said
11 weren't defense-in-depth would fit that definition.

12 MEMBER BROWN: Like what?

13 MR. BENDICK: EP.

14 MEMBER SIEBER: Yes, two wings on an
15 airplane.

16 MEMBER SKILLMAN: I'd say at least one of
17 them. You need one at least.

18 (Simultaneous speaking)

19 MS. DROUIN: That's why I think it is very
20 timely right now to try and put a handle on this, to
21 try and list, succinctly, you know, what are our
22 expectations, and how do we achieve them, and how do
23 we determine that it's adequate?

24 MEMBER STETKAR: This notion of adequacy
25 in defense-in-depth, I think, and it's on a couple of

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1 your slides there, merits some thought, and obviously
2 you've been thinking along those lines because I'll
3 come back to my standard example of a fairly decent
4 sized, let's call it about a 5 meter diameter
5 meteorite. What's adequate defense-in-depth against
6 that threat?

7 Emergency planning might be, from a
8 nuclear perspective. We don't design plants against
9 10 to the minus 7 earthquakes. So I don't care how
10 many barriers I have, because give that threat, any
11 number of those barriers aren't going to work. Now,
12 you can say about the infrastructure, maybe emergency
13 planning doesn't do all that well against that threat
14 either, so what is an adequacy of defense-in-depth?

15 It gets a little bit to what Charlie says.
16 If I just think of a plain vanilla, you know, hiccup
17 in the plant, the notion of fuel, and reactor vessel,
18 and containment might be more than adequate defense-
19 in-depth for that kind of threat. You follow me?
20 That's one of those margins. I sure would like more.

21 MEMBER BLEY: Let me throw in my two cents
22 worth. I don't think adding redundancy is defense-in-
23 depth. That's what I do to meet my reliability
24 requirements. I do everything to make my design work.
25 I have QA, I have good design, I have maintenance, I

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1 have testing, I have redundancy to meet my reliability
2 requirements, but when the world doesn't work the way
3 my calculations and experiences say it should, I do
4 something else to take care of that, and that's what
5 this stuff is.

6 Mary said it earlier on in something
7 pretty simple, it's the thing that goes beyond all of
8 those pieces you put in the design when the day
9 happens, it isn't the way you thought it was, this is
10 something extra to take care of it.

11 CHAIRMAN SCHULTZ: That's a diverse
12 approach.

13 MEMBER BLEY: It's not so much diverse,
14 it's a little extra more than you thought you needed
15 to take care of -- and the diversity I design in to
16 get my reliability because I've looked at places I can
17 lose my redundancy, so I use diversity. That's part
18 of my design. This is, even so, the bad day comes and
19 it breaks, I'm within my design, but the bad day
20 comes, I want something else to back me up, or mother
21 nature works in a way I hadn't expected.

22 CHAIRMAN SCHULTZ: I only mention
23 diversity because you described the design features
24 and redundancy associated with that. That's the
25 routine way in which the design process has worked and

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1 there's plenty of plants out there, old and new, that
2 don't have diversity, they have redundancy. And I had
3 thought that defense-in-depth, in fact, included
4 diversity, or that diversity was not something that
5 you were relying upon to meet the challenge, but was
6 there in case the challenge was different than what
7 you designed for.

8 MEMBER BLEY: Well, the reason we put a
9 turbine-driven pump and a motor pump, we do that by
10 design and, you know, when we look at the reliability
11 we calculated including them.

12 CHAIRMAN SCHULTZ: There are sites out
13 there that don't have the diversity.

14 MEMBER BLEY: There are and people decided
15 that was okay for them.

16 MEMBER RAY: Redundancy and diversity are
17 two different things. I think the question whether
18 defense-in-depth requires diversity is a good question
19 because, for example, the reactor and pressure
20 boundary is diverse from the containment. I wouldn't
21 say it's redundant, I don't think, it's a diverse
22 defense-in-depth measure.

23 But Mary's into areas where that simple
24 model doesn't work, but I don't think saying that
25 something that's a redundancy is, by definition, a

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1 defense-in-depth is correct either.

2 MEMBER SHACK: No, I mean, I think it's
3 closer to what Dennis says, if you need it to meet
4 your design goal, you know, redundancy is just a way
5 to meet your design goal; diversity is a way to meet
6 your design goal. It's after you've met your design
7 goal and you're doing something else that you're
8 getting, to me, the true defense-in-depth.

9 MEMBER RAY: So you don't think something
10 that's to meet a design goal is a defense-in-depth
11 measure.

12 MEMBER ARMIJO: Until you set your design
13 goal.

14 (Simultaneous speaking)

15 MEMBER BLEY: This discussion points out
16 your problem.

17 MS. DROUIN: I mean, I would argue that
18 part of your design inherently includes defense-in-
19 depth, and these are all the things that I think we
20 just have to get, you know, straightened out. It's
21 not that people argue that you shouldn't have
22 diversity or you shouldn't have redundancy, it's just
23 that where are we putting that?

24 MEMBER BLEY: Good luck.

25 MEMBER ARMIJO: I'm looking forward to

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1 your final product.

2 CHAIRMAN SCHULTZ: Other comments or
3 discussion?

4 MEMBER BROWN: No, I won't disagree with
5 our disagreements, because I think it's a combination
6 of the two.

7 MEMBER BLEY: It was easier when we
8 thought of three physical barriers.

9 MEMBER BROWN: No, no, but I think one of
10 your points that you went through, you've got to look
11 at the threats that we try to address and you look at,
12 what are your protections against those threats? And
13 you can start categorizing things however you want to,
14 but it's how many layers of defense do we have between
15 that threat occurring and when we have something bad
16 happening out to the population, whether it's land
17 contamination, or whether we have melted -- whatever
18 your definition is, you have to look at what stands
19 between you and the other ones.

20 That's why I don't think it's subject to
21 a real refined definition, or a program statement,
22 that the Commissioners can make. I think it has to be
23 done as part of a threat assessment and how many
24 layers of protection do we think we need to account
25 for that based on the other analyses we do, whatever

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1 they are, whether it's risk assessments, PRAs, or what
2 have you.

3 MS. DROUIN: See, and I would suggest that
4 we're not really far off from being in disagreement
5 because what --

6 (Simultaneous speaking)

7 MEMBER BROWN: We're not far off from
8 being in agreement.

9 MS. DROUIN: No, I think we're being close
10 in agreement because when you start considering
11 whether or not you have adequate defense-in-depth,
12 you're going to think about the threat, you're going
13 to think about, you know, what design you have in
14 place, you know, how well is it met?

15 I mean, these are all part of the decision
16 criteria that you're going to be looking at in looking
17 at the design in the plant, and do you need to be
18 doing something extra so that we have confidence that
19 the plant can adequately deal with that threat?

20 So, you know, that's, to me, part of the
21 decision criteria in determining whether you have
22 adequate defense-in-depth. I don't see that,
23 personally, as a definition of defense-in-depth. To
24 me, that's part of the process you go through for
25 determining whether or not you have adequate. And

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1 this all comes into, you know, it would be married
2 with, you know, the process on adequate protection.
3 These all balance each other and come into play.

4 CHAIRMAN SCHULTZ: The other piece I
5 wanted to bring up relates to this and that is, I
6 thought, in your discussion of all of those elements
7 that people have described and discussed, one of the
8 features that is missing are the, because it's listed
9 in the elements that you put together, opportunities
10 for improvement, or defense-in-depth also mentioned
11 with that is, criteria that would be used to evaluate
12 defense-in-depth.

13 First you need the definition, but then
14 also, in order to appropriately, once defined, achieve
15 the defense-in-depth is the definition of what the
16 achievement criteria would be for defense-in-depth.

17 And I thought I heard you say that there's
18 not much out there with regard to criteria or
19 expectations, unless it's --

20 MS. DROUIN: No, people had jumped from
21 defining it to in terms of saying that it's multiple
22 barriers, or it's these three levels, or five levels,
23 to then jumping in saying, okay, that translates into
24 mean that it's QA, or it's translating into you have
25 to have redundancy, I mean, there was a whole list

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1 there, but they jumped from, you know, saying, okay,
2 it's either multiple barriers, and then that's what I
3 mean by it, without going through a process of
4 determining that, yes, I've achieved what I wanted to
5 achieve with my multiple barriers.

6 CHAIRMAN SCHULTZ: It seems to me that
7 that's a huge leap, that something like QA or a good
8 design practice is something that is just a
9 fundamental piece that may, in some way, connect to
10 defense-in-depth.

11 MS. DROUIN: Yes.

12 CHAIRMAN SCHULTZ: But it's not defense-
13 in-depth.

14 MS. DROUIN: Now, you know, we gave this
15 a lot of thought in 1860. Since then, there have been
16 some very good thought on decision criteria for
17 determining the implementation and the adequacy of
18 defense-in-depth. A lot of good thought that is out
19 there now; particularly for new reactors.

20 CHAIRMAN SCHULTZ: And what does that
21 sound like?

22 MS. DROUIN: It actually goes through a
23 lot of what Mr. Brown was saying that, you know, it
24 looks at the design, you know, it questions, you know,
25 the reliability, you know, if that's the part you're

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1 looking at, the reliability or the risk associated
2 with it, you know, it looks to see, you know, what are
3 the uncertainties and are they adequately addressed?

4 And it goes through a series of questions.
5 I haven't looked at it in detail, I've just kind of
6 skimmed it, and I thought it had some very good
7 thoughts in there that could be used.

8 CHAIRMAN SCHULTZ: Okay. Any other
9 discussion? I want to carry that one step further.
10 It seemed to me that as I looked through the
11 information that you presented that one of the
12 features, or one of the applications, related to, or
13 that defense-in-depth could be described as achieving,
14 or filling a gap, would be that, now that we have,
15 didn't have it back when defense-in-depth was first
16 described, probabilistic risk assessment, and we have
17 elements where we can evaluate the ability of the
18 facility to achieve a level of safety.

19 But even in the probabilistic risk
20 assessment evaluations there is uncertainty and the
21 work that's been done in the last decade has tried to
22 develop the relationship between the risk element
23 uncertainty associated with that, or the safety
24 element, and the uncertainty associated with that, and
25 defense-in-depth.

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1 And I thought that one of the elements
2 that would provide for a success measure associated
3 with defense-in-depth, or a purpose for defense-in-
4 depth, would be in those areas where I had a safety
5 evaluation, or a probabilistic risk assessment safety
6 assessment, performed that I would be able to identify
7 uncertainty within that.

8 And then in areas where I couldn't handle
9 the uncertainty because it was inherent in the
10 analysis that was done, I could be able to apply
11 something additional in the design, or the operation,
12 or the implementation, and I would do that through
13 something called defense-in-depth. Is that somewhere
14 where things have been headed?

15 MS. DROUIN: That's certainly places where
16 I feel like we'll be headed because when you try and
17 bring, you know, risk insights, and I think risk
18 insights need to be brought into defense-in-depth
19 because, you know, it can do many different things for
20 you. It can show you, again, where your design may be
21 weak and you want some additional depth because you're
22 very vulnerable in that area.

23 It can show you where you may be
24 vulnerable because of the uncertainty associated with
25 it. So, you know, you may look at that and say, okay,

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1 do I have, for example, adequate margin to deal with
2 that uncertainty? So it's going to help you in terms
3 of raising a lot of questions and then in terms of
4 pursuing, you know, what do you need to be doing or
5 where you may not need to do as much.

6 Where, you know, you have more than enough
7 in place to deal with where you may have a perceived
8 weakness or uncertainty. So it's a mechanism to,
9 certainly, help you determine, you know, where you
10 should be implementing things and also help you
11 determine where you have done enough.

12 MEMBER ARMIJO: Well, we face that issue
13 in the containment accident pressure debate, right?
14 The risk was used as part of the justification for not
15 requiring sufficient pumps. And some of us didn't
16 want to give up on defense-in-depth and others said
17 we've done a good risk study and you don't need that
18 much. It's those kinds of problems that we need to be
19 able to address.

20 MEMBER RAY: And I think another way I'd
21 sort of express it, Sam, is that, this is all
22 something we can sign-up for from an intellectual
23 standpoint, but regulating and enforcing it seems like
24 a much more difficult task; very non-transparent how
25 you assure you've actually done what you're striving

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1 to do. Deterministic rules are easy to enforce;
2 relatively speaking.

3 MS. DROUIN: Well, that's why --

4 MEMBER RAY: Probabilistic, now not
5 defense-in-depth, do you understand? Because that's
6 where I thought we were. And it just becomes more and
7 more of a reliance upon the integrity of the
8 practitioner, let's say, to recognize when things, as
9 the words, I can't remember exactly, that you used,
10 but when you should do this or you should do that. I
11 don't know.

12 Maybe we're being naive about what we
13 should expect, sort of like the banking industry is
14 often accused of doing things that serve their own
15 interests rather than the complicated rules that were
16 put in place after the changes were made that, I can't
17 think of the name of the law now, anyway, that was put
18 in place in the '30s.

19 So anyway, it's a more complicated
20 picture, by a long shot, when it comes to, are we
21 really doing what we want to do or are we kidding
22 ourselves?

23 MS. DROUIN: I'm a firm believer in risk-
24 informed processes, or risk-informed regulatory
25 framework. I would never advocate a probabilistic-

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1 based framework, and I don't advocate a deterministic-
2 based framework. And I think that when you bring risk
3 insights and blend them in with your deterministic
4 decision, you end up making the best decisions; better
5 decisions.

6 MEMBER RAY: You should. I agree with
7 you. I just said it was more difficult to enforce
8 them and I'll guess I'll stand by that.

9 CHAIRMAN SCHULTZ: Okay. Other comments
10 or questions from the committee? Antonio, could you
11 have the telephone line turned on for voice and I'll
12 ask the audience if there is any members of the public
13 that would like to make, or anyone in the audience, a
14 comment related to the discussion this afternoon?

15 Hearing none for those that are on the
16 phone lines, we're going to turn on the voice so we
17 can hear anyone that might be out there and -- hold
18 on. So the phone lines should be open now. If anyone
19 is present on the phone lines and would like to make
20 a comment, please do so now by stating your name. I
21 have not heard anyone yet.

22 Is anyone out there that would like to
23 indicate your presence?

24 MALE PARTICIPANT: I have no questions.

25 CHAIRMAN SCHULTZ: All right. Thank you.

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1 So the line is open. Anyone else that would like to
2 make a comment or state their name for the record.
3 Hearing none other, then I want to thank the staff for
4 the presentations this afternoon and this morning
5 also. I didn't do that at the close of the meeting
6 this morning, but it's been a very helpful day
7 associated with understanding where the staff is on
8 these important issues and resolving and determining
9 the course of action forward on the recommendations
10 from the NTTF.

11 So I thank you very much for this early
12 status report and we will certainly look forward to
13 meeting with you again in December. I did have an
14 opportunity to speak with Dick at the break and he's
15 indicated that there is, as he described, more
16 information that is currently in, I guess I would call
17 it, pre-draft form that's taking shape over the next
18 month.

19 And he's indicated that as soon as he
20 feels that it's ready as a product that we would
21 benefit from, he's going to provide that to the
22 committee, and so we'll have that before long. I
23 would guess before the end of September. We won't
24 hold you to that, but again, what we will hold you to
25 is that, when you feel something is ready for our

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1 consideration, we would really appreciate having it --

2 MR. DUDLEY: And we'll do that.

3 CHAIRMAN SCHULTZ: -- so that we can
4 prepare for comments on our behalf and your behalf.
5 So thank you very much and with that, I'll close the
6 meeting.

7 (Whereupon, the above-entitled matter went
8 off the record at 4:17 p.m.)

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

ACRS Subcommittee Meeting
August 15, 2012
by Interoffice Working Group

Outline of Presentation

- Review of Recommendation 1 and Commission direction
- Review staff's approach to develop Commission paper
- Discuss actions taken to date and schedule
- Provide overview of approach/options to disposition Recommendation 1
- Stakeholder feedback - Next steps
- Summarize knowledge on defense-in-depth

Acronyms

NRC – Nuclear Regulatory Commission

NRR – Office of Nuclear Reactor Regulation

SRM – Staff Requirements Memorandum

CFR – Code of Federal Regulations

IPE – Individual Plant Evaluation

IPEEE – Individual Plant Evaluation – External Events

CDF – Core Damage Frequency

LERF – Large Early Release Frequency

PRA – Probabilistic Risk Assessment

RES – Office of Nuclear Regulatory Research

OGC – Office of the General Counsel

NRO – Office of New Reactors

FSME – Office of Federal and State Materials and Environmental Management
Programs

NMSS – Office of Nuclear Material Safety and Safeguards

NSIR – Office of Nuclear Security and Incident Response

RMTF - Risk Management Task Force

Acronyms (cont.)

D-i-D – defense-in-depth

ACRS – Advisory Committee on Reactor Safeguards

LWR – Light Water Reactor

NEPA – National Environmental Policy Act

SSCs – Systems, Structures, and Components

NTTF – (Fukushima) Near-Term Task Force

ATWS- Anticipated Transients Without Scram

SBO – Station Blackout

SAMGs – Severe Accident Management Guidelines

TSs – Technical Specifications

LBE – Licensing Basis Event

EP – Emergency Preparedness

F-C – Frequency-Consequence

RG – Regulatory Guide

EAB – Exclusion Area Boundary

TEDE – Total Effective Dose Equivalent

LPZ – Low Population Zone

Task Force Recommendation 1

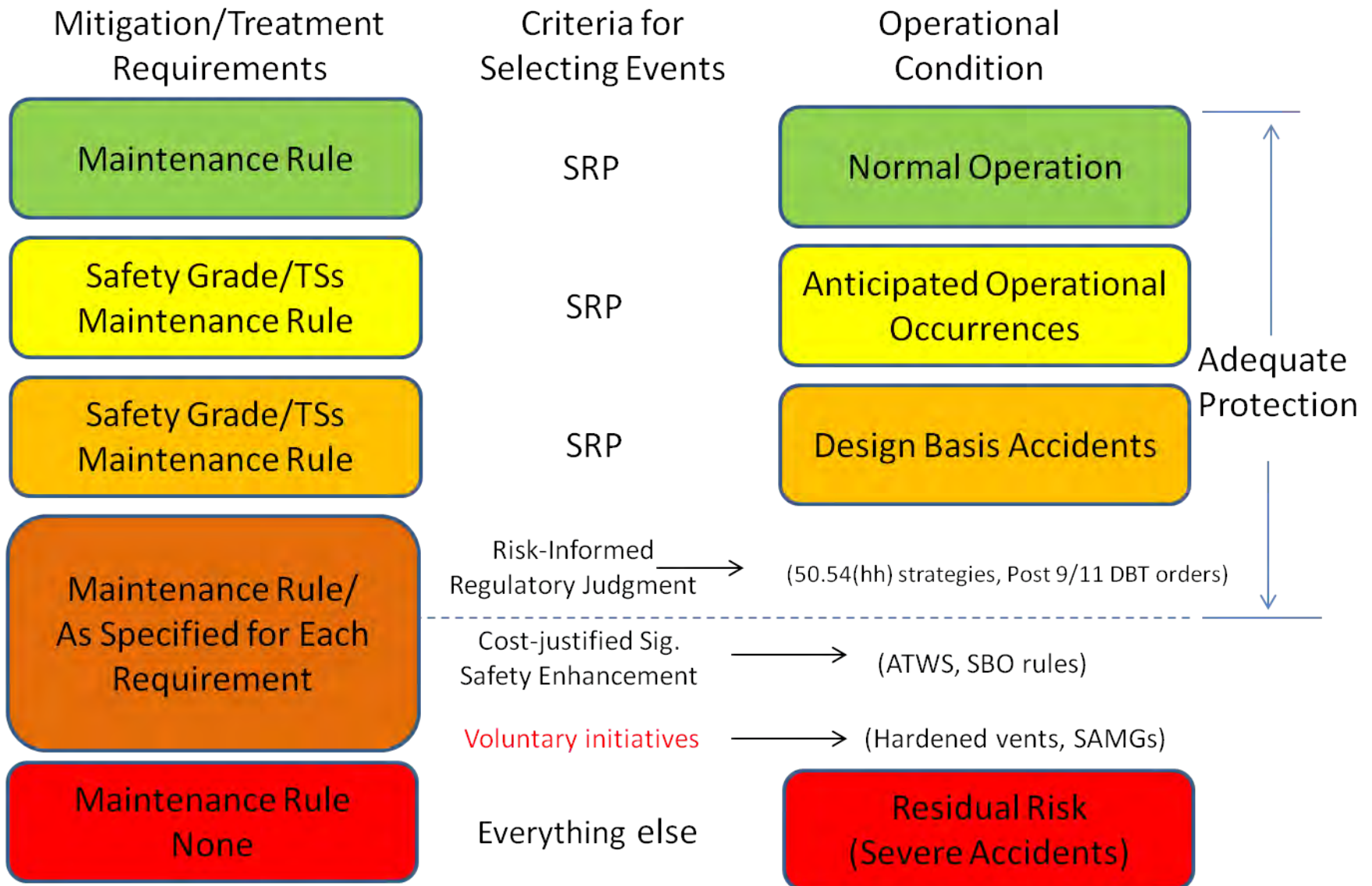
Recommendation 1:

- Establish a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations

Task Force findings and observations:

- 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 initiatives for a fundamental level of defense-in-depth (D-i-D) would leave gaps in NRC’s regulatory approach

Current Regulatory Structure Illustrating the “Patchwork”



NTTF Findings and Observations (cont.)

- Increase the level of safety associated with adequate protection
- Draft a Commission policy statement
 - Articulate a risk-informed defense-in-depth framework
 - Include extended design-basis category of requirements as necessary for ensuring adequate protection
- Modify the Regulatory Analysis Guidelines
 - More effectively implement defense-in-depth philosophy
 - Consider some of the concepts presented in the technology-neutral framework (NUREG-1860) to integrate safety goals with defense-in-depth
- Initiate rulemaking to implement the policy
 - Separate 10 CFR Section or Appendix (replace patchwork)
 - Specify treatment requirements and § 50.59-like change process for new section

NTTF Findings and Recommendations (cont.)

- Consider adding additional requirements:
 - Evaluate the insights from the IPE and IPEEE to identify generic or plant-specific requirements
 - Consider applying new reactor severe accident requirements to operating plants within reasonable bounds
- Voluntary initiatives:
 - Should not take the place of needed requirements
 - Use as mechanism for facilitating and standardizing implementation requirements (guidance)
- PRA role in new framework
 - Full-scope Level 1 PRA (CDF)
 - Containment performance Level 2 PRA (LERF)
 - Level 3 PRA may be needed for some alternatives
- No change to NRC's current approach to the issue of land contamination from reactor accidents

Commission Direction on Recommendation 1

Commission SRM-11-0093 (August 19, 2011):

“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)

Risk Management Task Force Regulatory Framework

- Proposed risk management framework documented in NUREG-2150 (April 2012)
- 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

RMTF Regulatory Framework

- Preservation of design basis accident supplemented with the creation of an enhanced design basis category via rulemaking
- The RMTF recommended that the design enhancement category should:
 - Use risk as a safety measure
 - Be performance based
 - Include consideration of costs
 - Be implemented on a site-specific basis
 - Include treatment of associated structures, systems and components based on the frequency of initiating events

RMTF Proposed Risk Management Regulatory Framework



Approach to Develop SECY Paper

- Inter-office Working Group (WG), led by NRR; support from RES, OGC, NRO, FSME, NMSS, NSIR, and liaison with Commissioner Apostolakis' Risk Management Task Force (RMTF)
- Prepare Commission paper evaluating a wide range of possible options:
 - technical and policy issues
 - schedules
 - resource requirements
 - stakeholder concerns
 - pros and cons
- Include a recommended approach and basis for its selection

Status/Schedule

- Briefed JLD Steering Committee on March 27 & May 1
- Briefed NRR ET (Significant Topic) on April 19
- First public meeting on June 20
- NEI letter on July 16, 2012 providing comments
- ACRS subcommittee August 15
- Second public meeting Fall 2012
- ACRS subcommittee in December
- ACRS full committee in February/March
- Commission paper due to EDO mid-February 2013

Working Group Actions to Identify Alternatives to Disposition Recommendation 1

- Developed working description of “regulatory framework”
- Includes NTF observations underlying Recommendation 1 and RMTF recommendations for power reactors
 - Safety and regulatory policy criteria
 - Regulatory decision making process
 - Monitoring and feedback loop
 - Judge efficacy of decisions made; make iterative corrections
 - Incorporate new technical information
- Framework limited to:
 - operating power reactors and evolutionary new LWR designs
 - matters affecting radiological health and safety and NEPA compliance
 - initial licensing and operational stage (not reactor decommissioning)

Working Group Actions to Identify Alternatives to Disposition Recommendation 1

- Framework approaches considered:
 - Extended design basis categorization described by NTTF
 - Risk management framework and regulatory decisionmaking process described in RMTF Report
 - Category-based regulatory framework (initiating event frequency)
 - Technology-neutral regulatory framework approach described in NUREG-1860
- Working Group review identified 12 potential activities for improving regulatory processes

Basic Options

- Option 1 – (Status Quo) - Continue with existing regulatory processes making occasional improvements in a non-integrated manner
- Option 2 - Refine and improve specific high value areas of existing regulatory framework as approved by the Commission
- Option 3 - Develop improved regulatory framework including integration of activities in all 12 improvement areas

Potential Areas of Improvement for Existing Regulatory Processes

- Working Group identified 12 potential areas for improving regulatory processes:
 1. Establish key D-i-D elements and decision criteria for determining adequacy of D-i-D
 2. Establish key safety margin elements and decision criteria for determining adequacy of safety margin
 3. Establish methodology for identification and categorization of accident conditions/events which will define regulatory requirements
 4. Establish methodology for identification and categorization of accident conditions/events at multi-unit sites which will define regulatory requirements

Potential Areas of Improvement for Existing Regulatory Processes (cont.)

5. Establish regulatory requirements to perform and maintain PRAs
6. Establish regulatory process for systematic re-evaluation and updating of the licensing basis for each NRC regulatory approval (e.g., licenses, permits, certifications, approvals), based in part on new information and experience.
7. Establish regulatory process for systematic re-evaluation and updating of the regulatory framework (for nuclear power plants), based in part on new information and experience.
8. Establish NRC concept of “reasonable assurance of adequate protection” and define decision criteria for determining reasonable assurance of adequate protection

Potential Areas of Improvement for Existing Regulatory Processes (cont.)

9. Establish decision criteria for balancing risk, D-i-D, and safety margins in NRC decisionmaking
10. Establish criteria for analyzing environmental effects directly resulting from safety decisions made in licensing of nuclear power plants (NEPA)
11. Reconcile all NRC-mandated and defined licensee change control processes to reflect modifications to regulatory process
12. Develop consistent position on NRC consideration and crediting of voluntary industry initiatives

Option 1 – *Continue with existing regulatory processes*

- NRC would not change structure or operation of existing regulatory processes
- Regulatory actions/orders would continue to be undertaken as issues warrant; e.g., as is currently being done in response to Fukushima event
- No new event categories would be developed
- NTTF noted that current processes have served us well in past

Option 2 – *Optimize portions of existing regulatory processes*

- Use quantitative evaluation process to rank the 12 regulatory process improvement activities
- Staff could recommend that Commission implement the high value improvement activities (in integrated approach)
- Commission could approve staff recommended activities or specify others

Option 2 – *Quantitative Evaluation Process*

- Staff is assessing priority of improvement activities based on nine attributes:
 1. Safety
 2. Balances defense-in-depth, safety margins, and risk
 3. Stability (predictable, reliable)
 4. Clarity (coherent, logical)
 5. Efficiency
 6. Risk-informed
 7. Performance-based
 8. Feasibility (likelihood of success)
 9. Costs
 - NRC development, implementation, operation
 - Licensee implementation and operation

Option 3 – Develop Revised Regulatory Framework

- Option 3 revised framework effort would strive to optimize all 12 improvement areas in integrated fashion
- Option 3 includes extensive implementation activities to conform and harmonize NRC regulations, guidance, other infrastructure and perform training

Stakeholder Feedback

- Feedback from June 20, 2012 public meeting:
 - Use of PRA in licensing basis
 - Don't use because PRAs are defective
 - Reduces transparency to public
 - What QA requirements would apply to PRA?
 - Will limited applicability of framework cause preferential treatment?
 - Regulation is an inherently patchwork process
 - Focuses only on adding requirements

Stakeholder Feedback

- July 16, 2012 NEI letter
 - Schedule is too aggressive/focus on Tier 1
 - Problem statement must be better defined
 - Consider lessons learned from past risk-informed efforts
 - Consider cumulative resource impacts

Future Stakeholder Interactions

- Fall 2012 – Public meeting to discuss options - pros/cons
- ACRS subcommittee (August and December)
- ACRS full committee in February/March
- NRR_JLD.Resource@nrc.gov email address
- Recommendation 1 information also posted on regulations.gov website under docket NRC-2012-0173
- SECY paper to EDO/Commission in February 2013



Fukushima Task Force Recommendation 1

NRC Staff Concept of Defense-in-Depth

Mary Drouin, RES/DRA

Defense-in-Depth *and NTFF Recommendation 1*

- A more balanced application of the Commission's defense-in-depth philosophy using risk insights
- Application of the defense-in-depth philosophy can be strengthened by including explicit requirements for beyond-design-basis events
- New insight regarding low-likelihood, high-consequence events that warrant enhancements to defense-in-depth on the basis of redefining the level of protection that is regard as adequate
- The defense-in-depth philosophy is useful and broadly applied concept; however, it is not susceptible to a rigid definition because it is a philosophy

Defense-in-Depth *and NTFF Recommendation 1* (*cont.*)

- NTFF focused on the following application of the defense-in-depth concept:
 - Protection from external events that could lead to fuel damage
 - Mitigation of the consequences of such accidents should they occur, with a focus on preventing core and spent fuel damage and uncontrolled releases of radioactive material to the environment
 - Emergency preparedness to mitigate the effects of radiological releases to the public and the environment, should they occur

Defense-in-Depth – *Sources Reviewed*

- Over two dozen sources identified spanning a 45 year period
- Primarily regulatory sources reviewed:

<ul style="list-style-type: none">• Joint Committee on Atomic Energy Hearings, 1967• Internal Study Group, 1969• ECCS Hearings, 1971• WASH-1250, 1973• 10 CFR Part 60• Post TMI Definitions and Examples, 1981• NUREG/CR-6042, 1994• Commission Policy Statements, 1986, 1994, 1995• NUREG-1537, 1996• MIT Speech by Chairman Jackson, 1997• Commission White Paper, 1999• PSA '99 paper, 1999• ACRS letters, 1999, 2000• IAEA Documents (INSAG-3, 10, & 12, NP-T-2.2), 1988, 1996, 1999, 2000	<ul style="list-style-type: none">• 10 CFR Part 50, Appendix R, 2000• 10 CFR §50.69, 2004• NEI 02-02, 2002• Petition on Davis Besse, 2003• Remarks by Chairman Diaz, 2004• Digital Instrumentation and Controls (NUREG/CR-6303, RG 1.152, NUREG-0800 BTP HICB-91, NUREG-0800 SRP BTP 7-19, DI&C-ISG-02), 1994, 1996, 1997, 2007, 2009• NUREG-1860, 2007• INL NGNP report, 2009• RG 1.174, 2012• NRC glossary, 2012• RMTF, 2012
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Defense-in-Depth – *Review Approach*

- Reviewed the sources to identify defense-in-depth positions regarding:
 - The need for defense-in-depth
 - The objective for defense-in-depth (what is it trying to accomplish)
 - The approach or strategy to defense-in-depth (how is it accomplishing the objective)
 - Criteria used to implement the approach or strategy
 - Criteria used for determining whether adequate defense-in-depth has been achieved

Defense-in-Depth – *Review Findings*

- Numerous common themes
- Differences primarily in how the themes are characterized
 - For example, one position may state the objective of defense-in-depth is to have multiple barriers, another may state multiple barriers is a strategy to achieve defense-in-depth, and another may state multiple barriers as criteria for determining adequate defense-in-depth
- Perspectives grouped by whether related to:
 - The need for defense-in-depth
 - The objective for defense-in-depth (what is it trying to accomplish)
 - The approach or strategy to defense-in-depth (how is it accomplishing the objective)
 - Criteria used to implement the approach or strategy
 - Criteria used for determining whether adequate defense-in-depth has been achieved

Review Findings: *Regarding the Need for Defense-in-Depth*

- Examples of various views on the need:
 - guard against unwanted events
 - compensating for uncertainty in probabilistic analyses
 - related to the issue of uncertainty
 - the aggregate of provisions made to compensate for uncertainty and incompleteness in the knowledge of accident initiation and progression
 - compensation for inadequacies, incompleteness, and omissions of risk analyses
 - a strategy to ensure public safety given the unquantified uncertainty in risk assessments
 - a strategy to ensure public safety given there exists both unquantified and unquantifiable uncertainty in engineering analyses (both deterministic and risk assessments)
 - application of deterministic design and operational features for events that have a high degree of uncertainty
 - ultimate purpose is to compensate for uncertainty (e.g., uncertainty due to lack of operational experience with new technologies and new design features, uncertainty in the type and magnitude of challenges to safety)
 - an element of NRC's safety philosophy that is used to address uncertainty
 - a safety philosophy intended to deliver a design that is tolerant to uncertainties in knowledge of plant behavior, component reliability, or operator performance that might compromise safety
 - to compensate for the recognized lack of knowledge of nuclear reactor operations and the consequences of potential accidents

Review Findings: *Regarding the Need for Defense-in-Depth (cont.)*

- There does appear to be a general consensus regarding why defense-in-depth is needed.
- There is a common recognition that there is a lack of knowledge (or uncertainty) with regard to the design, construction, maintenance and operation of the facility.

Review Findings: *Regarding the Objective of Defense-in-Depth*

- Examples of various views on the objective:
 - to protect the plant, the plant operators, and the health and safety of the public
 - guarding against unwanted events
 - ensure the protection of public health and safety
 - reducing the potential for, and consequences of, severe accidents
 - to increase the degree of confidence in the results of the PRA or other analyses supporting the conclusion that adequate safety has been achieved
 - the probability of accidents must be acceptably low
 - to prevent accidents or mitigate damage if a malfunction, accident, or naturally caused event occurs
 - if a failure should occur it would be compensated for or corrected without causing harm to individuals or the public at large
 - preventing the release of radioactive material to the environment
 - averting damage to the plant
 - the facility or system in question tends to be more tolerant of failures and external challenges
 - to provide several levels or echelons of defense to challenges to plant safety, such that failures in equipment and human error will not result in an undue threat to public safety
 - to designing and operating nuclear facilities that prevents and mitigates accidents that release radiation or hazardous materials
 - to prevent, contain, and mitigate exposure to radioactive material

Review Findings: *Regarding the Objective of Defense-in-Depth (cont.)*

- There also appears to be a general consensus regarding the objective of defense-in-depth.
- There is a common recognition that the objective of defense-in-depth is to avert damage to the plant by preventing and mitigating accidents and thereby ensuring the protection of public health and safety while maintaining an acceptably low probability of accidents.

Review Findings: *Regarding the Strategy for Defense-in-Depth*

- Examples of various views on the strategy:
 - three lines of defense: (1) prevention of accidents, (2) protective systems are provided to take corrective actions, and (3) engineered safety features to mitigate the consequences of postulated serious accidents
 - three successive protective barriers: (1) preventing initiation of incidents (conservative design margins, etc.), (2) capability to detect and terminate incidents, and (3) Protecting the public.
 - The key elements are accident prevention, safety systems, containment, accident management, and siting and emergency plans.
 - the strategy for defense in depth is two fold: first, to prevent accidents and, second, if prevention fails, to limit their potential consequences and prevent any evolution to more serious conditions.
 - three layers of defense against the consequences of an event at a nuclear facility. The three layers are (1) protection to prevent accidents from occurring, (2) mitigation of accidents if they occur, and (3) emergency preparedness to minimize the public health consequences of releases if they occur
 - maintaining multiple barriers against radiation release, and by reducing the potential for, and consequences of, severe accidents

Review Findings: *Regarding the Strategy for Defense-in-Depth (cont.)*

- There also appears to be a general consensus regarding the strategy for defense-in-depth.
- There is a similar concept that can be found, which is there are basic protections which involve, at a high level, prevention of accidents and mitigation of accidents.
 - Prevention of accident can be defined as preventing the occurrence of an event to preventing the progression of accident sequences.
 - Mitigation of an accident can be defined from ending the progression of a severe accident, to containing the effects of a severe accident, to mitigating the consequences of a severe accident.

Review Findings: *Regarding the Implementation of Defense-in-Depth*

- Examples of various views on the implementation:
 - quality and quality assurance, independently and concurrently.
 - redundant elements, provision for periodic in-service testing, and other features to enhance performance and reliability
 - provide multiple barriers to the escape of radioactive material, from whatever cause, and to withstand the occurrences of natural forces . . . without compromising these barriers
 - selection of proper materials, quality controls in fabrication of components, rigorous systems of inspection and testing, appropriate techniques and controls in workmanship.
 - high standards of engineering practice in design for critical components and systems
 - regularly scheduled equipment checks and maintenance programs; prompt and thorough investigation and correction of abnormal events, failures or malfunctions.
 - the requirements of sound and well defined principles of good management in operation; a competent and well-trained staff, clearly assigned duties, written procedures, checks and balances in the procedures for revisions, periodic internal audits of operations, etc.
 - redundancy in controls and shutdown devices; emergency power from independent sources -sometimes in triplicate -and emergency cooling systems
 - containment building itself, building spray and washdown system, building cooling system . . . , and an internal filter-collection system
 - through requirements and processes that include design, construction, regulatory oversight and operating activities.
 - programmatic activities as compensatory measures; system redundancy, independence, and diversity
 - no key safety functions will depend on a single element (i.e., SSC or action) of design, construction, maintenance or operation.
 - appropriate safety margins
 - containment functional capability

Review Findings: *Regarding the Implementation of Defense-in-Depth (cont.)*

- There also appears to be a general consensus regarding the implementation of defense-in-depth in terms of some of the specific criteria; these include, for example:
 - quality assurance, redundancy, independence, oversight, containment, emergency planning.
- There is no similarity with regard to a process in selecting the criteria for implementing defense-in-depth
 - Only a couple of sources provided a process which involved both deterministic and probabilistic criteria

Review Findings: *Regarding the Adequacy Criteria for Defense-in-Depth*

- Examples of various views on adequacy criteria:
 - Risk insights can make the elements of defense-in-depth more clear by quantifying them to the extent practicable
 - Decisions on the adequacy of or the necessity for elements of defense should reflect risk insights gained through identification of the individual performance of each defense system in relation to overall performance
 - The rationalist is: (1) establish quantitative acceptance criteria, such as the quantitative health objectives, core damage frequency and large early release frequency, (2) analyze the system using PRA methods to establish that the acceptance criteria are met, and (3) evaluate the uncertainties in the analysis, especially those due to model incompleteness, and determine what steps should be taken to compensate for those uncertainties
 - The various compensatory measures taken for the purposes of defense in depth can be graded according to the risk posed by the activity, the contribution of each compensatory measure to risk reduction, the uncertainties in the risk assessment, and the need to build stakeholders trust.
 - The ultimate objective is that any credible accident sequence, even considering the failures of lines of protection for the different levels of defense in depth, remain under the overall frequency consequence curve.
 - Defense-in-depth is adequate if the overall redundancy and diversity among the plant's systems and barriers is sufficient to ensure the risk acceptance guidelines discussed in are met
 - Assessing the adequacy via a process that uses a PRA to assess the acceptability of uncertainties and uses identified options (such as increasing performance monitoring) to determine the acceptability of the uncertainties or refine the design

Review Findings: *Regarding the Adequacy Criteria for Defense-in-Depth (cont.)*

- There are no similarities regarding criteria for determining the adequacy of defense-in-depth
 - Most did not offer perspectives in this regard
- A few did touch on this topic
 - each proposed a process to be used
 - some relied strictly on probabilistic criteria, others deterministic criteria and other used a combination of deterministic and probabilistic criteria

Defense-in-Depth: *Status of Staff Review*

- Although there are common themes, the differences do indicate there is not a consensus regarding the implementation of defense-in-depth and determination whether sufficient defense-in-depth has been achieved
- Thus, should the staff make recommendations regarding:
 - Whether there should be a policy statement explicitly stating the Commission's expectations?
 - Stating the Commission's view regarding the need and objective of defense-in-depth the strategy for achieving defense-in-depth.
 - Whether a process (with associated guidance and criteria) should be developed on:
 - How defense-in-depth should be implemented?
 - How to determine if adequate defense-in-depth has been implemented?

Backup Slides

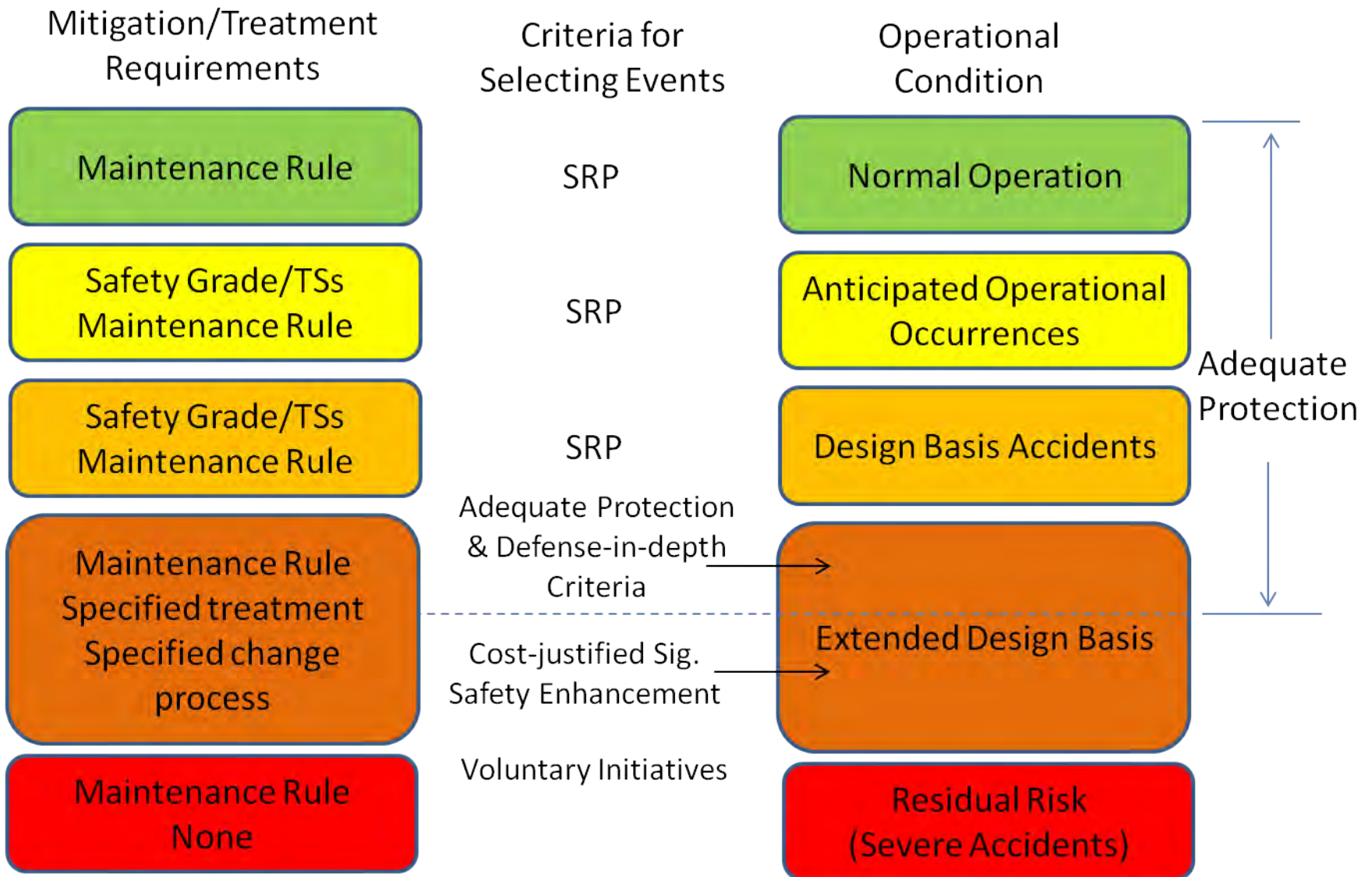
Task Force Recommendation 1

- ***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.*

Extended Design Basis Regulatory Framework



Risk Management Task Force - Proposed Regulatory Framework: Power Reactors

