

# **Official Transcript of Proceedings**

## **NUCLEAR REGULATORY COMMISSION**

Title:                   Advisory Committee on Reactor Safeguards  
                              Reliability and PRA Subcommittee

Docket Number:     (n/a)

Location:             Rockville, Maryland

Date:                  Wednesday, May 18, 2016

Work Order No.:     NRC-2397

Pages 1-202

NEAL R. GROSS AND CO., INC.  
Court Reporters and Transcribers  
1323 Rhode Island Avenue, N.W.  
Washington, D.C. 20005  
(202) 234-4433

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, as reported herein, is a record of the discussions recorded at the meeting.

This transcript has not been reviewed, corrected, and edited, and it may contain inaccuracies.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

[www.nealrgross.com](http://www.nealrgross.com)

UNITED STATES OF AMERICA  
 NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

+ + + + +

RELIABILITY AND PRA SUBCOMMITTEE

+ + + + +

WEDNESDAY

MAY 18, 2016

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Subcommittee met at the Nuclear  
 Regulatory Commission, Two White Flint North, Room  
 T2B1, 11545 Rockville Pike, at 8:30 a.m., John W.  
 Stetkar, Meeting Chairman, presiding.

COMMITTEE MEMBERS:

JOHN W. STETKAR, Meeting Chairman

RONALD G. BALLINGER, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR., Member

MICHAEL L. CORRADINI, Member

PETER C. RICCARDELLA, Member

GORDON R. SKILLMAN, Member

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
 1323 RHODE ISLAND AVE., N.W.  
 WASHINGTON, D.C. 20005-3701

## ACRS INVITED EXPERT:

WALTER KIRCHNER

MATTHEW SUNSERI

MARGARET CHU

## DESIGNATED FEDERAL OFFICIAL:

JOHN LAI

## ALSO PRESENT:

MARK A. CARUSO, NRO

MARY DROUIN, RES

ANDERS GILBERTSON, RES

DONALD G. HARRISON, NRO

GORDON KLEFSON\*

MARVIN LEWIS\*

LYNN A. MROWCA, NRO

JOHN NAKOSKI, RES

STACEY ROSENBERG, NRR

STEPHEN P. SCHULTZ\*

RUTH THOMAS\*

GORDON THOMPSON\*

\*Present via telephone

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

C O N T E N T S

	<u>Page</u>
Opening Remarks, Chairman John Stetkar:.....	4
Mary Drouin - Historical Review and	
Observations of Defense In Depth.....	11
Regulatory Guide 1.200, Rev. 3 Update Plan.....	63
Regulatory Guide 1.174, Rev. 3 Update Plan.....	90
Public Comment .....	123
Adjourn	

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

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

8:31 a.m.

CHAIRMAN STETKAR: The meeting will now come to order. This is a meeting of the Reliability and PRA Subcommittee. I'm John Stetkar, Chairman of the Subcommittee meeting.

ACRS members in attendance are Ron Ballinger, Dick Skillman. I believe that we'll be joined shortly by Mike Corradini. I hope that we'll be joined shortly by Dennis Bley and Charlie Brown.

John Lai of the ACRS Staff is the Designated Federal Official for this meeting. This Subcommittee will hear discussions of a Knowledge Management Report, NUREG/KM-0009 on the Historical Use of Defense In Depth.

The Staff will also present their plans to update Regulatory Guide 1.200, an Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results or Risk Informed Activities. And an update of Regulatory Guide 1.174, an Approach for Using Probabilistic Risk Assessment in Risk Informed Decisions on Plant Specific Changes to the Licensing Basis.

There will be a phone bridge line. To

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

(202) 234-4433

1 preclude interruption of the meeting, the phone  
2 will be placed in a listen in mode during the  
3 presentations and Committee discussions.

4 We have received no written comments or  
5 requests for time to make oral statements from  
6 members of the public regarding today's meeting.  
7 The entire meeting will be open to public  
8 attendance.

9 The Subcommittee will gather  
10 information, analyze relevant issues and facts, and  
11 formulate proposed positions and actions as  
12 appropriate for deliberation by the full Committee.

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

17 A transcript of the meeting is being  
18 kept, and will be made available as stated in the  
19 Federal Register Notice. Therefore, we request the  
20 participants in this meeting use the microphones  
21 located throughout the meeting room when addressing  
22 the Subcommittee. It gets old after a while.

23 The participants should first identify  
24 themselves and speak with sufficient clarity and  
25 volume so that they can be readily heard.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   And I'll ask everyone to please check  
2           all     of     your     phones     and     whatever     other  
3           communications devices you have, and turn them off.  
4           And as I normally warn you, if you don't, I will  
5           smash them.

6                   Also, anybody who's up front, remember,  
7           push the little base of your microphone to turn it  
8           on when you speak. Please turn it off when you're  
9           not speaking, so that we don't get a lot of  
10          rustling of papers and things like that.

11                   Before we begin, I want to remind the  
12          Subcommittee members, this is an information  
13          briefing to hear, as I said in the introduction,  
14          about the Knowledge Management NUREG on Defense In  
15          Depth. And to have an opportunity for the  
16          Subcommittee to exchange some ideas with the Staff  
17          at a very early stage of the updates of Reg Guide  
18          1.200, and in particular Reg Guide 1.174.

19                   We've had some discussions about both  
20          of those Reg Guides in other Subcommittee meetings.  
21          So, we thought that this would be a good  
22          opportunity to have some early exchanges with the  
23          staff before they get too far along on those  
24          updates.

25                   And with that, I think John Nakoski has

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 some opening remarks. John?

2 MR. NAKOSKI: Yes. Hello. My name is  
3 John Nakoski. I'm the Chief of the Performance and  
4 Reliability Branch in the Office of Research at the  
5 NRC.

6 I appreciate the opportunity for the  
7 Staff to come and talk to you about these three  
8 topics. As you mentioned, NUREG/KM-0009, it's a  
9 Historical Review and Observations on Defense In  
10 Depth.

11 Regulatory Guide 1.200 that provides an  
12 approach for determining the technical adequacy of  
13 PRA results for risk informed activities. And then  
14 also Regulatory Guide 1.174, which provides an  
15 approach for using PRA and risk informed decisions  
16 on plant specific changes to the licensing basis.

17 As you know, NUREG/KM-0009, Historical  
18 Review on Defense In Depth, was prepared in  
19 response to a Commission direction to enshrine  
20 Enclosure Three to SECY-13-0132 on NTTF  
21 Recommendation One. We recognize that Enclosure  
22 Three was not a comprehensive historical summary.  
23 But it was basically developed to illustrate that  
24 there's a rich history on defense in depth.

25 So, we decided to do a more detailed

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 history for reactor safety, nuclear materials and  
2 waste security. Also, looked internationally. And  
3 then considered how other domestic agencies such as  
4 NASA, the FAA, Department of Defense and others  
5 looked at defense in depth, even if they called it  
6 something different. Which I think you'll hear a  
7 little bit from Mary on some of that.

8 And then also, this you know, really  
9 provides observations based on the last 60 years  
10 that we've been in this business. And it provides  
11 perspectives on it regarding various definitions,  
12 purposes, goals and approaches.

13 Mary will also be talking to you this  
14 morning about Regulatory Guide 1.200. And as I  
15 mentioned, this Guide provides Staff, the Staff  
16 position on what constitutes a technically  
17 acceptable-based PRA, such that it is technically  
18 adequate to support risk informed regulatory  
19 activities.

20 It provides the Staff position on how  
21 consensus PRA standards and associated review  
22 guidance can be used to demonstrate that the PRA is  
23 technically adequate to support the specific risk  
24 informed decision under consideration for that  
25 licensing action or that activity. And as such, it

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 endorses the published PRA standards and review  
2 guidance.

3 There's a joint committee on nuclear  
4 risk management between ASME and ANS that is the  
5 standard setting body for that. And they've  
6 recently published some new PRA standards, have  
7 plans in the near future to publish additional  
8 standards, and plan to publish a new addition to  
9 the current Level 1/LERF PRA Standard.

10 And you'll hear more about that from  
11 Mary as we go through this. And also NEI is  
12 updating their peer review guidance documents. And  
13 plans to publish that guidance for review of new  
14 PRA methods. And Mary will touch on that also.

15 And then the Staff has developed a  
16 plan, and you're going to hear about that, to  
17 provide early Staff positions on these revised NEI  
18 standards and review guidance scheduled for  
19 Revision to Reg Guide 1.200.

20 I'm going to switch presenters. And  
21 Anders Gilbertson will provide you a status and the  
22 plans for the Staff's efforts to update Regulatory  
23 Guide 1.174.

24 Back in 2011 the Commission directed  
25 the Staff in SRM-SECY-11-0014 to revise the Reg

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Guide to use precise language to assure that the  
2 defense in depth philosophy is interpreted and  
3 implemented consistently. That was put on hold  
4 while -- shortly after Fukushima happened.

5 We did issue a draft guide for public  
6 review and comment back in 2012. We received  
7 public comments. And now we're re-engaged in  
8 updating that following the latest Commission  
9 direction.

10 The focus on this, as you'll hear from  
11 Anders, is to look at changes in defense in depth  
12 guidance by reorganizing it. Reorganizing the  
13 seven elements, now called factors in the Reg  
14 Guide.

15 And then trying to provide additional  
16 discussion explaining the meaning of each of the  
17 elements or factors. And then providing examples.

18 As I mentioned, the Staff was recently  
19 directed in SRM-SECY-15-0168 to expeditiously  
20 complete the revision to the Regulatory Guide on  
21 defense in depth in Reg Guide 1.174 to discuss more  
22 clearly defense in depth in order to improve the  
23 clarity of the guidance.

24 And again, I appreciate the opportunity  
25 to have the Staff come and brief you on this. And

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 we look forward to your feedback. Thank you.

2 CHAIRMAN STETKAR: Thanks very much,  
3 John. Just for the record, we've been joined by  
4 ACRS Member Pete Riccardella. Good morning Pete.

5 Any of the Members have any comments or  
6 anything before Mary gets started?

7 (No response.)

8 CHAIRMAN STETKAR: If not, Mary, it's  
9 all yours.

10 MS. DROUIN: Okay. As John talked  
11 about in SECY-13-0132, we have an Enclosure 3,  
12 which provide, you know, that I want a -- a very  
13 high level summary of the history of defense in  
14 depth.

15 You know, it did touch on nuclear  
16 materials, a little bit on security, a little bit  
17 on international. But, it was primarily on power  
18 reactors.

19 But, it was not anywhere near a  
20 comprehensive historical review. It was just to  
21 give a flavor that we have a lot of history on this  
22 topic.

23 So, when the Commission came back and  
24 told us to take this Enclosure, this history and  
25 enshrine it as an agency knowledge tool, and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 republish in other formats. So, we just, you know,  
2 started this work.

3 We quickly went back to the Commission  
4 in terms of our due date because we wanted, you  
5 know, them to understand that if we're going to  
6 publish this as a knowledge management tool, we  
7 really did need to be comprehensive. And do a good  
8 job on reviewing the history.

9 So, we did go back to the Commission,  
10 get approval to do a very comprehensive search for  
11 not just reactors, for nuclear materials, waste  
12 security, international. And we were trying to  
13 also bring in perspectives from other domestic  
14 agencies. You know, to kind of get a feel to see  
15 how they look at defense in depth and their  
16 challenges and everything.

17 CHAIRMAN STETKAR: Mary, just for the  
18 benefit of -- I didn't even think about this until  
19 I just looked at my slide. For the benefit of the  
20 other Members, could you remind us what SECY-13-  
21 0132 was?

22 MS. DROUIN: SECY-13-0132, that was the  
23 response to NTTF Recommendation 1. And in that  
24 SECY paper we had said three improvements.

25 And the SECY improvement was to develop

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 stuff on defense in depth. And we put this  
2 Enclosure to give them an idea of why we were  
3 making that recommendation on defense in depth.

4 And we did in that enclosure provide  
5 some insights of why we should move forward on  
6 this.

7 CHAIRMAN STETKAR: Thanks. This helps.  
8 It just gives the Members some context of it.

9 MEMBER CORRADINI: And then just to  
10 make sure I'm -- since I forget this. The  
11 Commission came back and disapproved the  
12 recommendation. And you were left in what position  
13 at that point?

14 MS. DROUIN: Well, they came back and  
15 told -- put everything in there on hold is  
16 basically. Because the working group quickly moved  
17 into looking at NUREG 2150, the Risk Management  
18 Regulatory Framework.

19 And wanted us to come back and revisit  
20 that. Then in that SECY paper, the Staff did a  
21 complete reversal and said we didn't need to do  
22 anything on defense in depth.

23 And that's where I wrote my non-  
24 concurrence.

25 MEMBER CORRADINI: We all understand

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 it.

2 MS. DROUIN: Yes. Because we all  
3 understand it, I guess. I'm sorry, I'm being a  
4 little bit sarcastic here.

5 CHAIRMAN STETKAR: That's okay. We all  
6 are. That's why we get along.

7 MEMBER CORRADINI: Okay. Thank you.

8 MS. DROUIN: Okay. So, if you go back  
9 and you look at, you know, defense in depth, the  
10 earliest discussion in the NRC literature, AEC back  
11 then, you know, dates all the way back to 1956.

12 And the term defense in depth doesn't  
13 appear in that document. But, it talks about these  
14 lines of defense.

15 And what you'll see through the history  
16 is that many times the term defense in depth, but  
17 you'll see lines of defense, layers of defense,  
18 echelons of defense. I mean, it's just incredible  
19 the different terminology.

20 It's like, you know, somebody picked up  
21 a thesaurus and said how many different ways can I,  
22 you know, use this term. But, it touched on, you  
23 know, three main elements, you know, which was  
24 recognizing the different accidents.

25 You know, and designing it in such a

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 way that you have your risk, you've got a minimum.  
2 And to take into account, you know, the  
3 consequences.

4 And those three things are fairly  
5 consistent through the history. You know, they may  
6 slice them up a little bit differently. But, those  
7 are very similar to what you'll see throughout the  
8 history.

9 But, since that time of course, there's  
10 been many, many things written upon defense in  
11 depth in the literature. So, when we started this  
12 KM NUREG, you know, our primary objective was to  
13 provide a summary of course.

14 And we wanted to provide descriptions,  
15 discussions, definitions, et cetera, that had been  
16 used. And then based on that, try and stand back  
17 and give some observation, some perspectives of  
18 what we can learn insights from the history.

19 MEMBER CORRADINI: Have there been  
20 other -- so, two questions, more just  
21 clarification. So, now there's a new designation  
22 of NUREGs that's a KM NUREGS? Is that like a whole  
23 different series?

24 You keep on using that terminology.

25 MS. DROUIN: Yes. And I'm going to get

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 into that on my very next slide.

2 MEMBER CORRADINI: Okay. And then the  
3 second question is, has there been a history  
4 document in the past like this about defense in  
5 depth?

6 MS. DROUIN: There have been --

7 MEMBER CORRADINI: I seem to remember  
8 an ACRS Staff Member writing something in the '90s.

9 MS. DROUIN: There was a paper. And  
10 that paper actually is in our document. And it  
11 looked at a couple of things. It looked at two or  
12 three things.

13 MEMBER CORRADINI: Okay.

14 MS. DROUIN: There was another paper  
15 written, so people -- but there's not ever been  
16 this extensive detailed review of the history.

17 MEMBER BLEY: Did you get any surprises  
18 when you really delved into this history?

19 MS. DROUIN: Well, you know, the  
20 surprise because when I first started in the  
21 industry, you know, to me defense in depth was the  
22 three barriers. You know, the cladding, the  
23 vessel, and the containment.

24 And what I was surprised is that that  
25 is very -- it's not throughout the literature.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 It's only in very specific things.

2 And really, what you see dating all the  
3 way back to the 1950s is that defense in depth are  
4 these layers of defense. And it's not really these  
5 three barriers.

6 That was just a very narrow point in  
7 time. And it's not really throughout this --

8 MEMBER BLEY: Well, that was one that  
9 the Navy sold way back when I went through in the  
10 early '60s.

11 MS. DROUIN: Yes.

12 CHAIRMAN STETKAR: I think it's an easy  
13 way for, you know, knucklehead engineers to think  
14 about the concepts. Because it's something you can  
15 put your hands on, you know.

16 MS. DROUIN: Yes. But, that surprised  
17 me because I really thought I was going to see that  
18 all through the history. And you really don't.  
19 You really see these layers.

20 So, --

21 MEMBER BROWN: Can I make one  
22 observation? Talk about the Navy doing it since I  
23 have some background on that.

24 Yes, we did -- that was frequently  
25 discussed in the framework, the physical barriers

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 as you just described them. But we also spent a  
2 lot of time looking at and evaluating what we  
3 called the supporting parts that allow those  
4 barriers to maintain their ability to perform as  
5 desired.

6 And that falls -- that's a flow down  
7 into the protection and then the safeguard systems,  
8 et cetera, et cetera. So, I don't necessarily -- I  
9 actually kind of think those three barriers are  
10 pretty descriptive.

11 Because, you know, I read the stuff in  
12 the historical document. And I didn't see anything  
13 else that comes out and lays it out quite as  
14 crisply as the multiple letters and other type  
15 things in the KM-0009.

16 MS. DROUIN: Um-hum.

17 MEMBER BROWN: And they also -- but  
18 they did bring up the aspects here that I just  
19 mentioned, the backout, the other systems which we  
20 bring into it --

21 MS. DROUIN: Yes.

22 MEMBER BROWN: Support the ability to  
23 maintain those.

24 Because it -- and then you can make  
25 trade-offs as to how hard you have to be in certain

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 areas. You know, how many other things other than  
2 those that you need in order to maintain those  
3 particular barriers.

4 So, I don't think there's a real big  
5 difference between talking about layers, what I  
6 read from the early days, that first mentioned it  
7 back in 1956 or something like that. And then  
8 going onto the barrier, the physical barrier  
9 concepts that were laid out in some of the later  
10 discussions.

11 I just -- it served the Navy well. And  
12 we don't -- our ultimate barrier obviously is to  
13 put the whole thing in the sea at the bottom of the  
14 ocean.

15 CHAIRMAN STETKAR: But that's a bit of  
16 the difference though. And that's part of the  
17 concept is that one of the concepts of these layers  
18 is emergency planning, evacuation, siting --

19 MEMBER BROWN: And I agree with that.  
20 That was thrown in later.

21 CHAIRMAN STETKAR: And you could site  
22 yours on the bottom of the ocean.

23 MEMBER BROWN: Yes. No, I think the  
24 last step is the emergency planning aspect of it if  
25 you do have a -- so, that's a part. And that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       wasn't discussed in the earlier ones. That was  
2       brought out in some of the later documents.

3               Anyway, I just wanted to make that  
4       observation from a spending 35 years arguing about  
5       defense in depth for the Navy.

6               MS. DROUIN: So, moving on. The scope  
7       of our work, you know, of course was to, you know,  
8       cover reactors, materials, waste, security. We  
9       also, you know, tried to do a good research on the  
10      international literature.

11              The biggest work has been done by IAEA.  
12      There was stuff by NEA. And we did want to provide  
13      some perspectives on how other domestic agencies  
14      that, you know, deal with high risk activities.

15              So, we looked at the Department of  
16      Energy, NASA, FAA, Department of Defense, the  
17      Department of Interior, the Army Corps of  
18      Engineers. And we did that by hosting a two-day  
19      workshop.

20              And each agency came in and gave  
21      extensive presentations. And we had extensive  
22      discussions on how they looked at defense in depth.

23              The document is meant to be  
24      comprehensive. But, it's not necessarily  
25      exhaustive. I'm sure that there's pieces of

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 literature we missed.

2 You know, we did a lot of electronic  
3 searching. We talked to a lot of people to come up  
4 with our sources that we were going to do our  
5 review on.

6 We came up with a lot of key words to  
7 use. Because if you just, you know, did an  
8 electronic search on the word defense in depth, you  
9 probably wouldn't find nearly as much as what we  
10 did. So, you know, we tried to be very creative in  
11 trying to identify the sources.

12 And why did we publish this as a KM?  
13 So, I just gave you the quote, right from the  
14 Management Directive. Because this really was the  
15 proper vehicle to document this work.

16 Because it does exactly what the  
17 Management Directive says. It collects, compiles,  
18 and interprets historical information, references  
19 technical topics to assist future, current, and  
20 former Staff in understanding how the agency's  
21 regulatory system and technical knowledge have  
22 evolved.

23 And that's exactly what this document  
24 does. You know, we don't do an evaluation. It is  
25 strictly, you know, a collection of information and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 observations based on that information.

2 It doesn't make recommendations.

3 MEMBER BLEY: I'm glad you did it that  
4 way. Because I didn't know about the KM series.  
5 And there's some interesting stuff in there.

6 MS. DROUIN: Yes. There aren't that  
7 many KM's out there. But, -- so then what were the  
8 sources?

9 Well, we looked at, you know, we went  
10 through all the regulations as best we could.  
11 Policy statements, NUREGS, a zillion Regulatory  
12 Guides, SECY papers, Commission papers, and  
13 speeches.

14 It was interesting, you know, what you  
15 found in a lot of Commission papers and speeches.  
16 We went through a lot of ACRS presentations.

17 We went through numerous ACRS letters.  
18 This body has written a lot of defense in depth.  
19 So, that was our primary sources of literature that  
20 we looked at.

21 In terms of how we presented the  
22 information, well, for reactors it was easy to do  
23 it in a chronological order. It just made sense  
24 when you looked at it. And we could actually group  
25 it by certain, you know, time periods.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 But, when it came to materials, waste,  
2 and security, they don't have -- their history is  
3 not -- there's not NUREGS and SECY papers, and you  
4 know, their information is primarily in the  
5 Regulations. So, it really didn't make sense to --  
6 it wasn't that informative to try and do it  
7 chronologically.

8 It made more sense to group it by the  
9 Regulations and stuff. So, you know, their  
10 presentation is in a little different order.

11 MEMBER BLEY: I'm just curious because  
12 a lot of times you find some really interesting  
13 background information in the Statements of  
14 Consideration. But they're not always easy to  
15 find.

16 MS. DROUIN: And we do have some  
17 references on Statements of Consideration.

18 MEMBER BLEY: Okay.

19 MS. DROUIN: That kind of falls under  
20 the Regulations and other stuff.

21 MEMBER BLEY: That's what I was  
22 figuring. But you were able to chase some of those  
23 then?

24 MS. DROUIN: Yes. We were. We were  
25 absolutely. So, how the KM organ -- how it was

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 organized. Well, Section Two of course, you know  
2 is your list of acronyms.

3 But, Section Three, you know, we wanted  
4 to try and for somebody who didn't to spend the  
5 time going into the details, we thought it would be  
6 good to have like an executive summary type of  
7 historical summary.

8 And so Section Three, you know, if you  
9 just want to get a quick feel of the history, we  
10 have a very high level summary in Section Three.  
11 Then the subsequent chapters, Four, Five, and Six -  
12 - no, Four, Five, and Six get into the details.

13 Where Chapter Four is a detailed  
14 summary of reactors. And then Five is nuclear  
15 materials and waste. Six is security. No, I'm  
16 saying this wrong. No, Six is security. That's  
17 right.

18 And then Seven gets into the  
19 international. And Chapter Eight we would have  
20 liked to have gotten into a lot more detail, but  
21 other circumstances occurred. So, we were not able  
22 to get into the depth that we would like to from  
23 the other agencies.

24 And then Chapter Nine tries to stand  
25 back and say, well, what have we learned? You

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 know, what insights can we gain? What has history  
2 told us about defense in depth? And then Section  
3 Ten gives us the list of references which is very  
4 extensive.

5 So, in looking for the references as I  
6 said, you know, there's many different descriptions  
7 of defense in depth. And so, our search included,  
8 you know, the explicit use of the term defense in  
9 depth. But as I said, many places they don't use  
10 that term.

11 So, you know, there were certain key  
12 things that we were looking for. And so, if for  
13 example the discussion referred to one of these  
14 like multiple barrier, they may not have used the  
15 term defense in depth. You know, lairs, levels,  
16 layers, as I said, I saw one place they, you know,  
17 called them echelons.

18 Safety margins, that they talked about  
19 accident prevention and mitigation. Key safety  
20 functions are not dependent on a single element, et  
21 cetera.

22 So, if we saw discussions related to  
23 some of this stuff, and this is not meant to be,  
24 you know, an exhaustive list here, but just to give  
25 you a flavor. That then we looked at that in a lot

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 more detail to see if we could classify that. That  
2 really wasn't discussion on defense in depth even  
3 though they may not use the term.

4 So, then when we get to reactors, here  
5 is a list of all the references that we used. And  
6 if you look on the very far bottom right, it has  
7 SECY Reg Guides and ACRS letters.

8 They're all -- all the SECY papers and  
9 all the Regulatory Guides and all the ACRS letters,  
10 I didn't try and list them in this table. But, we  
11 do have a set of tables that identifies all the  
12 ones.

13 There were some particular ones that we  
14 got into detail. And those are the ones that were  
15 written back in 1999. But, as you can see, the  
16 history starts in 1956.

17 And it goes all the way up to 2014.  
18 There really wasn't anything at least at the NRC  
19 that was written that we found, after 2014.

20 So, in the non-reactor areas, there  
21 were ACRS letters. There were primarily as you can  
22 see, very few NUREGS, very few SECY papers. It was  
23 mainly in the Regulations.

24 So, when you get into it and into the  
25 detail, this was a lot more challenging, you know,

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 to find the references. And the, you know, the  
2 descriptions of defense in depth. Because  
3 particularly the in the non-reactor area they don't  
4 really use the term defense in depth.

5 A double contingency principle is a  
6 term that comes to mind that they use. So, this  
7 one was a lot more challenging to do.

8 And again, you know, as you see the  
9 other parts of the non-reactor, again, and you see  
10 of course 2150, you know repeated overly. But,  
11 there's not really a whole lot in 2150 on defense  
12 in depth.

13 But, they do mention it for each of the  
14 areas. So, you know, we had to give them credit  
15 for it. But, again, primarily the history is  
16 showing up in the Regulations.

17 The same thing when it came to  
18 security. It's primarily in the Regulations.  
19 There were a couple of Regulatory Guides and a  
20 couple of NUREGS.

21 MEMBER BLEY: Can you say anything  
22 about the difference in thinking from the security  
23 area and the safety and risk area. And are either  
24 of those missing something that you picked up from  
25 the other that might be worthy of consideration?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MS. DROUIN: Not really. Not really,  
2 you know, at a high level the concepts were very  
3 similar. Very similar.

4 Terminology was different. But the  
5 concepts were very similar.

6 MEMBER BLEY: I see. Okay.

7 MS. DROUIN: And that was pretty much  
8 the same thing we found from the international and  
9 from other domestic agencies. The concepts were  
10 very, very similar.

11 CHAIRMAN STETKAR: But again Mary,  
12 mostly in the security they're talking about guns,  
13 gates and guards type of concepts, right?

14 MS. DROUIN: Well, not when you're  
15 talking about cyber security.

16 CHAIRMAN STETKAR: Well, but even then  
17 it's the same basic guns, gates and guards. It's  
18 just air gaps and, you know, hardware. It's not  
19 the notion --

20 MS. DROUIN: I'm going to come back to  
21 this --

22 CHAIRMAN STETKAR: Okay.

23 MS. DROUIN: When I get to the end.

24 CHAIRMAN STETKAR: Okay.

25 MS. DROUIN: And to explain why I think

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 the concepts are similar.

2 CHAIRMAN STETKAR: I'm sure -- I know  
3 the concepts are similar. But, from when I read  
4 through the security stuff, I guess there were some  
5 references to the nexus between safety and  
6 security. And how one thing about that --

7 MS. DROUIN: Yes. There is not a good  
8 nexus.

9 CHAIRMAN STETKAR: In terms of defense  
10 in depth. Because --

11 MS. DROUIN: Because personally I think  
12 there could be a better nexus.

13 CHAIRMAN STETKAR: Yes.

14 MS. DROUIN: But, they pretty -- it  
15 evolved separately.

16 CHAIRMAN STETKAR: Yes.

17 MS. DROUIN: Absolutely. Now looking  
18 at international, IAEA has, you know, written quite  
19 a bit on defense in depth. I think everybody's  
20 pretty familiar with INSAG-3, 10 and 12.

21 But, there's a lot of other IAEA  
22 reports that get into defense in depth. And it has  
23 some very interesting discussions in there.

24 The NEA had a big workshop back in  
25 2014. Very, very interesting information came out

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 of that workshop. There was a detailed proceedings  
2 on that. So, we were actually able to get quite a  
3 few insights from that workshop.

4 The only other thing we could find on  
5 the international level was the Swedish Radiation  
6 Safety Authority wrote a document back in 2015.  
7 Now, it was very challenging.

8 And it was how much resources were we  
9 really going to put trying to track down  
10 international, you know, sources. And I'm sure  
11 there's a lot more. But, it was really beyond, you  
12 know, our capability in terms of the time and the  
13 resources we had.

14 Now, the NEA recently in March, I think  
15 it was March of this year. And we were -- just as  
16 we were going to publication, we were actually able  
17 to take this booklet that they had published, and  
18 capture it in our NUREG.

19 So, that's the most recent thing that  
20 was done. And that was done in -- you know, I  
21 mean, they worked on it for several years. And it  
22 was finally published in March of this year. So,  
23 we were able to capture that document in our  
24 international.

25 In terms of our other domestic agencies

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 as I said, you know, we had NASA and we had about  
2 three or four presentations by different factions  
3 around NASA. FAA, I think we had two or three  
4 presentations by them.

5 DOE, we had presentations from both the  
6 safety side of DOE and the security side. The  
7 Naval Nuclear Propulsion Program from the  
8 Department of Defense came in and gave an  
9 outstanding.

10 Department of Homeland Security,  
11 Department of the Interior, this one I found  
12 particularly interesting. Because this is the non-  
13 nuclear.

14 This is from, you know, we thought to  
15 have somebody from the oil industry. Particularly,  
16 you know, with the new challenges that they're  
17 facing. So, the Bureau of Safety and Environment  
18 Evaluation came in and gave a couple of  
19 presentations.

20 We had the Army Corps of Engineers.  
21 And I know they're not a domestic agency, but since  
22 they're just kind of right up there, and they are  
23 in the midst of doing recent stuff on defense in  
24 depth, we did invite them to the workshop.

25 Unfortunately, things occurred and we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 weren't able to produce the proceedings. We're  
2 still in our plan to write up those proceedings for  
3 the workshop. That will get into a lot more than  
4 what we were able to capture in the KM NUREG.

5 MEMBER CORRADINI: Is the -- are the  
6 presentations available?

7 MS. DROUIN: Some of them -- we're  
8 having to scrub some of them because --

9 MEMBER CORRADINI: So, this was a  
10 closed meeting?

11 MS. DROUIN: Yes. It was. So, we're  
12 working with them to find out what it is we have to  
13 scrub from their presentations. But, it's not a  
14 whole lot in my opinion, you know.

15 But, we too, you know, we didn't have a  
16 transcript. But we had people at the workshop  
17 whose sole job was to take detailed notes. So, I  
18 think we're going to, you know, have a good  
19 proceeding.

20 And then it will go to all the  
21 participants, you know, to do a scrubbing of it.  
22 And I think it will be very informative.

23 CHAIRMAN STETKAR: We're sure the  
24 Members would like once you get it cohesive, we'd  
25 like to have a copy of that.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MS. DROUIN: Yes. It will be made  
2 public. That's the whole purpose of it.

3 CHAIRMAN STETKAR: Well, send it to  
4 John, please.

5 MS. DROUIN: We will. We will. So,  
6 after doing all the history, you know, as I said  
7 the last chapter, you know, tries to provide  
8 observations.

9 So, you know, we sat back and we  
10 thought okay, what kind of insights? You know,  
11 what do we want to try and learn from this?

12 So, the first one of course is, you  
13 know, how is defense in depth defined? That one  
14 was pretty straightforward.

15 But, you know, as you read -- as we  
16 were reading the literature, and this was something  
17 that came out when we were doing Enclosure 3. It  
18 was, you know, why is defense in depth, you know,  
19 needed? What is its purpose?

20 You know, and what are we attempting to  
21 achieve? You know, what is ultimately the goal?  
22 And there's a difference between purpose and goal.  
23 And you know, what is the structure of the approach  
24 used to implement defense in depth?

25 You know, and what actions or

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 strategies are put in place to achieve it? And how  
2 is it determined that we have adequate defense in  
3 depth? And then just some overall observations.

4 So, when we look at the first question,  
5 definitions, what you will see is that there are  
6 actually six formal -- I call it formal definitions  
7 of defense in depth in the NRC literature.

8 There's the NRC glossary. There's the  
9 strategic plan. There's NUREG 1860. There's the  
10 Federal Register Notice. There's the Commission  
11 White Paper. And then 10 CFR 70.64 gives a  
12 definition of defense in depth.

13 I'm not going to go through and read  
14 these on these next pages. But, I just thought,  
15 you know, for --

16 CHAIRMAN STETKAR: But why?

17 (Laughter.)

18 MEMBER CORRADINI: So, can I ask a  
19 different question? Aside from definition and  
20 everything, the practical working elements that you  
21 showed back in 1956 seems totally reasonable.

22 Why is that not essentially the key  
23 elements that would have to live on? I mean, what  
24 they did 60 years ago looks a lot better than a lot  
25 of the stuff in between.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MS. DROUIN: That's above my pay grade.  
2 No, not -- you know, there's a lot of good stuff  
3 all through the literature. There's a lot of good  
4 stuff.

5 And in my mind, and I'm talking from a  
6 personal perspective, just the fact that you've got  
7 these six different definitions, and I'm not going  
8 to read them, but I am going to give some insights  
9 on the differences between them.

10 That I felt very strongly that the  
11 Commission ought to say, this is our definition.  
12 As a stakeholder, you know, I look at this and I  
13 think, well what is the Commission's position on  
14 defense in depth?

15 And there are enough subtleties and  
16 differences. And what do we mean by it? Do I  
17 think that we ought to give a very detailed  
18 descriptive guidance on it? No.

19 But, I think at the 80 thousand foot  
20 level, we should, you know, we can capture some of  
21 this.

22 MEMBER CORRADINI: The only reason I go  
23 back to those is, this was given by the AEC to  
24 Congress. Which means it's non-technical people  
25 hearing the words. And the words are very

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 understandable to non-technical people.

2 And that's why --

3 MS. DROUIN: Yes.

4 MEMBER CORRADINI: Those elements to me  
5 seem pretty reasonable.

6 MS. DROUIN: Absolutely.

7 MEMBER CORRADINI: With all due respect  
8 to the six definitions in between, more reasonable  
9 than many of the in between definitions.

10 MS. DROUIN: That's not what has  
11 evolved.

12 MEMBER CORRADINI: Okay.

13 MS. DROUIN: When you look at these  
14 different definitions, you know, almost all of them  
15 agree that defense in depth employs successive  
16 measures.

17 You know, some define successive  
18 compensatory. This concept of successive  
19 compensatory, you know, defines, you know, in depth  
20 as multiple lines of defense.

21 Two of the definitions include safety  
22 margins as part of the successive measures. All  
23 the definitions, you know, agree that defense in  
24 depth involves both prevention and mitigation.

25 Some of the definitions are more high

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 level. And they just specify prevention and  
2 mitigation of accidents. You know, while others  
3 get into, you know, providing prevention and  
4 mitigation of malfunction of equipment, accidents  
5 naturally caused.

6 All the definitions but one indicate  
7 that defense in depth is a philosophy. Personally  
8 I hate that. Because, you know, how you interpret  
9 a philosophy, you know, I think that has caused a  
10 lot more confusion than anything in the history of  
11 defense in depth when we start talking about it.

12 Almost about -- I think out of the six,  
13 I think four of them, you know, indicate that  
14 safety -- that the definition indicates that safety  
15 will not be wholly dependent on any single element  
16 to ensure, you know, be more tolerant of failures.

17 One definition includes redundancy as  
18 part of its definition. I'm sorry, Mike, I think I  
19 interrupted you.

20 MEMBER CORRADINI: No, that's okay.  
21 I'm still back in 1956.

22 MS. DROUIN: Oh, okay.

23 MEMBER CORRADINI: I mean, I look at  
24 one, two and three, and I'm going to say something  
25 to which I'm not an expert. So, these risk types

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 over here will say something to me that it's almost  
2 like a risk triplet.

3 What can go wrong? What probably can  
4 go wrong? And what are the consequences? And  
5 that's in '56.

6 MS. DROUIN: Yes.

7 MEMBER CORRADINI: So, to me that  
8 endures more than trying to over define it. But,  
9 anyway, I just -- I'm just very struck by how  
10 reasonable what was said to the Congress was back  
11 then.

12 MS. DROUIN: I can't disagree with you.

13 MEMBER CORRADINI: Okay.

14 MS. DROUIN: So, anyway, that's just,  
15 you know, some --

16 MEMBER BROWN: I wanted to make one  
17 observation here. It's interesting you said one of  
18 the definitions, and I read this when I was reading  
19 the stuff, included redundancy as part of the  
20 definition.

21 And I thought back to what Mike's  
22 talking about, these original three. And then  
23 there was a little amplification I would add to  
24 what he was saying, talking about if you -- that's  
25 the order of recognizing then designing and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1       operating a reactor, then the containment and  
2       isolation.

3               I think that's the letter you're  
4       referring to. But, there's some parts of this  
5       where redundancy, if you look at the physical  
6       barriers you talk about, we've got a containment,  
7       or we've got the fuel vessel cooling system, and  
8       then the containment.

9               There's no redundancy. They're  
10      different layers or levels. Independent barriers.  
11      And the redundancy only comes in in my mind  
12      relative to the design, how you design the  
13      supporting systems and everything else.

14              They are -- they themselves support  
15      ensuring that those three critical elements of the  
16      physical protection itself actually perform. And  
17      that's what I was kind of looking for when I -- in  
18      1.174.

19              MS. DROUIN: Well, you are absolutely  
20      correct. Because if you look at the terms  
21      redundancy, independence, and diversity, those  
22      three concepts are all through the general design  
23      criteria.

24              MEMBER BROWN: Exactly.

25              MS. DROUIN: And they're in there to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       assure that your system's safety function can be  
2       accomplished assuming a single failure. And it's  
3       part of the design criteria.

4               And that's where those three terms, you  
5       know, their genesis comes out of the GDC as part of  
6       your design criteria.

7               MEMBER BROWN: I just wanted to kind of  
8       separate the big picture as Mike was trying to  
9       emphasize.

10              MS. DROUIN: Yes.

11              MEMBER BROWN: A little bit from the  
12       stuff that comes underneath that sometimes gets  
13       lumped in as defense in depth. When in reality  
14       it's ensuring that those fundamental -- I mean, if  
15       you want to keep radiation from affecting the  
16       public, you've got to isolate it and contain it.

17              MS. DROUIN: And I agree with you.

18              MEMBER BROWN: That's the only way you  
19       can do it.

20              MS. DROUIN: And that's the problem  
21       when you look at these definitions. They're all a  
22       different mixture of different things that they --  
23       and it's not clean.

24              And it -- I'm going to get back to this  
25       if you all will bear with me. Because that's kind

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 of like my punch line at the end.

2 Okay, so you know, as I -- so at the  
3 beginning we're trying to provide some observations  
4 about, you know, we talked about the definitions.  
5 But, you know, in looking over the history was  
6 there a common theme, you know, in terms of what  
7 everybody felt like what was the purpose?

8 And you did see a similar concept. You  
9 know, and that was to ensure that the risk remains  
10 acceptably low regardless of our lack of knowledge.

11 And that, you know, and that's the key  
12 thing. Is that we have defense in depth because we  
13 recognize we have a lack of knowledge.

14 Now, it could be, you know, we don't  
15 understand things as well as we think we do. Or  
16 there's just things we just don't know about.

17 And so, you want this concept of  
18 defense in depth integrated into the design and  
19 operation of the facility, you know, to deal with  
20 this lack of knowledge. And make sure the risk is  
21 acceptably low.

22 So, you know, then the goal as you go  
23 through the literature, you know, you saw common  
24 themes on the goal. You know, was to ensure the  
25 public is protected from harm by both preventing

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 and mitigating accidents.

2 There were a couple of places in the  
3 literature where the focus was on prevent the  
4 accident. But, that was very rare. Most of the  
5 history always talked about both prevention and  
6 mitigation.

7 And then the approach to achieving it  
8 was to have these multiple layers of defense that  
9 said if one failed, you had a backup. If that one  
10 failed, you had a backup, et cetera.

11 But that, you know, when you're talking  
12 about whether it's reactor safety or security, or  
13 transportation, or waste, you know, the number of  
14 layers in the actual layer are dependent on the  
15 particular threat or hazard.

16 MEMBER BROWN: Interesting. Can I make  
17 one?

18 MS. DROUIN: Absolutely.

19 MEMBER BROWN: Regulated activity  
20 remains acceptably low regardless of lack of  
21 knowledge. So, I mean, we do all this defense in  
22 depth because we don't have knowledge.

23 We've gained a lot of knowledge over 60  
24 years. I can't see us ever applying -- eliminating  
25 those physical barriers even if we thought we had

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 perfect knowledge. It is just --

2 MS. DROUIN: But we'll never get  
3 there.

4 MEMBER BROWN: I know. So, I mean, it's  
5 all --

6 MS. DROUIN: So, you'll never -- you  
7 will always have an incident.

8 MEMBER BROWN: Well, it's a great  
9 overarching statement, but we shouldn't obsess on  
10 it. My point is, there are certain design criteria  
11 relative to the barriers and protecting the public  
12 that we shouldn't ring our hands over.

13 They're going to be there. They're  
14 going to stay there. And I agree with the  
15 overarching thought process. But it's very  
16 abstract.

17 MS. DROUIN: Yes. Yes.

18 MEMBER BROWN: I can't design to that.

19 MS. DROUIN: And then, you know, the  
20 strategy is to have -- for accomplishing is to have  
21 what we call when we claim the strays, protective  
22 measures. And those are your design, your  
23 operational, and your programmatic features that  
24 you put in place, you know, to ensure that you have  
25 the functionality of these defensive measures.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   And then imposed on top of all of that  
2           is a set of principles that we do.   And the  
3           principle for example, of the single failure  
4           criteria is a very good example.   Which translates  
5           to independence, dependency and diversity.

6                   That is a principle that we impose so  
7           that, you know, our design accomplishes that.  
8           Which then helps us in terms of ensuring the  
9           functionality of each of our layers of defense.

10                   Now, the one place where there really  
11           wasn't anything, almost no guidance, and I will say  
12           this, when we had our public workshop, all the  
13           various agencies all agreed, this is where the  
14           struggle is.   Is how do we determine that we have  
15           adequate defense in depth?

16                   We can all agree, you know, that it's a  
17           philosophy, that it is multiple layers.   That you  
18           know, you got these -- all this stuff.

19                   But then, you know, when you're trying  
20           to make a decision, how do you determine or not  
21           that you've maintained?   That you've actually  
22           designed adequate defense in depth or that you've  
23           maintained adequate defense in depth.

24                   And this is just a few of the things  
25           and there was very little in the literature on

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 this. That the elements, you know, some people  
2 suggested that they should be quantified.

3 That you can use risk to assess the  
4 adequacy of each defensive system. Your  
5 compensatory measures can be graded. You could  
6 standard -- you know, you could use some kind of  
7 frequency consequence curve.

8 But, this was pretty much about it.  
9 And as I said, there's very little in the  
10 literature and help, you know, guiding, you know,  
11 when do we have adequate defense in depth.

12 CHAIRMAN STETKAR: Mary, before you  
13 leave this one. I was struck by the way, you know  
14 I believe some sort of estimate of risk with  
15 uncertainty is the only way that you can measure  
16 adequacy of defense in depth.

17 You have to understand what your  
18 criteria for adequacy is. But, that's a different  
19 issue I think.

20 I was struck when I started to read  
21 some of the references. And I haven't digested  
22 them all. But, a lot of them are written by and  
23 I'll come back to the weenie engineer approach to  
24 life.

25 That the only way we can measure this

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 is by subdividing our Excel spreadsheet from 100  
2 cells to 1,000 cells and deluding ourselves that by  
3 having a six significant figure of measurement in  
4 those cells gives us some measurement of this  
5 adequacy.

6 And there were discussions about well,  
7 we don't know whether it's prevention or  
8 mitigation. So, they have to put more top events  
9 in an event tree and develop a different importance  
10 measure for this. That's silliness.

11 You know, this whole notion -- I'll  
12 come back to what Mike was saying earlier. That if  
13 you try to get too precise on the definitions,  
14 you're going to get the weenie engineers out there  
15 trying to get six significant figure -- importance  
16 measures out of a risk assessment.

17 Which is probably not what you want to  
18 do. You probably want some sort of risk curve and  
19 see if there are any outliers. And what's the  
20 reason for the outliers and how you can make that  
21 better. Bumps and wiggles if you will.

22 And I didn't see much of that concept,  
23 you know. Especially in the later stuff that  
24 evolves from people pushing buttons and having  
25 computers run long times. And saying that I can

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1       subdivide basic events.

2                   MS. DROUIN: Well, --

3                   CHAIRMAN STETKAR: Did you get much of  
4       that? Maybe I'm being more cynical than normal.

5                   MS. DROUIN: No. To me there were a  
6       couple, you know, I know when we did NUREG 1860 we  
7       really felt like the approach proposed, believe it  
8       or not by the ACRS in taking a structure less  
9       integrated rationalist approach was the best way to  
10      approach defense in depth.

11                   There was also a paper, and it was one  
12      of the few times we went outside, was from the  
13      Idaho National Engineering Laboratory. They wrote  
14      a paper on how to progress through looking at  
15      defense in depth.

16                   And they certainly brought in the risk  
17      as part of their evaluation. And I thought they  
18      had a very interesting approach.

19                   The only other document that really got  
20      into, in my mind, you know, trying to determine  
21      adequacy was also NEI wrote a paper back in 002 --  
22      I think I'm 02-02, I think.

23                   CHAIRMAN STETKAR: Yes. 02-02.

24                   MS. DROUIN: Where they had it looking  
25      more also in a programmatic way. So, if we go

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 here, you know, and this is, in my mind, showing  
2 the rationalists and structuralists approach.

3 But, I think from the structuralist you  
4 come in and you say okay, I have these layers of  
5 defense. For reactor safety it might be those  
6 three. When you look at the literature people have  
7 divided up into as simple as two layers, prevention  
8 and mitigation.

9 IAEA goes down into five layers. Some  
10 people have three layers. Personally, I think for  
11 reactor safety I would divide it up into four  
12 layers.

13 But, you know, you can cut it and split  
14 it, you know, in many different ways. I think the  
15 more you split it you get into this danger, you  
16 know.

17 So, then within each layer, you know,  
18 what are you going to put in place as part of your  
19 design and operation and programmatic features to  
20 make sure that you're accomplishing that layer?  
21 And then you impose on top of that, you know, a set  
22 of principles.

23 And all of those are going to vary, you  
24 know, depending on what you're trying to, you know,  
25 defend against. You know, some of the principles

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 may be common, whether you're dealing with reactor  
2 safety or materials or security.

3 But, you probably have some unique  
4 principles for each of those. Certainly your  
5 protective measures, you know, are going to change.  
6 You know, whether you're dealing with security  
7 versus reactors.

8 But, I think that when you're now  
9 trying to determine, you know, your adequacy,  
10 you're always going to have to have these layers.  
11 Those are your structuralist aspect.

12 And the list does not enter the  
13 equation. And that kind of gets to the three  
14 things that you see all the way back in 1956.

15 CHAIRMAN STETKAR: But Mary, if you say  
16 risk doesn't enter into the equation, it always has  
17 to.

18 MS. DROUIN: No, no, no. Just at the  
19 structures level.

20 CHAIRMAN STETKAR: At -- okay.

21 MS. DROUIN: Okay? The risk now comes  
22 into, you know, how do you determine that you have  
23 enough protective measures in place for that layer  
24 of defense. So, that's to me where you bring in  
25 the rationalist, is -- you know, I don't have a

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 point -- oh well, here I do.

2 You know, the risk is the evaluation of  
3 each of the layers. But, the actual layers are not  
4 dependent on the risk. Those are your  
5 structuralist aspects.

6 CHAIRMAN STETKAR: Well, again though,  
7 I'll always use -- take my classic meteorite  
8 example. How many layers of defense in depth do we  
9 need against a meteorite? We can't have enough.

10 And why can't we have enough? Because  
11 we accept the risk of a meteorite strike. So, risk  
12 does enter into the structuralist approach even  
13 though the structuralists won't admit that.

14 It's good to have several layers  
15 against more frequent, hopefully less consequential  
16 events. There are some events against which no  
17 measure of layers will ever protect us.

18 MS. DROUIN: I think you know --

19 CHAIRMAN STETKAR: And just think of  
20 the meteorite.

21 MS. DROUIN: Well, but you know, if I  
22 took that argument, you know, to me when you think  
23 of the layers, you know, you want to defend against  
24 or you know, you want to minimize the -- I'm not  
25 saying this right.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: You're eventually  
2 going to say you want to minimize the risk to the  
3 public.

4 MS. DROUIN: You want to try because  
5 you can't ultimately prevent, you know, an event  
6 from occurring. An event, you know, it will occur.

7 But, you want to minimize its impact.  
8 So, you know, and you're going to minimize that  
9 impact depending on the design criteria. So, the  
10 risk is there when you're figuring out your design  
11 criteria. But you have the layer regardless.

12 I think we're saying the same thing  
13 personally.

14 MEMBER BLEY: I think you're getting  
15 close. There's two or three things I wanted to  
16 chime in on.

17 One, I'm glad Mike pointed out what he  
18 did about Chairman Libby's early statement. It was  
19 very perceptive at the time to come up with  
20 basically the frame work for risk analysis and to  
21 phrase it. So, that's it.

22 MS. DROUIN: Yes.

23 MEMBER BLEY: What happened in between  
24 was because we couldn't do that risk analysis at  
25 all then or with confidence sometime later. We

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       came up with surrogates.

2               We came up with single failure. We  
3       came up with -- that led us to redundancy and  
4       sometimes to diversity. Which the Europeans I  
5       think call functional redundancy. Which is the  
6       same thing.

7               How many barriers do we need? Well,  
8       let's say three. But for some scenarios, some of  
9       those don't even exist. And eventually we get to  
10      the point we can do most of that quantitatively.  
11      And we come back to where you were.

12              Still, there are areas we have  
13      uncertainty. And we want to be able to cover that.  
14      I was a little surprised on your previous slide  
15      that that issue of uncertainty didn't come up again  
16      as one of the key things dealing with adequacy. It  
17      seemed to me it belonged there.

18              And being able to not just draw a curve  
19      for the uncertainty, but structure the way you  
20      think about what I don't know. To then use that  
21      whether I can feel I can quantify it or not, I can  
22      build a little extra into my defense in depth to  
23      cover those things, I think is the key issue.

24              And your meteorite doesn't bother me  
25      because yes, it's as likely to hit me as it is that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 thing sitting next to me.

2 CHAIRMAN STETKAR: Sure.

3 MEMBER BLEY: So, there are some things  
4 like that. But for the things that are happening  
5 at the plant, you know, at some point the frequency  
6 is low enough we just don't want to deal with it.

7 MS. DROUIN: Right.

8 MEMBER BLEY: But up to that point,  
9 this allowance for uncertainty seems to be the key.  
10 And 1860 -- I was a little surprised the other day,  
11 I went back and read 1860 again.

12 And somewhere toward the last draft, I  
13 think it was toward the last draft, defense in  
14 depth got elevated above the structuralist and  
15 rationalist approaches instead of being part of the  
16 structuralist approach. Which kind of surprised  
17 me.

18 MS. DROUIN: It was a combination of  
19 both.

20 MEMBER BLEY: Yes. It kind of  
21 surprised me. But, nevertheless, I think that's -  
22 it shows up here a little bit. And it was really  
23 missing on the previous slide.

24 So, I was concerned about that.

25 MS. DROUIN: Well, I think all your

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 points that you're raising are all very reasonable.  
2 You know, but that is beyond the scope of this  
3 document.

4 And that -- you know, to me that's the  
5 next step. Okay, we looked at the history. We  
6 have all these insights. Now, what do we do with  
7 it?

8 You know, how do we make sense out of  
9 it? But that's where, you know, the Commission  
10 told us not to go.

11 CHAIRMAN STETKAR: I think that, you  
12 know, and when I was taking about the curve it's  
13 easy to talk in three seconds about a curve. I  
14 think more of it is a surface that's got, you know,  
15 a texture to it. Bumps and wiggles.

16 And you look at things that are  
17 protruding. I have to keep to monosyllables and  
18 grunts. That's -- I do better that way.

19 But, you look at places where there are  
20 things that are bulging out if you will, and  
21 indentations on that surface as areas where you  
22 might examine. But, that surface is determined  
23 also by the uncertainty.

24 What struck me as reading some of the  
25 more recent attempts at gee, how do we get our

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 hands on measuring the adequacy of defense in depth  
2 is number one, they didn't address uncertainty.  
3 They were all of this notion of, we need more  
4 things.

5 MEMBER BLEY: I agree with that.

6 CHAIRMAN STETKAR: And a little bit of  
7 drawings like this I think tend to reinforce that  
8 notion. Because there are boxes and little things  
9 that I can now parse things up into.

10 So, going forward, if we're going to go  
11 forward on this, I think we need to step back from  
12 a discrete nature of it perhaps.

13 MS. DROUIN: Well, I think we --

14 CHAIRMAN STETKAR: At least at a  
15 beginning. Because it tends to reinforce that  
16 notion that if I can subdivide my spreadsheet or I  
17 can subdivide my basic events in an event model, I  
18 can then delude myself into, you know, some sort of  
19 precise quantitative measure of something without  
20 even addressing uncertainty.

21 Because none of the things that I read  
22 had that notion in it. It was all parsing little  
23 models.

24 MS. DROUIN: Well, I thought that, you  
25 know, out of all the literature that the paper done

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 by Idaho that got into, you know, they're the ones  
2 that really talked about. The only place that  
3 really talked about in any kind of detail how to  
4 determine the adequacy.

5 And it's a process. And you know, they  
6 go through and they look at the uncertainty. You  
7 know, and they question about the uncertainty.

8 They question about -- now I may be  
9 mixing in my own thoughts here.

10 CHAIRMAN STETKAR: I was going to say,  
11 which paper was that? I probably missed that one.  
12 And don't try to find it right now.

13 MS. DROUIN: It's on page 41, 4-41.

14 CHAIRMAN STETKAR: Okay. 4-41? What a  
15 memory? Gees, man or man that's --

16 MS. DROUIN: Because I just looked it  
17 up.

18 CHAIRMAN STETKAR: You're a scary  
19 person. That's all right. But we can do it  
20 offline.

21 MS. DROUIN: But I think that, you  
22 know, you can go through, you know, for however you  
23 defined your layers. And say you know, you've got  
24 -- you know, you want to keep your, you know,  
25 stable operation.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           You know, you want to prevent a severe  
2           accident. And then ultimately you want to mitigate  
3           the consequences. And so those at a high level are  
4           your three things.

5           Then as you look at each of them you  
6           can start asking questions, you know. And how is  
7           the risk assessed for each of those?

8           Now, I do think that there's a good  
9           process you can go through. And I think by taking  
10          the Idaho and I think some of the insights from the  
11          NEI document, you really can come up with a process  
12          using risk.

13          But, it needs a lot of good thought.  
14          It's not something you're going to be able to just,  
15          you know, develop overnight.

16                 MEMBER BLEY: That Idaho paper was I  
17          think the NGNP White Paper on defense in depth.  
18          Right.

19                 MEMBER CORRADINI: Where they actually  
20          gave us a curve.

21                 CHAIRMAN STETKAR: Yes. That's right.

22                 MEMBER CORRADINI: And they saw some  
23          bumps and wiggles.

24                 CHAIRMAN STETKAR: That's right.

25                 MEMBER CORRADINI: And for two for

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 instance.

2 CHAIRMAN STETKAR: Yes.

3 MEMBER BROWN: Let me make one comment  
4 relative to it. I guess one of my concerns, and we  
5 talk too much overarching. I mean, I almost agree  
6 with John since --

7 CHAIRMAN STETKAR: Don't do that. That  
8 would be incredibly --

9 MEMBER BROWN: It would be horrible if  
10 I did.

11 CHAIRMAN STETKAR: Just slit my throat  
12 with this one.

13 MEMBER BROWN: Relative to dividing  
14 spreadsheets into finer, finer grids. And coming  
15 up with more precise numbers.

16 And that I think trying to get too  
17 detailed and too -- I'll use this word two  
18 different ways, too prescriptive in here's the  
19 process. Meet each of these metrics and you're  
20 done. You come up with a number you're happy.

21 I don't think that's productive because  
22 I think the tension that exists between designing  
23 and evaluating each design as it goes within the  
24 concepts that we had -- that are framed here,  
25 doesn't result in complacency in the long run.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           That people say I can go through this  
2 calculation. Come up with a number and I'm happy.  
3 I don't have to have a containment that's leak  
4 tight because I've done this risk analysis and  
5 everything comes out just fine because we know so  
6 much.

7           And off we go. And we're just happy as  
8 pigs in a mud wallow. And we don't worry about it  
9 being leak tight anymore.

10          I just think -- or independence doesn't  
11 have to be totally independent in terms of a  
12 support your arrow doing down. The stuff that  
13 supports any one of these things.

14          You can be sort of independent. You can  
15 have some stuff communicating between systems of  
16 whatever, you know, mechanical or electrical  
17 systems. And that's okay. Because we've done the  
18 analysis of that.

19          And I just think that's -- you need to  
20 fight about that and make sure that some of those  
21 fundamental principles of the independent's  
22 diversity that make redundancy really -- redundancy  
23 don't get compromised because a number says we  
24 don't really have to be as good as we would like to  
25 be.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   And that's reflected, there's words in  
2                   here about a balance between this, I forgot what  
3                   the three terms of balance between mitigation,  
4                   prevention and I don't know, something else. Or  
5                   redundancy or independence, whatever the words  
6                   were.

7                   I just think it's a -- that's a  
8                   slippery slope. And tension is good when engineers  
9                   and regulators have to think about, discuss and  
10                  evaluate things as they go along as they approach  
11                  each design.

12                  So, that's just my kind of sense.

13                  MS. DROUIN: Yes. I'm a firm believer  
14                  that you cannot and should not be prescriptive  
15                  here. I absolutely agree with that. Because I  
16                  think --

17                  MEMBER BROWN: On a risk basis in terms  
18                  of prescriptiveness. I think some prescriptiveness  
19                  you're going to have a --

20                  CHAIRMAN STETKAR: Charlie likes his  
21                  own prescriptives, not yours.

22                  MEMBER BROWN: Well, there are places  
23                  where prescriptive is fine. There are other places  
24                  where you want to do exactly what you're talking  
25                  about. You want to see have we gone overboard?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   And you do some other analysis. But  
2                   there's some fundamental principles that you need  
3                   to maintain. And the barriers I think those are  
4                   prescriptive.

5                   You're never going to make them fell  
6                   less good then it is today. You're always going to  
7                   have a cooling system that's tight. And you're  
8                   always going to have a containment that's tight.

9                   I don't think you're going to go do a  
10                  risk analysis and come up with a leaky container.

11                  MS. DROUIN: Well, and that's you know,  
12                  --

13                  MEMBER BROWN: That's prescriptive no  
14                  matter how you slice it.

15                  MS. DROUIN: I guess I would not have  
16                  termed personally when I put perspective  
17                  prescriptive.

18                  MEMBER BROWN: Well, you're dictating  
19                  it now. As prescriptive.

20                  MS. DROUIN: But what I -- but to me,  
21                  you know, in looking at the history and looking at  
22                  where we currently are today, you know, there is no  
23                  single place that you can really go to and get even  
24                  at the 80 thousand foot level, this is, you know,  
25                  are you a defense in depth?

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           And to me just, you know, I felt like  
2           at a minimum, you know, at the 80 thousand foot  
3           level, let's at least have a definition that we can  
4           all live with, you know. Now, is it one of those  
5           six ones that are there? I don't know.

6           You know, I think that there's good  
7           pieces that, you know, in all the different ones.  
8           But, what do we mean, you know, at the 80 thousand  
9           foot level by defense in depth?

10          And I think that we owe it to our  
11          stakeholders both internally and externally, you  
12          know, what are the Commission's expectations. And  
13          I -- and again, I'm talking from a personal level.  
14          I think we've done a disservice, you know, by not  
15          trying to put a better explanation, you know,  
16          around this.

17          And the best that I can offer is that  
18          when you do look at the history you do see that,  
19          you know, everybody if you think of defense in  
20          depth in a framework type of way, you know,  
21          everybody agrees that you have these layers. And  
22          in the layers you have your design and operation  
23          and programmatic features you put in place.

24          And superimposed on top of that is a  
25          set of principles. And I think just capturing that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 in some words would be a good thing. Do you need  
2 to go past that? That's debatable.

3 But, I think at least at this level, to  
4 talk about this is our view of defense in depth, I  
5 think is a good thing. So, that we're all coming  
6 from the same place.

7 Then my last slide, you know, each  
8 office has been given this KM NUREG to put on their  
9 SharePoint. It's been published. And there's the  
10 ML Number.

11 And at this point, you know, we have no  
12 more -- I mean, that tied up our ticket items that  
13 the Commission asked us to do on this topic.

14 MEMBER BROWN: This is being used. I  
15 saw some of this for a second in the Reg Guide  
16 1.174. It's stuff that we're going to hear later.

17 I mean, some of the terminology and the  
18 line items were pulled from different sections. It  
19 looks like they were kind of collated and put  
20 together in this section on defense in depth.

21 So, it looks like it was utilized. Is  
22 that right or wrong? Or did they just invent those  
23 out of whole cloth without any reference to this  
24 KM?

25 MS. DROUIN: Well, I think we'll get

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       into that, you know.

2               MEMBER BROWN:   Okay.

3               MS. DROUIN:     But yes, insights from  
4 this of course are being used.   Okay.

5               CHAIRMAN STETKAR: Anything we're going  
6 to   switch gears here.   You know, and now for  
7 something completely different.

8               So, anymore --

9               MS. DROUIN:     Do you want to take a  
10 break? Or do you want to --

11              CHAIRMAN STETKAR: No. Unless you do.

12              MS. DROUIN:    No. I'm fine.

13              CHAIRMAN STETKAR:    Anymore -- but  
14 before we do switch gears, anymore comments or  
15 questions for Mary on this topic?

16              Mary, by the way, for the record, this  
17 is a really heroic and great effort. I mean, this  
18 is -- this is really good.

19              MS. DROUIN:     Well, thank you, very  
20 much.

21              CHAIRMAN STETKAR:    I haven't been --  
22 and I read the whole thing cover to cover. And,  
23 you know, went and fetched some of the references  
24 that I never -- well, forgotten about is polite.  
25 Never knew about is more accurate.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MS. DROUIN: Well, I'd like to --

2 CHAIRMAN STETKAR: It's really, really  
3 good.

4 MS. DROUIN: Thank you. Sorry, I just  
5 said I would like to put it on the record, just  
6 some acknowledgment. You know, John Nakoski, my  
7 supervisor, you know was a tremendous help.

8 Ryan Wagner, John Mainer and Benault  
9 Benayu from Brookhaven were critical in this  
10 document. And then you know, getting the resources  
11 on all the ACRS letters and the Reg Guides.

12 Donald Chung and C.F. Fong and -- oh,  
13 this is embarrassing. There's another individual,  
14 he is acknowledged in the document. But, I do --  
15 and Don Knoxberry. Man, he knows how to Google  
16 search like nobody else.

17 MEMBER BLEY: I did want to say one  
18 thing. I too agree, it's a great report. And long  
19 overdue. I mean, it puts together things that  
20 people are given bits and pieces about for a long  
21 time.

22 I did want to mention the report that  
23 came out of the ACRS showed up as a conference  
24 paper by Sorensen, George Apostolakis, Tom Kress  
25 and Dana Powers. And the thing that led to that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 paper was a feeling that the idea of defense in  
2 depth had become so amorphous that anybody who  
3 wanted to add one more thing to any power plant  
4 could always say I want you to do that. And we  
5 need it because of defense in depth.

6 And it was crying for let's bring some  
7 rationality back. That doesn't -- you can't do  
8 that without end. You just can't operate that way.

9 And that led to that paper and to this  
10 dichotomy between the structuralists and the  
11 actionalists approach. And that's helped. That  
12 helped us in 1860, years ago.

13 MS. DROUIN: I think that's a very true  
14 statement. And I think unfortunately, personally I  
15 think that view is still there, you know. Okay.

16 So, how do I change the presentation?  
17 Okay. Okay. I think this one should go a lot  
18 quicker.

19 And this is to bring you -- explain to  
20 you where we are on Reg Guide 1.200. Because we  
21 are right now starting our plan for our next  
22 revision.

23 But, I thought, you know, we ought to  
24 recalibrate ourselves because, you know, Reg Guide  
25 1.200, Rev. 0 was originally published back in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 February 2004.

2 So, you know, we're 12 years later with  
3 this Reg Guide. I think it's been a very  
4 successful Reg Guide.

5 You know, and the purpose was, you  
6 know, to describe an approach for determining that  
7 the PRA was technically adequate to support the  
8 risk informed decision under consideration.

9 And so as such, this Reg Guide, and if  
10 you look at most Reg Guides, it tells you what  
11 regulations it's providing you guidance on. This  
12 is a unique Reg Guide because it doesn't provide  
13 guidance on a regulation except for Part 52 for new  
14 reactors.

15 But, for operating reactors, it does  
16 not. It's really what we call a supporting Reg  
17 Guide. And it's really invoked by other regulatory  
18 guides.

19 So, you know, it provides us that  
20 position on again, what constitutes a technically  
21 acceptable base PRA. You'll see the terms base PRA  
22 sprinkled throughout the Regulatory Guide.

23 And the base PRA is meant to be, you  
24 know, independent of any application. If you went  
25 out and you wanted to develop, you know, quantify

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

(202) 234-4433

(202) 234-4433

1 the risk of a reactor, you're not thinking of a  
2 particular application, you're just trying to  
3 capture the entire risk. That's the base PRA.

4 Now, for a particular decision you may  
5 not need to capture, you know, all the initiators.  
6 You may not need to, you now, do all your  
7 abstinence sequences. But a base PRA is, you know,  
8 meant to capture the whole risk.

9 And in providing, you know, what  
10 constitutes a technically acceptable PRA, the goal  
11 of 1.200 is that if the licensee followed it, it  
12 would obviate, and you see those words in the Reg  
13 Guide, it would obviate the need for an in depth  
14 Staff review.

15 That doesn't mean the Staff couldn't  
16 come and do an audit. But, it was to help them  
17 focus, you know, on the more significant things to  
18 take into consideration their review.

19 And so it also, you know, in providing  
20 the Staff position it provides guidance on how  
21 standards and peer reviews can be used to  
22 demonstrate that you have a technically acceptable  
23 PRA.

24 So, when you look at the current  
25 revision that's out on the street it's Rev. 2. And

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       it provides a Staff position in three areas.   What  
2       metrics are used to characterize your risk.

3               And so right now it provides Staff  
4       position for core damage frequency and for your  
5       radio nuclide release frequency.   It does not get  
6       into a Level Three PRA, your consequences.

7               And that decision was made because at  
8       this point in time, we do not use -- we do not  
9       require or rely on Level Three PRAs in any of our  
10      risk-informed regulatory decision making.

11              It does cover, you know, all plant  
12      operating states.   Both at power, and low power,  
13      and shut down.   And it does look at both internal  
14      and external hazards.   So, it covers internal  
15      events, internal fire, internal flood, seismic,  
16      high winds, et cetera.

17              MEMBER BLEY:   Mary, well over the last  
18      several years, we have objected and argued many  
19      times about the capability category required for a  
20      design cert PRA.   And the Staff has cited some of  
21      their own guidance to say why they think it should  
22      be category one.

23              We've objected and said it should be  
24      category two because whether it's a risk informed  
25      application or not, it is being used for making

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 decisions. And it would make a much better  
2 transition to the final pre-core load PRA to do  
3 capability category two.

4 And then for things that you can't do  
5 it, you could by exception address them at maybe  
6 capability category one level. We've been told a  
7 couple of times take a deep breath. Because when  
8 the revision to 1.200 comes out it's going to say  
9 for design cert PRAs they ought to be capability  
10 category two.

11 It's not happening, is it? Or is it?  
12 I'd be happy if you said yes, it is.

13 MS. DROUIN: The answer is yes.

14 MEMBER BLEY: When and where and how?

15 MS. DROUIN: We have an ISG that is  
16 coming out that will get into -- it will cover  
17 design cert. I really wasn't prepared to get into  
18 this kind of discussion at this point in time.

19 There is an advanced light water  
20 reactor trial use standard that will be coming out.  
21 But, I don't know, what's the schedule on the ISG  
22 Donnie?

23 MR. HARRISON: It's with --

24 CHAIRMAN STETKAR: Donnie, we all know  
25 you. But the transcript doesn't.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 MR. HARRISON: Right. This is Donnie  
2 Harrison from New Reactors. I do want to clarify  
3 that the interim staff guidance does not say we  
4 need to achieve capability category two.

5 So, it goes through the standard at  
6 capability category one. And sometimes pushes it  
7 to two if there's no requirement at one.

8 So, that was the briefing a number of -  
9 - eight months ago or so. So, that's the guidance  
10 document is with our project to be pushed forward  
11 towards publishing.

12 So, that -- what you heard eight months  
13 ago is still -- and you have a response back to  
14 ACRS later on that. That's still where we're at  
15 for new reactors.

16 So, I just wanted to clarify that part.  
17 There is an advanced light water reactor appendix  
18 to the PRA standard that's being -- it's right now  
19 under review to put your probability within the  
20 standards development organization.

21 It does address capability one, two and  
22 actually three for advanced light water reactors  
23 and the pre-operational base. So, design servicing  
24 combined with light --

25 MEMBER BLEY: It addresses them? I'm

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 not sure what that means.

2 MR. HARRISON: What it does is it tells  
3 you if you can meet certain requirements or you  
4 cannot meet it. It uses the language of can meet,  
5 cannot meet, alternate requirement.

6 In some cases it proposes a new  
7 requirement.

8 MEMBER BLEY: So, it would be category  
9 two unless you cannot meet category two at that  
10 stage?

11 MR. HARRISON: Well, they don't say  
12 what unit. Again, it's to be used like by a peer  
13 review. So when a peer review goes out, it can  
14 actually grade each of the supporting requirements.

15 MEMBER BLEY: Okay.

16 MR. HARRISON: So, for the most part a  
17 design cert will come out as a capability one on  
18 some of them, and capability two on some others.  
19 And even three on a handful.

20 But -- so, it's being used as -- well,  
21 the capability category is, which I think Mary and  
22 I both agree with, almost wish they had never  
23 happened.

24 MEMBER BLEY: But we'll get into --

25 MR. HARRISON: But we don't have a

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 sense of grading.

2 CHAIRMAN STETKAR: Okay, Donnie, if you  
3 wish they wouldn't have happened, and Mary wishes  
4 they wouldn't have happened, and the ACRS wishes  
5 they wouldn't have happened, why don't we make them  
6 not happen as far as the Nuclear Regulatory  
7 Commission guidance is concerned?

8 I mean, you know, --

9 MS. DROUIN: Well, we have -- we have -  
10 -

11 CHAIRMAN STETKAR: We can do that.

12 MS. DROUIN: We have in essence do  
13 that. Because when we have reviewed and endorsed  
14 these standards, we only review and endorse  
15 capability category two.

16 If you look at the appendix to Reg  
17 Guide 1.200 and if you look at that preamble and if  
18 you look at the discussion, you know, we do  
19 acknowledge these other capability categories.  
20 But, we've only reviewed and endorsed capability  
21 category two.

22 MEMBER BLEY: But the Staff has written  
23 back to us, and at least one of their guidance  
24 documents set forth design certs capability  
25 category one is perfectly adequate.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: And the Staff  
2 violently defends that. Violently defends it.

3 MS. DROUIN: But that's not a 1.200  
4 issue.

5 MEMBER BLEY: Yes. You're right.  
6 We've set that for 1.200.

7 MS. DROUIN: Yes.

8 MEMBER BLEY: But I thought it was  
9 going to show up in 1.200. I had heard that.

10 CHAIRMAN STETKAR: We had been told  
11 once that --

12 MEMBER BLEY: That's why I came up  
13 here.

14 MS. DROUIN: I mean, it shows up in the  
15 sense that the reason I said yes is because we have  
16 this advanced light water reactor standard and ISG,  
17 which is pre-operational.

18 So, it moves from the design cert into  
19 pre-operational. And that is looking at capability  
20 category two.

21 CHAIRMAN STETKAR: Go ahead.

22 MS. DROUIN: But I will say that there  
23 has been a lot of discussion within JCNRM. And it  
24 was balloted at -- it failed ballot, but it was re-  
25 balloted.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   And the next addition is getting rid of  
2                   capability category three. So, we're coming down.

3                   We're getting back to the original. If  
4                   you remember, the original standard right before it  
5                   published didn't have capability categories.

6                   And so, we're slowly getting back to  
7                   that.

8                   MEMBER BLEY: In my opinion we're  
9                   knocking off the wrong end first.

10                  MS. DROUIN: That may be true. So,  
11                  essentially, you know, Reg Guide is a full scope  
12                  level one/level two. You know, all hazards, all  
13                  operating states.

14                  So, when you look at what is currently  
15                  endorsed, so it goes through and there's the  
16                  ASME/ANS RA-SA-2009. There has been an Addendum B  
17                  to that standard.

18                  The NRC elected not to review and  
19                  endorse Addendum B. The reason we did that is  
20                  because it's a lot of time and resources to review  
21                  and endorse these standards.

22                  And we had a lot of technical issues  
23                  with Addendum A. And it was our understanding  
24                  Addendum B was going to address our technical  
25                  issue. It did not address any of them.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           And it was basically what we felt  
2           technical editing. And so, we were not going to  
3           use our resources to, you know, --

4           MEMBER BLEY: But, it didn't water  
5           things down. It just did some textural  
6           improvement.

7           MS. DROUIN: It's debatable on how much  
8           that improvement really was there, you know. But,  
9           it did not -- you know, we sent in oh, gosh, like a  
10          30-page letter to ASME and ANS as part of the  
11          public comment.

12          And we had some very solid technical  
13          issues. None of them were addressed in Addendum B.  
14          So, we just told us, well, look, we're not going to  
15          spend our time and resources.

16          They had been very hard working on  
17          these technical issues since then. And they are  
18          being addressed in the next addition.

19          NEI 00-02 was the first document NEI  
20          put out on the peer review. That one we're  
21          probably going to drop in the next revision because  
22          it's outdated.

23          And it's been replaced with NEI 05-04.  
24          The other document that Rev. 2 endorses is 07-12.  
25          Which is the internal fire peer review.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           So, right now this is the documents  
2           that Rev. 2 endorses. And they're all endorsed  
3           again, the Staff position that's written up in  
4           detail in the front part of the document.

5           But there's been a lot of work going on  
6           within the Joint Committee on Nuclear Risk  
7           Management, which is a joint committee between ASME  
8           and ANS. They have written a level two PRA  
9           standard.

10           It was issued, I think, in January of  
11           this year. It is out for trial use. Now, this is  
12           a new position taken by the JCNRM.

13           Any new standard that comes out will be  
14           first initially issued as a standard for trial use.  
15           So, it's not being issued as an ANSI standard. It  
16           is still a consensus standard.

17           But it just is issued under ASME and  
18           ANS. It hasn't gone to the next step for ANSI  
19           approval. It will go for an ANSI approval once the  
20           trial use period is over with.

21           And their goal of doing the trial uses  
22           to pilot the standard first, you know, get lessons  
23           learned, come and fix it, and then issue it, you  
24           know, as a final ANSI standard. There is a low  
25           power shutdown standard that is also currently out

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 for trial use.

2 Part Five of the current standard deals  
3 with seismic. They've gone through and done some  
4 major updates to that. They don't want to wait for  
5 the next addition.

6 So, they're issuing that. It's due out  
7 late this summer as a code case. So, we will  
8 review and endorse it as a code case that will  
9 ultimately be incorporated into Rev. 3.

10 NEI has issued peer review guidance for  
11 a seismic PRA. We did review this and we had  
12 drafted up an ISG. But, this will now be turned  
13 into a draft guide.

14 They have updated their peer review  
15 guidance on 05-04. And that is the new work that  
16 they've done on resolving the F&Os from a peer  
17 review.

18 In the past we really had no idea how a  
19 licensee dispositioned the F&Os from the peer  
20 review. And this is meant to update that. And  
21 we've been working closely on this. And there's  
22 going to be some pilots performed on this.

23 NEI has also recently issued a draft  
24 16-04. We've been up in front of the Committee to  
25 talk about this. And this is --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1                   MEMBER BLEY: I need help remembering.  
2                   Yes, go ahead.

3                   MS. DROUIN: It's their vetting panel  
4                   approach to look at new PRA methods for  
5                   acceptability.

6                   MEMBER BLEY: All right. Thank you.  
7                   I'd forgotten what that was.

8                   MS. DROUIN: Then there is, you know,  
9                   we just spoke of a little while ago, the Advanced  
10                  LWR PRA standard. That's expected to be issued by  
11                  the end of this year.

12                  And then there is the new addition,  
13                  which is supposed to be, you know, next year.  
14                  There's two other -- there's another standard here  
15                  -- two other standards. But, we're not reviewing  
16                  those for endorsement.

17                  The level three PRA standard which is  
18                  out for ballot right now, so if it passes the  
19                  ballot then it will be out this year. Last year  
20                  they did issue a PRA standard. It's like a 500-  
21                  page document on for non-light water reactors.

22                  But, we've been very up front with ASME  
23                  and ANS that we had no intention of reviewing and  
24                  endorsing that standard at this point in time. And  
25                  it all comes down to just a matter of resources.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   So, in looking at all this stuff coming  
2 out, it's a lot. So, it's just really not -- it  
3 takes a lot to issue a Reg Guide. There are a lot  
4 of hoops to jump through.

5                   MEMBER BLEY: I should really ask  
6 somebody else about this. But, on that last one  
7 that you said, up for advanced reactors and not  
8 looking at. Is NRO --

9                   MS. DROUIN: Right.

10                  MEMBER BLEY: I wonder if NRO is  
11 involved in that? Or if they're using that as a --  
12 as part of the input for the work they're doing for  
13 new reactors? Advanced reactors?

14                  MS. DROUIN: Yes. Even though we may  
15 not review and endorse a standard, we have NRC  
16 Staff on all the working groups.

17                  MEMBER BLEY: All the groups. Okay.

18                  MS. DROUIN: For all the groups. So,  
19 you know, we do have somebody on the Level Three  
20 PRA Working Group. We've had one to two people on  
21 the Non-LWR Working Group. So, we do participate,  
22 you know, and provide them, you know, with  
23 regulatory perspectives.

24                  But, because right now everything is up  
25 in the air on like non-light water reactors, you

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 know, there may well come a time when we will  
2 review and endorse it. But, as I said, it's very,  
3 very costly and time consuming to do this.

4 So, as I said, it's just not, you know,  
5 an effective and efficient way to try and review  
6 and endorse each one of these standards and make a  
7 revision to the Reg Guide for that particular new  
8 standard. Particularly also since they're being  
9 issued for trial use.

10 So, what we did is to try to come up  
11 with a way that would be beneficial and help, you  
12 know, get a win/win situation. So, what we've  
13 decided to do is issue a series of draft guides.

14 You know, and so that we would end up  
15 instead of issuing one draft guide at the end, you  
16 know, as each of these trial use standards are  
17 issued, we would issue out a draft guide that would  
18 provide a preliminary Staff position.

19 And then once that first one gets  
20 issued, that first draft guide gets issued, then  
21 the public review and comment period just keeps  
22 remaining open as we keep issuing another draft  
23 guide as a new standard comes out.

24 CHAIRMAN STETKAR: And these would be -  
25 - I'm not sure it makes much difference, but

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       probably somehow it does.    You characterize these  
2       as draft guides,   DGs,   which are normally draft  
3       regulatory guidance.

4                You're not characterizing them as ISGs,  
5       Interim Staff Guidance.

6                MS. DROUIN:   No, no.   these are draft  
7       guides.

8                CHAIRMAN STETKAR:        So, it's just  
9       something that's going to be out there sort of  
10      morphing and changing.

11               MS. DROUIN:       The way a Reg Guide  
12      process, you know, works, is you write the draft  
13      guide first.   It's issued for public review and  
14      comment.

15                You know, and then you look at the  
16      public and you go final.

17               CHAIRMAN STETKAR:   Right.   That's the  
18      normal process.

19               MS. DROUIN:       And that's the normal  
20      process.   And usually you go out for a public  
21      review and comment period anywhere from 30 to 90  
22      days.

23               CHAIRMAN STETKAR:   Right.

24               MS. DROUIN:       But in this case we're  
25      going to be out for public review and comment for

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       like a year and a half. And you're going to see  
2       this, I think it will become clear when you see it  
3       more visually.

4               It's kind of hard to explain this, you  
5       know, in words. But, the main thing is --

6               MEMBER CORRADINI: But the motivation -  
7       - I just want to make sure I understand motivation.  
8       The motivation is, there's so many things going on  
9       at once you can't keep on updating it too  
10      frequently?

11              Is that what I understand it is?

12              MS. DROUIN: That's a lot of it. Yes.  
13      And it's complicated also that these are trial use  
14      standards.

15              MEMBER BLEY: But these are in the end  
16      rather than a series of Reg Guides they'd be  
17      integrated into 1.200? Is that the idea?

18              MS. DROUIN: Yes. Yes, they'll be a  
19      series of draft guides. But only one revision  
20      ultimately to 1.200.

21              So, but also doing this, you know, the  
22      big thing is that it allows for the trial use  
23      standard to be piloted before we finalize our  
24      endorsement in the final revision to the Reg Guide.

25              It also allows us to do a detailed

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 review of this Reg Guide. We haven't really done a  
2 detailed review of it since we published it in  
3 2004.

4 We did some updates to it. But we  
5 haven't really sat back. And in the time, you  
6 know, it's very timely to stand back and say okay,  
7 what's been successful? You know, what has worked  
8 well with this Reg Guide? You know, what has not  
9 worked well?

10 You know, one of the ideas we were just  
11 talking about, you know, what's the merit including  
12 the NRC Staff on the peer reviews? You know,  
13 factoring that in.

14 So, we want to do, you know, a good  
15 scrubbing of this Reg Guide. You know, is there,  
16 you know, clarifying language that we could improve  
17 upon?

18 So, the formal, you know, revision  
19 would occur after this long, lengthy, public review  
20 and comment period is open. And I think, you know,  
21 I probably should have gone to this slide first.

22 Okay. Let's try this. This is trying  
23 to, you know, illustrate and come up with our  
24 schedule. And if you look at that top brown line  
25 and all those diamonds that's when all the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 standards are going to be issued.

2 At least right now as they're  
3 scheduled. Now you know, we don't have control  
4 over the ASME and ANS schedules.

5 But right now I think the schedule is  
6 pretty stable. You know, there is a Non-LWR  
7 Standard that's been issued for trial use. The  
8 Level Two is out. The low power shut down is out.

9 The Level Three standard, you know, is  
10 expected in the next month. The Part Five, the  
11 seismic, it is -- oh, my time line got screwed up.  
12 The Level Three is not out.

13 Somehow when this got cut and pasted,  
14 it screwed up the time line. The Level Three isn't  
15 going to be out until later on this year.

16 But the rest of it there looks right.  
17 The NEI peer review guidance, they have issued an  
18 initial draft. The Part Five seismic is due out in  
19 August. The advanced light water reactor by the  
20 end of the calendar year.

21 And tentatively the final peer review  
22 and the new methods, that's 04-05 and 16-04 later  
23 on this year. And then the new addition isn't  
24 scheduled until the later part of 2017.

25 Then if you look at the next line, the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 blue one, they're color coded and to, you know,  
2 when we will be seeing, you know the draft guides.  
3 So, the first draft guide we're planning on doing  
4 it's towards -- is at the end of this year.

5 And it would be a draft guide reviewing  
6 the Level Two, the low power shut down and Part  
7 Five. Then we would have an update to that draft  
8 guide in 2017. That's the purple triangle.

9 And that would get into the updated to  
10 the peer review from NEI 05-04 and 16-04. And it  
11 would also look at the advanced light water reactor  
12 standard.

13 Then we would issue another draft guide  
14 in early 2018, which would take into the new  
15 addition. And then three months after that, the  
16 public review and comment period would close.

17 And so that brings us down to the  
18 purple line. And it takes us, you know, once we  
19 close the public review and comment period, it  
20 takes us six months to get through our process.

21 Because, you know, we have to come back  
22 to ACRS. We've got to go for interoffice review,  
23 OGC review. So, then we were looking at Rev. 3 to  
24 occur towards the end of 2018.

25 So, you know, when you go back to that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 middle line you see the red triangles of when we  
2 would probably have public review and comment. If  
3 the ACRS wanted us to talk to each of those draft  
4 guides, you know, we would have, you know, come in  
5 after each of the draft guides had issued.

6 And then we would come for a final  
7 ACRS, you know, after we have the new addition and  
8 we've gotten all the public comments in and we've  
9 addressed them.

10 So, again, what this schedule is  
11 allowing us to do is giving early notification, you  
12 know, to ASME, ANS and our stakeholders, you know,  
13 our view on these standards and these review  
14 guidance documents.

15 And it allows them to factor this into  
16 account, you know, while they're piloting it. So  
17 that when they go final, they have hopefully  
18 addressed our concerns so that any objections we  
19 may have raised in the draft guide, we can remove  
20 when we go to the final revision.

21 And that's very similar to the approach  
22 we did at the very beginning when the standards  
23 first came out. So that when we actually had Rev.  
24 0 we had very few exceptions at that point in time.  
25 Because the ASME and ANS had gone through several

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       addendums prior to our endorsement.

2               So, and we have presented this at a  
3       public meeting. We got very good feedback that  
4       they liked this approach.

5               The only clincher in all of this, and  
6       we've warned the stakeholders is that we will not  
7       wait forever for them to go from trial use to  
8       final. You know, we are expecting them to do this  
9       in a timely fashion.

10              If they decide to take ten years, well,  
11       we'll probably just end up endorsing a trial use  
12       standard. Which we can do. And we have done at  
13       the NRC in the past.

14              But, we're going to give them the  
15       opportunity to pilot it. But if they start  
16       dragging this out, then you know, we will have to  
17       revisit, you know, in terms of when we go final  
18       with the Reg Guide.

19              So, that's kind of where our proposed  
20       plan is right now on Reg Guide 1.200.

21              CHAIRMAN STETKAR: Good. And I'm glad  
22       that -- I'm sure that the Subcommittee will want to  
23       kind of hit it at, you know, conceptually those  
24       milestones that you had, inter-milestones there.

25              Because one of my initial concerns was

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       that we wouldn't see it until, you know, close to  
2       the end of this process, a couple of years from  
3       now. Which is not useful for you to get feedback.  
4       At least at the Subcommittee level.

5               And of course, you know, if  
6       Subcommittee so decided that it wanted to kick it  
7       up to the full Committee to give a more formal  
8       feedback, you know, we would have that opportunity.

9               MS. DROUIN: Um-hum.

10              CHAIRMAN STETKAR: So, that's good.  
11       I'm glad that it's laid out this way.

12              MS. DROUIN: And you know, as I said,  
13       the biggest thing since, you know, we're going to  
14       be out during this entire period for public review  
15       and comment, we're going to take advantage of that  
16       in terms of doing a good scrub of the Reg Guide.

17              CHAIRMAN STETKAR: Okay.

18              MEMBER BALLINGER: Can we mention that  
19       there's something wrong with the time line?

20              CHAIRMAN STETKAR: I think it's just  
21       the Level Three diamond on there, right?

22              MS. DROUIN: Yes. Just the Level  
23       Three.

24              MEMBER BALLINGER: But for the  
25       uninitiated and ill-informed and ignorant --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MS. DROUIN: Okay.

2 MEMBER BALLINGER: Myself included, can  
3 we get a revised version of that so the -- a  
4 correct version?

5 MS. DROUIN: Sure. I'll send John a  
6 corrected version of this table. That one somehow  
7 got screwed up.

8 CHAIRMAN STETKAR: Anything else on,  
9 because we're going to switch gears. We're going  
10 to take a break. And then we're going to switch  
11 gears again.

12 So, anything else for Mary on 1.200?

13 (No response.)

14 CHAIRMAN STETKAR: Okay. Good. Thank  
15 you. And we will take a break until 10:30. We're  
16 recessed until then.

17 (Whereupon, the above-entitled matter  
18 went off the record at 10:16 a.m. and resumed at  
19 10:32 a.m.)

20 CHAIRMAN STETKAR: We are back in  
21 session. We're going to switch gears and talk  
22 about the update to Regulatory Guide 1.174.

23 Anders, it's yours.

24 MR. GILBERTSON: Okay. Thank you.

25 CHAIRMAN STETKAR: A new face.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. GILBERTSON: Nice to be here. And  
2 thanks again for the opportunity to present. And  
3 my name is Andres Gilbertson. I'm a Reliability  
4 and Risk Analyst in the Division of Risk Analysis  
5 in the Office of Research. I am the project  
6 manager for the update to Regulatory Guide 1.174.  
7 And this morning I will be giving a presentation on  
8 the development plan and our schedule for  
9 completing this work.

10 I'll go through this relatively  
11 quickly. This is a lot of what John Nakoski spoke  
12 about in his opening remarks. This is really just  
13 to illustrate that work started on this update back  
14 in 2011 with the SRM-SECY-11-0014 where we were  
15 told to use precise language and update this  
16 defense-in-depth language in 1.174.

17 Work proceeded on that. We had the  
18 Draft Guide developed. And I'll just add some of  
19 the major changes to the guidance going from  
20 Revision 2 to DG-1285, which is the Draft Guide.

21 We reorganized the seven elements of --  
22 that are -- need to be considered when evaluating  
23 the impact of defense -- or on defense-in-depth to  
24 the licensing basis change. There were additional  
25 discussions that were added to help explain the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 meaning of each element. In Revision 2, these  
2 elements were really just a bullet list of things  
3 to be considered by the licensee, so more  
4 explanation was added. And beyond that, we --  
5 there were some examples that were developed for  
6 each element to further explain those elements.

7 So the effort was delayed due to the  
8 ongoing NTTF Recommendation 1 and the RMRF work  
9 related to defense-in-depth. And bringing us up to  
10 March of this year, the SRM-SECY-15-0168 was issued  
11 and the staff were directed to expeditiously  
12 complete the revision to Reg Guide 1.174.

13 And so with that direction, we have --  
14 we are -- we have moved forward. We have an Inter-  
15 Office Working Group that has been formed and that  
16 consists of Members of the Office of Research, NRR,  
17 NRO as well as OGC and we have Members from NMSS  
18 and NSIR participating as observers.

19 We -- I'll go into this a little bit  
20 more in the presentation, later in the  
21 presentation, but the intent behind having multiple  
22 Members from the different offices was to make sure  
23 that -- you know, right now we have a relatively  
24 restricted schedule. We were told to do this  
25 expeditiously, so we just want to make sure that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       there is open communication between the offices of  
2       the internal stakeholders.

3               We have an Inter-Office Division-Level  
4       Steering Committee that the working group reports  
5       to and so that consists of the division directors  
6       from RES/DRA, NRR/DRA, NRO/DSRA.

7               We had a kick-off meeting at the  
8       beginning of April on the 7th with the Steering  
9       Committee and the working group and management.  
10      And from that meeting, we started working on  
11      developing a scope of changes to be considered.  
12      Our working group is meeting on a weekly basis, so  
13      we have already met three times so far and we will  
14      be meeting on a weekly basis up through the very  
15      beginning of August to do -- to complete the  
16      revision of the guidance.

17              Our Scope and Project Plan was shared  
18      with the public at a public meeting on May 2nd. It  
19      was actually the same meeting that Mary discussed  
20      earlier in her presentation. The scope and plan  
21      were well-received. There was overall support for  
22      this update. And there was also interest in making  
23      sure we were able to test-out this guidance after  
24      the -- as we develop it.

25              So the working group, we are starting

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 off with public comments that were received back in  
2 2012. So DG-1285 was developed and issued for  
3 public review and comment. And after, it was a 90-  
4 day period, we received a number of comments and  
5 that was when we put the effort on hold. We did  
6 not take any additional efforts to go through and  
7 address these public comments. So that's really  
8 our starting point at this point.

9 We have a number of opportunities where  
10 -- for the public to interact with the staff in the  
11 development of this guidance, as well as the ACRS,  
12 we are planning for multiple briefings, including  
13 this one. Like I said before, we have weekly  
14 working group interactions. And we are also  
15 briefing our Steering Committee on a monthly basis,  
16 at this point.

17 So after we finish our development of  
18 the guidance, after revising the guidance, we are  
19 going to hold a public workshop on DG-1285 to share  
20 with the public what we have developed and to get  
21 their input and also to serve as an opportunity to  
22 try and test out this guidance.

23 During the public meeting if we -- it  
24 was brought up that there was not going to be an  
25 additional public review and comment period. So

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 despite the fact that four years have passed, we  
2 are picking up from, in the process, where we left  
3 off. So because we are not going to have another  
4 public review and comment period, our approach was  
5 to make sure that we have multiple points of public  
6 interaction.

7 So right now that has manifested as two  
8 public meetings that we have during the public  
9 review and comment -- or I'm sorry, during the  
10 guidance revision period and then we are going to  
11 have this public workshop.

12 So after the workshop, we are going to  
13 take our -- the input from the public and revise  
14 the guidance further, as needed. And after that,  
15 we are proceeding forward into the more  
16 administrative aspect of the process where we are  
17 preparing it for our inter-office/office management  
18 level review. And then subsequently, the OGC  
19 review as well.

20 MEMBER SKILLMAN: Anders, you mentioned  
21 back on Slide 3 the interest in testing revised  
22 guidance and you just mentioned now.

23 MR. GILBERTSON: Um-hum.

24 MEMBER SKILLMAN: Would you explain  
25 what that testing might be? What would be in that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 testing and how you would assess whether the test  
2 was a successful test?

3 MR. GILBERTSON: So at this point, I --  
4 we don't really have a concrete plan for what that  
5 looks like. At this point, we are -- well, I'll go  
6 into this a little bit later, but we are developing  
7 maybe one or two examples. We are not exactly sure  
8 yet. And we are going to get public input on this  
9 actually next Monday that go through and to help  
10 give a sense of how the process has performed to  
11 address each one of these seven factors.

12 So that was one of the comments that  
13 the public offered that it wasn't clear. That  
14 there wasn't really a how-to in DG-1285, so you've  
15 got these factors and, you know, they are  
16 relatively high level. You know, you avoid over-  
17 reliance and programmatic activities, you know, and  
18 make sure that you are accounting for common cause  
19 failure.

20 So we -- the revision -- I'm sorry.  
21 DG-1285 had examples for each one of those, but it  
22 didn't really address them as a whole. And so that  
23 is one of the points that we were really interested  
24 in hearing from the public if they have any ideas  
25 on how to address that. And I think that from that

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 dialogue, we will get a better sense of how we  
2 could test out this guidance, in particular, we  
3 want to solicit the public for what a good example  
4 would be. What kind of licensing basis change did  
5 they think would allow us to really go through all  
6 of these factors.

7 MEMBER SKILLMAN: Thank you, Andres.

8 MR. GILBERTSON: Yes.

9 MEMBER SKILLMAN: Thank you.

10 MR. GILBERTSON: Okay. So I started  
11 touching on this already a little bit. I'll just  
12 summarize what the public comments were that we  
13 received back in 2012.

14 So like I just mentioned, one of the  
15 comments was that it didn't -- the guidance in DG-  
16 1285 didn't really give them a sense of how to  
17 assess the impact on defense-in-depth, I'm sorry,  
18 DID means defense-in-depth.

19 While the examples were seen as a good  
20 start to helping explain how to address defense-in-  
21 depth, it didn't really go so far as to really give  
22 them a sense on a specific application basis.

23 Now, our approach going forward, we  
24 don't intend to be prescriptive in that regard in  
25 so far as saying well, if you are doing this kind

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 of application, then we are going to save you X, Y  
2 and Z. But what we are attempting to do, and I'll  
3 go through this on the next slide as well, is to  
4 just give a better understanding of how they would  
5 address these seven factors through more explicit  
6 language to help define these relative terms that  
7 are provided in the factors.

8 Beyond not having or beyond the first  
9 comment, there were three general other types of  
10 comments. The public felt that the reorganization  
11 of the defense-in-depth factors didn't really add  
12 clarity. And so a little more detail on this.

13 Revision 2 had talked about -- I'm  
14 sorry. DG-1285 talked about two of the seven  
15 elements from Revision 2 as being sort of a higher  
16 level of these over-arching principles. And this  
17 is basically the idea that you are not degrading  
18 the layers of defense and that you are preserving  
19 the multiple fission product barriers.

20 And so there were those high level  
21 discussions and then after that, the subsequent  
22 five factors from Revision 2 were bullet items.  
23 And then that's where we went in and talked about  
24 each one.

25 And so there was confusion about how

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       those pieces of guidance related to each other.  
2       Was one more important than the other?   How were  
3       the licensees supposed to address the five factors?  
4       Were they supposed to address all of them?   Were  
5       some more important than others?   So that was not  
6       really clear to them.

7               Beyond that, the examples that were  
8       used, they felt that they didn't really help  
9       describe what the licensee should do.   And some of  
10      the examples they felt were confusing, they -- even  
11      a little bit contradictory in some cases.

12              And then finally, they expressed a  
13      desire to be more engaged and that really came in  
14      the form of expressing that they wanted to talk  
15      about these examples that the NRC developed, have  
16      additional interaction.

17              And so that is one of our -- one of the  
18      things that we are really trying to address with  
19      our plan going forward is to make sure that we are  
20      giving them the opportunity to interact.

21              So the scope of changes for Revision 3  
22      of Reg Guide 1.174 includes our charter issue,  
23      which is that -- revising the defense-in-depth  
24      language.   And so here you see this talks about DG-  
25      1285 and then conforming changes to DG-1286, 1287

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 and 1288. Those three Draft Guides were guidance  
2 documents that had similar sections on defense-in-  
3 depth.

4 Back in 2011, we looked at those  
5 guidance documents and we also made some changes to  
6 those. There were some really minor changes and  
7 really what we did was we ended up just having a  
8 pointer from those regulatory guides back to 1.174.  
9 There was almost, you know, a couple paragraphs for  
10 each Draft Guide.

11 The other scope item includes some  
12 outstanding Commission-directed work and as well as  
13 some staff commitments to ACRS related to Reg Guide  
14 1.174. And I will go into the detail in to those  
15 in a couple of slides.

16 First, I want to address the scope  
17 item, the defense-in-depth scope item. And so in  
18 addressing those high level public comments --  
19 well, in each of the public comments, those high  
20 level -- addressing those high level issues, we are  
21 going to develop, like I said, examples that  
22 illustrate how the process of going through and  
23 addressing each one of the seven elements that are  
24 to be considered when assessing the impact on  
25 defense-in-depth from a licensing basis change.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           We are also planning to revert back to  
2           the organization of the elements in Revision 2. So  
3           we are -- what that means is that we are starting  
4           with DG-1285, but instead of having high level  
5           explanations for two of these elements and then a  
6           bullet list for the subsequent five, we are just  
7           going to talk about the seven elements altogether  
8           and each one of those will have some expanded and  
9           revised language to explain them.

10           And as in the next bullet, we are going  
11           to -- we are looking at the language, the  
12           narratives that were developed to discuss what was  
13           meant by each one of those seven factors. And  
14           then, of course, as I mentioned, we are organizing  
15           a number of public meetings and the workshop, so  
16           that we can engage the public and address their  
17           concerns.

18           So the other scope items relate to a  
19           couple of items relating to the transition from  
20           conditional containment failure probability and  
21           large early release to, it says, core damage  
22           frequency for new reactors. That should actually  
23           say a large early release frequency for new  
24           reactors. I only just caught that this morning.

25           And so this is an issue that NRO is

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 dealing with. And they have actually developed  
2 some white -- written some White Papers on this.  
3 And have essentially drafted much of the language  
4 that would go into Revision 3 of 1.174.

5 The other issue is the containment  
6 performance expectations for new reactors. And  
7 here again, there is actually a 1.174 revision to  
8 actually already address -- or I'm sorry, DG-1285  
9 already addresses this to some extent. So the  
10 working group was going through and looking to  
11 identify other places where we might need to build  
12 out that language a little bit.

13 The larger point that I would like to  
14 emphasize here is that these two scope items were  
15 included because they were -- it was felt that  
16 these-- work was already being done on these,  
17 language has already been crafted, so, by and  
18 large, the working group was really just working to  
19 identify where this needs to go in the document and  
20 then we would work from that.

21 So this slide again I just want to  
22 emphasize that we are -- we have a number of points  
23 of public outreach. We have got a meeting on May  
24 23rd. It's in the afternoon and we are going to --  
25 this -- actually this afternoon, the working group

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 is meeting and we are developing a draft version of  
2 the revised language for these seven factors. And  
3 that is something that we are planning on sharing  
4 with the public in the meeting on the 23rd.

5 And the meeting in June has not been  
6 scheduled yet, but we will -- it's tentatively  
7 scheduled for June, based on how much progress the  
8 working group has made.

9 Again, the public workshop, we are  
10 currently planning for that to occur in August.

11 The revised version of DG-1285 will be  
12 issued publicly prior to the workshop, so that  
13 people can take that, digest it and come ready to  
14 work on that and give us their feedback.

15 And after the public meeting, we are --  
16 you know, if we need to have subsequent public  
17 meetings to help address public comments, then we  
18 are prepared to do that. Our schedule does allow --  
19 -- has an allowance for additional time to engage  
20 the public.

21 Our hope is that by engaging them early  
22 on in this process and sharing with them our  
23 progress, we hope to keep them informed, so that  
24 when we get to the workshop we don't have a whole  
25 lot of big issues that they just all of a sudden

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 have a concern about.

2 So and again, as I said, we will be  
3 planning for subsequent ACRS Subcommittee briefings  
4 as well as the full Committee briefing which is  
5 part of the normal Reg Guide Update process. That  
6 occurs after the Inter-Office reviews and OGC's  
7 review. I guess it's during the OGC's review is  
8 when we normally schedule an ACRS full Committee  
9 briefing.

10 I will point out that currently we have  
11 our next briefing for the ACRS Subcommittee is  
12 scheduled for the beginning of September which if  
13 you have looked at the last slide, you can see that  
14 that puts us outside of our guidance revision  
15 development period.

16 So our hope was to have that a little  
17 bit earlier, but recognizing that the schedule for  
18 the ACRS does fill up relatively quickly, we will -  
19 - we certainly can reach out in the meantime  
20 perhaps through individual and formal briefings  
21 with integral Members just to keep you abreast of  
22 our progress.

23 And so here are just the -- some of the  
24 high level project milestones that we have. We  
25 have an EDO due date of June 30, 2017. And like I

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 said, we have the public meeting in May, June, a  
2 public workshop in August. And then any other  
3 public meetings.

4 We will be working to finalize the Reg  
5 Guide in late 2016 and early 2017, performing  
6 internal reviews and approvals in the spring of  
7 2017. And publishing in early summer to meet that  
8 EDO due date.

9 And what I have here is a tentative  
10 development schedule that we put together that this  
11 really assumes that everything goes according to  
12 plan. So we are hopeful of that, but as you can  
13 see, we would be publishing according to this  
14 development schedule by late January. So there is  
15 about a five month gap between that and our EDO due  
16 date.

17 So we do have time to accommodate  
18 schedule shifts. And I think just due to normal  
19 interruptions and schedules, people being out sick,  
20 what have you, I imagine this may get extended into  
21 the middle of February as it is anyways.

22 So that is my presentation.

23 MEMBER BLEY: Thank you, sir. Anders,  
24 I've got a couple of questions.

25 MR. GILBERTSON: Okay.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   MEMBER BLEY:    Back early on Slide 3,  
2                   you talked about the Inter-Office Working Group.  
3                   And NSIR is observing.    Were they invited to  
4                   participate?   I'm just curious why they are just  
5                   observing.    They are starting to do some things  
6                   related to this.

7                   MR. GILBERTSON:       Yes.       They were  
8                   invited to participate as an observer.   And I guess  
9                   just because the Reg Guides primary focus is for  
10                  operating reactors, we just wanted to keep them  
11                  informed about what is going on.

12                  MEMBER BLEY:    Okay.   And just I'll be  
13                  interested to see how this progresses.   I generally  
14                  like examples.   This particular Reg Guide though I  
15                  worry a little and the public comments seem to be  
16                  pushing this way, I hope you will resist it looking  
17                  like a cookbook ever and moving toward being  
18                  overly-specific.   And one little thing, you are  
19                  changing elements to factors, which doesn't sound  
20                  like much, but to me factors kind of rings of  
21                  something you can plug in and multiply together or  
22                  something where elements are things I have to think  
23                  about.

24                  And this whole thing is really aimed at  
25                  coming up with a thoughtful integrated decision

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 process and anything that moves it away from that,  
2 would be troublesome. I just wanted to get that  
3 notion across.

4 MR. GILBERTSON: Okay. I appreciate  
5 that. Thank you.

6 CHAIRMAN STETKAR: Now, for something  
7 related. We have enough time here. I wanted to  
8 address something that you are not addressing in  
9 the update, but that has been troubling the ACRS  
10 now for going on at least four years. And that is  
11 that we have, as Subcommittee and as actually the  
12 full Committee, had a number of interactions with  
13 the staff in a variety of topics that come back to  
14 the notion of determining risk significance.

15 And our first, at least the one that I  
16 remember more clearly, was in the context of  
17 significance determination on reactor oversight  
18 process for new reactors. And you wrote a letter  
19 on that back in April of 2012. You addressed it  
20 also a couple years later when you reviewed  
21 sections of the Chapter 19, Standard SRP.

22 And very recently, I don't know if the  
23 letter is out yet --

24 MR. GILBERTSON: I'm done with it.

25 CHAIRMAN STETKAR: It --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. GILBERTSON: I didn't know if it  
2 actually hit the street or not.

3 MEMBER BLEY: I read it.

4 CHAIRMAN STETKAR: -- will if it -- as  
5 long as you decide that it's final. We had a  
6 presentation of a topical report submitted by  
7 NuScale on their proposed framework for determining  
8 risk significance for their design certification.  
9 We addressed it during the ESBWR Design  
10 Certification process when they were proposing a  
11 different set of metrics or revised set of  
12 numerical criteria.

13 Some folks on the staff said well,  
14 yeah, we recognize that that's a problem, but it  
15 ought to be addressed in 1.174. NuScale in  
16 particular said well, our criteria are based on  
17 1.174.

18 And so now we are talking about  
19 revising 1.174. Is it time that Reg Guide 1.174  
20 extends that staircase various colored shaded sort  
21 of concept out to core damage frequencies and large  
22 early release frequencies, I said that very quickly  
23 because it's still not clear which one we are  
24 talking about, and extend down to exceedingly small  
25 numbers that people are, at least in a marketing

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 sense, claiming that their reactors can achieve, so  
2 that there is now clarity when people say well, I  
3 have a core damage frequency of  $10^{-97\text{th}}$  and I want to  
4 determine what is significant or risk in that  
5 context?

6 It would be more literal, people of  
7 opposing values down to the  $10^{-7\text{th}}$ . I have seen  
8 values down to  $10^{-8\text{th}}$ . Partial scope PRAs and in a  
9 way their hands about -- we think it isn't going to  
10 be much higher than this.

11 But they argue anywhere from well, I'll  
12 use this construct for my reactor design and submit  
13 it to the staff and the staff reviews that in  
14 isolation. Yeah, that kind of sounds okay for you  
15 guys. And somebody else would come in and submit a  
16 slightly different construct for their reactor.  
17 What the intentions are, I don't know. I don't  
18 care. It's probably related to minimizing the set  
19 of their equipment that is classified as non-safety  
20 related for which they need to apply additional  
21 controls under their reliability assurance program  
22 or RTNSS in this program or for some other reasons.

23 But we are getting quickly now with new  
24 reactors especially into a situation where each  
25 applicant seems to be bringing their own rock to

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 the staff with their own rationale for why the rock  
2 is a particular size and asking the staff to review  
3 it and the staff is reviewing them on a case-by-  
4 case basis, which has already led to conceptual  
5 inconsistencies.

6 And in the sense of regulatory  
7 stability and certainty, such that as I am a new  
8 applicant coming in, I have had some confidence in  
9 what the staff now determines is an approach or a  
10 framework for assessing risk significance in the  
11 context of everything that is done in terms of  
12 risk-informing our regulatory decisions, is it not  
13 time to update Reg Guide 1.174 to clarify that  
14 process once and for all?

15 And I say once and for all, that's  
16 perhaps too final, at least a current snapshot but  
17 with a view of what is coming in, rather than  
18 keeping it focused on well, we have the operating  
19 reactor fleet. We believe that their core damage  
20 frequency is probably in the  $10^{-4}$ ish to  $10^{-5}$ ish range  
21 and yeah, they haven't looked at everything, but  
22 that's where we feel comfortable.

23 So isn't it time to do that? And we  
24 have the opportunity to do that now.

25 MR. GILBERTSON: Yes.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 CHAIRMAN STETKAR: And it's certainly  
2 timely because we have not yet received the next  
3 application, but we hear rumors that one might be  
4 coming in toward the end of this year, depending  
5 upon what Congress does. There might be yet  
6 another revival of new reactors.

7 So we have an opportunity here. And my  
8 fear, my personal fear, is that if this revision  
9 gets pushed through, because it's a Reg Guide and  
10 it's now fast-tracked according to your schedule,  
11 we're going to miss that opportunity because under  
12 Project Aim and restrictions of resources, there is  
13 going to be a lot of push-back to revising this  
14 Regulatory Guide for another 5 to 10 to 15 to 30 to  
15 I don't know how many years, because this is  
16 working fine.

17 So I would like to open up that  
18 discussion right now while we have that  
19 opportunity. And any -- I welcome certainly any  
20 feedback that the staff might have and certainly  
21 any input from any other Members.

22 MR. GILBERTSON: Okay. So I will speak  
23 to that at a very high level from sort of the  
24 administrative perspective. Our -- that was --  
25 that is a scope item that we did consider and we

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 put to our -- the working group submitted to our  
2 Steering Committee. It has subsequently been  
3 decided that that would not be a part of this  
4 update.

5 CHAIRMAN STETKAR: When was that  
6 considered, Andres? When you said we did consider  
7 it, you mean in the last three weeks?

8 MR. GILBERTSON: Well, after the April  
9 7th kick-off meeting.

10 CHAIRMAN STETKAR: Oh, okay.

11 MR. GILBERTSON: Yes.

12 CHAIRMAN STETKAR: So this -- I just  
13 wanted to make sure --

14 MR. GILBERTSON: That was one --

15 CHAIRMAN STETKAR: -- for the record  
16 that that wasn't something that was considered four  
17 years ago under --

18 MR. GILBERTSON: Right.

19 CHAIRMAN STETKAR: -- the original DG-  
20 1285.

21 MR. GILBERTSON: Right, right. No, it  
22 was very recent. Now, as to the basis --

23 CHAIRMAN STETKAR: And why? Okay.  
24 You're going to tell us why?

25 MR. GILBERTSON: Right. The basis for

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       that I will -- I would like to hand that over to  
2       Mark Caruso or Lynn Mrowca.

3               CHAIRMAN STETKAR:   Sure.

4               MR. GILBERTSON:   And ask them to speak  
5       to that.

6               MR. CARUSO:   Well, it's -- actually,  
7       there is kind of a yes or no answer here.  The yes  
8       -- in is it the right time and the answer to that  
9       is yes.  As Lynn mentioned at our last meeting, I  
10      think she suggested at the end of the meeting, that  
11      we have been listening and that we didn't disagree,  
12      you know, with the idea that was about what, when,  
13      and how.

14              The no part is doing it on this update  
15      to 1.174 and the Inter-Office Steering Committee  
16      basically looked at the schedule for this activity.  
17      I'm sure you heard about the conditions desired for  
18      being expeditious.  You heard about the fact that  
19      they had already been through the public comment  
20      process issue for comments, get comments, resolve  
21      comments.

22              And so, you know, they are looking to  
23      basically have I think these workshops and a few  
24      meetings, you know, and hit the ground running  
25      before that.  So I think to come out of that ready

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 to rock and roll.

2 I mean, if you look at the milestone, I  
3 think it is saying that they want to finish their  
4 guide and finalize it in, you know, the fall/winter  
5 time frame.

6 CHAIRMAN STETKAR: Mark?

7 MR. CARUSO: So they -- for that  
8 reason, I think there was a decision not to hold it  
9 up. So we are going to work -- we think that there  
10 are other venues to do this on and it doesn't have  
11 to be 1.174. So we are going to work on a plan on  
12 addressing how, when and where one might do this in  
13 a response to your letter on the topical report.

14 CHAIRMAN STETKAR: Okay. A couple of  
15 comments. You keep saying they as if they are some  
16 sort of God creatures. They are human beings and  
17 they may not appreciate all of these issues. I'll  
18 just say that on the record.

19 The second part though is why is 1.174  
20 not the appropriate vehicle? Because 1.174 is  
21 recognized as, I believe in the Agency and in the  
22 industry, the fundamental process for thinking  
23 about how one integrates risk information in  
24 regulatory decisions.

25 So if that's the case, if that's -- and

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       that's why people like NuScale point, too, that's  
2       why other people -- everybody points to 1.174, they  
3       don't point to anything else. So why is 1.174 not  
4       the vehicle for it?

5               MR. CARUSO: Well, I don't mean to say  
6       that it's not the vehicle. I think it could be a  
7       perfectly fine vehicle. I think it's a perfectly  
8       good place. I agree with you it would be an  
9       excellent place. But I also think that, you know,  
10      being one of the authors of 1.174, it was basically  
11      structured as a very high level document.

12             Right now it has the philosophical, you  
13      know, genesis of what we are all talking about here  
14      about, you know, scaling and using absolute risk  
15      and accounting for, you know, low risk and all that  
16      sort of stuff. Then it provides, you know, a  
17      pointer. It provides the fundamental basis to it  
18      and that the actual implementation in terms of a  
19      draft and guidance and terms and whatever you need  
20      to do it, you know, there are other places.

21             Like I said at the meeting, there is,  
22      you know, an NEI document that goes into a great  
23      deal of guidance on how one does -- uses measures  
24      to assess risk significance. There is guidance for  
25      the maintenance rule. In fact, all those documents

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 would have to be modified once we sort out what  
2 this new process or this process for new reactors  
3 would be.

4 So there are other places to do it.  
5 And I think, you know, we agree you are not going  
6 to turn around after this update and go back and  
7 revise 1.174 again.

8 So it's not that it's not the right  
9 place or a good place, it's just that there are  
10 others. And it seems to us to get it done, it  
11 would be better to let them do what they need to do  
12 now and not hook this cart to that horse because it  
13 would probably slow that horse down quite a bit  
14 because we would have to go through the public  
15 comment process for our stuff. They are done. So  
16 realistically, we, you know, don't see it being  
17 viable to be consistent with that schedule.

18 So that's all I can say, I mean.

19 CHAIRMAN STETKAR: All right. Let me  
20 just bring you back to the notions that the Near-  
21 Term Task Force after the Fukushima accident made  
22 the observation that the NRC's Regulations and  
23 Regulatory Guidance has become so fragmented that  
24 it is really difficult to follow and in some cases  
25 it is contradictory.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Promulgating yet one other sort of  
2 vehicle that might or might not be targeted at  
3 perhaps only new reactors just simply reinforces  
4 that notion of fragmenting guidance.

5 MR. CARUSO: I didn't say that either.

6 CHAIRMAN STETKAR: Okay. Well, what  
7 are you -- it's -- I heard you saying new reactors.  
8 I heard you saying different vehicle. I heard you  
9 saying something not 1.174, because we are  
10 apparently schedule-driven by some working group on  
11 this thing.

12 MR. CARUSO: Well, let me say the new  
13 reactor part is the part that needs to be  
14 addressed.

15 CHAIRMAN STETKAR: No. No, I'm saying  
16 that all reactors need to be addressed  
17 consistently.

18 MR. CARUSO: Yeah.

19 CHAIRMAN STETKAR: I'm saying that a  
20 currently operating reactor if it had a core damage  
21 frequency, because it had made so many upgrades in  
22 the last 40 years of its life, that its core damage  
23 frequency was  $9.6 \times 10^{-6}$ , it ought to be treated the  
24 same way as a new reactor that comes in that has a  
25 core damage frequency of  $1.3 \times 10^{-6}$  or a currently

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 operating reactor that has a core damage frequency  
2 of  $3.7 \times 10^{-4}$ .

3 There ought to be a consistent  
4 framework for understanding what is important to  
5 risk.

6 MR. CARUSO: We agree. We agree.

7 CHAIRMAN STETKAR: For all of those.  
8 So it isn't new reactors.

9 MR. CARUSO: No.

10 CHAIRMAN STETKAR: It's part of the  
11 continuum.

12 MR. CARUSO: I guess we were talking  
13 about it in the context of new reactors at the --

14 CHAIRMAN STETKAR: It has come up.

15 MR. CARUSO: -- at the level -- I  
16 didn't mean to imply that. We recognize that it is  
17 about core damage frequency. It doesn't matter if  
18 they are new, old.

19 CHAIRMAN STETKAR: Right.

20 MR. CARUSO: It can be either or  
21 whatever. And you know to do it on this update,  
22 would continue the fragmentation. So to look at it  
23 totally, where does it all have to go and fit is  
24 probably a better way to approach it that way. I  
25 think, you know, we would maybe work more towards

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 the idea of being more holistic and integrated.

2 CHAIRMAN STETKAR: So how would it  
3 continue the fragmentation if we -- I'm saying you  
4 take the schedule, you tear it up. I didn't want  
5 to do that because I need this to hang on my wall,  
6 but you tear it up. You go back to the working  
7 group. And if you need help from the ACRS to write  
8 letters and do lobbying, that's fine. I think the  
9 ACRS -- I can't speak for the ACRS. I'm only me,  
10 but if the ACRS could help to say bring this to a  
11 screeching halt because this is just simply an  
12 update that addresses a few elements of defense-in-  
13 depth that people might be struggling with right  
14 now.

15 And maybe it's time to holistically  
16 look at this thing --

17 MR. CARUSO: Sure. I agree. I'm just  
18 here to explain --

19 CHAIRMAN STETKAR: -- you know? Yeah.

20 MR. CARUSO: -- what decision was made  
21 and to try and put it in context and explain it,  
22 you know. I -- the Steering Committee would need  
23 to consider your proposal.

24 CHAIRMAN STETKAR: Right, right.

25 MR. CARUSO: So --

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: Right.

2 MR. CARUSO: -- I can't -- I really  
3 can't speak to that.

4 CHAIRMAN STETKAR: No, I understand  
5 that. But as I said, I'm trying to -- you know,  
6 the Subcommittee meeting, make sure for the public  
7 record, this is individual Members at a  
8 Subcommittee meeting, this is certainly not ACRS.

9 MR. CARUSO: Sure.

10 MEMBER CORRADINI: But can I ask a  
11 question? So has this been brought up to the  
12 Steering Committee, this concept?

13 MR. GILBERTSON: Yes.

14 MEMBER CORRADINI: Has this concept  
15 been brought up?

16 MR. GILBERTSON: So you are talking  
17 about doing this more -- this holistic review of --

18 MEMBER CORRADINI: Well --

19 MR. GILBERTSON: -- or the --

20 MEMBER CORRADINI: No. Well, I'm not  
21 sure what you mean by holistic review.

22 MR. GILBERTSON: -- consistency?

23 MEMBER CORRADINI: The concept that was  
24 first advanced in 2012 by one letter, then in 2014  
25 and now with regard to NuScale.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. GILBERTSON: Yes.

2 MEMBER CORRADINI: The concept of a  
3 continuous scale.

4 MR. GILBERTSON: Yes.

5 MEMBER CORRADINI: This has been  
6 brought up to the work group?

7 MR. GILBERTSON: Yes.

8 MR. CARUSO: Yes, yes.

9 MR. HARRISON: And I'll point out the  
10 Steering Committee --

11 CHAIRMAN STETKAR: And you are?

12 MR. HARRISON: This is Donnie Harrison  
13 of New Reactors Office. It was presented to the  
14 Steering Committee an option, if you will, of  
15 blowing up the schedule and going back to the  
16 Commission and saying do you want a holistic  
17 approach? And we will try to do everything now.  
18 That was one of the options or discussions we had  
19 with the Steering Committee that we have.

20 MEMBER CORRADINI: But I guess I'm  
21 asking -- I'm not asking a schedule question. I'm  
22 asking a different question.

23 MR. HARRISON: Okay.

24 MEMBER CORRADINI: I'm saying do they  
25 see the importance and the need to do this and they

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 just don't want to do it now or they don't see the  
2 importance and need to do it? I want to be -- I  
3 want to understand. So the answer was not now?  
4 Okay. So if not now, when and how? That's what I  
5 think John is asking.

6 MR. HARRISON: And I think what Mark's  
7 comment earlier was --

8 MR. CARUSO: We haven't figured that  
9 out yet, but we hope to give you a plan when we  
10 respond to your letter that says you should do this  
11 and this is important and here is why. And we have  
12 already seen your comment.

13 MR. HARRISON: Okay.

14 MR. CARUSO: So I think that there is -  
15 - I think what we can say today is yes, we agree we  
16 need to do this. And but we can't tell you right  
17 here today how and when.

18 CHAIRMAN STETKAR: But the -- in terms  
19 of, you know, ACRS doesn't traditionally get  
20 involved in resources and scheduling, I mean,  
21 that's not what we do. But on the other hand, real  
22 resources are being spent right now based on this  
23 schedule. I mean, Andres has already said that  
24 there is weekly meetings going on. There is people  
25 -- you know, there is public interaction being

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 scheduled and things like this.

2 And if there is a more overall  
3 efficient way to achieve, what I'm hearing you say  
4 is, the same goal from your perspective as from my  
5 perspective, just as individuals now, and saving  
6 some of these intermediate resources to achieve  
7 those goals, ought we not to start working on that  
8 now rather than letting this train get far down the  
9 track and then saying well, we will figure out how  
10 to patch it up later? That's --

11 MR. CARUSO: Resource questions are  
12 hard to answer.

13 CHAIRMAN STETKAR: And that's why --  
14 but again, we keep coming back to well, the working  
15 group decided that it's not time to do -- we don't  
16 know quite how to do that now. We will figure it  
17 out as we go along. We are on the schedule, you  
18 know, that is laid out here.

19 MR. CARUSO: Yeah.

20 CHAIRMAN STETKAR: Again, I don't want  
21 to tear it up, because I need it for my wall.  
22 Resources are being spent on this. And if this is  
23 only going to partially achieve something that we  
24 could achieve more completely with -- you will have  
25 to expend some of these resources anyway, because

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       you still have to address the issues that are in  
2       the current version of the DG.

3               But if we could do that instead of  
4       trying to get something out on the street, you  
5       know, a year and a third from now, if we could do  
6       it in a year and two-thirds from now or a year and  
7       a half or something like that, why certainly  
8       something that is -- at least start the discussion  
9       in the context of this Regulatory Guidance that  
10      people do understand in a timely fashion such that  
11      the discussion essentially is done soon enough to  
12      support the new reactors that may or may not be  
13      coming in.

14              MR. CARUSO: All I can do is take the  
15      views of the Subcommittee and the recommendations  
16      and the arguments of the Subcommittee back to the  
17      Steering Committee and let them consider them.

18              CHAIRMAN STETKAR: And again, it is a  
19      Subcommittee, I'm glad you said that. It's  
20      individual Members. It isn't necessarily a  
21      Subcommittee, so it's -- right at the moment, it's  
22      just me granting.

23              MR. CARUSO: Oh.

24              CHAIRMAN STETKAR: No, honestly, that's  
25      the way the truth is. It's individual Members.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 MR. CARUSO: Well, your views are  
2 highly respected.

3 MEMBER SKILLMAN: I would like to weigh  
4 in and support what John has been communicating,  
5 but I would like to come at it from a little  
6 different angle.

7 We are in the process of reviewing the  
8 change to Reg Guide 1.26. And this is kind of a  
9 plumbing Regulatory Guide. It establishes what are  
10 the quality classifications for the components in a  
11 nuclear power plant.

12 And if you had been there 45 years ago  
13 until Reg Guide 1.26 and 1.29 were produced, the  
14 people who were designing the current fleet were  
15 doing very much like what John was talking about in  
16 terms of each design having its own philosophy for  
17 what is safety grade.

18 And the one Reg Guide 1.26 was  
19 published all of a sudden, the designers and the  
20 measure shops knew what was ASME Section 3, Class  
21 I, Seismic I; what was ASME 2, Seismic I and II;  
22 what was ASME 3, all of those pieces finally came  
23 together. If you recall, the general design card  
24 had been changed from 70 to general design card  
25 carried down to 67. And so there was some

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 turbulence in trying to figure out what belonged to  
2 what and that tied to what was then the new  
3 Appendix B to 10 CFR 50, but had a half QA.

4 Because if you recall, there was no  
5 Appendix B to 10 CFR 50. So these interlocking  
6 pieces of regulation began to come together.

7 Here is my point. We have got Reg  
8 Guide 1.26, it has been through OGC. We are being  
9 told it is ready to go. It is on schedule, but  
10 there is not a single word in the updated Reg Guide  
11 for passive plants. And we have a whole new breed  
12 of plant that is very different from what we had in  
13 the late '60s and early '70s. And so we are  
14 reviewing this Reg Guide and we're saying what is  
15 missing.

16 Isn't it time to bring this one up to  
17 current standard? That doesn't mean it's wrong or  
18 bad, it's incomplete. And I believe that that's  
19 what John is saying here on 1.174. It's not wrong.  
20 It's not bad. But when do we finally say stop this  
21 crazy schedule? Let's get these documents up to  
22 where they are so well-coordinated that there would  
23 not have been a proposed Recommendation 1 out of  
24 NTTF, because remember Recommendation 1, from my  
25 point of view, was there are so many overlapping

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 and intriguing regulations, it's just hard to find  
2 your way through them. This is another example.

3 So like John said, why don't we just  
4 say hey, wait a minute. Let's just take a chill  
5 and let's get these, let's get this one set to  
6 where it needs to be for the new environment and,  
7 in particular, the risks associated with this new  
8 breed of plant? Like I'm advocating, let's take  
9 1.26 and get it indexed for what are clearly new  
10 breeds of plants.

11 So I'm supporting John in his thesis.  
12 We had a backup here and do this one time and do it  
13 right instead of doing it in slivers and then just  
14 perpetuating this morass of intrigue and  
15 regulation. Thank you.

16 CHAIRMAN STETKAR: I think that, you  
17 know -- thanks, Dick. I appreciate that. The -- I  
18 was just looking at my file system here and I note  
19 that I hung a date on my receipt of the file of DG-  
20 1285 of four years and one day ago today. Four  
21 years and one day ago today and now suddenly,  
22 suddenly because somebody says well, we've got to  
23 get this done, we are now on a fast-track. I'm  
24 sorry, if it wasn't important for four years and  
25 one day ago until today or four years and 11 months

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       until a time that suddenly all of these meetings  
2       started to -- it doesn't sound like it's really,  
3       really important to get it done immediately.

4               At least the elements that are in this  
5       part of the plan, because if it was that important  
6       that we needed to get it done, we ought to have  
7       gotten it done four years ago or three years ago.  
8       So just because somebody has suddenly said we've  
9       got a box that needs checking off and we better  
10      check it off now, I don't get it. I just don't get  
11      it.

12             And I don't know -- I mean, I think we  
13      have made our -- well, I've made my point on the  
14      record. I think Dick and others have said a few  
15      things. I don't know if any of the other Members  
16      wanted to chime in or if the staff, Lynn and Mark,  
17      I know you came, you had some heads up on this, so  
18      I don't know if you have anything else you wanted  
19      to say.

20             I would feel a lot more comfortable if  
21      you had come in and said yes, and we are going to  
22      immediately update Rev. 4 of Reg Guide 1.174 and we  
23      are planning to finish that by the end of 2017, but  
24      I don't see anybody saying that or the first  
25      quarter of 2018. I don't care. I don't see

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 anybody saying that.

2 MS. MROWCA: This is Lynn Mrowca. We  
3 do understand the considerations here and I guess  
4 that would be hard for us to say in this meeting  
5 right now that we haven't gotten Rev. 3 out and we  
6 are planning for Rev. 4, but we did as late as last  
7 Thursday, May 12th, talk to the Steering Committee  
8 about concluding this and trying to figure out how  
9 we could do a parallel path to get through public  
10 comment period and all that.

11 But what I do understand is I know this  
12 Reg Guide revision has been put on hold for a  
13 while, but I also know that the Commission directed  
14 us to expeditiously update it, whatever that means.

15 CHAIRMAN STETKAR: Well, why -- what  
16 prompted that? I mean, we don't get -- honestly,  
17 this is why we have a Subcommittee meeting. What  
18 actually prompted the sudden Commission interest in  
19 expediting this? Do you know?

20 MS. MROWCA: No. I can't answer that.

21 MEMBER CORRADINI: Hearings in front of  
22 the Congress, I would guess.

23 CHAIRMAN STETKAR: Well, no. I mean,  
24 honestly, if it is hearings in front of the  
25 Congress and if it's focused on -- if it's resource

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       hearings in front of the Congress, that's one  
2       issue. If it's setting a stage for risk-informing  
3       the process for new reactors, someone ought to  
4       educate the folks who are in those hearings with  
5       Congress that this isn't going to solve that  
6       problem.

7               This is simply going to elaborate on  
8       one little part of that problem and that might be a  
9       better understanding of what may or may not be  
10      understood as defense-in-depth. It's not going to  
11      solve NuScale's problem in terms of what metrics to  
12      use. It's not going to solve problems on how do I  
13      think about large release frequency or maybe large  
14      early release frequency and maybe that those  
15      somehow might be an order of magnitude different  
16      suddenly when I transition from a design  
17      certification to a fuel load situation after the  
18      COL is issued, because there are differences in  
19      thought processes on what those metrics might or  
20      might not meet.

21             It's not going to help that. So Mary?

22             MS. DROUIN: In question of, you know,  
23      what prompted the Commission to deal expeditiously,  
24      you have to go back and read SECY-13-0132. And the  
25      staff in that paper said we don't recommend moving

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 forward with anything on defense-in-depth because  
2 we have done this in 1.174. Not only have we done  
3 it, we completed the work. And so it's just a  
4 matter of we just now have to issue it.

5 So, you know, we gave the very distinct  
6 message to the Commission that, you know, this Reg  
7 Guide was pretty much ready to go and just stopped  
8 it, you know, but we can pick it up and we've done  
9 all the work. Those are the words that were used  
10 in the SECY paper. So that's, you know, at least  
11 in my opinion, why the Commission came back and  
12 said okay, well, you did all the work, then  
13 expeditiously get this out.

14 CHAIRMAN STETKAR: Okay.

15 MS. DROUIN: There is nothing more to  
16 be done.

17 CHAIRMAN STETKAR: And specifically as  
18 you presented earlier this morning, in Enclosure 3  
19 to SECY --

20 MS. DROUIN: No, that was the previous  
21 SECY paper. But in that -- in SECY-13-0132 --

22 CHAIRMAN STETKAR: Which is the one  
23 that had Enclosure 3 --

24 MS. DROUIN: No, no, no.

25 CHAIRMAN STETKAR: I'm sorry, didn't

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 it?

2 MS. DROUIN: No, sorry. I'm sorry.

3 CHAIRMAN STETKAR: It did.

4 MS. DROUIN: Okay. Okay. You're  
5 right. You're right.

6 CHAIRMAN STETKAR: That's one number  
7 that I do remember.

8 MS. DROUIN: I'm quoting the wrong one.  
9 SECY-15-0168.

10 MR. CARUSO: There you go.

11 CHAIRMAN STETKAR: Oh, okay, yes, yes.

12 MS. DROUIN: Okay. It was that. I  
13 apologize.

14 CHAIRMAN STETKAR: Okay.

15 MS. DROUIN: You are absolutely  
16 correct. And that paper is where the staff said we  
17 don't need to do anything more on defense-in-depth.  
18 You have done it on Reg Guide 1.174. You know, we  
19 issued DG-1285. The work is all done. We just  
20 need to publish the thing now. And so that -- you  
21 know, it was characterized that way in the SECY  
22 paper and so the Commission then came back well,  
23 you have done all the work, get it out the door.

24 CHAIRMAN STETKAR: Okay.

25 MS. DROUIN: So we did not bring up in

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       SECY-15-0168 that there could potentially be other  
2       things that we may want to consider to do in Reg  
3       Guide 1.174.

4               CHAIRMAN STETKAR: Right.

5               MS. DROUIN: So the Commission was not  
6       -- you know, when they wrote their SRM, they were  
7       not reacting to a full set of information, so to  
8       speak.

9               CHAIRMAN STETKAR: Yes, thanks. That  
10       helps.

11              MEMBER BROWN: Am I correct this only  
12       applies to operating reactors?

13              CHAIRMAN STETKAR: No.

14              MR. CARUSO: Which the licensing basis  
15       -- specific licensing basis changes. And in my  
16       mind, that is a presumption that the plant already  
17       has a licensing basis and is in operation now, but  
18       that's wrong.

19              CHAIRMAN STETKAR: But part of the  
20       problem is that if you start to read the words very  
21       literally for your own use, you can interpret it  
22       many different ways. It is a -- as Dennis said  
23       earlier, you are more eloquent than I am, but it's  
24       a process of thinking about how to risk-inform  
25       regulatory decisions.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           New reactors, NuScale, ESBWR, the  
2           inspection process, reactor oversight process,  
3           significance determination for new reactors all  
4           point back to this thought process, regardless of  
5           what the individual words might say that you want  
6           to take out of context.

7           MEMBER BROWN: They point to 1.174.

8           CHAIRMAN STETKAR: They absolutely do.

9           MEMBER BROWN: Even though it -- when  
10          you read the whole preamble, it almost leads us --

11          CHAIRMAN STETKAR: That's because  
12          originally it was originally written in that very  
13          narrow focus, which was probably the question when  
14          it was written.

15          MEMBER BROWN: Okay.

16          CHAIRMAN STETKAR: Because it was  
17          focused as how do I use risk information as part of  
18          the regulatory decision process when somebody comes  
19          in with a change to their licensing basis for an  
20          existing plant? I want to risk-inform my tech  
21          specs. I want to risk-inform my in-service  
22          inspection. I want to risk-inform a plant design  
23          modification.

24          MEMBER BROWN: And that's when it was  
25          originally conceived.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1                   MEMBER BLEY: But Charlie is probably  
2 right. If there were a revision for a revised  
3 title and preamble, it would probably be  
4 applicable.

5                   MEMBER BROWN: Yeah, I mean, the whole  
6 first page or the second page --

7                   CHAIRMAN STETKAR: But in fact, people  
8 are using it much more broadly than that, you know,  
9 narrow --

10                  MEMBER BLEY: That's fine. I didn't --

11                  MEMBER BROWN: I would have presumed  
12 when I read -- you know, when I looked through part  
13 of this, based on the detail that was in it, that  
14 it would apply. It would be useful for those  
15 submitting their new designs, whether it be  
16 NuScale, whether it be APR-1400 or what have you.  
17 And that's where I would go to -- if somebody  
18 proposed something for how they were going to  
19 assess some of these things, that's where you would  
20 go for some of the guidance, that's all.

21                  So I understand what you are telling  
22 me. Sort of. I believe words have meaning.

23                  MS. ROSENBERG: Can I just make a  
24 comment? My name is Stacey Rosenberg. I'm the  
25 Branch Chief for PRA Licensing in NRR. And we use

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Reg Guide 1.174 quite often and very literally.  
2 And it is written very specifically for licensing  
3 changes for existing operating reactors. And not  
4 specific -- it's not used especially the numerical  
5 guidance for the SDP and other processes.

6 So in order to change it to include  
7 other processes, I know that the over-arching  
8 thinking is used for other processes, but in order  
9 to use it for new reactors and for other operating  
10 reactor processes, that -- we would -- it would  
11 need significant changes.

12 CHAIRMAN STETKAR: Well, that's what  
13 Dennis said. Perhaps changing some of the words  
14 might alleviate that focus, but I think the basic  
15 concepts are there.

16 MR. HARRISON: And this is Donnie  
17 Harrison from the Office of New Reactors again.  
18 I'll just point out that even in new reactors,  
19 design certs and buying license applications, they  
20 can propose that once they get in operation, they  
21 are going to implement some of these risk-informed  
22 programs. And so if you will, they have the  
23 opportunity to -- prior to actually getting their  
24 license tell you that they want to implement risk-  
25 informed in-service inspection or some risk-

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 informed program. And that's what they are going  
2 to do in the future.

3 So they would use the Reg Guide 1.174  
4 guidance for that even before they have gotten  
5 their license and design cert possibly, recognizing  
6 it wouldn't implement it until they got it actually  
7 into operation. So the risk-informed tech specs  
8 would be applied or someone might pursue that. So  
9 they would leverage the guy and it would be in  
10 implementation.

11 CHAIRMAN STETKAR: That's right. And  
12 we have had those discussions. I know that US-APWR  
13 had, at one time, released Comanche Peak as the  
14 reference COL. It was initially thinking about  
15 incorporating risk-informed tech specs in their COL  
16 application, that obviously has gone by the  
17 wayside.

18 But I will come back to people like  
19 NuScale and they are not saying that they are  
20 having a risk-informed design reliability assurance  
21 or a RTNSS or whatever they are calling it box of  
22 pieces of equipment that will receive different  
23 treatment. They aren't using those words, but on  
24 the other hand, they are certainly using the  
25 concepts in Reg Guide 1.174.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1           So if you want to say that that's not a  
2 risk-informed application, yes, perhaps under some  
3 narrow legalistic terminology, that is not a risk-  
4 informed application. On the other hand if they  
5 are using these principles and pointing back to  
6 this Regulatory Guide as the source of their  
7 thought process, they are using it. You can't get  
8 away from it.

9           MEMBER BROWN: Well, I just want to  
10 bring up one other point. I mean, there are seven  
11 elements you talked about in this thing and that's  
12 on pages 11 and 12 under the defense-in-depth  
13 Section 2.1 something like that. And it says they  
14 should evaluate these things, meet the principles,  
15 defense-in-depth consistent with the philosophy if  
16 the following occurs.

17           And one of the bullets on there says,  
18 and this is the application of risk-informed  
19 decision making, "System redundancy, independence  
20 and diversity are preserved." Then the magic words  
21 come along that say "Commensurate with the expected  
22 frequency, consequences of challenges to the  
23 systems and uncertainty."

24           And that starts talking to me, I'm  
25 being very parochial here, okay as you can probably

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1        imagine        for systems which I have specific  
2        interest in, that well, I guess maybe we don't need  
3        complete independence based on the consequences of  
4        challenges or the expected frequency of those  
5        challenges. And I guess I get nervous with those  
6        types of statements for certain types of what --  
7        based on our earlier discussion today, of systems  
8        that support maintaining the physical barriers that  
9        we have in place.

10                    But they don't have to be redundant.  
11        Do I want a reactor trip system that is not fully  
12        redundant? Do I want it not to be fully  
13        independent from division-to-division? And do I  
14        not want diversity in terms of how we apply the  
15        thought process of diversity into what has been  
16        going on in the new reactor approach right now?  
17        And this implies, okay, that no, we can do a risk  
18        analysis and do a performance-based evaluation and  
19        say oh, no, we don't really need diversity in this  
20        case for those particular systems or independence  
21        or even redundancy.

22                    And I just have a problem, a little bit  
23        of a problem. It's -- particularly if you look  
24        down to the fifth bullet which says "Independence  
25        of barriers is not degraded." Well, what

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 constitutes a barrier in this? Is it just the fuel  
2 reactor vessel, reactor coolant system and  
3 containment or what barrier are we talking about?

4 So there is, to me, some confusion and  
5 there is the possibility. I'm tired of arguing  
6 with the new reactor of vendors that come in here  
7 and say I can communicate software-wise channel-to-  
8 channel and I'm perfectly happy because I have  
9 great software algorithms that will ensure that I  
10 can't contaminate, corrupt or shutdown all four  
11 loading systems. And I have a real problem with  
12 that.

13 Anybody who believes that, you know,  
14 they ought to put their money in Lehman Brothers  
15 again and see how long it lasts. So I'll stop now.  
16 I'm very parochial from this standpoint.

17 MEMBER BLEY: Well, yeah, I understand.  
18 And let me leave out digital I&C systems.

19 MEMBER BROWN: Yeah.

20 MEMBER BLEY: Because I have to because  
21 I can't analyze them the way I can other systems.

22 MEMBER BROWN: I agree with that.

23 MEMBER BLEY: But you can't get the  
24 kind of reliability you want out of a trip system,  
25 even the old kind, without having the kind of

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 things you talked about. So --

2 MEMBER BROWN: You can't get it out of  
3 the new ones without that either.

4 MEMBER BLEY: I'm sure that's true,  
5 too. So the kind of analysis that looks at all of  
6 those things brings you to the same conclusion.

7 MEMBER CORRADINI: So can I take us  
8 back? I'm -- I think these are all really good  
9 things to talk about, but I want to make sure what  
10 is being promised by the staff. Maybe nothing is  
11 being promised by the staff, but at least I want to  
12 get clear what I thought was promised which is you  
13 have brought up this concept of a continuous scale  
14 to the working group. They decided that would  
15 essentially delay and distract them from finishing  
16 the schedule, which is driven by a number of issues  
17 that are unclear, but definitely being driven to  
18 finish expeditiously, at this point. So that's  
19 point one.

20 Point two is you are going to come back  
21 to the Subcommittee and the full Committee and  
22 explain how you are going to include or consider  
23 these concept of continuous scale applying both the  
24 current reactors and potentially future reactors,  
25 but we will have to wait and see how that unfolds.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1                   And there is no schedule for that  
2                   because you are still trying to figure out where to  
3                   stick it or what to modify. Is that approximately  
4                   right?

5                   MR. GILBERTSON: Yes.

6                   MEMBER BROWN: Or not. I didn't get it  
7                   that way. I just got it --

8                   MEMBER CORRADINI: They had asked the  
9                   steps. Andres?

10                  CHAIRMAN STETKAR: Let the staff  
11                  answer.

12                  MEMBER BROWN: Okay. Okay. I got it.

13                  MEMBER CORRADINI: Do I have the  
14                  interpretation approximately right? Because I want  
15                  to make sure we are on the record as to what we  
16                  should expect or what you guys are expecting to do  
17                  next.

18                  MR. CARUSO: No. I think you have it  
19                  approximately right.

20                  MEMBER CORRADINI: Okay. Okay.  
21                  Because again speaking just for myself, I was  
22                  further educated in going through the NuScale  
23                  Topical Report on how the staff is doing this. And  
24                  I think this essentially convinced me that it's  
25                  even more so that we need some sort of consistent

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 attack at this. So thank you.

2 MR. CARUSO: I think and I hope that  
3 you will be better illuminated after we respond to  
4 the letter on the NuScale Topical Report.

5 CHAIRMAN STETKAR: Any other  
6 discussion? If not, before we go around the table  
7 and I'm going to ask all the Subcommittee members  
8 for any final comments and I'll ask -- also give  
9 you a couple minutes to think about whether or not  
10 we should bring this to the full Committee. So be  
11 thinking about that.

12 While you are doing that, John can get  
13 the public line open. While trying to do -- get  
14 the bridge line open, I'll ask if there are any  
15 members of the public or anyone in the room who  
16 would like to make a comment come on up to the  
17 microphone and do so. I'll wait a couple of  
18 minutes until we get the bridge line open. So  
19 first of all, if there is somebody out on the  
20 bridge line just do me a favor and say hello, so  
21 that we are sure that it is open.

22 MR. KLEFSON: Hello, John. This is  
23 Gordon Klefson, member of the public.

24 MR. LEWIS: Marvin Lewis, member of the  
25 public.

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 CHAIRMAN STETKAR: Hi, Gordon. Hi,  
2 Marvin. Are there any members of the public who  
3 would like to make a comment? And if so, please,  
4 identify yourself and do so.

5 MS. THOMAS: This is Ruth Thomas.

6 CHAIRMAN STETKAR: Hi, Ruth.

7 MS. THOMAS: And I haven't been on the  
8 -- I had trouble getting on the line, so I haven't  
9 been on for the full time. So I, you know, am  
10 taking notes.

11 CHAIRMAN STETKAR: Okay.

12 MS. THOMAS: And I guess I need even  
13 more time than the people there to think about this  
14 and to share it with the other members of our group  
15 and they are called Environmentalists Incorporated.  
16 Isn't that an awful name?

17 Anyway, so there is a lot to think  
18 about. And of course, I did try to fill in with  
19 what went on before I got help in getting on the  
20 line. Thank you.

21 CHAIRMAN STETKAR: Okay. Thanks, Ruth.  
22 And as you know, the transcript will be available  
23 on our website typically in a week or so. I don't  
24 know how quickly, maybe a couple of weeks. It's  
25 usually a week to two weeks, depending on how well

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 we expedite it, so you will have the transcript  
2 available with copies of the slides that are  
3 presented, so that will help you, I think.

4 Anybody else from --

5 MS. THOMAS: So I had another question.  
6 Will that include the slides with it?

7 CHAIRMAN STETKAR: Yes. Yes, the  
8 slides are always appended to the transcript, so  
9 you can come on the website and pick up the  
10 transcript and the slides.

11 Anybody else?

12 MS. THOMAS: Okay. Thank you.

13 CHAIRMAN STETKAR: I'm sorry, did I  
14 hear another voice?

15 MEMBER BLEY: She said okay.

16 DR. SCHULTZ: John?

17 CHAIRMAN STETKAR: Yes?

18 DR. SCHULTZ: This is Steve Schultz.

19 CHAIRMAN STETKAR: Hi, Steve.

20 DR. SCHULTZ: Hi. Just a couple  
21 comments based on the presentation earlier on  
22 defense-in-depth. I'm glad the document is ready  
23 and available for the discussions that are moving  
24 forward on 1.174. It's very clear that based on  
25 the discussions today, as well as the document

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1       itself, that it provides really good information  
2       that is taken now as a whole and displayed as a  
3       whole and provide defense-in-depth.

4               So the overall discussion that should  
5       be very helpful to real improvement in definitions  
6       going forward. So I would just encourage both the  
7       use and implementation as it moves forward in the  
8       Reg Guide revision.

9               I think what is really important here  
10       is the -- is what was described on 1.174, the  
11       public interaction. And I would be a little  
12       concerned about the schedule as that is laid out to  
13       -- in their plan to be assured that the public  
14       interaction as being truthful in carrying forward  
15       to come to the right conclusions. It's a very  
16       short schedule for that public interaction between  
17       now and September.

18               But I'm encouraged by what has been  
19       planned. And if it's executed properly, it should  
20       be very beneficial to approve the document and the  
21       revision.

22               CHAIRMAN STETKAR: Thank you. Anybody  
23       else from the public out there who would like to  
24       make a comment?

25               MR. KLEFSON: Yes, John. This is

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 Gordon Klefson, a member of the public.

2 CHAIRMAN STETKAR: Hi, Gordon.

3 MR. KLEFSON: I have two points I would  
4 like to bring up. One is since we have waited four  
5 years for this process to develop into a product, I  
6 think it is important that we support the concept  
7 to take the time to create a quality product and  
8 this was identified getting the public involved in  
9 only a couple of months after waiting four years  
10 for this, may be a rush on it.

11 So I would say that I would support  
12 taking the time to create a quality product and not  
13 rush for an expeditious result. There is a lot  
14 that is developed in the past four years.

15 And the second point that I would like  
16 to bring up is that the industry certainly  
17 appreciates solidified guidance. And as you  
18 identified slivers of guidance here and there are  
19 difficult to work with. In the digital field we  
20 have got a shotgun approach to where we go for  
21 guidance and there is conflicts between us and if  
22 we can get it solidified by taking the time to do  
23 it right, I think it would be greatly appreciated.  
24 Thank you.

25 CHAIRMAN STETKAR: Thank you. All

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 right. Anybody else? Any comments? Okay. If  
2 not, we will reclose the bridge line for now, so  
3 that we don't hear the pops and crackles that we  
4 get here.

5 And I'll go around the table and as we  
6 always do at the end of the Subcommittee meeting  
7 and ask each member for your comments. And as I  
8 said earlier, ask you if you think that we should  
9 bring this to the full Committee.

10 And I'll start with Charlie.

11 MEMBER BROWN: I guess I said my piece  
12 on the other parts when we were going through it.  
13 Did you hear me? Okay. I know I didn't make this  
14 comment on it before, but I can understand the  
15 thought process for this when it applies to  
16 existing reactors, because I've got a licensing  
17 basis to plant design if somebody wants to make a  
18 change, you then go play this, you know, through  
19 the elements and evaluate what is going on.

20 I have -- based on that earlier  
21 comment, I would really like to see some changes.  
22 So if we were going to do something in its total or  
23 holistic application to new reactors as well,  
24 because I think it make things more complex than  
25 they ought to be in some areas where you should

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 have some specific design criteria as opposed to  
2 what I call performance-based design criteria, but  
3 design results.

4 Relative to the full Committee, if we  
5 really want to go down and get this thing squared  
6 away, then the only way I know to do it, based on  
7 what they are saying and once we get some feedback,  
8 is that we would need a full Committee letter of  
9 some type to try to get it up, elevated.

10 So, I mean, if we get some feedback  
11 that they are going to go do something else to do  
12 what you have -- you know, the recommendations  
13 were, then we don't need it. So that's my thought  
14 process on full Committee or not.

15 I prefer to have to be able to get it  
16 all done before we have a full Committee meeting,  
17 let's put it that way.

18 CHAIRMAN STETKAR: Dennis?

19 MEMBER BLEY: Yes. I definitely don't  
20 think we need a full Committee meeting on the --  
21 that we have three things going on here on the  
22 history of defense-in-depth, although I really  
23 appreciate that report.

24 The same thing for Reg Guide 1.200,  
25 although I remain a little disappointed that it

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 didn't pick up the issue that we had talked about  
2 earlier on design cert PRAs.

3 But Reg Guide 1.200 -- I'm sorry,  
4 1.174, we could have a full Committee meeting and  
5 write a letter, although we are going to get a  
6 response back on the NuScale letter. And we have  
7 in the past with a response from EDO written a  
8 letter back to the Commission and that seems to me  
9 like the easiest way to deal with this.

10 So I would lean against a full  
11 Committee meeting until we see what the response  
12 looks like on the letter we just finished, that  
13 they haven't seen yet. And that's final.

14 CHAIRMAN STETKAR: Thank you. Dr.  
15 Corradini, sir?

16 MEMBER CORRADINI: I agree with Dennis.  
17 I don't think we need a full Committee meeting, at  
18 this point, on any of the three topics.

19 And as for responding to -- or  
20 anticipating the staff's response to our NuScale  
21 letter, that is probably the venue about the topics  
22 that they have already decided doesn't fit into  
23 their plan with the 1.174, at this time.

24 CHAIRMAN STETKAR: Thanks. Dick?

25 MEMBER SKILLMAN: Two things. I want

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701



1 to commend the Agency, but particularly Mary, for  
2 pulling together the defense-in-depth compendium.  
3 I think that's valuable.

4 Relative to the letter, I suggest we  
5 wait until we see what staff or how the staff  
6 responds to our NuScale letter, because I believe  
7 that that puts in place the major issues about  
8 which we are concerned. So I say no special  
9 meeting. Let's wait for the letter and then decide  
10 how to proceed. Thank you.

11 CHAIRMAN STETKAR: Thanks. Pete?

12 MEMBER RICCARDELLA: Yeah, I have no  
13 comments and I don't really have an opinion on  
14 whether we need a full Committee or not.

15 CHAIRMAN STETKAR: Thanks. Ron?

16 MEMBER BALLINGER: Yeah, I was actually  
17 learning toward a letter until I heard what Dennis  
18 said and so we achieve the same goal of raising  
19 this to the level that we think is important by  
20 waiting until the NuScale -- the response to the  
21 NuScale letter comes out. So that may be the best  
22 way to do it.

23 CHAIRMAN STETKAR: Okay. Thank you.

24 MEMBER BROWN: Yeah, I forgot about  
25 that by the way, too. I would revise my comments

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 and I would agree with waiting also for the NuScale  
2 response.

3 CHAIRMAN STETKAR: I would like to  
4 thank the staff. I agree also. I mean, you heard  
5 the staff, heard the kind of consensus of the  
6 Subcommittee. I think that's probably the best and  
7 most expedient way for at least the full Committee  
8 to deal with it, because we would expect a response  
9 to that NuScale letter sometime in the relatively  
10 near future, probably by our July full Committee  
11 meeting, I'm hoping.

12 And we do, as a full Committee, have  
13 the opportunity to respond either to the staff or  
14 to the Commission to make our desires known. And  
15 that, I mean as a practical matter, couldn't come  
16 to the full Committee before then anyway, so I  
17 think that is probably the best way to deal with  
18 this.

19 I would like to thank, by the way,  
20 everybody for bringing everything together and  
21 especially Mary, who is not here anymore. Mary is  
22 -- oh, you're behind the -- hi there.

23 Regardless of whatever discussions we  
24 had about 1.200 and our complaints about whether or  
25 not it is satisfying our concerns and 1.174, the

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

1 fact of the matter remains that that compilation of  
2 defense-in-depth is a landmark accomplishment and  
3 ought to be acknowledged as such and I think we  
4 have.

5 So if there is no further discussion,  
6 thank you all for your time. I think it was a very  
7 fruitful meeting, educational.

8 And we are adjourned.

9 (Whereupon, the above-entitled meeting  
10 went off the record at 11:56 a.m.)  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23

**NEAL R. GROSS**

COURT REPORTERS AND TRANSCRIBERS  
1323 RHODE ISLAND AVE., N.W.  
WASHINGTON, D.C. 20005-3701

# ***“Historical Review and Observations of Defense-in-Depth” KM NUREG***

---

Presented to

Advisory Committee on Reactor Safeguards

Reliability and PRA Subcommittee

Presented by

Mary Drouin, [mary.drouin@nrc.gov](mailto:mary.drouin@nrc.gov)

Office of Nuclear Regulatory Research

US Nuclear Regulatory Commission

May 18, 2016

# Background

---

- In SECY-13-0132, Enclosure 3, provides a high level summary of the history of defense-in-depth and provides insights (i.e., observations) based on an historical review of defense-in-depth, mainly for nuclear power reactors
- The Commission Staff Requirements Memorandum (SRM) to SECY-13-0132 states:  
*“Enclosure 3, ‘Defense-in-depth Observations and Detailed History,’ should be enshrined as an agency knowledge management tool and republished in other formats to make it more widely available.”*
- This NUREG is developed in response to the SRM and starts with, and builds on, the material in Enclosure 3 of SECY-13-0132.

# *Defense-in-Depth*

---

- Earliest discussion on reactor defense-in-depth (DID) dates back to a letter from W.F. Libby, Acting Chairman of the US Atomic Energy Commission (AEC) to the Honorable Bourke Hickenlooper of the Joint Committee on Atomic Energy Congress of the United States on March 14, 1956
  - Term “defense-in-depth” does not appear, describes “lines of defense”
  - Describes three elements that could be interpreted as defense-in-depth
    1. Recognizing all possible accidents which could release unsafe amounts of radioactive materials;
    2. Designing and operating the reactor in such a way that the probability of such accident is reduced to an acceptable minimum;
    3. By appropriate combination of containment and isolation, protecting the public from the consequences of such an accident, should it occur.
- Since that time, numerous discussions on DID can be found in the literature.

# *KM NUREG Objectives*

---

- A summary of the history of defense-in-depth, specifically a summary of the various descriptions, discussions and definitions of defense-in-depth that have been used in the literature
- Overall historical observations based on the review of the history of defense-in-depth

# KM NUREG Scope

---

- Reactors, materials, waste, and security
- International literature; e.g., IAEA, NEA
- Perspectives of other domestic agencies
  - Department of Energy, National Aeronautics and Space Agency, Federal Aviation Administration, Department of Defense, Department of the Interior, Army Corps of Engineers
- Document is comprehensive but not necessarily exhaustive
- Published as a KM NUREG because it *“collects, compiles, and interprets historical information and references on technical topics to assist future, current, and former staff in understanding how the agency’s regulatory system and technical knowledge have evolved”* (per Management Directive 3.7)



# *Sources*

---

- Based primarily on NRC documents:
  - Regulations
  - Policy statements
  - NUREGs
  - Regulatory guides
  - SECY papers
  - Commission papers and speeches
  - ACRS presentations
  - ACRS letters

# *Presentation of Information*

---

- For reactor safety, there is a rich history starting in the 1950s, and therefore, able to present the history in a chronological order
- For materials, waste and security, the history is not similar in that the concept of defense-in-depth primarily is addressed in the regulations and therefore difficult to present in a chronological order

# *KM NUREG Organization*

---

- Section 2 – list of acronyms
- Section 3 – a high level summary of the history of defense-in-depth, specifically summarizing the various descriptions, discussions and definitions of defense-in-depth.
- Section 4 – detailed summary of defense-in-depth from a reactor perspective
- Section 5 – detailed summary of defense-in-depth from a non-reactor (i.e., materials, waste, uranium recovery, fuel cycle, interim spent fuel storage, and transportation) perspective
- Section 6 – detailed summary of defense-in-depth from a security perspective
- Section 7 –detailed summary of defense-in-depth from an international perspective
- Section 8– summary of defense-in-depth insights from other organizations
- Section 9 –overall historical observations on defense-in-depth
- Section 10 – list of references

# *Search For References*

---

- In looking at the history, the various descriptions, discussions and definitions use different language and terminology and vary in length, from a few sentences to pages, to entire reports
- Search included both explicit and implicit use of the term defense-in-depth
  - Explicitly means actual use of the term in discussing defense-in-depth
  - Implicitly means that the text is related to the concept of defense-in-depth
- It is assumed related to the concept, if, at a minimum, it refers to one of the following:
  - Multiple barriers
  - Levels (or e.g., layers) of defense
  - Appropriate safety margins are provided
  - Accident prevention and mitigation capability are provided
  - Key safety functions are not dependent upon a single element of design, construction, maintenance or operation
  - Appropriate barrier capability is provided
  - Regulated activities are carried out at locations that facilitate the protection of public health and safety.

# List of References -- Reactors

- AEC letters [AEC, 1956]
- WASH-740 [AEC,1957]
- Joint Committee on Atomic Energy Hearings [TCAE, 1967]
- Internal Study Group [TCAE, 1969]
- AEC letter [AEC, 1971a]
- ECCS Hearings [AEC, 1971b]
- WASH-1250 [AEC, 1973]
- NRC Annual report [NRC, 1975]
- NRC Reactor fact sheet [NRC, 1976a]
- NUREG-0050 [NRC, 1976b]
- NUREG-0578 [NRC, 1979a]
- NUREG-0585 [NRC, 1979b]
- NUREG/CR-1250 [NRC, 1980]
- Post TMI Definitions and Examples [NRC, 1981]
- NUREG-0880 [NRC, 1983]
- Commission Policy Statements [NRC, 1986], [NRC, 1995], [NRC, 2008a]
- NUREG/CR-6042 [NRC, 1994a]
- NUREG-1537 ,[NRC, 1996b]
- 10 CFR Part 100, 1996 [CFR]
- MIT Speech by Chairman Jackson [NRC, 1997b]
- Some Thoughts on Defense-in-Depth by Tom Kress [ACRS, 1997]
- PSA '99 paper [Sorenson, 1997]
- Commission White Paper [NRC, 1999a]
- ACRS letters [ACRS, 1999]
- Joint ACNW/ACRS Subcommittee [ACRS, 2000a]
- 10 CFR Part 50, Appendix R
- A Risk-Informed Defense-in-Depth Framework for Existing and Advanced Reactors, Karl Fleming, Fred Silady [Fleming, 2002]
- NEI 02-02 [NEI, 2002]
- Petition on Davis Besse [NRC, 2003b]
- 10 CFR §50.69, 2004 [CFR]
- Remarks by Chairman Diaz [NRC, 2004]
- Digital Instrumentation and Controls (NUREG/CR-6303, RG 1.152, NUREG-0800 BTP HICB-19, NUREG-0800 SRP BTP 7-19, DI&C-ISG-02), [NRC, 1994b], [NRC, 1996c], [NRC, 1997a], [NRC, 2007a], [NRC, 2009a]
- NUREG-1860 [NRC, 2007b]
- INL NGNP report [INL, 2009]
- RG 1.174 other RGs [NRC, 2011a]
- NTTF Review Report [NRC, 2011b]
- NUREG-2150 RMTF [NRC, 2012a]
- NRC glossary [NRC, 2014b]
- SECYs, RGs, and ACRS letters [ACRS], [RG], [SECY]

# *Non-Reactor Areas References*

---

- All non-reactor nuclear areas
  - Advisory Committee on Reactor Safeguards (ACRS) letter 2000 [ACRS, 2000b]
  - Joint Advisory Committee on Nuclear Waste (ACNW)/ACRS Subcommittee, January 2000 [ACRS, 2000a]
  - Risk Informed Decisionmaking for Nuclear Material and Waste Applications [NRC, 2008b].
- By product materials
  - 10 CFR Parts 30 to 39 [CFR]
  - NUREG-1556 [NRC, 2012g]
  - NUREG-2150 [NRC, 2012a]
- Uranium recovery
  - NUREG-2150 [NRC, 2012a]
- Disposal of high and low level waste
  - 10 CFR Parts 60 and 63 [CFR]
  - SECY-97-300 [NRC, 1997c]
  - SECY-99-186 [NRC, 1999b]
  - Federal Register Notice 66 [FRN, 2000]
  - NUREG-2150 [NRC, 2012a]

# *Non-Reactor Areas References (Cont'd)*

---

- Domestic licensing of special nuclear material
  - 10 CFR Part 70 [CFR]
  - NUREG-1520 [NRC, 2015]
  - NUREG-2150 [NRC, 2012a]
- Transportation
  - 10 CFR Part 71 [CFR]
  - NUREG-2150
- Storage of spent nuclear fuel
  - 10 CFR Part 72 [CFR]
  - NUREG-1536 [NRC, 2010b]
  - NUREG-1567 [NRC, 2000c]
  - NUREG-2150 [NRC, 2012a]

# *Security References*

---

- Security of byproduct materials
  - 10 CFR Parts 30 and 37 [CFR]
  - NUREG-1556, Vol. 1 [NUREG, 2012g]
- Physical protection of plants and materials
  - 10 CFR Part 73 [CFR]
  - Regulatory Guide 5.63 [NRC, 1982]
  - Regulatory Guide 5.71 [NRC, 2010a]
  - NUREG-1804, Rev 2 [NRC, 2003a]



# *International References*

---

- International Atomic Energy Agency (IAEA) Documents
  - INSAG-3 [IAEA, 1996a]
  - INSAG-10 [IAEA, 1996b]
  - INSAG-12 [IAEA, 1996c]
  - IAEA SRS No. 46 [IAEA, 2005]
  - IAEA SF-1 [IAEA, 2006]
  - IAEA TECDOC-1570 [IAEA, 2007]
  - IAEA, NP-T-2.2 [IAEA, 2009]
  - IAEA, SSR-2/1 [IAEA, 2012]
  - IAEA, INFCIRC 225 [IAEA, 2011]
- The Nuclear Energy Agency/Committee on Nuclear Regulatory Activities/Committee on the Safety of Nuclear Installations (NEA/CNRA/CSNI) Joint Workshop on Challenges and Enhancements to DID in light of the Fukushima Dai-ichi Accident [NEA, 2014]
- DID-PAS: Development of a Framework for Evaluation of the Defence-in-Depth with PSA, Swedish Radiation Safety Authority [SSM, 2015]
- Implementation of Defence in Depth at Nuclear Power Plants: Lessons Learnt from the Fukushima Daiichi Accident, Nuclear Energy Agency [NEA, 2016]

# *Other Domestic Agencies*

---

- Perspectives were gained from an August 2015 workshop
- Participating agencies included:
  - National Aeronautics and Space Administration (NASA)
  - Federal Aviation Administration (FAA)
  - Department of Energy (DOE) – both safety and security
  - Naval Nuclear Propulsion Program
  - Department of Homeland Security (DHS)
  - Department of the Interior (DOI) (Bureau of Safety and Environmental Evaluation)
  - Army Corps of Engineers
  - Canadian Nuclear Safety Commission (CNSC)

# *Observations*

---

- To better understand the history, review the history and provide observations for the following:
  - How is DID defined?
  - Why is DID needed (purpose)?
  - What is DID attempting to achieve (goal)?
  - What is the structure used for DID (approach)?
  - What actions or strategy are used to achieve DID?
  - How is DID adequacy determined?
  - Overall observations

# *Definitions*

---

- NRC Glossary [NRC, 2014b]
- NRC Strategic Plan [NRC, 2012e]
- NUREG-1860 [NRC, 2007b]
- *Federal Register Notice* (FRN) on Final Rule for 10 CFR §50.69 [NRC, 2012d]
- Commission White Paper [NRC, 1999a]
- 10 CFR §70.64

# Definitions (Cont'd)

---

**NRC Glossary (current):** “An approach to designing and operating nuclear facilities that prevents and mitigates accidents that release radiation or hazardous materials. The key is creating multiple independent and redundant layers of defense to compensate for potential human and mechanical failures so that no single layer, no matter how robust, is exclusively relied upon. Defense in depth includes the use of access controls, physical barriers, redundant and diverse key safety functions, and emergency response measures.”

**NRC Strategic Plan (2008-2013):** “An element of the NRC’s safety philosophy that employs successive compensatory measures to prevent accidents or lessen the effects of damage if a malfunction or accident occurs at a nuclear facility. The NRC’s safety philosophy ensures that the public is adequately protected and that emergency plans surrounding a nuclear facility are well conceived and will work. Moreover, the philosophy ensures that safety will not be wholly dependent on any single element of the design, construction, maintenance, or operation of a nuclear facility.”

**NUREG-1860 (2007):** “Defense-in-depth is an element of NRC’s safety philosophy that is used to address uncertainty by employing successive measure including safety margins to prevent and mitigate damage if a malfunction, accident or naturally caused event occurs at a nuclear facility.”

**Commission White Paper (1999):** “Defense-in-depth is an element of the NRC's Safety Philosophy that employs successive compensatory measures to prevent accidents or mitigate damage if a malfunction, accident, or naturally caused event occurs at a nuclear facility. The defense-in-depth philosophy ensures that safety will not be wholly dependent on any single element of the design, construction, maintenance, or operation of a nuclear facility. The net effect of incorporating defense-in-depth into design, construction, maintenance, and operation is that the facility or system in question tends to be more tolerant of failures and external challenges.”

**FRN on Final Rule for 10 CFR §50.69:** “Defense-in-depth is an element of the NRC’s safety philosophy that employs successive measures to prevent accidents or mitigate damage if a malfunction, accident, or naturally caused event occurs at a nuclear facility. Defense-in-depth is a philosophy used by the NRC to provide redundancy as well as the philosophy of a multiple barrier approach against fission product releases. The defense-in-depth philosophy ensures that safety will not be wholly dependent on any single element of the design, construction, maintenance, or operation of a nuclear facility. The net effect of incorporating defense-in-depth into design, construction, maintenance, and operation is that the facility or system in question tends to be more tolerant of failures and external challenges.”

**10 CFR §70.64:** “Defense-in-depth practices means a design philosophy, applied from the outset and through completion of the design, that is based on providing successive levels of protection such that health and safety will not be wholly dependent upon any single element of the design, construction, maintenance, or operation of the facility. The net effect of incorporating defense-in-depth practices is a conservatively designed facility and system that will exhibit greater tolerance to failure and external challenges. The risk insight obtained through performance of the integrated safety analysis can be then used to supplement the final design by focusing attention on the prevention and mitigation of the higher-risk potential accidents.”

# *Observations of Definitions*

---

- Almost all the definitions agree that defense-in-depth employs “successive measures”
  - some are specific in defining successive compensatory measures. Compensatory is used to denote that each successive measure is designed to compensate for the failure of the previous measure
    - This concept does appear in another definition, but instead of using “successive compensatory measures,” it defines defense-in-depth as “multiple lines of defense.”
  - two of the definitions include safety margins as part of the successive measures
- All the definitions agree that defense-in-depth involves both prevention and mitigation

# *Observations of Definitions (cont'd)*

---

- Some of the definitions are more high level in that they just specify prevention and mitigation of “accidents” while others specify prevention and mitigation of malfunction of equipment, accidents and naturally caused events
- All of the definitions, but one, indicate that defense-in-depth is a philosophy.
- A little over half of the definitions indicate that safety will not be wholly dependent on any single element and that defense-in-depth will ensure the facility (or system) will be more tolerant of failures.
- One definition includes redundancy as part of its definition.

# Overall Observations of Defense-in-Depth

---

- The **purpose** of defense-in-depth is to ensure that the risk of the regulated activity remains acceptably low regardless of lack of knowledge
- The **goal** of defense-in-depth is to ensure that the public is protected from harm by preventing and mitigating accidents
- The **approach** used for achieving defense-in-depth is to have multiple layers of defense incorporated into the design and operation of the regulated activities and to have these multiple layers address both prevention and mitigation
  - The actual layers are dependent on the posed threat



# *Overall Observations of Defense-in-Depth (Cont'd)*

---

- The **strategy** for accomplishing the defensive layers is to have protective measures and defined principles
- The protective measures are the actual design, operational or programmatic features that ensure the function of the defensive layer (e.g., emergency core cooling system)
- The principles set the goals of the protective measures (e.g., system safety function can be accomplished assuming a single failure occurs)

# Overall Observations of Defense-in-Depth (Cont'd)

---

- There is almost no guidance on criteria for determining adequacy of defense-in-depth; the literature does suggest that
  - the elements (e.g., layer of defense) should be quantified
  - risk can be used to assess each defense system (e.g., safety measure)
  - compensatory measures can be graded in order to reduce risk,
  - any sequence (given all defense layers have failed) remain under a frequency consequence curve,
  - redundancy and diversity is sufficient to ensure risk guidelines are met
  - the adequacy of defense-in-depth can be assessed via a process that uses measures of risk.

# Example Generic Defense-in-Depth Framework

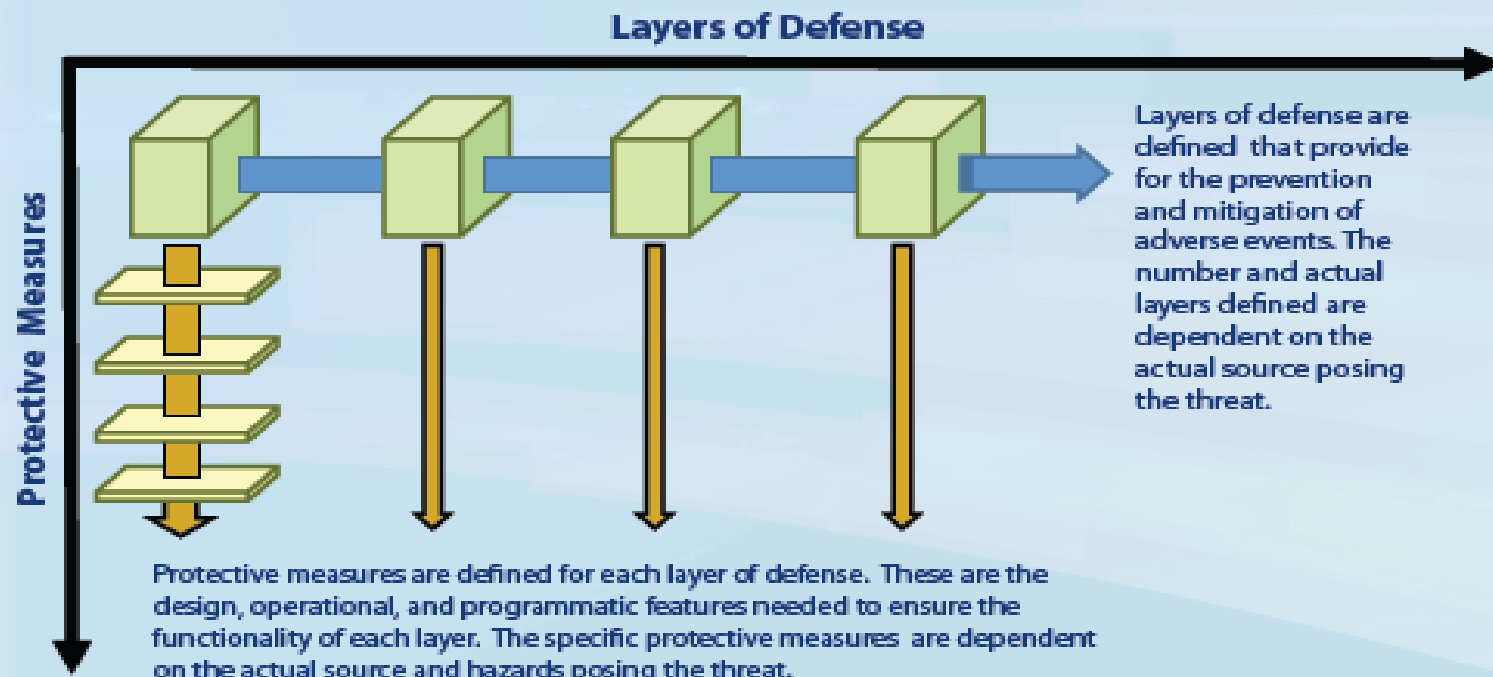
*Ensure that the public is protected from harm by preventing and mitigating accidents*

*Ensure that the risk of the regulated activity remains acceptably low regardless of lack of knowledge*

*Have multiple layers of defense incorporated into the design and operation of the regulated activities and have these multiple layers address both prevention and mitigation*

## Principles

The basic ideas behind the measures that implement the approach used to accomplish defense-in-depth



# *KM NUREG Availability*

---

- Each Office has been given the NUREG/KM to put on their sharepoint site
- NUREG/KM-0009 has been published
  - ML16104A071

# Staff's Plan on Next Revision to RG 1.200

---

Presented to  
Advisory Committee on Reactor Safeguards  
Reliability and PRA Subcommittee

Presented by  
Mary Drouin, [mary.drouin@nrc.gov](mailto:mary.drouin@nrc.gov)  
Office of Nuclear Regulatory Research  
US Nuclear Regulatory Commission

May 18, 2016

# Regulatory Guide (RG) 1.200

---

- *“Describes one acceptable approach for determining whether the technical adequacy of the PRA, in total or the parts that are used to support an application, is sufficient to provide confidence in the results such that the PRA can be used in regulatory decisionmaking for light-water reactors.”*
- As such, the RG provides staff position on
  - What constitutes a technically acceptable base PRA
  - How a PRA standard and peer reviews can be used to demonstrate a technically acceptable PRA

# RG 1.200, Revision 2

---

- RG addresses staff position on
  - Metrics used in characterizing risk
    - Core damage frequency (Level 1 PRA) and radionuclide release frequency (Level 2 PRA)
    - Does not address Level 3 PRA
  - Plant operating states for which risk is to be evaluated
    - At-power, and Low-power and Shutdown
  - Causes of initiating events that can potentially challenge and disrupt the normal operation of the plant
    - Internal and external hazards

# RG 1.200, Revision 2 (Cont'd)

---

- RG endorses:
  - ASME/ANS RA-Sa-2009 (Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications)
  - NEI 00-02 (Probabilistic Risk Assessment Peer Review Guidance, 5-19-2006, Rev 1 and Update of Appendix D, 11-15-2006)
  - NEI 05-04 (Process for Performing Follow-on PRA Peer Reviews Using the ASME PRA Standard, Revision 2, 11-2008)
  - NEI 07-12 (Fire Probabilistic Risk Assessment Peer Review Process Guidelines, Draft Version H, Revision 0, 11-2008)



# New and Revised Standards and Guidance

---

- Level 2 PRA standard – currently out for trial use
- Low Power and Shutdown standard – currently out for trial use
- Seismic PRA, Part 5 of the Level 1/LERF PRA standard – expected to be issued by JCNRM as a “code case” in August 2016 that will remain as a code case until incorporated in the next edition of the standard
- NEI Peer Review Guidance 12-13 on seismic PRA
- NEI update to Peer Review Guidance 05-04 addressing resolution of Facts and Observations (F&Os) – expected to be issued by NEI for use in 2016
- NEI guidance 16-04 on new methods – expect to be issued by NEI for use in 2016
- Advanced LWR PRA standard – expected to be issued by JCNRM for trial use in December 2016
- Edition to Level 1/LERF PRA standard – expected to be issued by JCNRM in October 2017

# New and Revised Standards and Guidance (Cont'd)

---

- Not efficient and too resource intensive to revise RG 1.200 each time a new/update standard or guidance is issued
- Although a consensus standard, new standards are being issued for “trial use”

# Staff Proposed Approach

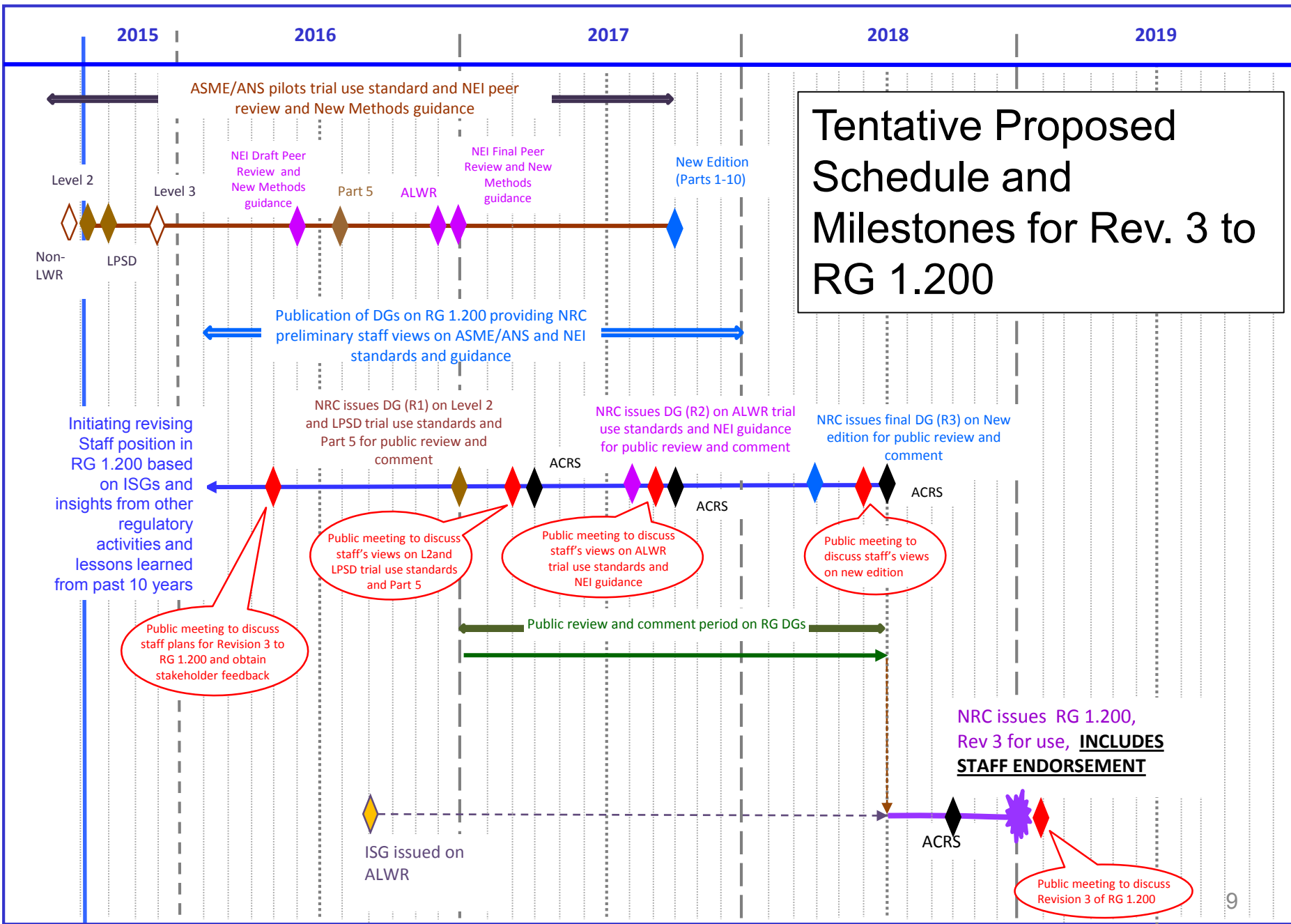
---

- Issue a series of Draft Guides (DG)
  - As standards are issued, draft guides would be issued for public review and comment providing a **draft** staff position
- Public review and comment period would be open over the entire time
- Allows for trial use standards to be piloted including staff position before finalizing RG

# Staff Proposed Approach (Cont'd)

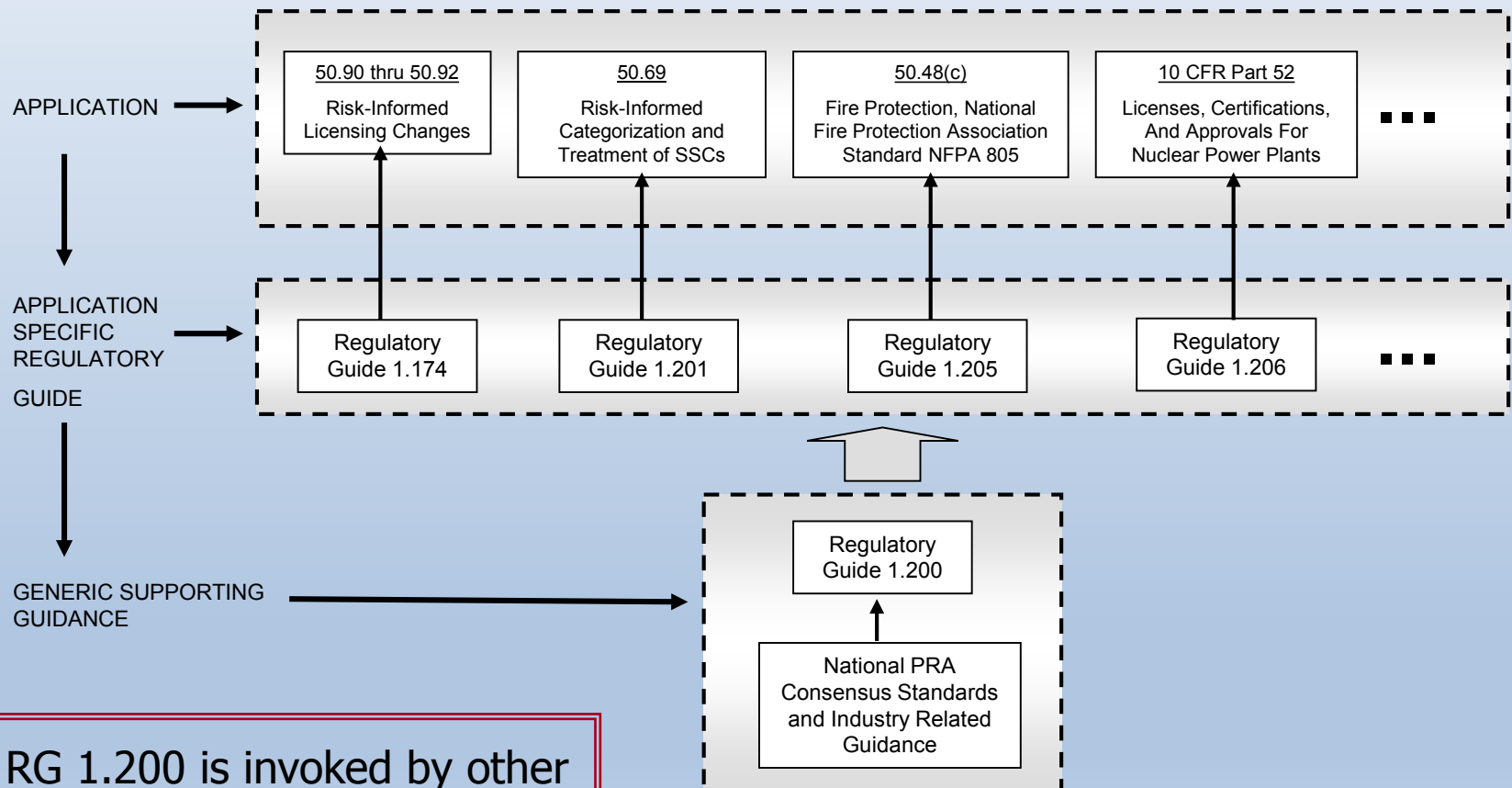
---

- Allows staff to perform a detailed review of the RG
  - Identify what has been successful and what could be improved
  - For example, merit of including NRC staff on peer reviews?
- Using this approach, formal revision to the RG would occur after the public review and comment period ends for the various DGs



# Back-Up Slide

# Relationship of RG 1.200 to Other Guidance Documents



⇒ RG 1.200 is invoked by other regulatory guides

# Regulatory Guide (RG) 1.174, Revision 3 Development Plan and Schedule

Anders Gilbertson  
Reliability and Risk Analyst  
RES/DRA/PRB  
May 18, 2016

---



---

# Overview of RG 1.174, Revision 3

- The staff were directed in SRM-SECY-11-0014 to revise RG 1.174, “...using precise language to assure that the defense-in-depth philosophy is interpreted and implemented consistently...” and to similarly update other relevant regulatory guidance that refers to defense in depth.
- A proposed draft of RG 1.174, Revision 3, (i.e., DG-1285) was developed and made available for public review and comment (May, 2012).
- Major changes to defense-in-depth guidance in DG-1285 included:
  - Reorganization of the seven elements (now called factors in DG-1285)
  - Additional discussion explaining the meaning of each element
  - Examples added for each element
- Completion of the effort was delayed due to ongoing work under NTTF Recommendation 1 and RMRF, as related to defense in depth.
- The staff were directed in SRM-SECY-15-0168 to, “...expeditiously complete the revision to Regulatory Guide 1.174 on defense in depth, in order to improve the clarity of the guidance...”

---

# RG 1.174, Rev. 3 – Project Plan

- Inter-Office Working Group has been formed (RES, NRR, NRO, and OGC; NMSS, NSIR observing)
- Inter-Office Division-Level Steering Committee overseeing efforts (RES/DRA, NRR/DRA, and NRO/DSRA)
- Kickoff meeting held on 4/7/16 with management and staff
- Weekly meetings of the working group (3 held as of 5/4)
- Scope and Project Plan was discussed with public during May 2, 2016, public meeting on PRA Technical Adequacy
  - Overall support for the update
  - Interest in testing out the revised guidance

---

# RG 1.174, Rev. 3 – Project Plan (cont')

- Working Group (WG) efforts to revise DG-1285 includes:
  - Responding to the 2012 public comments
  - Public outreach and ACRS briefings
  - Weekly WG interactions
  - Frequent briefings with Steering Committee
- After DG-1285 revision is complete:
  - Public workshop to be held on revised DG-1285
  - Revise guidance further based on feedback from workshop, as needed

---

# RG 1.174, Rev. 3 – Project Plan (cont')

- Summary of public comments received:
  - Guidance not provided on how to assess impact on DID
  - In general, three main types of comments:
    - Reorganization of the defense-in-depth factors did not add clarity; introduced additional confusion
    - The examples used to illustrate the meaning of each defense-in-depth factor are often confusing
    - Expressed a desire to be more engaged

---

# RG 1.174, Rev. 3 – Project Plan (cont')

- Scope of changes:
  - Revising defense-in-depth language in DG-1285 with conforming changes in DG-1286, DG-1287, and DG-1288
  - Outstanding Commission-directed work and staff commitments to ACRS related to RG 1.174

---

# RG 1.174, Rev. 3 – Project Plan (cont')

- Addressing defense in depth:
  - Develop examples illustrating the process of addressing all seven elements when assessing the impact on defense in depth
  - Revert back to the organization of elements in Revision 2
  - Revise language to more clearly explain the meaning of the defense-in-depth factors
  - Organize public meetings and workshop to obtain feedback during the guidance revision period

---

# RG 1.174, Rev. 3 – Project Plan (cont')

- Addressing other scope items:
  - Transitioning from conditional containment failure probability and large release frequency to core damage frequency for new reactors
  - Containment performance expectations for new reactors

---

# RG 1.174, Rev. 3 – Project Plan (cont')

- Public meetings tentatively planned to occur in mid- to late-May and June
    - Inform public about progress and gives an opportunity for public to provide feedback
  - August: Public workshop on revised DG-1285
    - Revised DG-1285 to be issued prior to workshop
  - Subsequent public meetings to be planned as needed
  - ACRS Subcommittee and Full Committee briefings
-



---

# RG 1.174, Rev. 3 – Project Milestones

- Project schedule meets EDO due date of 6/30/2017:
  - Public meeting → late-May, 2016
  - Public meeting → late-June, 2016
  - Public workshop → August, 2016
  - Subsequent public meetings held as needed
  - Finalization of RG → Fall, 2016/Winter, 2017
  - Internal reviews/approvals → Spring, 2017
  - RG 1.174, Rev. 3, published → Early Summer, 2017

# RG 1.174, Rev. 3 – Tentative Development Schedule

2016													
April				May					June				
Week of 4 <sup>th</sup>	11	18	25	2	9	16	23	30	6	13	20	27	
4/7 Kickoff meeting to discuss plan				5/2, Public meeting	5/10, RISC public meeting	5/18, Brief ACRS Subcommittee on plan	Public meeting				Public meeting		
Project Plan Development			Working Group Revises Regulatory Guide										
July				August					September				
4	11	18	25	1	8	15	22	29	5	12	19	26	
						Public Workshop			Brief ACRS Subcommittee	Workshop summary available			
Working Group Revises Regulatory Guide					Revised DG avail. to Public		Address Feedback from Public Workshop						
October					November				December				
3	10	17	24	31	7	14	21	28	5	12	19	26	
										ACRS Full Committee briefing			
Technical editing	Resolve tech editing	Prep & send to ACRS & Program Offices	Program Office (Office Mgmt.) Review and Concurrence / ACRS Full Committee Review					Resolve comments		OGC Review		Resolve OGC comments	
2017													
January					February				March				
2	9	16	23	30	6	13	20	27	6	13	20	27	
Finalization of RG and FRN for publication		Publication by the Office of the Federal Register											