

**Official Transcript of Proceedings**  
**NUCLEAR REGULATORY COMMISSION**

Title: Advisory Committee on Reactor Safeguards

Docket Number: (n/a)

Location: teleconference

Date: Tuesday, November 2, 2021

Work Order No.: NRC-1734

Pages 1-214

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

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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690TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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TUESDAY, NOVEMBER 2, 2021

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The Advisory Committee met via Video  
Teleconference, at 9:30 a.m. EDT, Matthew W.  
Sunseri, Chairman, presiding.

COMMITTEE MEMBERS:

MATTHEW W. SUNSERI, Chairman

JOY L. REMPE, Vice Chairman

WALTER L. KIRCHNER, Member-at-large

RONALD G. BALLINGER, Member

VICKI M. BIER, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR. Member

VESNA B. DIMITRIJEVIC, Member

GREGORY H. HALNON, Member

JOSE A. MARCH-LEUBA, Member

DAVID A. PETTI, Member

PETER C. RICCARDELLA, Member

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1 DESIGNATED FEDERAL OFFICIAL:

2 MICHAEL SNODDERLY

3 ALSO PRESENT:

4 GARY BECKER, NuScale

5 MARK BLUMBERG, NRC NRR

6 GREG BROADBENT, Entergy

7 ELIJAH DICKSON, NRC NRR

8 JERRY DOZIER, NRC NRR

9 MICHELLE HART, NRC NRR

10 STEVE JONES, NRC NRR

11 ROBERT KAHLER, NRC NSIR

12 MEENA KHANNA, NRC NRR

13 EDWIN LYMAN, Union of Concerned Scientists

14 MICHAEL MARKLEY, NRC NRR

15 CHARLES MURRAY, NRC NSIR

16 MARCUS NICHOL, Nuclear Energy Institute

17 JOHN PARILLO, NRC NRR

18 FRANKIE PIMENTEL, Nuclear Energy Institute

19 ERIC SCHRADER, NRC NSIR

20 TODD SMITH, NRC NSIR

21 SOLY SOTO LUGO, NRC NMSS

22 SHILP VASAVADA, NRC NRR

23 GREGORY WARNICK, NRC Region IV

24

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

9:31 a.m.

CHAIR SUNSERI: Good morning, everyone.

The meeting will now come to order. This is the first day of the 690th meeting of the Advisory Committee on Reactor Safeguards. I'm Matthew Sunseri, the Chair of the ACRS. I'll now call the roll to verify quorum and make sure communications are clear.

I'll start with Ron Ballinger.

MEMBER BALLINGER: Here.

CHAIR SUNSERI: Vicki Bier.

MEMBER BIER: Here.

CHAIR SUNSERI: Dennis Bley.

MEMBER BLEY: Here.

CHAIR SUNSERI: Charles Brown. I

understand that Member Brown may have some personal matters to take care of today so we'll give him a little leniency here.

Vesna Dimitrijevic.

MEMBER DIMITRIJEVIC: I'm here.

CHAIR SUNSERI: Greg Halnon.

MEMBER HALNON: Here.

CHAIR SUNSERI: Walt Kirchner.

MEMBER KIRCHNER: Here.

CHAIR SUNSERI: Jose March-Leuba.

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1 MEMBER MARCH-LEUBA: Here.

2 CHAIR SUNSERI: Dave Petti.

3 MEMBER PETTI: Here.

4 CHAIR SUNSERI: Joy Rempe.

5 VICE CHAIR REMPE: Here.

6 CHAIR SUNSERI: And myself. So everyone  
7 except Member Brown, and I expect that he'll join us  
8 when he can.

9 MEMBER BROWN: I'm here. My laptop was  
10 muted and I didn't know it.

11 CHAIR SUNSERI: Okay. Good to hear you.

12 MEMBER BROWN: Not Teams so it was the  
13 laptop. I forgot.

14 CHAIR SUNSERI: No problem. All right,  
15 great. Full house then. We have a quorum.

16 The ACRS was established by the Atomic  
17 Energy Act and is governed by the Federal Advisory  
18 Committee Act. The ACRS section of the USNRC public  
19 website provides information about the history of the  
20 ACRS and provides documents such as our charter,  
21 bylaws, Federal Register notices for meetings, letter  
22 reports, and transcripts of all full and subcommittee  
23 meetings including the slides presented at the  
24 meetings.

25 The Committee provides its advice on

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1 safety matters to the Commission through its publicly  
2 available letter reports. The Federal Register notice  
3 announcing this meeting was published on October 8,  
4 2021 and provided an agenda and instructions for  
5 interested parties to provide written documents or  
6 request opportunities to address the Committee.

7 The Designated Federal Officer for this  
8 meeting is Mr. Michael Snodderly. During this week's  
9 meeting the Committee will consider the following  
10 topics:

11 Today we have the draft final rule for  
12 Emergency Planning for Small Modular Reactors and  
13 Other New Technologies which we will prepare a letter  
14 report on that topic.

15 We have an ISG Supplemental Guidance for  
16 Radiological Consequence Analyses Using Alternative  
17 Source Terms. That will be today also. We will  
18 prepare a letter report on that topic.

19 Wednesday we have DRAFT NUREG on Advanced  
20 Reactors Fuel Qualification. We have an Oak Ridge  
21 National Lab report on molten salt reactor fuel  
22 qualification. We will begin our deliberation on our  
23 bi-annual report on the agency's research program.

24 Thursday morning we have a planning and  
25 procedure session. Following that, and through the

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1 rest of the week, we will work on letter reports. All  
2 of the topics that I mentioned will have letter  
3 reports.

4 A communication channel has been opened to  
5 allow members of the public to listen in on  
6 presentation and committee discussions. We have  
7 received no written comments or requests to make oral  
8 statements from members of the public regarding  
9 today's session.

10 There will be an opportunity for public  
11 comment and we have set aside time in the agenda for  
12 comments from members of the public attending or  
13 listening in to our meeting. When we call for those  
14 public comments, since this is going through the Teams  
15 communication link you'll have to use the command \*6  
16 to unmute yourself. We'll repeat that as the  
17 appropriate time but I just want to give you a heads  
18 up on that.

19 Also, written comments may be forwarded to  
20 Mr. Michael Snodderly, the designated federal officer.  
21 A transcript of the open portions of the meeting is  
22 being kept and it is requested that the speakers  
23 identify themselves and speak with sufficient clarity  
24 and volume so that they can be readily heard.  
25 Additionally, participants should mute themselves when

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1 not speaking.

2 As you can see from that introduction  
3 there, we have quite a heavy schedule for this week,  
4 a lot of topics, five letter reports potentially, and  
5 we will work through those in a straight-forward  
6 manner. I will ask for your patients with me. If I  
7 seem a little pressy today, it's because we're just  
8 trying to work through the agenda. We will take  
9 whatever time we need to thoroughly review the topics  
10 that are at hand.

11 Let me turn to the members now and see if  
12 members have any questions about the agenda or any  
13 other comments you would like to make before we get  
14 started with the first topic.

15 All right. I will now turn to Member Greg  
16 Halnon for the first topic which is the draft final  
17 rule for Emergency Planning for Small Modular Reactors  
18 and Other New Technologies. Greg, all yours.

19 MEMBER HALNON: Thank you, Chairman  
20 Sunseri. Good morning to my ACRS colleagues, NRC  
21 staff, and those listening in. Appreciate this time  
22 this morning.

23 We'll be hearing from the staff and from  
24 some other important groups regarding the draft final  
25 rule for Emergency Preparedness and for SMRs and Other

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1 Nuclear Technologies. That will be ONT's that you  
2 might hear often throughout the day. That's Other  
3 Nuclear Technologies.

4 This rule language is an important  
5 building block for the future of the country's nuclear  
6 infrastructure and it's a key element to the defense  
7 in depth for the protection of the health and safety  
8 of the public, as well as the occupational wellbeing  
9 of our nuclear workers. The Future Plant Designs  
10 Subcommittee reviewed this on September 21st with the  
11 staff and now the full Committee will review the  
12 language as well as the accompanying regulatory guide.

13 After the subcommittee we were still  
14 interest in more detail about engagement of offsite  
15 local agencies for exposure and ingestion pathways, as  
16 well as the preciseness of the language for selection  
17 of accidents to be considered in developing the source  
18 term.

19 We look forward to hearing from the staff  
20 and from some other important groups that we will have  
21 making some comments on these topics and other topics  
22 as well. With that being said, I'll give the floor  
23 over to Greg Warnick, Deputy Director, Division of  
24 Emergency and Response for him to kick off the NRC  
25 staff presentations.

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1 Greg.

2 MR. WARNICK: Thank you. Yes, my name is  
3 Greg Warnick and, as Greg mentioned, I'm the Deputy  
4 Director of the Division of Preparedness and Response  
5 in the Office of Nuclear Security and Incident  
6 Response. I would like to take this opportunity to  
7 thank the ACRS full committee for this opportunity to  
8 discuss the draft final rule as we've been presenting  
9 here.

10 With me today are Eric Schrader, EEP  
11 technical lead from INSIR; Soly Soto Lugo, rulemaking  
12 project manager from NMSS; Charles Murray, technical  
13 lead for Reg Guide 1.242 from NSIR; and Michelle Hart,  
14 senior reactor engineer in NRR.

15 I would like to acknowledge the working  
16 group members and management that supported  
17 development of the draft final rule in this  
18 presentation. It was a tremendous team effort. The  
19 staff met with ACRS in October 2018 to discuss the  
20 Draft Proposed Rule and proposed guidance, and more  
21 recently with the future plant's design subcommittee  
22 a couple months ago on September 21st.

23 The staff appreciates the comments and  
24 valuable feedback received from the ACRS over the  
25 course of this rulemaking. Today's presentation will

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1 provide an overview of the draft final rule and  
2 guidance including significant changes made from the  
3 proposed rule.

4 As you will hear from the staff, the  
5 draft final rule outcomes are technology inclusive and  
6 performance based, include a hazard analysis for  
7 contiguous facilities, and consider a graded approach  
8 to EP and ingestion response planning.

9 At this time I would like to turn the  
10 meeting over to Soly Soto Lugo to begin the staff's  
11 presentation.

12 MS. SOTO LUGO: Thank you, Greg.

13 Good morning, everyone. As Greg  
14 mentioned, I am Soly Soto Lugo, project manager for  
15 this rulemaking. The draft final rule we are about to  
16 discuss today includes new alternative emergency  
17 preparedness requirements for small modular reactors  
18 and other new technologies such as non-light water  
19 reactors and certain non-power production or  
20 utilization facilities.

21 This draft final rule is technology  
22 inclusive and provides alternatives to develop a  
23 performance-based EP program rather than using the  
24 existing EP requirements. The scope of this draft  
25 final rule is limited to small modular reactors and

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1 other new technology facilities for which the NRC  
2 expects to receive license applications under 10 CFR  
3 Part 50 or Part 52. This draft final rule does not  
4 include within its scope emergency planning  
5 preparation or response for large light-water  
6 reactors, fuel cycle facilities, or currently  
7 operating non-power reactors.

8 Next slide, please. The proposed rule was  
9 published in May of last year for a 75-day public  
10 comment period. Then in June the staff had a public  
11 meeting to provide the public and external  
12 stakeholders an opportunity to ask questions about the  
13 proposed rule. The NRC received no comments in the  
14 comment period due to the coronavirus public health  
15 emergency and extended the comment period by 60 days  
16 in July. The comment period closed in September 2020.

17 The NRC received comments from over 2,000  
18 individuals and organizations including form letters.  
19 The staff analysis of the public comments identified  
20 over 600 unique comments of the proposed rule, the  
21 draft regulatory guidance, regulatory analysis, and  
22 environment assessment.

23 The NRC received comments from state and  
24 local governments, tribal governments and tribal  
25 organizations, federal agencies, members of the

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1 nuclear power industry, non-governmental  
2 organizations, and private citizens. A summary of the  
3 NRC responses to the comments will be published upon  
4 Commission approval of the final rule.

5 Eric Schrader will discuss some of the  
6 public comments we received later in his presentation.  
7 The draft final rule package is due to the Commission  
8 in December of this year. With that, I will now turn  
9 the presentation over to Eric Schrader who is going to  
10 discuss the draft final rule.

11 Next slide, please.

12 MR. SCHRADER: Thanks Soly, and good  
13 morning. Next slide, please.

14 The NRC chose a graded approach to the  
15 draft final rule commensurate with the relative  
16 radiological risk and potential hazards presented by  
17 the facility. The staff received direction from the  
18 commission to proceed with rulemaking using the  
19 performance-based approach.

20 The performance-based approach bases the  
21 adequacy of EP on the NRC's identification of  
22 emergency response functions that affect the  
23 protection of the public and the health and safety and  
24 the licensee's successful execution of those  
25 functions.

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1 Technology inclusive means the  
2 establishment of performance requirements for any SMR  
3 or ONT applicant or licensee to use in its emergency  
4 plan. These will be flexible and practical for  
5 application to a variety of reactor technologies. EP  
6 is evolving through the technological innervations and  
7 may look a little but different but will always be  
8 there.

9 This draft of the final rule offers a  
10 consequence-oriented approach to establishing EP  
11 requirements for SMRs and ONTs. This approach refers  
12 to the principle evasion decisions on the scope of the  
13 EP required upon the potential consequences from a  
14 spectrum of accidents including those that could  
15 result in a radiological offsite release.

16 Based on information currently available  
17 to the NRC, unique design considerations and the  
18 potential for multi-module facilities sites contiguous  
19 to or near NRC licensed or non-licensed facilities  
20 could lead to a variety of accident frequency  
21 progression times and potential consequences for SMRs  
22 and ONTs.

23 Based on that concern, this framework also  
24 includes a hazard analysis that will be required to  
25 show that the impact of co-located or contiguous

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1 facility operation is accounted for in the emergency  
2 plan and will not negatively impact the licensee's  
3 ability to implement its emergency plan.

4 Next slide, please. This slide shows a  
5 depiction of what the current prescriptive regulatory  
6 framework looks like and how the new performance-based  
7 framework fits in with that. You can see at the  
8 beginning there's a number of entry points for the use  
9 of either of the two regulatory frameworks. Those  
10 remain constant. We'll focus today on the light blue  
11 side to EP for SMRs and ONTs final draft rule  
12 framework.

13 There were some changes made to  
14 50.33a(g)(2) which is one of the entry requirements  
15 talking about the content of -- the technical content  
16 of the application. That will be the entry point for  
17 which we go into 51.60. Once we're in 51.60, there  
18 will be two options.

19 There will be an option for EPZ or not an  
20 EPZ. If there's an EPZ that is offsite, you can see  
21 that it goes to the left and there's a number of  
22 aspects of 51.60 that will go through. Then if there  
23 is on-site and off-site, we see that there are  
24 additional requirements of 51.60(b)(1).

25 Next slide, please. The framework has

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1 four major key parts. Maintenance of performance.  
2 The emergency plan is required to describe how  
3 applicants or licensees are going to maintain their  
4 preparedness and response to emergency and accident  
5 conditions and how provisions employed to maintain  
6 emergency plan are up to date. Said another way, how  
7 will the licensee maintain a reasonable assurance.

8 Performance objectives. Developed and  
9 maintain a set of performance objectives and  
10 performance thresholds to track the licensee's ERO's  
11 ability to implement the emergency response functions  
12 in drills and exercises.

13 Developing that a little bit further, the  
14 emergency response performance. A set of key  
15 emergency response functions are required to  
16 adequately demonstrate reasonable assurance that lend  
17 themselves to a quantitative evaluation of  
18 performance.

19 Then there's the planning activities.  
20 This is an additional set of emergency response  
21 requirements that are more programmatic in nature and  
22 do not easily lend themselves to a quantitative  
23 performance evaluation.

24 EPZ size determination is described in  
25 50.33(g)(2). this requires an EPZ size determination

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1 analysis based on a specific design and site that  
2 describes the area within which the public dose is  
3 projected to exceed 10 millisieverts or one rem total  
4 effective dose equivalent over 96 hours from the start  
5 of the release of radioactive materials from a  
6 facility considering accident likelihood, source term,  
7 timing of the accident sequence, meteorology, and  
8 where predetermined prompt protective measures are  
9 necessary.

10 This approach covers the two core  
11 attributes of an EPZ. The first being projected dose  
12 savings, and the second, a required urgency of  
13 protective measures to maximize those savings. The  
14 EPZ is a planning tool in a boundary area in which  
15 prompt protective measures are warranted.

16 Next slide, please. Regulatory Oversight  
17 is covered in Section 50.160(b)(1)(iii). It requires  
18 that all applicants and licensees to use drills and  
19 exercises to demonstrate their capabilities in the  
20 required emergency response functions that include:

21 Event classification and mitigation;  
22 protective actions, communications, contact  
23 arrangements with federal, state, and local tribal  
24 government agencies; notification of off-site  
25 organizations; command and control; emergency response

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1 facilities (or facility); staff and operations,  
2 augmentation, training, drills and exercises and  
3 periodicities; radiological assessment; core and  
4 vessel damage; radiological conditions; off-site dose  
5 projections; protective equipment, re-entry, critique  
6 and corrective actions for drills and exercises.

7 The specifics of how the regulatory  
8 oversight of the draft final rule will be accomplished  
9 is yet to be determined. The Advance Reactor Policy  
10 Branch in NRR has begun an advanced construction  
11 inspection oversight framework project to develop  
12 recommendations for development of the NRC's  
13 inspection and oversight guidance to support  
14 construction and operation of advanced reactors that  
15 is technology inclusive, risk informed, and  
16 performance based.

17 The process of developing a regulatory  
18 oversight framework is expected to take two years  
19 following the issuance of the rule. No applications  
20 using the 51.60 rule are expected in the first two  
21 years following the implementation of the rule.

22 The rule requires each applicant to create  
23 a set of objectives and demonstrate regulatory  
24 compliance with each response function and a  
25 corresponding threshold established for the adequate

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1 performance of each emergency response function. The  
2 NRC will review the exercise and critique their  
3 performance similar to the current process.

4 The NRC expects applications for all  
5 different types of advanced reactors and oversight may  
6 need to be tailored for the specific designs. One of  
7 the questions that we've received is talking about  
8 performance indicators versus performance objectives.  
9 Performance indicators is really not the right term to  
10 use in the rule because of the current context in  
11 which it's normally used.

12 Current emergency performance indicators  
13 are not a regulatory requirement and do not  
14 demonstrate regulatory compliance. They establish a  
15 response band in which the NRC allows the license to  
16 identify and correct their weaknesses and  
17 deficiencies. Below the licensee response band the  
18 NRC applies additional inspection and oversight  
19 resources to evaluate the licensee's approach taken to  
20 correct the issue.

21 The 51.60 rule requires applicants and  
22 licensees to establish objectives and adequate  
23 performance thresholds for each of the response  
24 functions listed in 51.60(b)(1)(iii). Licensees will  
25 evaluate the ERO's performance of these objectives in

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1 a post-drill and exercise formal critique, identify  
2 weaknesses, deficiencies, and then enter them in a  
3 corrective action program.

4 At or above the threshold value will  
5 demonstrate adequate response function implementation  
6 and, therefore, regulatory compliance. The NRC will  
7 monitor the performance objectives and metrics to  
8 ensure that licensees are maintaining adequate  
9 emergency planning and preparedness. NRC will assess  
10 the performance of the licensee and review the ability  
11 of the licensee to take corrective actions in a timely  
12 manner.

13 MEMBER HALNON: Eric, this is Greg Halnon.  
14 I just wanted to harp on this just for a second. I  
15 realize that you guys are still working through the  
16 process of getting the overall framework set up and  
17 discussing it internally. Do you guys have in your  
18 mind a set of objectives and/or criteria for this  
19 oversight that transcends all technologies such that  
20 there is sort of a base level of inspection and  
21 oversight that you'll be doing the same on all  
22 technologies and then banking off to the individual  
23 technology specific attributes as well?

24 MR. SCHRADER: What we need to keep in  
25 mind is what we are attempting to do here in this

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1 performance-based reg guide and rule is to define the  
2 what of the regulation and leave the how to the  
3 licensee and the applicant so they will be objectives  
4 that will correspond to each one of the response  
5 functions.

6 The specifics of what those objectives  
7 will be will be based on that technology and how that  
8 license is constructed and what the licensee comes up  
9 with, but it won't change the fact that they will have  
10 to have a set of objectives that meet each one of the  
11 response functions

12 MEMBER HALNON: Okay. I understand that.  
13 I guess there will be some criticism relative to  
14 telling the licensee how do you want us to look at you  
15 and let them serve that up without at least some NRC  
16 oversight that independently determines what you are  
17 going to be looking at.

18 This is why probably down the road the  
19 ACRS will be reviewing the results of your process and  
20 looking at it, either the Plant Ops Committee or maybe  
21 a combined future design committee. We're interested  
22 in how you come up with this. This is an interesting  
23 project that you'll be going through realizing that  
24 there's a large spectrum of different types of  
25 technologies you're trying to cover so it's relatively

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1 -- there's some generic and there's some very  
2 specific.

3 We will be interested in how you develop  
4 this since this is one of the first oversight type  
5 topics that's come up, at least for me, in the new  
6 plant design arena. You can move on. I think we  
7 understand where you're going with it. We'll just  
8 review this in the future as you get it ready to go.

9 MR. SCHRADER: Okay. This is a bit of a  
10 paradigm shift where we've gone from the luxury of  
11 knowing specifically what a design is and specifically  
12 what we need to see to demonstrate, or what we need  
13 for capabilities for an adequate EP.

14 Moving to this performance based and  
15 technology inclusive arena we don't have that luxury  
16 so we can only describe it in as much detail as we can  
17 the what of the regulation, what needs to be  
18 demonstrated, what needs to be accounted for. The how  
19 part of it we need to leave up to the licensee to be  
20 able to adapt and tailor those requirements to  
21 whatever their technology is.

22 MEMBER HALNON: I agree. We've got the  
23 luxury in the 0350 -- oh, my goodness, the ROP process  
24 of having very tried and true inspection procedures,  
25 objectives, and whatnot. Then you're raking over new

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1 ground here so I fully understand this is going to be  
2 evolving. That's why we're going to kind of provide  
3 some oversight on it as we go forward.

4 MEMBER BLEY: Greg, this is Dennis. Could  
5 I speak a word in here?

6 MEMBER HALNON: Absolutely, Dennis. Go  
7 ahead.

8 MEMBER BLEY: I think where some of us are  
9 kind of hanging up is the separation between the what  
10 and the how is a little bit in the eyes of the  
11 beholder. We're having some of the same discussions  
12 in the Part 53 work. For a lot of people -- let me  
13 turn it around.

14 A lot of people are looking for a little  
15 more specificity in the what, at least in the way we  
16 think about the what, to kind of put -- you say  
17 requirements but it's a little more specificity in the  
18 requirements for the what to give some confidence that  
19 important issues won't slip out of the picture.  
20 You'll hear more about that, I think, as we go on from  
21 other people.

22 MR. SCHRADER: All right.

23 MEMBER HALNON: Go on, Eric. Thank you.

24 MR. KAHLER: This is Bob Kahler. If I  
25 could have just one moment. I'm the branch chief of

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1 the Policy and Oversight Branch in NSIR. I think what  
2 we keep talking about is the what and the hows but the  
3 how is part of the regulation also. Not only does it  
4 say what do you have to have the performance  
5 objectives in as far as functions, but how you are  
6 going to meet them is also part of the description  
7 that's required in the emergency plan.

8 We will be reviewing it as part of the  
9 application process for us to see it. It's not as if  
10 it's a piece after the application is approved. It is  
11 part of the process so the description of the how to  
12 meet -- how the licensee will tell us they are meeting  
13 the compliance of the regulations is to be described  
14 in the emergency plan.

15 MEMBER BLEY: Yeah, this is Dennis again,  
16 Dennis Bley again. I think we all understand that and  
17 there are two pieces to this that raise some concerns.  
18 The one piece is thinking about the safety side and  
19 saying are we giving enough guidance so that no safety  
20 important things will be overlooked. Your response is  
21 not unreasonable. Well, we will review very carefully  
22 and make sure that's true.

23 The other side is bring-me-a-rock side  
24 from the applicant's point of view not quite knowing  
25 exactly what will meet the staff's interpretation of

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1 whether we have a plan that will meet the  
2 requirements. This rulemaking is also in Part 53 and  
3 other places now.

4 MR. KAHLER: But that -- just to  
5 reclarify, that was part of Eric's presentation. That  
6 is what the guidance is that we'll be working on for  
7 the next two years is to provide to the applicants  
8 what it is we plan -- what it is we expect to see in  
9 their how and what would be acceptable to us and that  
10 is going to be part of that guidance that is going to  
11 be provided to them as we develop that over the next  
12 two years. It's not going to be a rock situation.  
13 We'll provide them what our expectations are for the  
14 how piece.

15 MEMBER BLEY: Okay. We'll look forward to  
16 that. I guess the same issue we have here and in Part  
17 53 is having a rule come out before guidance is  
18 available leaves a lot of these open questions for  
19 many different kinds of people.

20 MR. KAHLER: Understood. We did have an  
21 attempt early on to put something like this together  
22 but it was seen at that time that it was something  
23 that was a lot due to the complexity of the rule as it  
24 is that we wanted to tackle that later in the process,  
25 not as part of the rulemaking at this very time since

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1 we are also developing guidance for the rule itself to  
2 develop the oversight guidance knowing the time frame  
3 of when the final rule would be going to commission  
4 and all.

5 We felt like we had opportunity following  
6 the rule going to the Commission that we could work on  
7 the oversight piece. I understand your concerns and,  
8 yes, we will be looking forward to providing you how  
9 we're doing with that oversight process as we're  
10 putting the guidance together in the next several  
11 years.

12 MEMBER BLEY: Okay. This discussion  
13 helped me. I hope it helps others. I guess this  
14 trade-off between specificity and flexibility is one  
15 we haven't quite had to deal with until we're trying  
16 to do these kinds of rules.

17 MR. KAHLER: Agree, yes.

18 MEMBER HALNON: Thanks, Bob and Dennis.  
19 Just one more attribute yet, Dennis you mentioned the  
20 two things. I would add a third one, that's the  
21 predictability of inspections, and not having a unique  
22 inspection criterion for each different plant or  
23 technology. As little as possible anyway.

24 We do need to consider the inspectors who  
25 have to be trained up on the specific technologies and

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1 inspection criteria too. So, that would be a third  
2 aspect of it.

3 So Eric, I'm going to hand it back to you  
4 and let you continue on.

5 MR. SCHRADER: All right. The rule does  
6 not specify a required frequency for drill and  
7 exercise. An applicant's proposed exercise frequency  
8 will have to afford sufficient opportunities for  
9 emergency response organization members to develop,  
10 maintain, and demonstrate their required response  
11 functions.

12 There's also a part of the rule that  
13 discusses maintaining adequate staff to perform  
14 response functions. And this will help drive the  
15 exercise, the adequacy of a proposed frequency for  
16 drills and exercises.

17 They'll need to be -- ensure the fact that  
18 there's personnel that are available to perform each  
19 of the required response functions. And each of these  
20 -- each of these positions will need to have adequate  
21 depth to maintain the staffing of these areas.

22 And turnover of personnel as well as the  
23 depth of qualified personnel will also be a  
24 substantial contributor to an adequate drill and  
25 exercise determination. Next slide, please.

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1           The results of the analysis required by  
2 50.33(g) (2), determine a specific size distance for  
3 the EPZ. In 50.160(b) (3), emergency planning zone,  
4 requires an applicant to shape the actual EPZ boundary  
5 based on local and political physical and land  
6 characteristics.

7           A concept of ingestion pathway emergency  
8 planning zones was created in the 1970s. Since then,  
9 there have been significant improvements in the  
10 nation, and federal and state resources' capabilities  
11 to identify and remove biologically and radiologically  
12 contaminated goods or produce from the food chain.

13           These capabilities are not dependent upon  
14 preplanned actions for a specific area. Federal and  
15 state authorities frequently issue precautionary  
16 actions or implement quarantines or embargos for non-  
17 radiological contaminations of foods without a  
18 predetermined area.

19           Ingestion response planning requirements  
20 under 50.160(b) (4) provide the same capabilities and  
21 availability to identify and interdict contaminated  
22 food and water in the event of a radiological  
23 emergency as are required under existing AP  
24 regulations.

25           MEMBER HALNON: So Eric, I think we need

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1 to probably park here just for a second. I know that  
2 and just looking forward in your presentation, if you  
3 want to push this off to the guidance, we can.

4 But, one of our interests from after the  
5 subcommittee was in the selection of accidents, was  
6 the determining the EPZ boundary.

7 And then the other part was the  
8 development of the ingestion response planning. Which  
9 really comes down to just listing capabilities that  
10 are out there.

11 And relying on an ad hoc nature of post-  
12 accident, developing rules and -- not rules, but  
13 communications and what not.

14 So, I guess when do you want to deal with  
15 those questions that we want to get through?

16 Do you want to do that now? Or do you  
17 want to do that at the --

18 MR. SCHRADER: The accident selection I'd  
19 rather have Michelle talk to, and the guidance part.

20 MEMBER HALNON: Okay.

21 MR. SCHRADER: And as far as the ad hoc  
22 response that you're describing, I'd like too just, if  
23 we could hold onto that thought for just a couple more  
24 slides, I could -- I'll delve a little more into that.

25 MEMBER HALNON: Okay. Well, why don't you

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1 go on. And then let's -- one or both of us stop  
2 ourselves and discuss those areas when we get to them.

3 MR. SCHRADER: Okay. That would be  
4 great.

5 Planning activities for those required,  
6 facets of an EP program that do not easily lend  
7 themselves to the quantitative evaluation of  
8 performance planning activities described in Section  
9 50.160(b)(1)(iv)(a)(1)-(6) are applicable to  
10 applicants and licensees regardless of the EPZ size.

11 These include public information,  
12 coordination with licensees' safeguards contingency  
13 plan, communications with the NRC, emergency facility  
14 or facilities, site familiarization training, and  
15 emergency plan maintenance.

16 Offsite planning activities that are  
17 contained in 50.160(b)(1)(iv)(b)(1)-(9) and are  
18 additional requirements applicable to applicants and  
19 licensees with an EPZ that extends beyond the site  
20 boundary, that not all licensees would be subject to  
21 both onsite and offsite planning requirements under  
22 the rule. The NRC is not eliminating offsite EP with  
23 this rulemaking.

24 State and local comprehensive all-hazard  
25 emergency plans are tested by real events almost daily

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1 across the United States. The hazards that prompt the  
2 implementation of these response actions are sometimes  
3 immediately dangerous to life and health.

4 The responses are frequently ad hoc, they  
5 save lives, and additionally, communities can still  
6 develop and maintain radiological response  
7 capabilities without an NRC requirement for a formal  
8 offsite emergency response planning zone.

9 The NRC has confidence in the ability of  
10 OROs to implement their appropriate response actions,  
11 when necessary, using a comprehensive all-hazards  
12 emergency planning approach.

13 Offsite response organization general  
14 emergency response capabilities are not unique to  
15 their radiological emergency response. The NRC has  
16 confidence as -- the NRC's confidence, as expressed in  
17 the NRC regulations in 50.47(c)(1)(iii) and further  
18 strengthened by the NRC's recognition of a national  
19 level effort, the national incident management system,  
20 national preparedness goal, core capabilities,  
21 national preparedness system, and national planning  
22 frameworks, in which the NRC participates to improve  
23 state and emergency local planning at all levels of  
24 government and within the whole community.

25 Consequently, for SMRs and ONTs without a

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1 plume exposure pathway or plume -- without an EPZ or  
2 an APZ at the site boundary, there is reasonable  
3 assurance that appropriate responses -- response  
4 actions can and will be taken in the event of a  
5 radiological emergency without the need for regulatory  
6 standards for offsite regulatory emergency response  
7 plans and its associated FEMA findings and  
8 determinations that offsite plans are adequate and can  
9 be implemented.

10 MEMBER HALNON: So Eric, I think this is  
11 the one place that we're going to stop. Because that  
12 -- you just mentioned that the NRC has confidence in  
13 the local hazards plan.

14 How do you get that confidence that, you  
15 know, Community X is ready to have a nuclear plant,  
16 even with the EPZ less than the site boundary?

17 You still have a tremendous amount of  
18 offsite requirements. Fire departments, law  
19 enforcement, medical facilities.

20 You have communications requirements, just  
21 general information requirements, understanding you  
22 don't have to have maybe evacuations and other things  
23 that are more traditionally in an offsite response  
24 organization plan.

25 But, the all-hazards plans that do have a

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1 radiological annex that needs to be reviewed and  
2 ensure that it's adequate for -- for potential issues  
3 that may come up.

4 So, how does the NRC gain that confidence  
5 when FEMA is not required to review it when it's  
6 exempted, when it's the EPZ's less than the site  
7 boundary?

8 MR. SCHRADER: The comprehensive all-  
9 hazards planning is based on core capabilities and the  
10 ability to have those assets available.

11 Regardless of what the hazard is, the  
12 types or capabilities remain the same. Every -- as I  
13 stated earlier, a --

14 MEMBER KIRCHNER: Excuse me. This is Walt  
15 Kirchner. Greg, could I -- could I -- first, I  
16 apologize, I missed the subcommittee meeting, and I  
17 would have raised this question then.

18 But Eric, along the lines of what Greg was  
19 exploring, there are, you know, EP in general is based  
20 on radiological dose and ingestion pathways.

21 But, we have -- we will see now  
22 technologies that have other potential accident  
23 scenarios that -- I'm choosing my words carefully  
24 here. That would involve potentially, potential  
25 release of toxic materials and/or fire hazards that

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1 are well beyond just the radiological consequences.

2 How are you going to approach this? And  
3 given that you want to be technology inclusive, there  
4 are hazards that go beyond the radiological  
5 potentially. And these could prove very challenging  
6 to say local authorities and such.

7 And there's an analogy and experience now  
8 with lithium batteries in electric cars where fire  
9 departments are just ill prepared to deal with that  
10 technology should there be an accident and an ensuing  
11 fire.

12 So, how -- how are you going to approach  
13 this as part of the EP rulemaking? Because the  
14 hazards that might arise are way beyond perhaps most  
15 local authorities' capabilities and such.

16 Would that be part of your review for the  
17 EP determination?

18 MR. SCHRADER: Well, we have two questions  
19 here. Should I take them in the order that I received  
20 them? Or --

21 MEMBER HALNON: Go ahead and deal with  
22 Walt's issue right now.

23 MR. SCHRADER: All right. Walt's question  
24 will be dealt with under the hazard analysis. And it  
25 will be a graded approach to potential negative impact

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1 on a licensee's ability to implement its emergency  
2 plan, posed by whatever the hazard the facility  
3 located on or near the nuclear facility site is.

4 So, just as you said, depending on what  
5 other facility maybe co-located, it might be adjacent  
6 to, that could impact it and create some new hazard  
7 that would potentially negatively impact the ability  
8 -- either the operation of the licensed facility, or  
9 its ability to implement its emergency plan, would be  
10 dealt with in that arena.

11 And the --

12 MEMBER KIRCHNER: No Eric. I'm talking  
13 about the technology --

14 (Simultaneous speaking.)

15 MR. SCHRADER: Okay. Can I -- would you  
16 please take --

17 MEMBER KIRCHNER: Okay.

18 MR. SCHRADER: Mr. Kirchner, would you  
19 please allow me to finish my answer --

20 MEMBER KIRCHNER: Sure.

21 MR. SCHRADER: Before you -- before you  
22 cut me off.

23 MEMBER KIRCHNER: I'm not cutting you off.  
24 I'm hearing you out. Thank you.

25 MR. SCHRADER: So, that once you have that

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1 characterization of what those responses could be,  
2 what those potential hazards are, they'll have to put  
3 in aspects to their emergency plan that will deal with  
4 those.

5 Part of those may be a new accident  
6 selection criterion. And then that accident selection  
7 criteria would have to deal with whether or not  
8 there's the EPZ may -- or the EPZ boundary maybe  
9 extended or not.

10 As far as what you're -- what to do with  
11 a hazard that is not radiological, I don't think that  
12 that's necessarily any different than what we do now  
13 with a -- with an industrial hazard.

14 You have a site that has a large amount of  
15 ammonia, and if you have an ammonia leak, that's a  
16 very strong hazard. But, we don't require the  
17 licensee to ensure the fact that the offsite has  
18 resources enough to respond to that specific chlorine  
19 or ammonia leak.

20 But, the all-hazards, comprehensive all-  
21 hazards planning has, as one of their capabilities, or  
22 core capabilities and their capabilities based  
23 response to look at what hazards are avail -- what  
24 hazards are in that area, what's the likelihood of  
25 those hazards, and then what's the potential damage

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1 from those hazards.

2 And then determine through that process,  
3 which ones need to be -- have specific planning and  
4 procedures dedicated to them.

5 Does that answer your question?

6 MEMBER KIRCHNER: Perhaps I didn't pose my  
7 question very well. I'm concerned about technologies,  
8 nuclear technologies that have additional hazards to  
9 consider beyond a radiological dose.

10 For example, there are technologies being  
11 proposed that use highly toxic coolants. So that the  
12 release of the coolant maybe a danger or hazard that  
13 exceeds that of the radiological component.

14 There are other designs that will use  
15 coolants that are flammable, which adds a degree of  
16 complexity to the accident analysis and such.

17 So, where I was going with it, this Eric,  
18 was that it may require in the review, additional  
19 hazard analysis and capabilities that would affect  
20 either the size of the EPZ and/or the requirements of  
21 -- on the local community, where the technology is  
22 sited.

23 And I -- so, in a general way I was just  
24 trying to explore how this would factor into your  
25 decisions on what the -- say from a radiological

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1 consideration the EPZ is within the site boundary.  
2 But, from the toxicity standpoint, it exceeds the site  
3 boundary.

4 Do you see where I'm going with this?

5 MR. SCHRADER: Right.

6 MR. SMITH: Right. Eric, this is Todd  
7 Smith, hi. Senior Level Advisor for Emergency  
8 Preparedness and Response. Yeah, great questions.  
9 And just to address a couple of them.

10 One, for the non-radiological hazards, the  
11 emergency plan will address that as well. For  
12 example, fuel fabrication facilities have uranium  
13 hexafluoride to deal with.

14 And in fact, that is the bigger concern in  
15 an emergency for those facilities, over the  
16 radiological. And as such, those types of non-  
17 radiological hazards is part of the all-hazards  
18 planning that communities are prepared to deal with.

19 In regard to our confidence in all-hazards  
20 planning, you know, as Eric said, the licensee is part  
21 of the whole community. And within the United States,  
22 our national preparedness is a goal for everyone.

23 And FEMA reports to Congress every year on  
24 the state of our national preparedness. So, we  
25 understand the level of preparedness in our

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1 communities.

2 We also see these capabilities  
3 demonstrated all the time. Particularly for  
4 interdiction of foodstuffs and water.

5 And in fact, the NRC performed a study on  
6 offsite response capabilities even outside of  
7 emergency planning zones to be able to interdict food  
8 and water. And we documented that in NUREG/CR-7248,  
9 which was published in 2018.

10 So, we have a lot of evidence that went  
11 into this rule of why we have the confidence in these  
12 capabilities. And what we're doing here is supporting  
13 again, that all-hazards planning with another  
14 framework that fits into those capabilities base  
15 response.

16 MEMBER HALNON: So Walt, let me jump in.  
17 Todd, how does that get reviewed if the EPZ is within  
18 the site boundary and FEMA is excluded from the review  
19 of the emergency plan?

20 MR. SMITH: Thank you. The key is that  
21 emergency preparedness is more than an emergency  
22 planning zone.

23 So, the EPZ, that's a planning tool, which  
24 is related directly to the radiological hazard. When  
25 would we need to implement a prompt predetermined

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1 action?

2 The rest of emergency preparedness is  
3 about those capabilities. Which gets reviewed and  
4 this -- we have the findings on that before a licensee  
5 gets -- before we issue a license, and then we inspect  
6 that over the life of the facility.

7 MEMBER HALNON: Well, it was my  
8 understanding that 50.47(f) exempts and does not  
9 require a FEMA review to get a finding of adequacy if  
10 the EPZ is within the site boundary.

11 That's the new -- that's the new change  
12 that we're concerned about.

13 MR. SMITH: So, the partnership that we  
14 have with FEMA, which is also stated in a Memorandum  
15 of Understanding between our agencies, yes, FEMA will  
16 review the preparedness of offsites, according to the  
17 standards that the NRC has proposed for the site.

18 So, many facilities that we license do not  
19 have emergency planning zones for their emergency plan  
20 or offsite EPZs. And in those cases, we do not  
21 require FEMA's assistance in providing the evaluations  
22 of the plans.

23 In all cases, the NRC will perform a  
24 review of the emergency plan, and make a final  
25 determination and finding.

1                   MEMBER HALNON:   It's not the emergency  
2 plan I'm concerned about.  It's the all-hazards plan  
3 for the local communities, whether or not they're  
4 capable, ready, and ready to go.

5                   And we've seen at least one event that,  
6 granted it was many, many years ago, at Reed College  
7 back in '92, or somewhere around that time frame,  
8 where nobody was ready.

9                   And a lot of lessons learned.  It seems  
10 like we're going backwards on this one by exempting a  
11 FEMA review when the site boundary is less than -- I  
12 mean, the EPZ is less than the site boundary.

13                   So, we can move on.  That's just a place  
14 that we're going to deviate a little bit as we go  
15 forward.

16                   I think we'll get more information on that  
17 down in the presentation.  So, I --

18                   MR. TAYLOR:  Well, this is Bob Taylor  
19 again from Policy and Oversight Branch, Branch Chief.  
20 I'd just like to reiterate what we've been stating.

21                   This is for a radiological emergency  
22 preparedness and when FEMA's involvement is -- for  
23 consultation is required in order to review the  
24 radiological emergency preparedness offsite.

25                   You're talking about a different area, a

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1 different area within FEMA, the all-hazards planning  
2 and different review levels that they can go about  
3 performing.

4 But, we're talking about a requirement for  
5 a radiological emergency planning offsite. And we're  
6 saying that for a site that does not exceed one rem  
7 offsite in 96 hours, or when immediate protective  
8 actions are warranted, there's no need to have  
9 radiological emergency preparedness planning offsite.

10 But, for these type topics you're talking  
11 about, it's all-hazards planning in which FEMA goes  
12 about and does their business all the time for  
13 industrial facilities. And we have confidence in  
14 FEMA's capabilities to do that as they do with every  
15 community for every type of industrial facility and  
16 other technological hazards that are out there.

17 But, that's beyond the purview of the  
18 rulemaking and of radiological emergency planning.  
19 And when we're discussing this, we need to maintain  
20 the focus of what the -- of what the rule is  
21 accomplishing in providing dose savings to the public  
22 from a radiological event at the plant.

23 So, that -- I just felt that I needed to  
24 provide that bit as we're going around talking about  
25 different hazards at the site having an impact offsite

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1 with no EPZ.

2 And Todd stated it well in stating that an  
3 EPZ is a planning tool for a radiological emergency  
4 preparedness. And we don't want to tie the two  
5 together for the all-hazards planning and the EPZ and  
6 other hazards that are -- that may or may not exist at  
7 the plant.

8 MEMBER HALNON: Okay. Thanks Bob. And  
9 I'm going too just -- I'll call on Dennis in just a  
10 second, he's got his hand up.

11 But, I just wanted to just ask this one  
12 question then. Then why 50.47(f) then?

13 I mean, why -- why do you exempt FEMA  
14 review if in fact no review would be required, at  
15 least as a communication tool to let FEMA know that  
16 there's a nuclear plant within their community that  
17 wasn't there before?

18 MR. SCHRADER: Can you state -- I'm not  
19 certain I understood your question. Why -- why --

20 MEMBER HALNON: Why are you -- you are not  
21 sending the -- or asking FEMA for review of the plant?

22 If there's no radiological response  
23 required, let them tell you that. And let them tell  
24 you that the --

25 MR. SCHRADER: Because that's our job.

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1 That's our statutory responsibility and our authority  
2 to determine that.

3 It's not up to FEMA to tell us what's  
4 required. It's up to us to make that determination  
5 and then ask FEMA to go out and do an evaluation on  
6 what we've determined to be appropriate.

7 MEMBER HALNON: Okay. Dennis, did you  
8 want to jump in?

9 MEMBER BLEY: Yeah. Just a quick thing.  
10 And maybe the staff will get a hint from this.

11 The questions you're getting from us,  
12 others from other areas of the public and stakeholders  
13 have raised similar things.

14 And you might consider that perhaps the  
15 language you have in there allows those of us who  
16 aren't writing the rule to misinterpret what you  
17 intended.

18 And maybe a little clarification would  
19 help get rid of some of the issues that you're hearing  
20 from us right now. And that I think you'll hear from  
21 other people as well. That's all.

22 MEMBER HALNON: Okay, Eric. Why don't you  
23 move on?

24 MR. SCHRADER: All right. Next slide,  
25 please. Planning activities, we went over this one.

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1 So, next slide.

2 Okay. Hazard analysis. The NRC also  
3 considers its graded approach to EP, the potential  
4 negative impact on a licensee's ability to implement  
5 its emergency plan posed by a hazard at a facility  
6 located on or near the facility's site.

7 The potential impact of a hazard may  
8 require additional EP considerations, preparations, or  
9 arrangements that would have to be -- that would  
10 otherwise not be needed in the absence of the  
11 facility.

12 Consideration of credible hazards includes  
13 events at the contiguous or nearby facility that would  
14 lead to an emergency response at the SMR or ONT  
15 facility, or negatively impact the implementation of  
16 their response by them.

17 It may be appropriate for SMRs and ONTs  
18 with contiguous or nearby facilities to consider a  
19 quantitative or qualitative assessment of postulated  
20 accident scenarios at these facilities. The  
21 applicant's or licensee's EP program must reflect  
22 these hazards and planning activities needed to  
23 address them in their emergency response plans.

24 For example, notifying contiguous or  
25 nearby facilities of an emergency at the nuclear

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1 facility, classifying a hazard from a nearby facility  
2 impacting the safe operation of the nuclear facility,  
3 providing protective actions for onsite or offsite  
4 personnel, and recommending protective actions for  
5 nearby facility personnel. Next slide, please.

6 All right, hopefully this will scratch the  
7 itch of a lot of what is transpired in the last couple  
8 of slides.

9 Presidential Policy Directive 8, PPD-8,  
10 National Preparedness, it's a planning framework that  
11 consists of five areas, prevention, protection,  
12 mitigation, response, and recovery.

13 In each area, it's supported by an  
14 incident specific annex. And the response and  
15 recovery area is the nuclear radiological incident  
16 annex.

17 Each annex describes a specific response  
18 action and resources available as part of the nuclear  
19 response annex as the DOE, National Nuclear Security  
20 Administration, Federal Radiological Monitoring and  
21 Assessment Center, the FRMAC. Next slide.

22 So, when you look at this slide, you can  
23 see all of the FRMAC response capabilities. And how  
24 they're -- the time frames that they can mobilize and  
25 be onsite.

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1           They produce a myriad of support for any  
2 type of decision maker. As you start at the top  
3 there, the radiological assistance program, the  
4 program team on scene, it can be on scene within six  
5 hours.

6           The RAP team is a first response team. It  
7 assesses the emergency situation, it advises decision  
8 makers as to what steps could be taken to evaluate and  
9 minimize the hazards of the event.

10          Team support ranges from advice by phone  
11 to sending skilled, professional personnel and  
12 equipment to the scene to help evaluate, assess,  
13 advise, isotopically identify, search for, and assist  
14 in the mitigation of actual or perceived radiological  
15 hazards and risks to workers, the public, and the  
16 environment.

17          The DOE and NNSA implements RAP on a  
18 regional basis. There are nine geographical regions  
19 with a minimum of three RAP teams per region. A RAP  
20 team can be expected on scene within six hours.

21          There's a Consequence Management Home  
22 Team. The Consequence Management Home Team is a  
23 virtual extension of the FRMAC. It operates in  
24 preparation for the Consequence Management Response  
25 Team arrival and coordination with the deployed FRMAC

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1 assets.

2 The home team is on call 24/7, 365. It  
3 can respond within one hour during normal business  
4 hours, and within two hours after hours.

5 The same data and products and technical  
6 assistance are available from the Home Team as from  
7 the FRMAC response. And includes interpretations of  
8 measurements, protective action recommendations,  
9 calculations of derived response levels, worker turn-  
10 back limits and stay times.

11 When a Management Response Team, a  
12 Consequence Management Response Team is onsite, it's  
13 a 25-member team with 3,500 pounds of equipment ready  
14 to deploy within four hours of notification.

15 The team augments the RAP team and  
16 includes expertise in radiation monitoring, sampling,  
17 analysis, assessment, safety, health, support with --  
18 support and logistical functions.

19 It's designated for the quick response and  
20 rapid radiological data collection and assessment to  
21 provide early health affects information and timely  
22 characterization of a radiological situation to  
23 officials responsible for making and implementing  
24 protective actions.

25 In addition, the response team has the

1 capability to provide escort services for emergency  
2 workers entering a potentially contaminated area, for  
3 lifesaving or forensic operations.

4 Phase two of the response teams available  
5 in less than 12 hours of active -- within less than 12  
6 hours from activation, provides additional personnel  
7 and equipment. If needed, NNSA can request additional  
8 DOE and National Laboratory trained professionals, as  
9 well as additional personnel and equipment to augment  
10 and assist in operations.

11 A REACTS team is also an aspect that can  
12 be activated. It can activate within one hour and be  
13 onsite within 12 hours.

14 It's a -- the REACTS team is a world-  
15 renowned specialized medical team consisting of  
16 physicians and nurses, paramedics, and health  
17 physicists to educate, advise, consult on medical  
18 aspects of ionized radiation illness and injuries.  
19 It's deployable 24/7, 365.

20 All of these aspects are available, as you  
21 can see, within a matter of hours of being requested.  
22 They also can --

23 MEMBER HALNON: Could you -- could you  
24 walk through just how that gets requested? I mean,  
25 starting in the control room when there is an accident

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1 occurring.

2 How does that all get activated? It's  
3 really good stuff. I just wanted to know what the  
4 process was to get it activated.

5 MR. SCHRADER: Okay.

6 MEMBER HALNON: Put a context around those  
7 times you were talking about.

8 MR. SCHRADER: They would be -- they  
9 wouldn't be part of the licensee. This is all -- this  
10 is all for the offsite.

11 So, the licensee would notify the offsite  
12 of an event that would be affecting the offsite that  
13 would need to have some type of special response.

14 So, at this point we're in a situation  
15 where the EPZ is -- extends beyond the site boundary.  
16 So, once the --

17 MEMBER HALNON: So those would not be  
18 available for people for --

19 MR. SCHRADER: Oh, absolutely. This is  
20 available for any offsite response organization,  
21 regardless of what the type of event is.

22 It could be a spent fuel spill on a  
23 highway. It could be a resin spill. It could be any  
24 number of different, IEDs, dirty bombs, any type of  
25 radiological event, this is available to.

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1           It also includes any type of radiological  
2 power plant type of response. So, regardless of what  
3 it is, the offsite just has to contact the FRMAC and  
4 request the services.

5           This is --

6           (Simultaneous speaking.)

7           MEMBER HALNON: Which means they need --

8           MR. SCHRADER: This is --

9           MEMBER HALNON: They need to know about  
10 the accident onsite, even if it's within the EPZ then.

11          MR. SCHRADER: Well, they would have to be  
12 aware of some need for it, yes. If that's what you  
13 mean.

14          MEMBER HALNON: Yeah. Well, I guess it  
15 gets back question is, how do they know if there's no  
16 requirements for offsite planning, if the EPZ is --

17          MR. SCHRADER: I think we --

18          MEMBER HALNON: We don't need to go back  
19 through it again. But, that's just -- it adds to that  
20 same thing that Dennis was saying, that relative to  
21 the clarity of --

22          MR. SCHRADER: Regardless of -- if we go  
23 back and we look again at the requirements, the  
24 response functions, and the planning activities,  
25 you'll see in both sets, there are communication

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1 requirements with the offsite, regardless of whether  
2 there is an EPZ at the site boundary or not.

3 There is still a requirement to be able to  
4 deal with those offsite response functions that would  
5 be needed regardless, such as fire, EMS, police, any  
6 of those first responders, or any other type of  
7 response that would be needed because of some  
8 specialty event onsite.

9 So, those communication pathways still  
10 need to be, to remain open. The drill and exercise  
11 program still needs to include each one of those first  
12 responder type agencies.

13 So, it's not like when you say that  
14 there's a site boundary EPZ you are now completely  
15 devoid of any type of conversation or communication  
16 offsite. That's not the case.

17 It's just a matter of whether or not the  
18 EPZ extends beyond the site boundary. And whether or  
19 not within that EPZ there is a requirement for prompt  
20 protective measures.

21 If there is not a requirement for prompt  
22 protective measures because of the time frame of the  
23 accident progression or some other aspect, some other  
24 timing aspect at which the delay for the need of the  
25 protective measures is longer than what the -- what it

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1 would take for the offsite response organization to  
2 implement a protective measure, then there's no  
3 requirement for that planning tool, that emergency  
4 preparedness zone.

5 MEMBER HALNON: Okay. Go on. We're  
6 running a little bit behind schedule. So, let's --  
7 let's move through it.

8 MR. SCHRADER: Okay.

9 MEMBER HALNON: It's not your fault. It's  
10 my fault, so go ahead.

11 MR. SCHRADER: Next slide, please. Public  
12 comments, this was one of the -- one of the questions  
13 asked by the ACRS.

14 FEMA indicated that they supported a  
15 revised EP regulatory framework for SMRs and ONTs.  
16 However, opposed the potential for a site boundary EPZ  
17 and reliance on the all-hazards approach for the  
18 offsite response.

19 We responded to the proposed rule that  
20 offered the same level of protection and current  
21 regulatory framework that dose consequences to the  
22 public would be similar and therefore human health  
23 impacts would be similar.

24 And that as we've gone over numerous times  
25 here, the actions that would be needed to respond to

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1 a radiological emergency are not unique to the  
2 offsite.

3 If you need to evacuate personnel, it  
4 wouldn't be any different than if you were in some  
5 area that had no radiological offsite formal training,  
6 but had a wild fire or something approaching the  
7 community.

8 That community, the people that are in  
9 these OROs, these offsite response organizations,  
10 these professional emergency management agency  
11 directors and manager and that, are a very well  
12 skilled, very high competent group of people.

13 And they can figure out how to evacuate a  
14 designated portion of their population ahead of  
15 whatever the hazard is. We've seen this in wildfire  
16 events. We've seen this in hurricane coming ashore.  
17 We've seen it in tankers derailing and having some  
18 sort of life threatening ammonia or some type of  
19 chlorine gas or something like that.

20 These are very competent, very  
21 professional people. And they know what they're  
22 doing.

23 And it's really a bit of -- it's really  
24 kind of disrespectful to say that because they don't  
25 have a radiological offsite emergency response plan

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1 that they can't do any of these things. That they are  
2 -- that is well within their -- their charter and  
3 their expectations to perform.

4 FEMA also argued that the rule does not  
5 take into account consideration of a full spectrum of  
6 events. Threats that are beyond potential design  
7 basis accidents for SMRs.

8 But, in fact the license applications must  
9 include licensing basis events, and the required  
10 analysis to contain the spectrum of accidents that are  
11 considered for the facility's emergency response plan.  
12 And these include beyond design basis events and their  
13 licensing basis accidents.

14 Additionally, EP requires the knowledge of  
15 the potential dose consequences and accident timings  
16 of the radiologic -- potential radiological releases.  
17 The DOE --

18 MEMBER HALNON: Yeah Eric. It's just --  
19 I just need to respond to one thing. You know, the  
20 50.47 FEMA finding is a determination that the state  
21 and local emergency plans are adequate. Not  
22 radiological emergency plans, but emergency plans.

23 So, I acknowledge the fact that the  
24 emergency plans have been able to handle those other  
25 hazards well. I won't dispute that.

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1           But, I also want to respect the unique  
2 nature of a nuclear hazard that is not like a  
3 wildfire. So, we can move on.

4           Let's go on. And you don't need to have  
5 to respond to that. But that's just where my head's  
6 at.

7           So, go on.

8           MR. SCHRADER: DOE is actually, they  
9 submitted three sets of comments. Two in favor of,  
10 and one that challenged the rule.

11           But, the third submission basically went  
12 point by point in a second submission that challenged  
13 the rule, and refuted each of those comments  
14 submitted.

15           Basically, they were along the same -- the  
16 ones in -- the ones within the DOE response followed  
17 much of the same theme as FEMA's concerns.

18           So, the same responses that you'll see in  
19 the comment response document with the rule. You can  
20 see the details of how they were responded to. Next  
21 slide, please.

22           Significant changes to the proposed rule.  
23 The EPZ size determination in the proposed rule was  
24 defined as a single criterion. That area projected to  
25 exceed 10 millisieverts and one rem total effective

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1 dose over 96 hours.

2 We received a number of public comments  
3 that questioned the adequacy of just one criteria.  
4 And asked for additional detail on that.

5 We then revised the rule and added to it  
6 additional detail that talks to the requirements of a  
7 list of accident likelihood's source term, timing of  
8 accident sequences, meteorology as major  
9 considerations to be included in the radiological  
10 consequence analysis used in the determination of the  
11 EPZ size.

12 We also added a second criterion that  
13 talked to the determination that the need for prompt  
14 protective measures was necessary. Revisions to  
15 50.160(b)(3) included the idea that there was a  
16 potential that the -- given the new criteria in  
17 50.33(g)(2), that there could be no EPZ at all, if the  
18 criteria, one or both criteria were not met.

19 So, the staff recognized this and added a  
20 criterion, an entry criteria to 50.160(b)(3) saying  
21 that for those applicants and licensees with an EPZ,  
22 that they would need to incorporate the boundaries and  
23 describe a physical description of the EPZ within  
24 their emergency planning zone.

25 Timeliness for initial exercise, the

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1 initial proposed rule stated that it needed to be done  
2 no later than 18 months before the issuance of a COL  
3 or for -- I'm sorry, issuance of an operating license,  
4 or the initial fuel load date for a combined operating  
5 license.

6 They received public comment that the  
7 timeline was not appropriate. And as a result,  
8 revised the draft rule to allow greater flexibility  
9 and revising the requirements for that drill to be no  
10 later than -- from no later than 18 months before to  
11 within two years before an initial fuel load or an  
12 operating license. Next slide, please.

13 The definition of small modular reactor  
14 was revised to include a per-module discussion. And  
15 that makes it in alignment with the definition in  
16 52.1, which is the -- which is where the initial  
17 definition of small modular reactor from this 50.160  
18 rule came from.

19 We revised 72.32(c), the independent fuel  
20 storage installation, ISFSI, to include the -- a plan  
21 meeting the requirements of 50.160. Currently it says  
22 the plans meeting the EP requirements of only 50.47(b)  
23 would also meet the requirements for 50.32 -- I'm  
24 sorry, 72.32. So, that was revised to say 50.47  
25 and/or 51 -- or 50.160.

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1           We revised the section for 50.160(b)  
2 language describing initial issuance of an operating  
3 license. Initially it said we would not issue an  
4 operating license to a licensee.

5           That actually didn't make a lot of sense.  
6 So, it was revised to say an operating license, an  
7 initial operating license would not be issued to an  
8 applicant. Next slide, please.

9           We added -- we just discussed this  
10 earlier, 50.47 denotes the application complying with  
11 50.160. And when paragraphs (a)(2), (b) and (c)(2) of  
12 50.47 applied -- do not apply to offsite radiological  
13 emergency response plans.

14           Which is when an offsite emergency plan is  
15 not required to meet 50.47(b) or if the plume exposure  
16 pathway does not extend beyond the site boundary.

17           We revised the reporting requirements  
18 under the radiological assessment aspect of the  
19 radiological response functions from -- to be more  
20 applicable to those groups that are actually needed to  
21 have the information as opposed to the whole operating  
22 reactor.

23           So, it was revised to say, language or the  
24 information would be reported to the applicable  
25 response personnel.

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1           We revised 50.160(b)(1)(iv)(B)(4) to  
2           require an ETE. And that ETE would be to include the  
3           area within the site boundary. As the original  
4           description of the ETE could be interpreted to not  
5           need to include the area within the site boundary.  
6           Next slide.

7           We clarified in Section 50.33(g)(2),  
8           inclusion of tribal governments. The staff clarified  
9           that the applicant complying with 50.160 would need to  
10          submit an emergency plan for a participating tribal  
11          government.

12          A participating tribal government means a  
13          federally recognized tribal government that has  
14          decided to participate in FEMA's offsite radiological  
15          emergency preparedness program, and act as an  
16          independent entity with its own radiological emergency  
17          response plan.

18          This was added to address the public  
19          comment to ensure tribal government inclusion in the  
20          regulatory process for the NRC tribal policy.

21          That's all that I have.

22          MEMBER HALNON: Very good.

23          MR. SCHRADER: Additional questions?

24          Concerns for --

25          MEMBER HALNON: No, we'll move on. I

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1 think the next issue will focus in on the spectrum of  
2 accidents that we're going to be talking about down --  
3 down the road.

4 But, thank you, Eric. That, you know, was  
5 informative. I appreciate you weathering our  
6 questions and concerns.

7 And we were due for a break. But, I'm  
8 thinking that we'll just kind of push on through the  
9 draft REG Guide. And then we'll take a break in  
10 between the staff's presentation and the public.

11 So, go ahead.

12 MEMBER BIER: Greg?

13 MEMBER HALNON: Yes?

14 MEMBER BIER: I do have one question or  
15 comment that I would like to make, just following up  
16 on some of the earlier discussion about can we, and  
17 should we rely on the professional expertise of the  
18 local emergency responders?

19 And first of all, I agree that most of  
20 them are extremely well qualified. However, I don't  
21 know to what extent there are past experiences in non-  
22 nuclear disasters where the local community emergency  
23 responders were not well prepared and professional.

24 And that may not be sort of a legal  
25 responsibility of NRC to prepare for that. But, even

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1 if it is the fault of the local community organization  
2 to be prepared, it will still come back as a negative  
3 for the nuclear industry as a whole. If we end up in  
4 that situation.

5 So, that's just one comment.

6 MEMBER HALNON: Thank you, Vicki. I would  
7 refer people to Information Notice 92-79. And you'll  
8 get taste of what that would look like. That's the  
9 Reed College release in Portland, Oregon.

10 And granted, it's many, many, many years  
11 ago. And we've got a lot going for us now. But, that  
12 was a -- kind of the illustration of what Vicki was  
13 saying.

14 MR. SCHRADER: But, I don't know that  
15 that's necessarily a good example. I mean, no  
16 disrespect intended.

17 But, that Reed College incident started  
18 with the onsite. And the fact that the emergency  
19 preparedness program onsite was not well prepared to  
20 deal with it.

21 It really had nothing to do with the  
22 response of the offsite as much as it did the  
23 inability of the onsite emergency response plan to be  
24 implemented in the manner it was expected to be.

25 MEMBER HALNON: Yeah. I don't want to

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1 focus in on that event. I'm just saying that's an  
2 illustration of what ill-prepared license, either the  
3 licensee or offsite plans could look like. And the  
4 concerns the public would have with that.

5 So, I acknowledge your point there, Eric.  
6 Thanks.

7 MEMBER BIER: Well, and Hurricane Katrina  
8 was an example, where even after a major exercise,  
9 Hurricane Pam, the emergency response capability was  
10 still ill-prepared.

11 And obviously, I don't think any of the  
12 situations we're talking about are going to be of the  
13 magnitude of Hurricane Katrina.

14 But, you can have, you know, ill-prepared  
15 local agencies for whatever reasons, so.

16 MR. TAYLOR: And I think -- this is Bob  
17 Taylor again. I think Vicki, you pointed out, is the  
18 legal aspects of the statutory authority of the NRC  
19 and how much we can put into the regulation.

20 And also, based upon the technology and  
21 the extent of the dose offsite and what we're  
22 permitted to -- to provide for within our regulations.

23 So, that's where we're working with at  
24 this point.

25 MEMBER BIER: Yeah. I appreciate that.

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1                   MEMBER HALNON: Thank you. Let's move  
2 onto the draft Reg Guide.

3                   CHAIR SUNSERI: Yeah Greg, this is Matt.  
4 Just to be clear, we're close enough to lunch where I  
5 suggest we just push on through without a break. And  
6 then we'll just break at lunch.

7                   MEMBER HALNON: Okay. Thanks, Matt.

8                   MR. MURRAY: Okay. Good morning. I'm  
9 Charles Murray, and I'm an Emergency Preparedness  
10 Specialist in the Office of Nuclear Security and  
11 Incident Response. And I'll be covering the draft  
12 Regulatory Guide today.

13                   Reg Guide 1.242, the purposes of the Reg  
14 Guide is, identifies methods and procedures that the  
15 staff of the NRC considers acceptable for use by  
16 applicants and licensees for small modular reactors  
17 and non-light water reactors, non-power production  
18 utilization facilities to demonstrate compliance with  
19 performance-based emergency preparedness requirements.

20                   In the Title 10 Code of Federal  
21 Regulations, 10 CFR 50, domestic licensing of  
22 production and utilization facilities and 10 CFR  
23 50.160, the emergency preparedness for small modular  
24 reactors, non-light water reactors, non-power  
25 production or utilization facilities.

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1           And the applicability, again, it applies  
2           to the same there, the applicants for and holders of  
3           construction permits, early site permits, operating  
4           license, and combined license for the SMRs, non-light  
5           water reactors, and non-power production utilization  
6           facilities under the same provisions of 10 CFR Part  
7           50. Next slide, please.

8           Conforming changes to the Reg Guide, those  
9           were made based on changes that were made to the draft  
10          final rule language. And you heard some of those  
11          earlier examples in Eric's portion of the  
12          presentation.

13          We did include additional reference  
14          documents. Specifically Reg Guide 1.233 and revision  
15          two of NUREG-0654 to the Reg Guide.

16          We enhanced the guidance on accident  
17          likelihood source term timing of the accident sequence  
18          and meteorology. And we do have a slide, but we'll be  
19          talking about sort of the specifics of it a little  
20          later in the presentation.

21          We did add, also added the definition of  
22          safe conditions to the glossary. Next slide, please.

23          Appendix A, general methodology for  
24          establishing plume exposure pathway emergency planning  
25          zone size. This provides a general methodology

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1 acceptable to the NRC for the analysis for  
2 establishing a plume exposure pathway EPZ size.

3 And within Appendix A we did add Section  
4 A-3.1, which is event selection. Which discusses the  
5 applicant's consideration of accident likelihood.

6 And again, we do have a specific slide, a  
7 couple of slides down, where we go into a little more  
8 detail on the event selection process. Next slide,  
9 please.

10 Appendix B, development of source term  
11 information. This was provided in previous  
12 discussions with the ACRS. It was expanded.

13 The discussion on source terms by adding  
14 this Appendix, which is the development of information  
15 on source terms to Reg Guide 1.2.4.

16 This Appendix provides further clarifying  
17 guidance on the development of information on source  
18 terms and probabilistic risk assessment. Next slide,  
19 please.

20 Okay. This slide here, Appendix A-3.1,  
21 event selection. I'd like to turn the presentation  
22 over to Michelle Hart. Michelle?

23 MS. HART: Yes, thank you. This is  
24 Michelle Hart, I'm in NRR and I'm a reactor engineer  
25 of reviewing advanced reactors.

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1           In response to public comments and to  
2 provide more clarity in Appendix A, the staff expanded  
3 the discussion of event selection for what  
4 radiological release events should be used in a  
5 facility specific plume exposure pathway EPZ size  
6 justification analysis.

7           Because the rule is applicable to light  
8 water reactor SMRs and other new technologies, power  
9 and non-power reactors may be used in conjunction with  
10 new license applications under Part 50 or 52, the  
11 guidance in Appendix A of the Reg Guide, including  
12 that on event selection is given at a high level to be  
13 generally applicable to the different technologies and  
14 license application information.

15           The event selection should be carefully  
16 done to ensure that the radiological releases with  
17 large potential consequences that may affect the size  
18 of the EPZ are evaluated. Our concept is that the  
19 applicant should use the events evaluated in the  
20 license application safety analysis report as  
21 candidate radiological release scenarios for use in  
22 the EPZ size justification analysis.

23           Reg Guide 1.242 uses the term licensing  
24 basis events to mean the entire collection of event  
25 sequences considered in the design and licensing basis

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1 of the facility. Because of the range of technologies  
2 in licensing frameworks, the Reg Guide provides some  
3 examples of the events that may be included in the  
4 license application.

5 For example, light water reactor SMRs may  
6 have design basis accidents and severe accidents,  
7 which we would expect them to use in the EPZ size  
8 analysis as candidate scenarios.

9 Non-light water reactors may have chosen  
10 to use the risk-informed method in NEI 18-04, also  
11 called the Licensing Modernization Process, for  
12 determining the licensing basis events and may have  
13 design basis events, design basis accidents, and  
14 beyond design basis events.

15 Some applicants may have used a maximum  
16 hypothetical accident for their safety case, and that  
17 would also be included in the analysis.

18 MEMBER HALNON: So Michelle, this is Greg.  
19 For light water reactors, SMRs that are pretty much  
20 under design right now, right?

21 That includes Chapter 15 and 19 accidents  
22 -- Chapter 19 accidents, as well, which Chapter 19 is  
23 just like everything.

24 How does a licensee or an applicant  
25 eliminate some of the 19 accidents, such that it's not

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1 just looking at everything?

2 MS. HART: Right. So, the Reg Guide, we  
3 do talk in some detail about some considerations they  
4 should use for like scoping out analyses or scoping  
5 out scenarios, for lack of a better term.

6 I think when you're talking about the  
7 plume exposure pathway EZP size justification  
8 analysis, there are those two criteria that we were  
9 talking about, and the second criterion is the need  
10 for a prompt protective measures.

11 And so, timing of the accident releases  
12 can be used as justified, you know, if it is a release  
13 scenario that you have plenty of time for an off-site  
14 organization to determine, and in conjunction with the  
15 licensee, what actions may have to be taken at what  
16 point.

17 And to be able to effectively take those  
18 actions in the time to affect dose savings. So that's  
19 one consideration.

20 I think, you know, when we're talking  
21 about this analysis, we want to ensure that you're  
22 finding all of those large releases that you may have  
23 to take action for, and that's what the plume exposure  
24 pathway emergency planning zone is helping as a tool  
25 to do.

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1           MEMBER HALNON: So part of the issue here  
2 with that and some designers is that it's much easier  
3 and more effective to design a plant to a -- and a  
4 plan, for that matter -- to a very specific bright  
5 line design criteria.

6           This kind of makes it kind of fuzzy.  
7 We're running into the same type of issues with other  
8 parts, Part 53, such as the ALARA consideration, as  
9 well.

10           However, you know, I understand the  
11 balance that Dennis mentioned earlier between being  
12 specific and being flexible.

13           I guess the unknowns -- and I know you're  
14 dealing with this with the NuScale topical report, as  
15 well -- will we ever get to a point where we will have  
16 a specific bright line that we can design to, relative  
17 to criteria that -- whether it be quantitative or  
18 qualitative criteria, that we can just say, here it  
19 is?

20           MS. HART: So I think, you know, that was  
21 certainly a consideration as we were developing this  
22 guidance, was that balancing of all the different  
23 technologies and all the different considerations that  
24 you could have, and it may be easier for some  
25 facilities at some specific sites to make that

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1 determination on the face of it than it would be for  
2 others.

3 I think, you know, considering that this  
4 is a rule that is not for a specific technology, it's  
5 not for a specific set of sites, it could be, you  
6 know, people remotely sited in Alaska, you know, or it  
7 could be people in the middle of a city -- you know,  
8 I say middle of a city, that might be overstating it  
9 -- that there are all these different considerations  
10 we have to take into account, and I think a certain  
11 amount of this will become clearer as people try to  
12 exercise that.

13 The bright line, I don't think there will  
14 ever be a bright line, but the criterion itself, the  
15 dose related criterion that is in the regulation will  
16 remain as the goal to aim for for determining if, you  
17 know, a prompt protective measure is necessary, or a  
18 protective measure is necessary, and then the prompt  
19 part of that is also the second criterion.

20 MEMBER HALNON: Okay. Right, I think that  
21 -- go ahead.

22 MEMBER PETTI: Michelle, this is Dave.  
23 Just to follow on that, what about the event  
24 likelihood, including uncertainty?

25 There has to be a cutoff, right, at some

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1 probability that, you know, a ten to the minus 12  
2 event is very different than a ten to the minus 5  
3 event. What --

4 (Simultaneous speaking.)

5 MS. HART: Right. And so for -- yeah, for  
6 this rule, we're saying that whatever you are using  
7 for your safety analysis, whatever that cutoff was for  
8 what is appropriate to evaluate in your licensing  
9 basis events, is the same cutoff that you start with.

10 We are not saying that you need to  
11 necessarily have to consider events outside of that  
12 frequency range that you have already used, if you're  
13 using specific event frequency.

14 Or if you're using a different measure of  
15 likelihood, it's another discussion that we may have  
16 to have because it's not expected that everybody would  
17 use PRA in that manner, or determine event frequency.

18 MEMBER PETTI: Yeah. Okay, thanks.

19 MS. HART: Were there any additional  
20 questions on this?

21 (Simultaneous speaking.)

22 MEMBER HALNON: Yeah, I was going to ask  
23 if any other members have questions about criteria and  
24 specifics?

25 It seems like there's still going to be a

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1 gap between what an applicant desires versus what  
2 you're able to provide.

3 Is there room for getting more specific in  
4 your description at this point, or is this as specific  
5 as you're willing to go, relative to these  
6 considerations?

7 What I'm trying to understand is the first  
8 couple applicants that come in and exercise this will  
9 have lengthy discussions with you, but what we're  
10 trying to prevent is iterations that cost a lot of  
11 money both in regulatory uncertainty and design  
12 uncertainty.

13 MS. HART: Right. I think at this point,  
14 this is, you know, the right amount of what to do, and  
15 the flexibility to allow for different ways to do this  
16 that applicants may provide.

17 We did have a description. I mean, it may  
18 be a fairly high-level description that you do have to  
19 consider internal and external events and all sources,  
20 multi-module and multi-unit events, and interactions,  
21 you know, that you need to look at the entire  
22 potential releases for your facility.

23 We do have some additional information on  
24 how you may scope out analyses based on likelihood,  
25 and we did have a consideration of release timing, and

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1 we gave an example from NUREG-0396, which was the  
2 basis for the current regulatory framework for  
3 emergency planning that came up with the 10-mile EPZ  
4 for the large light water reactors.

5 So I think we've given sufficient  
6 information for applicants to understand what  
7 considerations that they should use.

8 We're not giving them details on how to do  
9 that at this time. Maybe we'll learn some things as  
10 we go along.

11 MEMBER HALNON: Okay. Well I'm certainly  
12 not an expert in this area, but it feels just to me  
13 that, you know, we have an equation of risk and we've  
14 only got one portion of it.

15 We look at the consequence, and we don't  
16 have a probability in that. So nevertheless, I think  
17 some of the comments coming from our groups will also  
18 explore some questions there too. Any other members?

19 MEMBER PETTI: Michelle?

20 MEMBER HALNON: Go ahead.

21 MEMBER PETTI: Yeah, this is Dave again.  
22 The issue of source term here, when you look at Reg  
23 Guide 1.183, it clearly says that you can't use that  
24 approach, or that additional considerations are needed  
25 beyond what is in 1.183.

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1           When you read the appendix here, it's  
2           fuzzy. But I assume it's, you know, what other source  
3           terms associated with the licensing basis events,  
4           would be sort of how you'd line that up.

5           I just worry that there's maybe a hole  
6           here for light water reactors, SMRs, and then advanced  
7           systems, and LWR, where there's not a lot of guidance  
8           about, you know, what's an acceptable source term.

9           Maybe I'm missing Appendix B, but can you  
10          help me there?

11          MS. HART:     So, in Appendix B, if I  
12          remember correctly -- I'm trying to pull it up -- we  
13          do point to that if an applicant does have a  
14          probabilistic risk assessment, that you could develop  
15          source terms based on that.

16          And of course, the non-light water reactor  
17          PRA standard does give guidance on what is considered  
18          in developing source terms.

19          The light water reactor PRA standard, of  
20          course, is not -- level two and level three are not  
21          endorsed at this time, but has similar information,  
22          and so there's some expectation that we would have  
23          that you could use that information to help you to  
24          determine your beyond design basis accident source  
25          terms.

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1 MEMBER PETTI: Okay.

2 MS. HART: And so, you know, of course we  
3 do have SECY papers and we have a long history in the  
4 NRC of the commission approving that non-light water  
5 reactors could have mechanistic source terms, and I  
6 acknowledge that we do not have specific guidance on  
7 how to develop mechanistic source terms.

8 However, we do have information and we're  
9 planning to put that on the public website on how to  
10 develop mechanistic source terms for non-light water  
11 reactors, as well.

12 MEMBER PETTI: Okay, thanks.

13 MEMBER BLEY: Excuse me, this is Dennis  
14 Bley. Michelle?

15 MS. HART: Mm-hmm?

16 MEMBER BLEY: Can you expand on your last  
17 statement a little? I think we'd be interested in  
18 that, what you're about to put on the website.

19 MS. HART: So, what we have done to  
20 prepare for non-light water reactor licensing, we have  
21 some reports, I think from Idaho National Lab and from  
22 Argonne, on how to develop mechanistic source terms.

23 It's very similar to the information  
24 that's in the non-light water reactor PRA standard,  
25 and so it's that kind of level of detail, like what

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1 considerations to use and how to get the information,  
2 and what information to be used.

3 So it's not like Reg Guide 1.183, which  
4 gives you a source term for light water reactors, it's  
5 information on how to develop a source term, and any  
6 other pieces of information that we can put up there.

7 And I apologize, I haven't looked to see  
8 if we have actually put it on the website yet.

9 MEMBER BLEY: That's okay. I think we've  
10 seen most of that, but we look forward to following  
11 this up later on.

12 MS. HART: All right. And so, I think  
13 that was everything I wanted to talk about on this  
14 slide. Were there any additional questions?

15 MEMBER HALNON: It does not sound like it.  
16 Thank you, Michelle.

17 MS. HART: All right, thank you. Next  
18 slide, please.

19 MEMBER HALNON: And I guess it's open to  
20 the members. Is there any other questions to follow  
21 up before we go into the comments from our groups?

22 Okay. We will press on. The next part of  
23 this presentation will come from Marc Nichol. Marc is  
24 from NEI.

25 Marc, you have about ten minutes to make

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1 your remarks.

2 If it goes beyond ten minutes, I'm going  
3 to start interrupting you, so make sure to get your  
4 points out first.

5 MR. NICHOL: Okay, thank you, Chairman,  
6 Halnon, and other ACRS members. Just to make sure,  
7 could you hear me okay?

8 MEMBER HALNON: Yes, you're loud and  
9 clear.

10 MR. NICHOL: All right, great. Thank you  
11 for the opportunity to make remarks on the NRC's final  
12 rule and guidance for SMR and other nuclear  
13 technologies, emergency preparedness.

14 My name is Marc Nichol, senior director of  
15 New Reactors at the Nuclear Energy Institutes. The  
16 comments below are made on behalf of the nuclear  
17 energy industry.

18 We've been engaging with the NRC staff on  
19 performance-based EP for advanced reactor since the  
20 issue was first identified in 2010, and we strongly  
21 support issuance of the final rule.

22 The commission's advanced reactor policy  
23 statement has encouraged the nuclear industry to  
24 develop designs with enhanced safety features.

25 The industry has responded to this policy

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1 goal with designs featuring smaller cores and reliance  
2 on passive safety systems.

3 These features reduced the potential for  
4 accidents and increased the time available to take  
5 mitigation or protective actions.

6 The overall lower risk provides a sound  
7 rationale for the EP changes proposed by the NRC  
8 staff.

9 The NRC's rule recognizes the enhanced  
10 safety of advanced reactor design and establishes EP  
11 requirements that are commensurate with the potential  
12 consequences to the public from an accident.

13 Most advanced reactors are expected to  
14 demonstrate that they can meet the dose based  
15 consequence limits for plume exposure EPZ at distances  
16 much less than the ten mile radius used by current  
17 operating reactors.

18 In all cases, the applicant will have to  
19 provide the NRC with a site specific technical  
20 justification for their proposed EPZ size.

21 In some cases an advanced reactor may  
22 present a lesser hazard to the public than some non-  
23 nuclear facilities, such as petrochemical facilities.

24 The final rule uses essentially the same  
25 EP technical basis as that underlying the requirements

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1 applicable to the current operating reactors, and  
2 therefore will maintain the same level of public  
3 protection.

4 There will be no reduction in defense in  
5 depth. Rather, EP activities are appropriately scaled  
6 to reflect the potential hazards posed by a facility.

7 The rule provides clear and reasonable  
8 regulatory requirements for designers, applicants, and  
9 licensees.

10 We support the performance based approach  
11 used in the rule as it will allow for innovation and  
12 flexibility in addressing the EP requirements.

13 It also aligns with the NRC's prior  
14 approval of emergency preparedness zones for the TVA  
15 Clinch River ESP.

16 We do believe, however, there is one area  
17 where the rule would benefit from additional clarity.

18 The rule states that the plume exposure  
19 pathway EPZ must include the area in which the public  
20 dose exceeds one rem TEDI over 96 hours from the  
21 release of radioactive materials from this facility  
22 considering accident likelihood and source term, and  
23 timing of the accident sequence in meteorology.

24 However, as was just discussed on Slide  
25 24, the proposed rule of guidance does not fully

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1 address the subject of accident likelihood.

2 For example, how likely must an event be  
3 to not be considered for a sizing analysis for an  
4 emergency planning zone?

5 The lack of sufficient detail in the  
6 proposed guidance to inform an application leaves the  
7 determination of which event should be included or  
8 excluded to be clarified during the NRC review,  
9 potentially through NRC request for information and  
10 applicant revisions of the documentation.

11 As a current example, we understand that  
12 the lack of this clarity has been a challenge in the  
13 NRC's review of the NuScale topical report on the EPZ  
14 methodology.

15 We believe there should be clear guidance  
16 with respect to which internal and external events are  
17 included.

18 For example, defining the cutoff frequency  
19 and uncertainty bounds, and consistency between the  
20 application of the guidance to light water and non-  
21 light water reactor designs.

22 Absent better definition criteria on this  
23 topic, the NRC's goal to create regulatory stability,  
24 predictability, and clarity through this rule will not  
25 be fully met.

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1           In closing, we believe the codification of  
2           the new requirements will provide for regulatory  
3           stability, predictability, and clarity in the  
4           licensing process, and eliminate the need for serial  
5           EP exemption requests.

6           This makes sufficient use of the NRC and  
7           applicant resources.

8           The provisions are consistent with the  
9           Atomic Energy Act, commission's policy statement on  
10          regulations of advanced reactors, and past staff  
11          requirement memorandums.

12          We also note that in addition to meeting  
13          NRC requirements, a facility owner and operator will  
14          be responsible for engaging state and local elected  
15          officials, emergency management agencies, and  
16          community to gain confidence in the siting of an  
17          advanced reactor facility.

18          In this manner, the facility owner-  
19          operator will work with communities to implement  
20          emergency response capabilities, even in cases where  
21          the EPZ is at a site boundary.

22          Therefore, the rule is important to  
23          facilitate the safe and efficient deployment of a new  
24          generation of U.S. designed reactors, all producing  
25          carbon-free power, an outcome that's good for our

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1 economy, national security, and one that supports  
2 global efforts to mitigate climate change.

3 Thank you for the opportunity to make  
4 these comments.

5 MEMBER HALNON: Thank you, Marc. Is there  
6 any questions to follow up?

7 Okay, Ed, Dr. Lyman, you're up, if you  
8 wanted to get your slides up. Again, ten minutes.

9 Marc actually gave you a few more extra,  
10 so come to about 12 minutes, I'll start interrupting  
11 you, so go ahead and get your slides up and we  
12 appreciate your comments.

13 DR. LYMAN: Yes, there may be a delay in  
14 loading. Let's see what's happening here.

15 MEMBER HALNON: Okay.

16 DR. LYMAN: Okay. Sorry, this is a slow  
17 process.

18 (Simultaneous speaking.)

19 MEMBER HALNON: It's all right. That's  
20 okay. Technology is not our friend always. All  
21 right.

22 DR. LYMAN: I think we're in business.

23 MEMBER HALNON: They're starting to come  
24 up, yes.

25 DR. LYMAN: All right, there you go, okay.

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1 Sorry about that.

2 Yes, on behalf of the Union of Concerned  
3 Scientists, I appreciate the opportunity to discuss  
4 our concerns with the draft final EP rule for SMRs and  
5 ONTs.

6 So, overall UCS would welcome a truly  
7 science-based revision to emerge as planning  
8 requirements that really uses the best available  
9 information to align protective measures to  
10 radiological risks while fully accounting for  
11 uncertainties and the need for defense in depth.

12 And I believe that would require up front  
13 an acknowledgment that if you're going to go to a  
14 mechanistic, source term based EPZ determination, that  
15 that could potentially lead to larger EPZ sizes than  
16 the current ten miles, as well as lower ones, a  
17 priori, but the underlying presumption here that they  
18 won't necessarily be smaller than ten miles indicates  
19 that there is a bias built into the entire process  
20 from the get-go, and that's a concern to me.

21 The draft final rule largely seems to  
22 provide cover for reactor vendors who have already  
23 made the case to the public, and presumably their  
24 investors, that their designs do not need an off-site  
25 EPZ.

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1           And if you look at the Nuclear Industry  
2 Council's vendor survey I have provided recently,  
3 that's clear that 100 percent of the developers  
4 surveyed already believe that they have the site  
5 boundary EPZ low, or below without even presumably  
6 having a rule to help them determine that.

7           So, this is a step function. If you can  
8 show that you don't need an EPZ beyond the site  
9 boundary, the applicant would be absolved of any off-  
10 site EP requirements, except for the kind of vague  
11 communication requirements that we heard of earlier,  
12 but there are no firm requirements for that.

13           And then the entire offsite EP burden  
14 would fall on public emergency management agencies,  
15 which is really an unfunded mandate.

16           And not only may these agencies lack the  
17 necessary radiological expertise, especially if you're  
18 dropping an SMR or a microreactor in a community  
19 that's never had any experience with nuclear power,  
20 then it's unreasonable to expect that they may have  
21 the resources or the expertise to be able to do that  
22 without a firm requirement consultation with the  
23 applicant, who is fully familiar with the reactor  
24 design and safety aspects.

25           And in addition, there's environmental

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1 justice impact of this as well by putting that entire  
2 burden on local populations.

3 There could be a variation depending on  
4 the resources available to local emergency management  
5 agencies' off-site response.

6 There is a financial component to that,  
7 the equipment and training that's needed, and that  
8 simply could lead to an implicit bias in the  
9 application of this rule.

10 Overall, we're concerned that there's an  
11 overall reduction to defense in depth associated with  
12 the approach to licensing new reactor technologies  
13 that essentially the PRA is used for a broad suite of  
14 regulatory rollbacks compared to the current licensing  
15 basis for reactors, including not just EP, but also  
16 security, the use of safety grade equipment, and the  
17 existence of a pressure resisting physical  
18 containment.

19 All those things together could lead to a  
20 significant reduction to defense in depth based on  
21 single PRA analysis.

22 And so, we have general concerns about  
23 that and how this EPZ rule could potentially  
24 contribute to that reduction to defense in depth.

25 We've heard about event selection. I

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1 think the committee seems to get the issue that we're  
2 concerned that if the rule is not specific enough --  
3 and I mean the rule, not simply the guidance, but the  
4 rule to -- you need that specificity to prevent  
5 applicants from fine-tuning the event selection  
6 analysis to achieve this significant goal of not  
7 having the off-site EPZ, or any of those requirements.

8 So that's a pretty big incentive to game  
9 this process, and that's why there need to be firm  
10 ground rules to make sure there's a level playing  
11 field for all applicants.

12 And that's already been discussed.

13 The NuScale draft topical report has been  
14 essentially stalled for years because of an argument  
15 that where you've cut off external event frequencies,  
16 and also the Oklo Combined Operating License also  
17 appears to be stalled because of a dispute over how  
18 you define maximum credible accident.

19 So, this is already coming up, and so the  
20 vague rule and guidance language will only contribute  
21 to that.

22 The initial proposed rule used the term  
23 spectrum of credible accidents, which was not defined  
24 anywhere, and the draft final rule is actually even  
25 less specific because -- or leaning sideways, going

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1 from spectrum of credible accidents, to just saying  
2 you have to consider various factors, but it doesn't  
3 say the extent to which you have to consider them or  
4 to provide any standards for how those will be  
5 considered.

6 And the draft guidance and its reference  
7 to licensing basis events doesn't help because that is  
8 also not defined anywhere in the regulations, and we  
9 don't know where things are going with Part 53, but  
10 this is independent of that, so that doesn't help in  
11 my view, and I think I actually agree with NEI's  
12 comment that by not addressing this likelihood  
13 question one way or another, you're not really moving  
14 the ball forward.

15 We heard that FEMA objects to significant  
16 aspects of this rule, especially related to the  
17 elimination of any off-site or formal off-site  
18 emergency planning on the part of the licensees, and  
19 the Department of Energy deputy under secretary Jay  
20 Tilden, also made similar comments in a rather  
21 remarkable sequence of events, where he on behalf of  
22 his office submitted critical comments, also  
23 highlighting this issue of accident selection and lack  
24 of defense in depth, but it was only the next day when  
25 the NNSA administrator walked those back.

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1 I don't believe Mr. Tilden was unfamiliar  
2 with or didn't expect the consequences of what he did,  
3 and so I would interpret this as a public airing of  
4 significant differences between NNSA and its  
5 radiological functions, its concern for counter  
6 terrorism and the Department of Energy's Nuclear  
7 Energy Office and its promotional role in pushing  
8 these things forward.

9 So, I would give those remarks significant  
10 consideration, even though they were officially  
11 withdrawn.

12 The addition of the seven criterion from  
13 the original proposed rule that this predetermined  
14 prompt protective measure standard, I believe it could  
15 potentially reduce the equivalence of this rule with  
16 the current licensing basis for EPZ size because that  
17 does not seem to be present in NUREG-0396, which is  
18 tied to the EPA tags.

19 It seems to me that satisfying the EPA tag  
20 itself is the standard for when predetermined prompt  
21 protective measures would be needed.

22 And so, I feel like adding this additional  
23 criterion really weakens the rule even further, makes  
24 it more vague and harder for the public to understand.

25 Other technical aspects that are

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1 inconsistent with department basis or missing the lack  
2 of addressing acute exposures, the potential for acute  
3 fatalities from a large radiological release.

4 There's no separate standard for that  
5 anymore, and there's no consideration of thyroid dose  
6 requirements which could -- or should be distinct from  
7 the whole-body dose, especially for children.

8 It could lead to potentially a more  
9 sensitive safety requirement for those more sensitive  
10 groups, with regard to thyroid exposure.

11 They also have a scope -- is inconsistent  
12 because I believe large light water reactors, should,  
13 you know, if you're going with what's sauce for the  
14 goose is sauce for the gander, and I believe that a  
15 mechanistic source term based technically based  
16 approach for determining EPZ size could develop to  
17 larger EPZs for a large light water reactor in ten  
18 miles, and I just have some examples from Fukushima,  
19 which I'm not going to go through, but you can review  
20 those, and also calculations from advanced reactors so  
21 the notion that advanced reactors are somehow -- or  
22 anything that calls itself an advanced reactor is  
23 necessarily going to be smaller, safer, and have to  
24 have potentially lower off-site consequences, is not  
25 validated by analyses both from the distant past, and

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1 also the recent past.

2 Here are some examples from fast reactors.

3 And so, another big gap is not addressing  
4 sabotage events, and when you're talking about  
5 accident likelihood, again, the issue is sabotage,  
6 which is essentially orthogonal to that because you  
7 can't really rule out sabotage events based on  
8 likelihood.

9 That is a separate component that will  
10 always require addressing large radiological releases.

11 It could be caused by a sabotage event,  
12 even if that would be a very low frequency event and  
13 accident space, and the public deserves to be  
14 protected from that off-site.

15 And finally, other aspects.

16 We heard about what's in the guidance,  
17 about other sources and how do you address  
18 multi-module effects, all very vague, and without more  
19 specificity, again, you're going to have this very  
20 relativistic, very subjective approach to this rule,  
21 and I think the public -- I'm confused.

22 If you not only have flexibility in how  
23 you meet the requirements, but also how essentially  
24 you design those requirements, and that doesn't give  
25 enough granularity to what's actually being

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1 accomplished to protect the public here, and it's  
2 another significant consideration, and I'm always  
3 keeping in mind that the NRC has a responsibility to  
4 the public to make sure there's transparency in what  
5 it's doing, and that requires some level of specific  
6 standards, which are inspectable and enforceable, and  
7 that means clarity in the rule.

8 And that's all I have, and thank you, and  
9 I hope I didn't exceed my time this time. Thank you.

10 MEMBER HALNON: No, you're fine, Dr.  
11 Lyman. Any members have questions for Dr. Lyman?

12 Okay. At this time, I'm going to ask the  
13 -- see, there is one request to make comment from  
14 somebody.

15 Oh see, I have a hand up somewhere. Who  
16 just raised their hand?

17 MR. SNODDERLY: Member Halnon, I believe  
18 it's Gary Becker from NuScale.

19 MEMBER HALNON: Okay, yeah. So that's  
20 what I was just going to recognize Gary Becker.

21 So Gary, as always, as I've asked the  
22 others to be brief, but don't compromise your message.

23 MR. BECKER: Okay, thank you. Can you  
24 hear me okay?

25 MEMBER HALNON: Yes, you're loud and

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1 clear.

2 MR. BECKER: Great, thank you, and thank  
3 you very much for the time to speak today. At the  
4 outset, I want to note that overall, NuScale supports  
5 this rulemaking.

6 We believe it's needed and it's  
7 appropriate, and in many respects, it's very well  
8 considered.

9 But as I stated at the subcommittee  
10 meeting in September, we do have, NuScale, concerns  
11 about the lack of clarity in the new rule and Reg  
12 Guide 1242, particularly on the issue of the event  
13 selection for EPZ sizing.

14 I did some advanced written comments  
15 yesterday that I think will be included in the  
16 transcript, and I don't want to recount all those  
17 here, but the fact of the matter is that there's  
18 nothing in the rule, and very little in the guidance  
19 to guide us on the appropriate accident likelihood for  
20 consideration for EPZ sizing.

21 In other words, have unlikely an event  
22 must be to not consider it for EPZ sizing.

23 And the conversation I heard today did  
24 nothing really to help ease my concerns.

25 In response to some questions today, NRC

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1 indicated that basically they can't provide any  
2 detailed information on event selection now, but they  
3 indicated that an applicant needs to, I think the  
4 quote was find all of the potential large releases,  
5 end quote, and look into every event in the so-called  
6 licensing basis of Chapter 15 and 19.

7 Surely that can't be the standard. The  
8 entire scope of Chapter 19, at least in the case of a  
9 PWR like NuScale, essentially has no bounds. It  
10 evaluates nearly every sequence, regardless of  
11 frequency.

12 And in fact, the applicants using NEI  
13 18-04, which are by definition non-LWRs, they're able  
14 to limit the bounds of their accident frequency to  
15 their licensing basis events, which have a defined  
16 frequency of greater than 5E to the minus seventh, so  
17 that provides them a starting point, but LWRs don't  
18 even get that level of guidance, let alone anything to  
19 guide us further in the event screening beyond the  
20 realm of so-called licensing basis events.

21 And NRC pointed to the need for prompt  
22 protective measures as one guide post in event  
23 selection, which just simply does not answer the  
24 question of how likely an event to consider?

25 And finally I'll note that we don't think

1 that this is a question that's specific to sites or  
2 technologies as was suggested today.

3 We believe this issue of accident  
4 likelihood and event selection is essential to the EPZ  
5 size and aspect of the rulemaking.

6 It's a generic question, and it speaks to  
7 the policy of how unlikely an event should be for pre-  
8 planned emergency actions to be developed around it.  
9 In other words, what is reasonable to consider?

10 The rule as it is in the guidance, with  
11 respect to EPZ sizing, does not achieve regulatory  
12 predictability, and it doesn't seem to be risk-  
13 informed at all. It doesn't define the frequency size  
14 risk situation.

15 I do want to spend a little bit of time on  
16 potential, you know, where we could potentially go  
17 from here, where NuScale sees there's a path to  
18 providing a better definition.

19 Section 3.7 of the guidance probabilistic  
20 dose aggregation gives us some clues, and NRC pointed  
21 a little bit to that today.

22 And that might help us make this rule and  
23 guidance risk-informed performance based.

24 That section discusses how NUREG-0396  
25 examines the conditional probability of exceeding

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1 various dose criteria, and it concluded that the ten  
2 mile EPZ was a sufficient size of the projected doses  
3 from traditional DVAs and most core melt sequences  
4 would not achieve PAG levels outside EPZ.

5 And for worst core melt sequences,  
6 immediate life threatening doses -- in other words,  
7 200 rem, would not generally occur outside EPZ.

8 That framework may provide an opportunity  
9 to bring some more clarity to this rule and guidance  
10 on event selection.

11 I want to point out that in SECY-97-020,  
12 staff acknowledged that two aspects of modifying EPZ  
13 framework would include addressing the probability  
14 level of accidents to consider an emergency planning,  
15 and the use of increased safety in one level of the  
16 defense in depth framework to justify reducing  
17 requirements in another level.

18 NUREG-0396, turning back to what the NRC  
19 and its counterparts did in the NUREG-0396.

20 They began with a starting point of  
21 accumulative probability of a core melt accident of  
22 approximately one in 20,000 per reactor year, 5E to  
23 the minus five.

24 Now, I'll note that's a core damage  
25 probability.

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1           That's roughly on the order of the core damage  
2 frequency safety goal that was later established.

3           For those core melt accidents, NUREG-0396  
4 found that the ten mile EPZ resulted in a 30 percent  
5 change of exceeding PAG levels, so the resulting  
6 probability of exceeding PAG doses at ten miles for an  
7 LLWR, a large light water reactor, is 1.5E to the  
8 minus fifth per reactor year, one chance in 50,000 per  
9 reactor year.

10           With uncertainty, it should be noted.

11           Clearly and explicitly timed, the EPZ  
12 sizing methodology to this performance level, a  
13 likelihood of exceeding PAGs, that EPZ boundary of  
14 about 1E to minus 5, would be risk-informed,  
15 performance based, and consistent with the  
16 commission's safety goals, and would very clearly  
17 allow as the staff envisioned in that SECY-97-020, for  
18 the use of increased safety in one level, the defense  
19 in depth, which is the core damage prevention level,  
20 to justify offsetting requirements in another level,  
21 emergency planning.

22           In fact, I'll note it would seem to  
23 address Mr. Lyman's concern over reduction in overall  
24 defense in depth quite well.

25           Invoking this analogous performance level

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1 of the ten mile EPZ, which is again 1.5E to the minus  
2 five likelihood of exceeding PAGs for the reference  
3 generic plant that was analyzed, that performance  
4 level doesn't alone answer the question of event  
5 frequency, especially when it comes to some external  
6 event, external hazard event initiators, so there's  
7 still need to be work done on specific sequence screen  
8 selection.

9 But it seems like perhaps an appropriate  
10 starting point.

11 In conclusion, NuScale does not believe  
12 it's appropriate to defer detailed consideration of  
13 event selection to an applicant seeking to implement  
14 the guidance.

15 We believe this question's essential to  
16 the rulemaking effort, and it needs to be resolved on  
17 a generic basis, and subject to the Commission's  
18 approval as part of this rulemaking process.

19 Thank you very much.

20 MEMBER HALNON: Thank you, Gary. Any  
21 other members of the public that would like to make a  
22 comment?

23 CHAIR SUNSERI: And just as a reminder,  
24 you'll have to unmute yourself by using \*6 if you're  
25 a member of the public.

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1 MEMBER HALNON: Okay, I don't hear any  
2 other comments.

3 At this point then, we're going to close  
4 the public comment period, and I'm going to ask the  
5 ACRS members if anyone would like to either make a  
6 comment or discuss any of the topics that were brought  
7 up.

8 This is an ACRS member time to kind of  
9 discuss what we're going to be later putting into a  
10 letter report.

11 So any comments, any questions, any  
12 thoughts from ACRS members?

13 MEMBER DIMITRIJEVIC: Hi Greg, this is  
14 Vesna.

15 I just would like to make a very general  
16 comment because I struggle a lot with this question of  
17 specificity, and setting the likelihood of the -- you  
18 know, events to be selected defining this maximum  
19 credible accident, and I really couldn't find.

20 I mean, I thought about that a lot before  
21 this meeting. I couldn't really find something.

22 We tried with the thing -- is it a better  
23 solution to state, like, you know, less specific or  
24 more specific.

25 And my main concern in this area is when

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1 it comes to uncertainty. You know, if you specify  
2 certain frequencies, then you get in this area of how  
3 big are uncertainties associated with those, you know,  
4 events and likelihoods?

5 And we are talking, you know, CDF or LERF,  
6 and uncertainties associated with this.

7 And so in this moment I decide that I  
8 don't have a really -- I mean, a big issue with this  
9 lack of the specificity, and I heard the NuScale  
10 presentation and I see that this is something which  
11 will work for them and it can be discussed with the  
12 staff and addressed on the specific case, but I think  
13 that actually once when we don't really have a good  
14 way to address big uncertainties, then that  
15 specificity, you know, we'll always struggle in these  
16 situations.

17 So, you know, I was -- that's one of the  
18 areas I'm very interested in. What to do, what is the  
19 right approach in situations when you have, you know,  
20 huge uncertainties associated with, you know,  
21 numerical answers, so.

22 So I just wanted to make these general  
23 comments, so.

24 MEMBER HALNON: Thanks, Vesna.

25 It sounds like there's some guidance

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1 options, information out there that we could get a  
2 little bit more specific to get as was put forward as  
3 a starting point, but again, I want to rely on some of  
4 y'all that have much more experience in the PRA and  
5 the uncertainty likelihood in the areas of topics.

6 So, if any of the other members have any  
7 comments on that, I would appreciate it.

8 Okay, well, it doesn't sound like there's  
9 a lot of things rolling, moving around in your all's  
10 heads. It sounds like we've got a pretty good path  
11 forward.

12 I do appreciate everybody's endurance  
13 through some of the questions.

14 I know that, you know, this is a very long  
15 and complex -- I mean, it's a short rule, but it's  
16 very complex when you start looking at all the  
17 tentacles into other Reg Guides and other areas of  
18 analysis that are needed, and then the implications of  
19 having that one decision of EPZ less than the site  
20 boundary, versus greater than the site boundary.

21 That's a very important, specific, and  
22 precedent-setting decision that has to be made, and  
23 we'll put forward -- if the NRC staff will be  
24 reviewing that in earnest I am sure, and putting a lot  
25 of questions, especially in the early stages of

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1 exercising this rule and guidance.

2 So, I don't think there is any question  
3 that the NRC staff would not come to the right  
4 decisions and whatnot.

5 It really comes down to is the rule and  
6 the guidance at this point specific enough and  
7 flexible enough, I guess that's that balance that --  
8 remember Dennis was talking about?

9 Is it in its framework that we can deal  
10 with and that we can understand and provide assurance  
11 that this was going to come out with the right answer  
12 at the end?

13 And I think that all the work that's been  
14 done, all the comments that are made, and all the  
15 questions that were asked, I think it all is again, a  
16 learning application, and some of the aspects of this  
17 rule that will be determined during the first couple  
18 applicants.

19 They may be painful, but I think they'll  
20 be good lessons learned in the long run, so we will  
21 continue to think through this, and we'll be  
22 developing a letter report and reading that into the  
23 record later into this whole committee meeting when  
24 Chairman Sunseri feels it's the right time.

25 But we've got a lot of stuff to do, so we

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1 will continue to work through the agenda items.

2 So with that, I'll open one last time for  
3 any member to discuss or ask a question.

4 Given none, Chairman Sunseri, it's back to  
5 you.

6 CHAIR SUNSERI: Thank you, Greg, and thank  
7 you, members.

8 So, we're off my expectation a little bit.  
9 We're not going to get an opportunity to read in this  
10 letter report.

11 We do have a hard stop at noon to pick up  
12 with the Planning and Procedures Subcommittee Meeting,  
13 which is scheduled for noon, so we will break here  
14 soon to support the rest of the schedule, and we will  
15 reconvene this full committee meeting at 1:00 p.m.

16 But just to let you know, I did allow the  
17 conversation and presentation material to cut into our  
18 deliberation time for this morning.

19 We were supposed to start deliberating at  
20 11:00, but I thought the discussion was good and would  
21 help us in our deliberation as we go forward.

22 So even though we didn't get to reading in  
23 the letter and discussing our major points with that,  
24 I think the information that we received will help us  
25 when we get to that point in time.

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1           So, with that said then, we will find the  
2 time in the agenda to read in this report and get our  
3 major comments.

4           We will soon here recess until 1:00 p.m.,  
5 at which time at 1:00 p.m. we will take up the ISG  
6 Supplemental Guidance for radiological consequence  
7 analysis using the alternate source term. I'm having  
8 trouble speaking today.

9           Anyway, does any members have anything  
10 they want to say, or any comments before we recess for  
11 lunch?

12           MEMBER HALNON: Matt, this is Greg, just  
13 one last time I wanted to thank the NRC staff.

14           I think they're very responsive to our  
15 questions and tolerant of our wandering through this  
16 complex guidance and rule -- I do think they did an  
17 excellent job, so just wanted to give them a kudos.

18           CHAIR SUNSERI: Yeah, I appreciate that,  
19 Greg. I remiss in doing that.

20           I thought all the speakers that we heard  
21 from today did a good job, and, you know, at least in  
22 my mind, this is a complicated issue, as you pointed  
23 out.

24           I mean, the relationship between the NRC  
25 and FEMA and how they interact with each other to

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1 govern this topical area is much like the NRC and OSHA  
2 in the industrial safety arena, where there, you know,  
3 there is a dominant agency, and then, you know, they  
4 try to coordinate so they don't double-dip, so to  
5 speak.

6 And I think that is probably something  
7 that we need to sort out as we contemplate our letter  
8 report.

9 Anyway, any other members? All right, it's  
10 11:50 Eastern Time. We're going to recess the full  
11 committee. At 12:00 noon, we will pick up subcommittee  
12 meeting on the planning and procedures.

13 So, thank you and we will see you back  
14 here at 1:00.

15 And oh, by the way, the Planning and  
16 Procedure Subcommittee is on this same Teams channel,  
17 so you don't have to exit to participate in it. Thank  
18 you.

19 (Whereupon, the above-entitled matter went  
20 off the record at 11:50 a.m. and resumed at 1:00 p.m.)

21 CHAIR SUNSERI: We will go ahead and  
22 reconvene the ACRS meeting now.

23 I will start with a roll call following  
24 lunch, so begin with Ron Ballinger.

25 MEMBER BALLINGER: Here.

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1 CHAIR SUNSERI: Vicki Bier?

2 MEMBER BIER: Here.

3 CHAIR SUNSERI: Dennis Bley?

4 MEMBER BLEY: Here.

5 CHAIR SUNSERI: Charles Brown?

6 MEMBER BROWN: Here.

7 CHAIR SUNSERI: Vesna Dimitrijevic?

8 MEMBER DIMITRIJEVIC: Here.

9 CHAIR SUNSERI: Greg Halnon?

10 MEMBER HALNON: Here.

11 CHAIR SUNSERI: Walt Kirchner?

12 MEMBER KIRCHNER: Here.

13 CHAIR SUNSERI: Jose March-Leuba?

14 MEMBER MARCH-LEUBA: Here.

15 CHAIR SUNSERI: Dave Petti?

16 MEMBER PETTI: Here.

17 CHAIR SUNSERI: Joy Rempe?

18 VICE CHAIR REMPE: Here.

19 CHAIR SUNSERI: And, myself.

20 So, thank you all. Welcome back. I  
21 appreciate your patience this morning. We have a  
22 pretty heavy agenda as I mentioned, and I'll try to do  
23 better with breaks and culminations.

24 So, having said that, we don't have a  
25 break scheduled this afternoon, but in about an hour

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1 or so, I'll leave it to the presenters to let me know  
2 when you find a good place in your presentations for  
3 a 15 to 20 minute break.

4 Okay, so just advise me when that comes up  
5 and then we will take a break in about an hour, hour  
6 and 10 minutes or so.

7 So, the next topic on our agenda is the  
8 Supplemental Guidance for Radiological Consequence  
9 Analysis Using Alternate Force Terms, and I will turn  
10 to Member Petti for this session.

11 Dave, it's all yours.

12 MEMBER PETTI: Thank you, Matt.

13 Members, before we start I just want to  
14 say this is a very interesting topic. We're going to  
15 be hearing about alternative source terms in our  
16 subcommittee week in November. The update of Reg  
17 Guide 1.183. So, these sort of dovetail nicely, so  
18 pay close attention.

19 With that, let me invite NRR management  
20 Meena to kick things off.

21 MS. KHANNA: Good afternoon Member Petti  
22 and ACRS members. I'm Meena Khanna, and I serve as  
23 the Deputy Director of the Division of Risk Assessment  
24 in NRR.

25 Thank you for the opportunity today for

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1 the staff to share advances in our regulatory reviews  
2 of radiological consequence analysis, using the  
3 alternate source term.

4 I do want to note that Mike Franovich  
5 really wanted to be here today, however, he is in  
6 Vienna participating in the IAEA technical meetings  
7 for two weeks. But, he did ask that I convey his  
8 apologies for not being here today.

9 The NRR staff briefed the subcommittee  
10 members on this topic on July 23, and we  
11 really appreciate the feedback that we received.

12 At that time, we highlighted a few recent  
13 regulatory transformations to improve our efficiency  
14 and reliability as regulators.

15 A major theme is that our licensing  
16 reviews or other regulatory decisions, and  
17 backfit/forwardfit actions must be risk informed.

18 There are two particular staff  
19 requirements memoranda that have provided guidance and  
20 direction to the staff on these times. One regarding  
21 MD 8.4 on backfitting and forwardfitting and issue  
22 finality; and the other associated with NuScale's  
23 inadvertent actuation block valves, also shown on the  
24 slide.

25 As noted in the November 2019 memo to the

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1 executive director for operations on applying risk  
2 informed principles, the NRC's application of risk  
3 informed decision making continues to evolve as  
4 improved realism, evaluation techniques, and other  
5 information are applied to improve our decisions.

6 With that, sorry, let me start this over.  
7 What that means to the staff is that there are  
8 tremendous opportunities to apply engineering and risk  
9 insights to inform our traditional deterministic  
10 reviews.

11 There is a significant amount of  
12 information that we have today to support our reviews,  
13 including plant operating experience, as well as our  
14 experiences from post-Fukushima activities, to make  
15 more realistic and ultimately better decisions.

16 In addition, cultural realignment is  
17 needed to ensure that we identify and resolve  
18 challenges and roadblocks for the appropriate and  
19 consistent integration of risk insights.

20 Important agency activities to address --

21 (Simultaneous speaking.)

22 MS. KHANNA: I'm sorry, I'll continue.

23 CHAIR SUNSERI: If you are not a member  
24 speaking, please mute your microphone, please.

25 Thank you.

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1 MS. KHANNA: Okay, thanks. I'll start  
2 over with that sentence.

3 In addition, cultural realignment is  
4 needed to ensure that we identify and resolve  
5 challenges and roadblocks for the appropriate and  
6 consistent integration of risk insights.

7 Important agency activities to address  
8 NRC's internal cultural realignment needs are detailed  
9 in the previously mentioned memo to the EDO.

10 Most recently, the Be riskSMART initiative  
11 is driving agency wide practices for a uniform risk  
12 and reward mind set, and use of graded approaches in  
13 our safety, security, and other agency business.

14 The development of the ISG serves as an  
15 example of NRC's continuous efforts in working towards  
16 becoming a more modern and risk informed regulator.

17 Today you will hear from a collective  
18 strength of a diverse team with deep experience in  
19 seismic analysis, plant systems, component  
20 engineering, operating experience, and risk assessment  
21 on top of accident and consequence analysis.

22 After the staff's presentation, you will  
23 be hearing from two NRC staff members regarding some  
24 different views related to the in arms staff guidance.

25 It is important to note that the

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1 information pertinent to these different views is not  
2 publicly available, nor has the staff responsible for  
3 the ISG received the details on these matters as yet.

4 It is also important to note that these  
5 different views represent the personal views of these  
6 individuals, and not of the NRC.

7 At this moment, NRC management is  
8 currently reviewing these differing views under the  
9 established process and at this time, a final decision  
10 on the merits of these differing views has not been  
11 issued.

12 We will carefully consider the supporting  
13 details of the different views we hear today, and once  
14 a final decision is made available to the staff, we  
15 will evaluate if any of these issues impact with  
16 positions stated in the ISG.

17 I do want to express my appreciation to  
18 Kevin Hsueh and his team, for all their significant  
19 contributions to the ISG. As you know, there has been  
20 quite a significant amount of work done by the team.

21 And at this time, I'm going to turn the  
22 meeting over to Jerry.

23 Thank you.

24 MR. DOZIER: Good afternoon. My name is  
25 Jerry Dozier, I'm a Senior Reliability and Risk

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1 Analyst in the Radiation Protection and Consequences  
2 Branch, in the Division of Risk Assessment.

3 First, we will hear from John Parillo  
4 regarding the use of risk insights in four MSIV  
5 leakage LARs, followed by Dr. Shilp Vasavada, who will  
6 provide an overview of the ISG, and then I will  
7 provide an overview of public comments with some  
8 examples.

9 Steve Jones, from the Division of Safety  
10 Systems, and Dr. Elijah Dickson, an expert in accident  
11 dose analysis, may be responding to specific  
12 questions. John Parillo has our next slide.

13 MR. PARILLO: Thank you, Jerry.

14 Slide 4 includes excerpts from Section  
15 50.67, Accident Source Term, and highlights that the  
16 rule states the NRC may issue the amendment only if  
17 the applicant's analysis demonstrate with reasonable  
18 assurance, that specific dose acceptance criteria will  
19 not be exceeded.

20 The regulation does not postulate a cause  
21 for the accident, or how the analysis should be  
22 performed. Assumptions that are acceptable to the  
23 staff are contained in Reg Guide 1.183. However, the  
24 Reg Guide does not provide an acceptable aerosol  
25 deposition model for the important BWR mainstream

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1 isolation valve leakage pathway.

2 Slide 5?

3 As stated previously, Reg Guide 1.183 does  
4 not contain an MSIV leakage aerosol deposition model.  
5 In addition, the staff has concerns with the aerosol  
6 settling velocities used in researcher's accident  
7 evaluation branch report AEB-98-03.

8 This report was an assessment of the  
9 radiological consequences for the Perry Pilot Plant  
10 application, which included an assessment of MSIV  
11 leakage.

12 In 2006, the NRC issued a regulatory issue  
13 summary, which included general concepts that  
14 licensees should consider when modeling main steamline  
15 deposition.

16 However, the risks did not provide an  
17 acceptable model, or a reference to one, that  
18 licensees could follow to provide confidence in  
19 gaining staff acceptance of their LARs.

20 As such, the risk did not resolve the  
21 ongoing issues with the assessment of MSIV leakage.

22 In 2009 the NRC published Draft Guide 1199  
23 for public comment as a proposed revision to Reg Guide  
24 1.183. DG 1199 provided a model for assessing MSIV  
25 leakage. However, the approach described in the draft

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1 guide proved to be very challenging for licensees and  
2 has never been implemented in a license amendment  
3 request.

4 Slide 6?

5 Slide 6 summarizes a significant  
6 uncertainty and counted in the review of the four  
7 recent MSIV leakage amendment requests.

8 The interaction between aerosol removal by  
9 drywell sprays and the subsequent aerosol removal due  
10 to main steamline deposition, as modeled by the  
11 licensees, was questioned.

12 Sensitivity analyses were submitted that  
13 indicated that if the power conversion system is  
14 assumed to be intact, providing a pathway to the  
15 condenser, the dose reduction would be substantial.

16 The effectiveness of an intact power  
17 conversion system providing a pathway to the  
18 condenser, is acknowledged by the NRC staff as  
19 evidence by assumptions in Appendix C of Reg Guide  
20 1.183, for the evaluation of the BWR rod-drop  
21 accident.

22 For this accident, a pathway to the  
23 condenser is assumed without any conditions or  
24 specifications. However, for the MSIV leakage pathway  
25 in Appendix A, current guidance discusses the need for

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1 components in the power conversion system to be safe  
2 shut down, earthquake qualified to credit hold up and  
3 deposition.

4 Slide 7.

5 Slide 7 shows the total main steam  
6 isolation valve technical specification allowable  
7 leakage for the boiling water reactive fleet.

8 The recently approved amendments allowed  
9 four plants that had been operating with MSIV leakage  
10 limits among the lowest in the industry as shown in  
11 red, to increase their allowable MSIV leakage limits  
12 to values more representative of the fleet, as shown  
13 in green.

14 Please note that the Fitzpatrick plant was  
15 not only operating with the lowest MSIV leakage in the  
16 fleet, but was the last BWR operating with the more  
17 restrictive thyroid dose acceptance criteria prior to  
18 adopting the alternative source term methodology in  
19 conjunction with its MSIV leakage increase request.

20 It should be noted that a major driver for  
21 licensees requesting increases in their allowable MSIV  
22 leakage, is to reduce the significant worker dose  
23 incurred during maintenance activities required to  
24 maintain very low MSIV leakage values.

25 In addition, the committee should be aware

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1 that the subject LARs did not request credit for the  
2 substantial reduction in dose from suppression pool  
3 scrubbing, or credit for a realistic post-accident  
4 drywell pressure profile.

5 Slide 8.

6 Slide 8 depicts how the NRC staff used  
7 risk insights to support its conclusion of reasonable  
8 assurance. The key points that we would like to  
9 convey are: the licensee's sensitivity analyses are  
10 not part of their licensing basis analyses of record.

11 A pathway to the condenser was not  
12 credited in the analyses of record. And, the  
13 licensees provided analyses which met the acceptance  
14 criteria in 10 CFR 50.67.

15 And, the staff's determination of  
16 reasonable assurance was supported by the recognition  
17 that there is a high probability that doses will be  
18 significantly lower than those estimated by the  
19 licensees, using deterministic methods that do not  
20 credit hold up and deposition of the main steam  
21 isolation valve leakage within the power conversion  
22 system.

23 This essential concept explains the  
24 relationship between the review of the four license  
25 amendment requests, and the use of risk insights to

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1 support our deterministic reviews.

2 Slide 9.

3 To summarize, the four LARs were completed  
4 using a team approach. Each safety evaluation  
5 includes a section on risk and engineering insights to  
6 support the staff's reasonable assurance finding.

7 The ISG is being developed to memorialize  
8 the staff's risk and engineering insights, as employed  
9 in the four safety evaluations.

10 Slide 10?

11 Slide 10 describes staff efforts to revise  
12 Reg Guide 1.183. The draft guide contains three MSIV  
13 leakage models, as well as a streamlined procedure to  
14 allow credit for an intact power conversion system  
15 employing insights from the ISG.

16 The staff's intention is that the revised  
17 guidance will provide licensees with a methodology  
18 that will have a more predictable regulatory outcome.

19 Now, Dr. Shilp Vasavada will discuss the  
20 technical content of the ISG.

21 MR. VASAVADA: Okay, thanks, John.

22 This is Shilp Vasavada, and I work in the  
23 Division of Risk Assessment in NRR. I will provide an  
24 overview of the ISG, starting with the technical  
25 context.

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1           As John very clearly explained, the NRC  
2 staff can be faced with review challenges due to input  
3 parameter uncertainty in the dose calculations  
4 submitted by the licensees.

5           Most of these dose calculations do not  
6 credit any of the SSEs beyond the outboard MSIVs.  
7 And, quantitative credit, as John pointed out, which  
8 changes the analysis of record for holdup in the  
9 condenser, is available through that 1999 safety  
10 evaluation on a BWRG topical.

11           The staff recognized again as any great  
12 team approach, that realistic pathways for efficient  
13 products exist through the power conversion system,  
14 which can help overcome review challenges and support  
15 the staff in reaching a reasonable assurance finding.

16           Next slide, please.

17           What I said verbally in the previous slide  
18 can be depicted pictorially using this slide and the  
19 next one. This slide essentially shows how the MSIV  
20 dose calculations, or MSI leakage dose calculations,  
21 are actually performed, which is that everything  
22 outside the, I'm sorry, downstream of the outboard  
23 MSIVs is considered to not exist, and the leakage is  
24 considered to be a ground level leakage to the turbine  
25 building.

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1 Next slide.

2 However, in reality, there are several  
3 pathways for the fission products to, through the  
4 power conversion system as is illustrated in this  
5 figure. Basically, there is a conservative double  
6 forest of piping.

7 And, these pathways can provide holdup  
8 volumes if the configuration is viewed realistically,  
9 than in the, rather than in the stylized postulated  
10 manner which was illustrated in the previous slide.

11 So, the technical assessment we performed,  
12 which supports this ISG, was essentially done to  
13 double up the confidence in the availability of these  
14 realistic pathways and thereby, in the ability of the  
15 staff to use them as a decision making input when  
16 performing their reviews.

17 Next slide, please.

18 We are on slide 14, and this slide  
19 provides a very high level overview of the key inputs  
20 that went into the technical assessment. We provided  
21 additional details during the subcommittee meeting.

22 We essentially cast the problem of whether  
23 there is high confidence in the availability of the  
24 realistic pathways in the form of a risk triplet.

25 Having done that, we looked at operational

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1 insights, random failure properties for components  
2 such as MOVs, which are present in the realistic  
3 pathways, and the seismic capacity of the components  
4 in the realistic pathway.

5 Taking all of this together in an  
6 integrated manner, we double up the technical  
7 assessment to, which is supporting this particular  
8 ISG.

9 Next slide, please.

10 I'll spend maybe a few minutes on the  
11 seismic capacity evaluation and, to do the evaluation  
12 of the seismic capacity of the PCS components, power  
13 conversion system components.

14 We reviewed several diverse sources of  
15 information that compiled fragility data, which is the  
16 conditional probability of failure, given a seismic  
17 event.

18 In addition, we also looked at insights  
19 from post-earthquake walkdowns, and we performed  
20 representative risk calculations to estimate the risk  
21 of gross failure of the PCS.

22 The fragility information included sources  
23 from NUREGs, as well as industry sources and reports,  
24 as well as recently submitted seismic PRAs in response  
25 to post, agency's post-Fukushima actions.

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1           We also reviewed post-earthquake walkdown  
2 reports for North Anna and Kashiwazaki-Kariwa, which  
3 is in Japan. Both are, sorry, Kashiwazaki-Kariwa is  
4 a BWR.

5           Both these plants experienced earthquakes  
6 that exceeded their respective design basis  
7 earthquake. And, in that review, we focused on any  
8 impacts to PCS components.

9           We also reviewed the IAE report on the  
10 walkdown at the Onagawa plant in Japan, following the  
11 Great Tohoku Earthquake of 2011.

12           What all of that information led to was  
13 the determination of a lower bound medium fragility,  
14 which encompasses the different failure modes of SSEs  
15 in the power conversion system.

16           During the subcommittee meeting, there was  
17 a discussion on the source of the lower bound  
18 fragility compared to the weak path in the realistic  
19 pathway. So, I'll take a minute to clarify that.

20           The weak point of the main condenser, or  
21 in the realistic pathway, with respect to the hold-up  
22 of fission products and gasses would be the expansion  
23 boot between the bottom of the low pressure turbines,  
24 and the main condenser shell.

25           However, information on the fragility of

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1 this component was not available. Consequently, the  
2 assessment, the technical assessment used information  
3 on the seismic fragility of a related elastomeric  
4 component, which is the expansion joint for the  
5 circulating water connection to the tube side of the  
6 main condenser.

7 As we mentioned in the subcommittee  
8 briefing, an opening in the condenser shell does not  
9 significantly impact the hold-up of aerosols and  
10 gasses because of the large volume and low driving  
11 head.

12 And expansion joint represents a  
13 conservative fragility of elective to important SSEs  
14 such as piping involved in the PCS, and therefore, for  
15 the purposes of this ISG as a decision making input,  
16 can capture the impacts of the gross failure of the  
17 PCS.

18 Next slide, please.

19 So, in summary of our assessment going  
20 through all of that concluded that there is a high  
21 probability that doses will be lower than those  
22 estimated, strictly using traditional deterministic  
23 methods, which include accepted assumptions and that  
24 do not credit hold-up and retention of the MSIV  
25 leakage within the power conversion system.

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1                   This is the key insight from the  
2 assessment, and it forms the recommendation for the  
3 ISG.

4                   Next slide, please.

5                   With that background, I just kind of bring  
6 it back into context that the objective of the ISG is  
7 to provide a near term regulatory footprint, a formal  
8 regulatory footprint, for the staff's use of this  
9 primary insight that I just talked about in the  
10 previous slide.

11                   We expect that the ISG will be used by the  
12 staff to offset uncertainty and input parameters for  
13 deterministic calculations, and thereby help the staff  
14 reach its reasonable assurance finding during reviews.

15                   We want to take this opportunity to  
16 reiterate that the ISG does not change the licensee's  
17 responsibilities to demonstrate compliance with  
18 regulation, including 10 CFR 50.67, nor does it change  
19 any acceptable methods for demonstrating compliance  
20 with 10 CFR 50.67.

21                   That's it from my end and I'll turn it  
22 over to Jerry Dozier, I believe, to take it forward.  
23 Thanks.

24                   MR. DOZIER:     Since the previous ACRS  
25 subcommittee meeting, we did have some changes to the

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1 draft ISG at that time.

2 OGC provided some editorial comments to  
3 the ISG for clarity that were incorporated. OGC also  
4 added a section regarding backfitting and issue  
5 finality discussion.

6 The staff included a new Attachment C with  
7 the analysis of public comments, and the staff  
8 provided clarification regarding the modeling  
9 uncertainty related to the ISG. Next slide.

10 Thirty-three comments were received.  
11 Thirteen of those comments were received from NEI; 19  
12 anonymous comments were given; and one comment, which  
13 was really not applicable to the whole study, was  
14 given by Liberty Toussaint. They actually gave like  
15 a financial report, so it was kind of not applicable.

16 One of the comments resulted in a change  
17 to the ISG. The full text of the comments and  
18 associated resolution are provided in ADAMS at the ML  
19 number on the board.

20 And, when we did submit that, we did have  
21 some duplicate information in the comment section that  
22 we will remove before our final ISG.

23 The following table provides a summary  
24 roll up, or categories, of public comments, followed  
25 by slides with general explanations for the

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1 disposition of various types of comments. Next slide.

2 So, of those comments, we tried to bend  
3 them into various categories. You'll see on the right  
4 the number of comments that we had in each of the, the  
5 categories.

6 Basically, we had a category for, you  
7 know, the purpose of the ISG. We had several comments  
8 regarding formal credit to the applicant's design  
9 basis. As we've expressed earlier, credit means that  
10 the analysis of record would show that the, for  
11 example, the condenser was credited and of course,  
12 those type of things are actually done in accordance  
13 with the Reg Guide, not, but for our ISG, it's  
14 basically a reasonable assurance determination.

15 We had comments regarding use of risk  
16 insights. Also, comments regarding the review  
17 process, and how we developed the ISG and the Reg  
18 Guide 1.183 review process.

19 We had a question regarding the  
20 uncertainty, and we changed the ISG as a result of  
21 that comment. Then, we had comments regarding ISG  
22 should not improve or is contrary to existing  
23 regulations. We had about 14 of those comments.

24 And, then we had some comments that felt  
25 like we were, we would be using Reg Guide 1.174

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1 instead of the LIC-206 process.

2 We'll talk about each one of these  
3 categories with maybe a specific example.

4 For the first, it would be, and now next  
5 slide, would be on the comment that we changed the  
6 ISG, and I'll turn that back over to Dr. Vasavada.

7 MR. VASAVADA: Thanks, Jerry.

8 So, on this comment as Jerry mentioned, we  
9 did receive a, this public comment on the treatment of  
10 uncertainties in the ISG.

11 The comment stated if I paraphrase, that  
12 modeling uncertainties were ignored when they are  
13 known to you can say dominate parameter uncertainties  
14 in the evaluation of risk.

15 While modeling uncertainties were not  
16 ignored, we did identify the need to clarify the  
17 discussion in Section 2.5 of Appendix A of the ISG, to  
18 explicitly state how parametric and modeling  
19 uncertainties were addressed in the technical  
20 assessment supporting the ISG.

21 So, for modeling uncertainties, we added  
22 clarification to the previous language to state that  
23 this uncertainty was addressed via conservatisms in  
24 the ISG's technical evaluation, as well as the  
25 unchanged conservatisms in the domestic dose

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1 calculations. And, the rest, that the guidance for  
2 doing those which again, was not changed by this ISG.

3 We added discussion in Section 2.5 of  
4 Appendix A of the ISG, to also state that the  
5 fragility values in the sources referenced in the  
6 technical assessment, were doubled up using state of  
7 practice matters, which is also another way of  
8 addressing modeling uncertainty, which according to  
9 Reg Guide 1.174, identifies the modeling uncertainty  
10 as where there is no consensus approach.

11 Next slide, please.

12 And, I'll let Jerry start, and then I'll  
13 take over.

14 Thanks, Jerry.

15 MR. DOZIER: Okay, for this one, there was  
16 several comments about where we're using the Reg Guide  
17 1.174, which is used to change the licensing basis.

18 And, like I said, we were actually using  
19 LIC-206 to use risk insights to come up with a  
20 reasonable assurance determination. But I'll turn it  
21 back over to Dr. Vasavada to explain the resolution of  
22 that comment.

23 MR. VASAVADA: Thanks, Jerry. So, this is  
24 Shilp again. Excuse me.

25 As Jerry mentioned, the precedent shows

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1 that MSIV leakage LARs are not risk informed following  
2 the Guidance in 1.174 and 1.177. And, risk, insight,  
3 the use of risk insights for the staff is not limited  
4 or precluded if the amendment is not risk informed.

5 In addition, our rationale also is that  
6 the ISG is not the sole decision making basis for the  
7 MSI leakage analysis review. It actually provides  
8 support, if necessary, to the NRC staff to reach its  
9 reasonable assurance finding that applicable  
10 regulations have been met when they are evaluating  
11 this dose analysis, which is again, following the  
12 guidance in the Reg Guide.

13 And, there are associated uncertainties  
14 with the import parameters to those dose calculations.

15 So, the ISG is used, if it is used, in  
16 conjunction with the deterministic analysis review.  
17 And, that deterministic analysis review forms the  
18 primary basis for the staff decision.

19 Moreover, if you look at the entirety of  
20 the MSIV leakage analysis and review, one can state,  
21 clearly state, that defense in-depth and safety  
22 margins continue to exist not only because of the rule  
23 itself and what it states, but also because of the  
24 conservatisms in the guidance for determining dose  
25 calculations. No accords or standards, which are

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1 already in use are being changed.

2 And, the ISG technical assessment also  
3 does not take any credit for the margin that high  
4 pressure piping would be, would have of any of the  
5 subject to a low pressure scenario, which is the case  
6 for the MHA.

7 So, in short because of all these reasons,  
8 we did not agree with this comment.

9 I'll turn it back to Jerry.

10 MEMBER KIRCHNER: Shilp, before you go on,  
11 this is Walt Kirchner.

12 MR. VASAVADA: Yes.

13 MEMBER KIRCHNER: So, the maximum, the MHA  
14 for this particular set of plants is what? Could you  
15 just give us the definition of what was used for the  
16 MHA?

17 MR. VASAVADA: Sure. So, I'll give what  
18 my understanding, but I would also request John or  
19 Elijah to jump in and correct me, or provide  
20 additional context.

21 My understanding is what was used was a  
22 double-ended guillotine break of the recirc line,  
23 suction line, right, John? Am I correct?

24 MR. PARILLO: Well, Shilp, the way I look  
25 at the maximum hypothetical accident, it's the

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1 accident that's described via a footnote in the  
2 regulation.

3 And, basically what it is is the core  
4 melts, and appreciable amounts of fission products are  
5 released into the containment so that the containment  
6 is assumed to be leaking at its design based its  
7 leakage.

8 In other words, the core melts but the  
9 containment holds. That is really what a maxima  
10 hypothetical accident is.

11 Now, in guidance now it's currently  
12 referred to as a LOCA, which Shilp mentioned would be  
13 a major pipe break as postulated as a cause.

14 But the footnote does not address any  
15 cause. It simply states that the analysis generally  
16 assumes substantial core melt with an appreciable  
17 release of fission products into the containment.

18 MEMBER KIRCHNER: Okay, so this is  
19 traditional from 10 CRF 50 and 52 in terms of a  
20 postulated MHA?

21 MR. PARILLO: Exactly.

22 (Simultaneous speaking.)

23 MEMBER KIRCHNER: Best way to start.

24 MR. PARILLO: It --

25 MEMBER KIRCHNER: Okay, thank you.

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1 MR. PARILLO: -- absolutely goes back to  
2 100.11 from 1962.

3 MEMBER KIRCHNER: Right, right. Okay,  
4 thank you.

5 MR. PARILLO: Thank you.

6 DR. DICKSON: Hi, this is Elijah Dickson.  
7 We do real actual consequence analyses in NRR, you  
8 know, with John Grillo.

9 The technical bases of this MHA source  
10 term can be found in NUREG 1465, and if you're curious  
11 to know what type of accident sequences were used to  
12 derive that source term and how they did the modeling  
13 in MELCOR, it could be found there.

14 MEMBER KIRCHNER: Thank you.

15 MR. VASAVADA: This is Shilp, I'll turn it  
16 back to Jerry. Jerry and Hess, you are taking over,  
17 right? Thanks.

18 MR. DOZIER: Okay, so we're continuing  
19 with the discussion of some of the public comments,  
20 and Dr. Vasavada shared two of those.

21 I'm going to share a few of those that  
22 were general. I'll give the specific words to give  
23 the commentor, to characterize it better. You'll see  
24 in the slides basically a summary, and how we resolved  
25 those comments.

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1                   Okay, this first comment was NRC 2021-01-  
2                   06 draft-0003-6. It was an NEI comment.

3                   This section of the ISG provides when the  
4                   ISG was developed, and that the technical assessment  
5                   identified the PCS as a realistic and available holdup  
6                   volume for fission products.

7                   The ISG also concludes that there is high  
8                   confidence in the SSEs in the PCS to provide a volume  
9                   for holdup, and retention of fission products.

10                  The question is why isn't the staff  
11                  incorporating this well thought out risk informed  
12                  methodology into Reg Guide 1.183? Why is this method  
13                  being limited for use only by the NRC staff when  
14                  reviewing AST LARs?

15                  For that positive comment we did have to  
16                  say it's out of scope. This comment is out of scope  
17                  for the ISG because it relates to the update of  
18                  Regulatory Guide 1.183, which is a separate document.

19                  Once the draft of Reg Guide of 1.183 is  
20                  complete, the public will be given an opportunity to  
21                  provide comment on the guidance document prior to  
22                  issue.

23                  No changes were made to the final ISG as  
24                  a result of this comment.

25                  MEMBER PETTI: So question here. You

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1 didn't answer their question, which I understand, it's  
2 out of scope. But you are incorporating this in 1.183  
3 and you'll have the opportunity to talk about it --

4 MR. DOZIER: Yes --

5 (Simultaneous speaking.)

6 MEMBER PETTI: -- later.

7 MR. DOZIER: -- and then you'll see that  
8 in the wrap up slide at the end.

9 Yes, we are moving forward with, of course  
10 with, okay, in this particular case, we were using the  
11 risk insight.

12 In the Reg Guide 1.183, it would be how  
13 the applicant would use that information to change  
14 their licensing basis to get the full credit and  
15 change the numbers, the calculations of record to that  
16 new, to that. And, they would use Reg Guide 1.183 to  
17 do that.

18 For the ISG of course we did not change  
19 any numbers in their calculation of record.

20 MEMBER PETTI: Yes. So, help me  
21 understand just from a process perspective given the  
22 timing of this relative to 1.183.

23 Why did you feel this needed to be issued  
24 now? Is there some LARs right out there right now  
25 that wouldn't, you know, be covered until, you know,

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1 relative to the timing of 1.183?

2 MR. DOZIER: Maybe when industry is there,  
3 that might be a good question for them is anything  
4 coming in. But to my knowledge, we do not have any  
5 rush to get this out to support a license amendment  
6 request.

7 MEMBER PETTI: So, why go, again, I'm  
8 trying to understand the process. Why go through an  
9 ISG when you could have just, you know, gone and done  
10 the relevant changes you wanted to make in 1.183?

11 MR. DOZIER: This change will actually go  
12 into the standard review plan because it's for the  
13 staff's guidance.

14 Reg Guide --

15 MEMBER PETTI: Ah, okay.

16 MR. DOZIER: -- 1.183 is for the  
17 applicant, and also for us to review with.

18 MEMBER PETTI: Yes.

19 MR. DOZIER: But this is how we would  
20 review and come up with our reasonable assurance  
21 determination. And, that's why this is a separate  
22 project.

23 MEMBER PETTI: Got you, thanks.

24 VICE CHAIR REMPE: So, this is Joy, and I  
25 guess I'd like to ask Dave's question a little

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1 different way.

2 In light of the fact that you are updating  
3 Reg Guide 1.83 and you're going to be putting it out  
4 for public comments, is there the potential that you  
5 may learn something from Reg Guide 1.83's update that  
6 will require you to go back and make some additional  
7 changes to this ISG?

8 MR. DOZIER: Well, this ISG is basically  
9 memorializing what we've already done in four LARs.

10 Of course, when we're updating Reg Guide  
11 1.183, and I think maybe some of my colleagues should  
12 answer, answer that question further, I'm sure, I mean  
13 we are updating it and we are learning things. But to  
14 this point, we've not found anything that would change  
15 this ISG.

16 MS. KHANNA: And Jerry, this is Meena, I'm  
17 going to just add on.

18 So, we thought about this question as  
19 well, and where we are right now is that we've  
20 completed all the work as Jerry mentioned that this  
21 does document the strategy, the approach, the review  
22 that we took for the four LARs that we've reviewed.

23 We do believe that we're in a good place  
24 to be able to issue this if, you know, if the ACRS  
25 members agree. And again, it has not been finalized

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1 yet; it's still going through concurrence. So, we  
2 will be able to address any comments that we need to.

3 In addition to that, this will be a living  
4 document so we can at any time, go back. Even if we  
5 issue it, we can go back and add anything if we learn  
6 anything new. That's something that we can definitely  
7 do with an ISG.

8 VICE CHAIR REMPE: And, then you'd come  
9 back to ACRS and it just seems like again, ACRS is  
10 supposed to be considered a safety, not process  
11 efficiency. But why not do them at the same time and  
12 be done?

13 MS. KHANNA: Yes, so, that's definitely an  
14 option. We respect and appreciate that and knowing  
15 that the ACRS meeting on the Reg Guide is actually  
16 November 19 and it's so close to this date, we don't  
17 see an issue there.

18 But at the end of the, we would say that  
19 we've done a robust review. We don't expect any  
20 changes but you're absolutely right, if there's  
21 something that comes about that's significant, we  
22 would definitely come back to you.

23 But again, I will just say that we're okay  
24 with waiting. Our recommendation was to move forward  
25 because we believe that we're in a good place. But

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1 knowing that the ACRS subcommittee meeting is just  
2 around the corner, that's also an option that's  
3 available.

4 VICE CHAIR REMPE: Because again, what the  
5 subcommittee says doesn't really count. It'll be when  
6 the full committee does the letter on it, okay?

7 But thank you for your response.

8 MS. KHANNA: Sure.

9 MEMBER PETTI: That helps a lot. Thank  
10 you.

11 MS. KHANNA: Okay, Jerry?

12 MR. VASAVADA: Jerry, you may be on mute  
13 if you're talking. I'm sorry.

14 MR. DOZIER: Yes, I was on mute. I  
15 apologize for that.

16 Okay, so continuing with the comments and  
17 again, we were, these are generalized comments, but  
18 several of the ISG comments related to obtaining  
19 formal credit in the licensees' design basis.

20 And, again, you know, just like we've  
21 already talked about, this comment was out of scope.  
22 And, it relates to the Reg Guide 1.183 and we'll be  
23 addressing it, in it because with this ISG, we're not  
24 crediting or changing anything in the licensees'  
25 design basis.

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1 So, next slide.

2 We had also some generalized public  
3 comments regarding use of risk insights. With this  
4 one I'm actually going to read the comment.

5 It would be NRC 2021-106 draft-0011, and  
6 it says: The NRC is confusing the use of PRA in  
7 quantitative health objectives with the intent of the  
8 regulations in 10 CFR Part 20 and 10 CFR 50.67.  
9 Limits on radiation dose for protecting workers and  
10 the public are based on preventing the likelihood of  
11 cancer in the exposed population.

12 The proposed ISG would adversely affect  
13 the dose to workers, and especially control room  
14 operators charged with mitigating the consequences of  
15 accidents, and have adverse impacts on public health  
16 and safety, and protecting the environment.

17 The NRC disagrees with the comment. The  
18 ISG cannot and does not change any regulation. It  
19 does not specify or change the acceptable methods for  
20 performing dose calculations to meet the regulations  
21 in 10 CFR Part 20, and in 10 CFR 50.67.

22 The ISG does not alter the licensee's  
23 analysis of record to meet 10 CFR 50.67. It provides  
24 support for the NRC staff to reach a reasonable  
25 assurance conclusion that the applicable regulations

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1 have been met when evaluating traditional  
2 deterministic analysis containing parameters with  
3 associated uncertainty.

4 Further, the technical assessment for the  
5 ISG uses neither a probabilistic risk assessment as  
6 defined in NUREG 2122, nor does it rely on the  
7 quantitative health objectives.

8 No changes were made to the final ISG as  
9 a result of this comment. Next slide.

10 There was several comments related to  
11 generalized public comment regarding the ISG in the  
12 Reg Guide 1.183 review process. This will be, I'll be  
13 quoting from the comment. An example comment would be  
14 NRC 2021-0106 draft-0004.

15 The draft ISG represents a substantial  
16 departure from the design basis of falling water  
17 reactors, and should be reviewed by the Atomic Safety  
18 Licensing Board Panel. The staff disagrees with the  
19 comment.

20 The ISG does not change or result in  
21 departures from the design basis of boiling water  
22 reactors. The ISG does not alter the licensee's  
23 analysis of record to meet 50.67, or any system  
24 qualifications.

25 It provides support for the NRC staff to

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1 reach a reasonable assurance conclusion that the  
2 applicable regulations have been met, when evaluating  
3 traditional deterministic analysis containing  
4 parameters with associating an uncertainty.

5 NRC's process for interim staff guidance  
6 documents is being followed by this ISG. This process  
7 described in LIC-508 Development Issuance Enclosure of  
8 Interim Staff Guidance Documents for the Office of  
9 Nuclear Reactor Regulation, involves internal review,  
10 review by the advisory committee for reactor  
11 safeguards, the ACRS, the Office of General Counsel,  
12 and the members of the public.

13 No changes were made to the final ISG as  
14 a result of this comment. Next slide.

15 One more group of comments, and we had  
16 several of these that says that the ISG should not be  
17 approved. And, I'll give an example of one of these,  
18 which would be NRC 2021-0106 draft-0005.

19 The proposed ISG allows plants to operate  
20 with the greatest safety equipment credit for  
21 mitigating the release of radiation adversely  
22 affecting operators in the control room. The ISG  
23 credit for condenser holdup is non-conservative and is  
24 not supported by experimental testing for the removal  
25 of radionuclides. As such, the ISG would not meet the

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1 regulations in 10 CFR 50.67 for control room dose. The  
2 staff disagrees with this comment.

3 And, it's pretty much the same thing I  
4 said on the other. The ISG does not specify or change  
5 the acceptable methods for performing dose  
6 calculations to meet the regulations.

7 The ISG does not alter the licensee's  
8 analysis of record to meet 10 CFR 50.67. The ISG  
9 provides support for the NRC staff to reach a  
10 reasonable assurance conclusion that the applicable  
11 regulations have been met when evaluating traditional  
12 deterministic analysis containing parameters with  
13 associated uncertainty.

14 The ISG does not provide any quantitative  
15 credit for condenser holdup, which would change the  
16 licensee's analysis of record. Quantitative credit  
17 for condenser holdup is a purview of Reg Guide 1.183.

18 No changes were made to the final ISG as  
19 a result of this comment. Next slide.

20 MEMBER HALNON: Jerry, this is Greg  
21 Halnon.

22 Did you analyze how the commentators or  
23 commentor got to the point that they said that the  
24 control room dose would be higher?

25 Your answer is it's not, and their

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1 question was it is. What's the gap there? How did  
2 they --

3 (Simultaneous speaking.)

4 MR. DOZIER: For the --

5 MEMBER HALNON: -- I'm sorry.

6 MR. DOZIER: -- for the, you know, we only  
7 had the comment as read. So, we did not have any  
8 additional information other than the comment was  
9 anonymous, and so we did not have any additional  
10 information to review other than what we saw since the  
11 comment was anonymous.

12 MEMBER HALNON: Okay. So, rather than  
13 read something into it, just hand off to 1.183 and add  
14 more detail for that effort. So, basically the  
15 answer.

16 MR. DOZIER: I wouldn't say hand off but  
17 yes, I guess that's true.

18 MEMBER HALNON: Okay. I mean I can  
19 postulate different scenarios that could get there,  
20 but I don't have any, I don't want to read something  
21 into a comment and make something of it, but I  
22 understand where you're going. Thanks.

23 MR. DOZIER: Right, and also when we're  
24 responding to these comments, we have to get OGC  
25 review. And, they're very good at what they do.

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1 MEMBER HALNON: Yes, I understand.

2 MEMBER PETTI: Just another question here.

3 Doesn't the changing of the leak rate and  
4 allowing a little higher leak rate from these valves  
5 actually help the workers? Because there's a fair  
6 amount of dose they take in, you know, making sure  
7 that they meet that, the tech spec.

8 MR. DOZIER: Maybe I could get John  
9 Parillo to do that because he did one slide that  
10 actually showed that. And, then perhaps when NEI gave  
11 the presentation, they could say what their burden  
12 was.

13 Because you know, as far as radiation, the  
14 maintenance of these big valves in the main steam  
15 tunnel is a very high radiation area.

16 But let me --

17 MEMBER PETTI: I'm just saying you know,  
18 you've got two different, right? These comments  
19 really don't talk about that, which is an important  
20 consideration in the overall scheme.

21 MR. PARILLO: Yes, this is John Parillo.

22 That's exactly right and as I mentioned,  
23 that's really the driver, one of the main drivers  
24 behind licensees that have requested an increase in  
25 this MSIV leakage. It's because this is a very dose

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1 intensive job to maintain these valves with very, very  
2 low leakage.

3 And remember, these leakages are in  
4 standard cubic feet per hour. So, they're still very  
5 low. Even as they have increased them, they're still  
6 very low.

7 And, so the maintenance and the real what  
8 I would say the real dose to workers, is a major  
9 consideration in this effort. Thank you.

10 MEMBER HALNON: Yes, this is Greg, and on  
11 the contrary, you can say more leakage downstream of  
12 the MSIVs just makes higher doses throughout the plant  
13 as well, or other items.

14 So, you could argue it both ways. It  
15 comes down to magnitude and that's what you don't have  
16 the analysis in front of us to be able to look at.

17 MR. DOZIER: We sometimes framed it as  
18 calculated dose versus real dose in the maintenance.  
19 Okay, so for the takeaways, what's next?

20 The ISG result in consideration of a large  
21 holdup volume in future MSIV leakage LARs. It offsets  
22 uncertainty in input parameters for deterministic  
23 calculations. It supports the staff's reasonable  
24 assurance finding during reviews, and realize it's  
25 only applicable, this insight is only applicable if

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1 quantitative credit is not included in the licensee's  
2 calculations.

3 So, it was something they could have done  
4 but they didn't do, but we know that if they did, they  
5 would have had a substantial reduction in calculated  
6 dose.

7 The ISG does not change the licensee's  
8 responsibility to demonstrate compliance with 10 CFR  
9 50.67. Acceptable methods for demonstrating  
10 compliance remain unchanged.

11 The ISG is expected to be transitioned to  
12 a standard review plan, section 15.0.1 and as the  
13 question earlier was, this is the answer: formal  
14 condenser holdup credit for licensees is being  
15 considered in a revision to Reg Guide 1.183.

16 And, that was our last slide.

17 MEMBER PETTI: Well, thank you.

18 MR. DOZIER: Thank you.

19 MEMBER PETTI: Okay, with that let's hear  
20 I guess, the different views.

21 MR. SNODDERLY: Yes, thank you Member  
22 Petty. Mark Blumberg, if you could bring up your  
23 slides? Thank you.

24 And, then just as Chairman Sunseri  
25 suggested a time for a break, I would suggest that

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1 after Mark and Mike Markley go, that might be a time  
2 for a break although I know the staff wanted to maybe  
3 make some comments after.

4 But that probably would be the best time.  
5 But let's let Mark get through his material first.  
6 Thanks.

7 MR. BLUMBERG: Are we ready?

8 MEMBER PETTI: Go ahead.

9 MR. BLUMBERG: Okay. My name is Mark  
10 Blumberg as Mike said. Mike Markley and I would like  
11 to thank you for the opportunity to provide our  
12 differing views on this draft ISG, the tender review  
13 by the ACRS.

14 As noted previously, these remarks that we  
15 will make represent mine and Mike's views, and do not  
16 represent positions of the NRC staff or management.

17 Just to give you some background on me,  
18 I'm a Senior Reactor Engineer in the NRC's Division of  
19 Risk Assessment, and have been working in this area of  
20 nuclear engineering and radiological consequence  
21 analysis for 37 years.

22 For many of the last 23 years, I've been  
23 the technical lead for Regulatory Guidance and  
24 Computational Code Development at the NRC for accident  
25 analysis, including DG 1199, which is a draft revision

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1 to Reg Guide 1.183, and the current draft revision,  
2 which is DG 1389, that will be undergoing review by  
3 the ACRS.

4 For Mike and me, our goal today is inform  
5 your consideration and recommendations, on the ISG  
6 using our related experience and knowledge.

7 The regulatory process for compliance with  
8 10 CFR 50.67 is a very systematic process. A method  
9 for demonstrated compliance with 50.67 is contained in  
10 Reg Guide 1.183.

11 The process and methods described in the  
12 draft ISG can, and have been used, to circumvent that  
13 guidance by approving licensing actions that are wrong  
14 because they don't comply with the regulations.

15 A stated purpose of the ISG is for the NRC  
16 staff to resolve differences between the licensees'  
17 methods and assumptions, and those deemed acceptable  
18 to the NRC. On its own initiative, the NRC has used  
19 methods upon which the ISG is based to approve license  
20 amendments in a manner that is contrary to the  
21 licensing process.

22 In particular, the NRC has done this  
23 without requiring the applicants to fix errors in  
24 their analyses, or in supplements to the license  
25 amendment request.

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1           In contrast, the current standard review  
2 plan has the staff resolve these differences by having  
3 the licensee fix significant differences, and by  
4 basing our acceptance upon the licensee's docketed  
5 analysis containing methods and assumptions that we do  
6 find acceptable.

7           The current SRP 15.01 and Reg Guide 1.183  
8 methods are consistent with 10 CFR 50.67. However,  
9 the proposed ISG method is not. The NRC staff should  
10 not be developing the analysis to support approval of  
11 license amendments by offsetting methods we do not  
12 find acceptable.

13           Because the regulation states that the NRC  
14 may approve the application only if the applicant's  
15 analysis demonstrates reasonable assurance, the ISG  
16 method is not consistent with the regulations Reg  
17 Guide 1.183, or the SRP.

18           All information relied on for the NRC's  
19 license amendment must be signed under oath and  
20 affirmation, and submitted to the NRC document control  
21 desk, but that did not happen for the precedence in  
22 which this ISG is based.

23           The ISG asserts that it does not change  
24 these systematic methods. We disagree. While the ISG  
25 does not explicitly change Reg Guide 1.183, it does

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1 implicitly change these methods by being based upon  
2 engineering insights that conflict with Reg Guide  
3 1.183.

4 The engineering insights in the ISG  
5 discount release pathways from the MSIV valve stem,  
6 bonnets, and other direct leakage to the steam tunnel.

7 HCR's concerns in the past regarding these  
8 pathways were previously considered so significant to  
9 safety, that it led to the installation of safety  
10 related leakage control systems to mitigate these  
11 release pathways.

12 The ISG engineering insights credit  
13 mitigation of the MSIV leakage to the steam tunnel by  
14 crediting the non-safety related steam tunnel space  
15 and blowout door seals, and the pathway itself through  
16 the MSIV packing.

17 In contrast, Reg Guide 1.183 does not  
18 credit these non-safety related structures, or the  
19 MSIV leakage pathway for mitigation.

20 Reg Guide 1.183 Regulatory Position 5.1.2  
21 in part states that credit may be taken for accident  
22 mitigation features that are safety related, and  
23 required to be operable by technical specifications.

24 Neither the steam tunnel nor the blowout  
25 door seals meet this regulatory position, yet the ISG

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1 engineering analysis credits them.

2 More importantly, some steam tunnel  
3 designs open directly to the non-safety related  
4 turbine buildings that are open to the environment.

5 Reg Guide 1.183 Appendix A, Regulatory  
6 Position 6.4 and 6.5 provide acceptable MSIV leakage  
7 modeling for designs without engineering safety  
8 features, or components capable of performing their  
9 safety functions.

10 In these designs, the releases to the  
11 steam tunnel should be assumed to be an unprocessed  
12 release to the environment.

13 The ISG discounts all releases to the  
14 steam tunnel despite the fact that all the allowable  
15 MSIV leakage could be released to the steam tunnel.

16 The surveillance testing performed for the  
17 MSIV leakage test pack does not discriminate where the  
18 leakage originates, making it possible that all  
19 leakage is to the steam tunnel, and operating  
20 experience studies indicate that approximately one in  
21 seven BWR MSIV failures is related to the valve stem  
22 leakage.

23 Since these release pathways would bypass  
24 any mitigation by the condenser that is central to the  
25 ISG logic, not considering these pathways constitutes

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1 a significant flaw in the ISG technical basis.

2 The ISG in its engineering insights are  
3 based largely on methods used by the NRC staff to  
4 approve four license amendment precedents containing  
5 numerous errors.

6 These errors and the lack of compliance  
7 with the regulations in one of these license  
8 amendments, have been confirmed by an independent  
9 panel of experts.

10 These panel results are currently not  
11 publicly available, but will become available in the  
12 future for your review, and your consideration.

13 One of the errors involved the NRC staff  
14 approving a calculation with an aerosol deposition  
15 model that is known to be orders of magnitude in the  
16 non-conservative direction.

17 Approval of the ISG would allow the use of  
18 these grossly non-conservative models to improperly  
19 calculate accident doses for demonstrating compliance  
20 with the regulations.

21 As such, the ISG does not meet the  
22 principles in Reg Guide 1.174, in that the regulation  
23 is not met.

24 The engineering insights that credited  
25 mitigation of the MSIV leakage in the flow pass are

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1 inconsistent with our knowledge and reviews of a prior  
2 similar issue.

3 Dr. Dana Powers reviewed methods that  
4 asserted mitigation releases by cracks in reactor  
5 containment buildings.

6 It is our understanding that the aerosols  
7 of the sizes considered in these analyses would likely  
8 follow the slipstreams around any obstacles and that  
9 extrapolation of available experiments to model these  
10 pathways was questionable.

11 His report SAND2009-1701 stated that  
12 deposition of particles also can be limited by the  
13 bounce from surfaces defining the leakage pathways,  
14 and by resuspension of particles to positive on these  
15 surfaces.

16 Resuspension of deposited particles can be  
17 triggered by changes in flow conditions, particle  
18 impact on the deposits, and by shock or vibration to  
19 the surface, on the surfaces. Therefore, credit for  
20 MSIV valve packing similarly would be questionable  
21 and likely, very small.

22 The ISG also depends upon crediting  
23 pathways to the condenser without requiring licensees  
24 to provide docketed information confirming that the  
25 pathway can, and will be used, and operated in a

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1 manner credited in the analysis.

2           Once again, this is inconsistent with the  
3 regulation that requires us to approve the amendment  
4 based upon the licensee's docketed analysis, and not  
5 our own personal NRC staff judgment on how the  
6 facility will be operated.

7           Next, Mike Markley will address the last  
8 bullet with you, but first I'd like to summarize what  
9 I've provided so far.

10           ISG methods have, and will be, used to  
11 approve accident analysis calculations with  
12 assumptions and methods not deemed acceptable to the  
13 NRC.

14           This staff approval is based upon NRC  
15 staff judgment, not using systematic methods, and not  
16 based upon docketed information.

17           The engineering insights in the ISG  
18 disregard the modeling pathways to the environment  
19 previously considered so important that safety related  
20 systems were installed to mitigate these pathways.

21           These pathways bypass the condenser relied  
22 upon in the ISG's engineering insights. Engineering  
23 insights in the ISG are inconsistent with our  
24 scientific knowledge, and conflict with the NRC  
25 approved systematic methods in the Reg Guide 1.183.

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1           In closing, I appreciate the committee's  
2           time to hear our differing views with the ISG. Much  
3           more information regarding the details of our views,  
4           and those of the independent panel, can be found in  
5           over 110 pages of documentation and recommendations  
6           that will be released to the public in the future.

7           We feel the ACRS could add substantial  
8           value to their review by considering the views, these  
9           views, and issues in these documents.

10           Next, I'd like to turn over the  
11           presentation to Mike Markley.

12           VICE CHAIR REMPE: Mark, before you  
13           switch, in your comments, you mention several reg  
14           guides that provide guidance for how to assess the  
15           leakage. Could you say those numbers again? I didn't  
16           quite them in my notes.

17           MR. BLUMBERG: Sure. The main guidance  
18           documents for assessing the leakage of what a licensee  
19           proposes to meet compliance with 50.67 is Reg Guide  
20           1.183.

21           VICE CHAIR REMPE: But you gave a couple  
22           other numbers in your discussion I thought. I'm aware  
23           of 1.183, but you mentioned like some others when you  
24           were talking.

25           MR. BLUMBERG: Well, I mentioned Dr. Dana

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1 Powers' report which was SAND2009-1701. Is that  
2 perhaps what you're thinking of?

3 VICE CHAIR REMPE: No, again, I should  
4 have stopped you when you said it, but I didn't want  
5 to interrupt you. But I thought you mentioned a  
6 couple of reg guides when you said that there is  
7 guidance already available to the staff, but maybe I  
8 misheard, too.

9 MR. BLUMBERG: I did cite a couple of  
10 regulatory positions from Reg Guide 1.183. One of  
11 those was Regulatory Position 5.1.2.

12 VICE CHAIR REMPE: That's it. It's a  
13 regulatory position, okay. So say that number again?

14 MR. BLUMBERG: 5.1.2.

15 VICE CHAIR REMPE: Okay.

16 MR. BLUMBERG: And Regulatory Guide 1.183  
17 Appendix A, Regulatory Position 6.4 and 6.5.

18 VICE CHAIR REMPE: Okay, yes. I do  
19 remember a six something or other. Thank you.

20 MR. BLUMBERG: You're welcome.

21 MEMBER BLEY: Mark?

22 MR. BLUMBERG: Yes.

23 MEMBER BLEY: This is Dennis Bley. Can  
24 you tell us what the status of the DPO is right now?  
25 I don't think we've actually seen all the documents

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1 yet, but I appreciate your presentation.

2 MR. BLUMBERG: That's correct. The  
3 documents are not to be made available until the  
4 process is complete. We are currently awaiting the  
5 NRR Director's decision on the matter. So what has  
6 happened is the differing views have been provided in  
7 a report and that report has been assessed by a panel  
8 of independent experts. And then that report, along  
9 with other information is being used by the NRR  
10 Director to make a decision.

11 MEMBER BLEY: Okay. Thanks very much.  
12 We're kind of between a rock and a hard place on this  
13 one since all we have is what you've told us today,  
14 but thanks for talking through it.

15 MR. BLUMBERG: I share that --

16 MR. SNODDERLY: Mark, this is Mike  
17 Snodderly. You're still showing your cover slide.  
18 Could you please -- did you mean to do that?

19 MR. BLUMBERG: No, I did not. I did not.

20 MR. SNODDERLY: Thank you.

21 MR. BLUMBERG: I just fired into the  
22 presentation and missed turning the slide. I  
23 apologize to the members for doing that.

24 MEMBER PETTI: And your colleague wanted  
25 to speak?

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1 MR. MARKLEY: Yes.

2 MEMBER PETTI: Go ahead.

3 MR. MARKLEY: This is Mike Markley.

4 MEMBER KIRCHNER: Before you change, Mike,  
5 before you start -- this is Walt Kirchner.

6 Mark, you mentioned in one of your  
7 bullets, you mentioned an independent panel. Can you  
8 share who that is? Is it an NRC staff panel or is it  
9 independent outside expertise or who is this panel?

10 MR. BLUMBERG: The panel is a group of  
11 independent NRC experts.

12 MEMBER KIRCHNER: So these are NRC  
13 employees --

14 MR. BLUMBERG: That were not tied to the  
15 matter.

16 MEMBER KIRCHNER: Who were not tied to the  
17 ISG effort or to you. Okay. Thank you very much.

18 MR. BLUMBERG: You're welcome.

19 MR. MARKLEY: This is Mike Markley and I'm  
20 speaking here myself today as Mark and sharing my  
21 views. I do not represent the NRC staffs or  
22 managements. I've been in the nuclear industry for 40  
23 years, 34 at the NRC, 6 years as a senior staff  
24 engineer for the ACRS with a Reliability and Peer PRA  
25 Subcommittee and Operations Subcommittees. I had the

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1 pleasure of working with Dr. Apostolakis and other  
2 members through the early debates of Reg Guide 1.174  
3 and the individual applications.

4 For the past 13 years, I've been Branch  
5 Chief in the Division of Operating Reactor Licensing  
6 and DORL of NRR. And in DORL, the branch chiefs  
7 reviewed this draft ISG when it was a White Paper in  
8 April of last year and we offered comments and  
9 recommended against concurrence on it, not  
10 collectively because obviously, there were two branch  
11 chiefs who signed out these amendments that we've been  
12 talking about.

13 But some of the comments that we offered  
14 at that time is that it was a substantial departure  
15 from the design basis of BWRs and that the draft  
16 guidance allowed plants to operate with the greatest  
17 safety equipment credited to mitigate accidents. And  
18 fixing the plant is always better than fixing the  
19 paper and this appears to be a paper-only fix via  
20 license amendments. And the NRC should not miss to  
21 use risk analysis to advocate or justify adverse  
22 industry trends or safety culture of not fixing the  
23 plant.

24 The direct guidance is risk based and does  
25 not ensure meeting the regulations in terms of dose.

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1 The proposed guide is not an approved method supported  
2 by Reg Guide 1.183 in its current form and the  
3 proposed guidance cuts the public out of the process  
4 for review and comment on the proposed generic changes  
5 for the licensing basis of BWRs.

6 And then again, the proposed guidance  
7 would also then --- we recommended at that time that  
8 the guidance would benefit from ACRS review, so we  
9 would rather have seen that on the front end when it  
10 was a draft White Paper before the four plants set  
11 precedence that you're seeing now that are credited  
12 for the development of the ISG.

13 Nevertheless, the unapproved White Paper  
14 was used to approve the four plants to set precedence.  
15 I'm glad it's now receiving ACRS review, but it should  
16 have come first.

17 I've known Mark Blumberg over the years  
18 and I've worked with him through a number of complex  
19 licensing actions where the NRC staff and licensees  
20 disagreed. With that exception, Mark's analysis was  
21 found to be correct and the licensees were either  
22 supplemented with new submittals and revised analysis  
23 or withdrawn from the NRC consideration.

24 There are calculations on professional  
25 differing views regarding the accuracy of the

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1 licensees' analysis meeting the regulations for the  
2 four precedents. We have concerns the NRC staff's  
3 methods and the ISG will codify the propagation of  
4 these errors in future licensing actions. It's also  
5 inconsistent with the licensing process and public  
6 interest for the NRC staff to develop analysis  
7 supporting licensee requests rather than the licensees  
8 submitting the information to justify the technical  
9 basis on the docket.

10 I want to note that the ACRS can provide  
11 expertise to assist the NRC staff, especially  
12 regarding the analytical methods. We fundamentally  
13 disagree with the calculation analysis of control dose  
14 meeting 50.67 and the NRC staff's approach to  
15 resolving the technically valid and relevant public  
16 comments. That's all I have. Thank you.

17 MEMBER PETTI: Okay, thank you.

18 MR. MARKLEY: Okay.

19 MEMBER PETTI: Well, we've been at this --  
20 why don't we take the break and then come back? I  
21 know NRR management wanted to say something. Unless  
22 they feel they could do it quickly, what's your  
23 preference, Meena?

24 MS. KHANNA: So thank you. We're okay  
25 with taking a break. I would like to ask a couple of

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1 my staff members to speak to some of the information  
2 that we heard from the two individuals if that's okay  
3 after the break, if you guys can support that, we'd  
4 like to do that and then I have some --

5 MEMBER PETTI: That's fine. That's fine.

6 So --

7 MEMBER BLEY: This is Dennis. Can I ask  
8 you a question? I'm a little concerned about us being  
9 asked to comment on the ISG when we know there is a  
10 DPO sitting out there and we don't know the results of  
11 that. It just feels out of sequence.

12 MEMBER KIRCHNER: I share that concern.  
13 This is Walt, Dennis.

14 MEMBER PETTI: I do, too.

15 MEMBER KIRCHNER: Yes, it seems that the  
16 NRC's internal process should be completed before we  
17 weigh in so to speak.

18 MEMBER PETTI: Because there's a lot of  
19 technical assertions here and the differing views that  
20 need to be -- I mean some are process related which we  
21 don't necessarily have to deal with, but there are  
22 technical issues here that were enumerated that --

23 MEMBER KIRCHNER: There's substantive  
24 technical questions being raised here that, as you  
25 said, even if we put aside the process aspect, that

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1 probably would bear further review. It's just -- I'm  
2 just following my intuition right now.

3 MEMBER HALNON: This is Greg. I share  
4 that because we kind of had the same discussion with  
5 the Seabrook issue with the ASR. We need to let the  
6 internal processes work out, otherwise we end up de  
7 facto influencing those processes.

8 MEMBER BALLINGER: This is Ron. I also  
9 agree. I think we're going to be unanimous. I'm  
10 trying to find underlying documents which is what I  
11 would like to see.

12 MEMBER PETTI: So Meena, you had a  
13 comment?

14 MS. KHANNA: Yes. Thank you. So I just  
15 want to know, I respect the thoughts that we're  
16 hearing here. I do want to mention that the DPO was  
17 not on the ISG. It was on the FitzPatrick MSIV SER.  
18 So I just want to be careful as far as, you know,  
19 we're talking about process. We believe that it's  
20 well founded. I would like to have the staff have an  
21 opportunity to speak to you guys about their views on  
22 what they've heard.

23 And then I do want to mention also, we  
24 weren't privy to all this information. The staff has  
25 been responsible for the ISG. It's just now hearing

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1 this. We did have the opportunity to have the slides  
2 that was presented. It did help to have some more  
3 context based on what we heard today. So we would  
4 like to have the opportunity after a break to have a  
5 few staff members to speak to you if you don't mind.  
6 But again, respect and appreciate where you're coming  
7 from, but we don't see the issues that have been  
8 raised here. I think impacting the ISG directly, I  
9 think they go well beyond the ISG. So maybe if you  
10 guys can give us an opportunity to provide some  
11 information that we have and then we can take it from  
12 there.

13 MEMBER PETTI: Sure. So members, what I'm  
14 thinking is we can talk about some of this after we  
15 hear from the staff members as we have our usual  
16 deliberation after we hear stuff at full committee.

17 So let's until the half hour, so come back  
18 at 30 minutes after.

19 VICE CHAIR REMPE: And are we going to  
20 hear from NEI then, too?

21 MEMBER PETTI: Yes. After we hear from  
22 the other employees, then we'll hear from NEI and then  
23 any other public comments.

24 VICE CHAIR REMPE: Thank you.

25 CHAIR SUNSERI: So Dave, there's one more

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1 question and then I have a comment. Go ahead, Mike  
2 Snodderly.

3 MR. SNODDERLY: I'm sorry, sir, I didn't  
4 have my hand up.

5 CHAIR SUNSERI: Okay. It was up, but it's  
6 now down.

7 All right, so let's take a 20-minute break  
8 and reconvene 20 until the start of the hour. All  
9 right?

10 MEMBER PETTI: Okay. Great.

11 CHAIR SUNSERI: Thanks. So we are  
12 recessed until 20 until.

13 (Whereupon, the above-entitled matter went  
14 off the record at 2:19 p.m. and resumed at 2:40 p.m.)

15 CHAIR SUNSERI: Okay, it's 20 minutes  
16 before the hour. We will reconvene the session here.  
17 This is Matt Sunseri.

18 Before I turn it over to Member Petti for  
19 (audio interference) I'd just like to say a couple of  
20 things. First off, we appreciate hearing the different  
21 views from the two presenters today, from a technical  
22 perspective, ACRS is trying to make a decision on the  
23 ISG. We're trying to formulate comments on the ISG  
24 and we want to hear different views. And so I think  
25 we heard the different views.

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1           It is not our obligation or our job to get  
2           in the middle of internal Agency processes on  
3           resolving the different views. And so any further  
4           remarks from staff or whatever, please keep that in  
5           mind. You know, we're not involved in the process,  
6           we're just here to hear the different opinions so that  
7           we can formulate our comments on the ISG.

8           And if anybody has any questions about  
9           that, you can ask me.

10           I will now turn it over to Dave.

11           Dave? Member Petti.

12           MEMBER PETTI: Okay, let's pick up where  
13           we left off and hear from staff.

14           MS. KHANNA: Okay, thank you so much. So  
15           I'm going to turn the presentation over to Elijah, Dr.  
16           Elijah Dickson. And he's going to walk us through  
17           some thoughts that he'd like to share and we'd like to  
18           also hear from a couple of the other members of the  
19           staff. Thank you.

20           DR. DICKSON: Thank you, Meena. Again,  
21           Elijah Dickson. I do these design basis accident  
22           radiological consequence analyses in NRR Division of  
23           Risk Assessment. And I'd like to provide you a little  
24           bit of perspective in regards to how we go about  
25           performing these analyses and the criteria or the

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1 figure of merit in terms of dose that we're computing,  
2 as well as discuss some of the conservatisms and  
3 margins that we rely on in the regulatory guidance  
4 when we're performing these analyses. These analyses,  
5 their intention is conservative, right? And they're  
6 not intended to represent any actual sequence of  
7 events, but rather intended to be surrogates to enable  
8 the deterministic valuation of the facility's response  
9 to a design basis accident.

10 The doses that we're computing aren't  
11 actual doses. These are figures of merit. And in  
12 that, there's as it's wrapped up in Regulatory Guide  
13 1.183 and 1.195, the analyses or the guidance that we  
14 use to perform the analyses, there is quite a bit of  
15 margin and conservatism in these calculations.

16 So you can kind of bin them into three  
17 different categories: analytical margin in regards to  
18 the code that we're using. There are margins in  
19 regards to the removal mechanisms that we use or that  
20 we compute and then use in our computer code. And  
21 then, of course, there's transport assumptions. And  
22 changing any one of these three categories, you can  
23 increase or decrease your figure of merit, that dose  
24 value, by tens of percentage points or by orders of  
25 magnitude. It depends on what you want to credit in

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1 the analysis itself.

2 And so, there are two big ones I'd like to  
3 point out to you. The first one is in regards to the  
4 transport of this beyond design basis source term that  
5 we're using. So when we're doing the calculations to  
6 assess leakage out of for instance MSIVs, we assume  
7 that the leakage is at the design pressure of the  
8 containment post-LOCA. And that leakage is assumed to  
9 go for 24 hours after which we allow licensees to have  
10 a deterministic reduction in the leakage rate by 50  
11 percent.

12 So post-LOCA, for instance, in a BWR, the  
13 drywell will reach about 45 pounds, very, very  
14 quickly, post LOCA. However, we don't credit the  
15 safety related drywell sprays to accurate and reduce  
16 the pressure in containment. And that happens over a  
17 period of about two minutes. So you'll see a pressure  
18 spike in the containment at around 45 pounds and then  
19 it decreases like a step function once these safety-  
20 related drywell sprays accurate down to around 5  
21 pounds or so.

22 And if you were to model it this way, the  
23 critical flow through these main steam isolation  
24 valves would be reduced and a leakage would be at  
25 much, much smaller rates. And this would be an order

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1 of magnitude type dose reduction in the calculations.  
2 So there's quite a bit of margin there in regards to  
3 the transport assumption of that source term through  
4 these particular valves or even through the  
5 containment leakage.

6 Now another area in which there's quite a  
7 bit of margin and this is something that would be  
8 allowed in Reg Guide 1.183 Rev. 0. It's also  
9 discussed in our Standard Review Plan and that is we  
10 generally don't allow for suppression pool scrubbing  
11 of halogens and iodines. I can't think of a single  
12 facility that we've allowed this for.

13 So when we're performing the analyses, we  
14 assume that the source term itself isn't a drywell,  
15 right, and then we use that concentration of that  
16 source term to then model the transport through the  
17 various reactor systems, through the containment, and  
18 then subsequently out to the environment. However, we  
19 don't credit suppression pool scrubbing, right? So  
20 when the event does occur, your safety related  
21 automatic depressurization valves, they pop open, the  
22 EDS system actuates which is part of the ECCS of a  
23 BWR.

24 They then direct the source term in effect  
25 down through the downcomers, through the T-Quenchers,

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1 into a very, very large body of water and the bubbles  
2 rise up between three and six feet. We know that the  
3 amount of halogens, based off of the study that we've  
4 done such as NUREG 11.50 and SOARCA that upwards to 95  
5 percent of the dosimetrically important radionuclides,  
6 specifically radioiodine, is actually suppressed and  
7 maintained in the suppression pool and this is  
8 something that we do not credit in the DVA calcs. We  
9 just assume that all of that source term is in the  
10 drywell regardless of the ADS system not -- regardless  
11 of the ADS system working.

12 Now when the source term is there in the  
13 pool itself, we have -- we can, we could allow for  
14 credit, decontamination factor credit, anywhere  
15 between five and ten. That's discussed in Standard  
16 Review Plan 6.5.5. And then if you also use a newer  
17 source term, they can take DFs or decontamination  
18 factors, upwards towards 50, right?

19 So we know that in the calculations  
20 themselves, the DVA radiological consequence analyses  
21 that there's quite a bit of conservatism, the orders  
22 of magnitude conservatism baked into the calculations  
23 because of the regulatory positions. And the one that  
24 I just mentioned here, this one particular regulatory  
25 position for not allowing decontamination of

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1 radionuclides going through the suppression pool, that  
2 dates back to the early '70s.

3 And I mean there's obviously areas of  
4 improvement, but these are things I think we need to  
5 remember when we're talking about these types of  
6 calculations. They're highly stylized. They're  
7 deterministic in nature. Some date back 50 plus years  
8 now. They don't utilize updated information from  
9 analyses such as NUREG-1150 and SOARCA.

10 And with that, I'd like to turn it back  
11 over to any other staff members that would like to  
12 provide their two thoughts or I can take any  
13 questions.

14 MR. JONES: Well, hearing no questions,  
15 this is Steve Jones in the Containment Appliance  
16 Systems Branch. I just wanted to address the credit  
17 or well, not actual calculational credit, but just  
18 discuss the reasons we believe the power conversion  
19 system provides a hold up, a realistic hold up volume  
20 for any release that does make it through the main  
21 steam system and around the MSIVs.

22 First of all, we did assess the  
23 construction of the main steam system. It's generally  
24 constructed to a conservative code, designed for very  
25 high pressure and high temperature applications,

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1 obviously, and subject to enhance quality assurance  
2 although it typically falls short of safety related  
3 for the plants that we're discussing here.

4 We're not assuming that this adds any  
5 specific value and the function we're looking for is  
6 just that there is a volume that does not allow early  
7 leakage of whatever material may get by the MSIVs  
8 directly to the atmosphere outside the reactor  
9 building which is what's assumed in the actual  
10 analysis of record. So the performance criteria for  
11 the main steam system is fairly low. And we looked at  
12 the flow paths that provide a way for that to either  
13 perhaps get to the high pressure turbine area and then  
14 eventually leak to the environment or go through other  
15 paths through the main power conversion system and  
16 arrive at the condenser.

17 And of course, we also discuss the  
18 pathways that may bypass that such as the stems of the  
19 main steam isolation valves or would be -- there would  
20 be some stem leakage, but that's a partition point  
21 where not all the leakage is going to go out the stem.  
22 Most likely, some goes through the main steam system  
23 and some may leak into the steam tunnel, but again,  
24 that is an analyzed structure for -- to maintain its  
25 integrity following a steamline break or some accident

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1 such as that. So there is some hold up within that  
2 area and not an immediate direct release to the  
3 environment.

4 I did want to touch on one thing, the Reg  
5 Guide looks at Reg Guide 1.183, we were earlier  
6 discussing some of the points there. It's  
7 specifically talking about engineered safety features  
8 which typically involve emergency power supplies to  
9 support fans or valve actuation or damper actuation  
10 that might mitigate the dose consequences such as  
11 standby gas treatment or what previously existed for  
12 many of these plants when the earlier source term, the  
13 initial TID source term was used where there is a need  
14 for automatic actuation, emergency power, or  
15 procedures for operators to start this. We are just  
16 looking in this case, we are just crediting or  
17 considering that the main steam system is likely to be  
18 present. It doesn't need to change state. We're not  
19 relying on any valves to change position. We're just  
20 assuming the normal conditions that would exist post-  
21 accident, without any actuation or any engineered  
22 safety feature actuation that might result.

23 I guess I'll leave it there unless there  
24 are any other questions. I'll turn it back over to  
25 Meena.

1                   MEMBER HALNON:     Steve, this is Greg  
2 Halnon. I know the steam tunnels in BWRs have  
3 boundaries from the standpoint of actuation in steam  
4 tunnel pressure and temperature so that you can't just  
5 have a bunch of leakage going into the steam tunnel  
6 without being addressed by the plant staff.

7                   But what is the power conversion, the non-  
8 safety main steam condensate feedwater systems have  
9 outside of containment that would prevent a plant from  
10 just allowing a steam leak to continue on which would  
11 change the assumption that the system is there and  
12 fully intact?

13                  MR. JONES: Okay, in general, there are --  
14 first in the steam tunnel, you have high temperature  
15 sensors that feed into the engineered safety feature  
16 system that would cause a main steam isolation. And  
17 there's also typically high temperature sensors in the  
18 turbine building itself that would react to a steam  
19 line release and those factor into different  
20 calculations related to releases from a main steam  
21 line break.

22                  MEMBER HALNON: Yes, the BWRs I've worked  
23 at, I know that we've had leaks in the steam systems  
24 and we've scheduled in leak repair companies to come  
25 in and leak repair them online, and what not. But

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1 those leaks, they could go on for days and even get  
2 worse until the plant is geared up to actually fix it.  
3 And some of them do cause shut downs, but there is no  
4 tech spec or required action other than the licensee's  
5 prudent maintenance.

6 MR. JONES: Okay, I think I understand  
7 your point. Yes, I mean some level of leakage could  
8 exist. It would have to be a fraction of I guess full  
9 steam flow though, a very small fraction to not cause  
10 actuation of those temperature sensors or other leak  
11 response to actually isolate the main steam lines and  
12 shut down the reactor.

13 But at the same time, the post-accident  
14 conditions we're looking at realistically, again are  
15 relatively low pressure upstream of the MSIVs,  
16 containment design pressure 45 pounds or so, and  
17 leakage rates, again on the order of a couple hundred  
18 standard cubic feet per hour and then going into very  
19 large piping systems that have hundreds of cubic feet  
20 of volume just in the main steam lines and then  
21 getting to other areas like the turbine or potential  
22 -- the high pressure turbine first and then  
23 potentially going into the low pressure turbine and  
24 the main condenser, going through drain paths or  
25 bypassing the turbine -- leaking past the turbine

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1 bypass valves and getting to the main condenser  
2 directly from the steam lines.

3 Any leakage path would just be one other  
4 way for that to release to get to the turbine building  
5 environment, but it's still performing the function  
6 we're really crediting which is delaying that release,  
7 holding up the material to some extent. We're not  
8 factoring in a specific value here. We're just saying  
9 that logically it's not like this release is going  
10 straight to the environment. We have a lot of  
11 confidence that the main steam system itself and all  
12 the pressure boundaries are going to for the most part  
13 contain it, but there are obvious leakage spots with  
14 the valve stems, the turbine shaft seals, and then  
15 again any minor leaks that may be preexisting in the  
16 plant. Does that respond to your question?

17 MEMBER HALNON: Yes, to some extent. Just  
18 another follow up. Does the ISG drive the reviewer to  
19 look at the aggregate leakage on the secondary side to  
20 address what -- so if you have so many cubic feet per  
21 hour going through the main steam isolation valves and  
22 leakage, going into the power conversation system, the  
23 amount of that that gets to the condenser is going to  
24 be based on how much leakage there is on its way. And  
25 does the ISG ask those questions and make sure there's

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1 a commensurate level of control?

2 Again, if you've got a leak in the steam  
3 tunnel, you have automatic actuations and tech spec  
4 values, but downstream of that, you have nothing,  
5 nothing to drive an action by the licensee.

6 MR. JONES: Well, the turbine building,  
7 you know, also has the steam leak temperature sensors,  
8 so --

9 (Simultaneous speaking.)

10 MEMBER HALNON: -- building.

11 MR. JONES: Right. I mean it would take  
12 a very large leak to actuate those. But at the same  
13 time, it's still just a fraction of the overall steam  
14 flow.

15 MEMBER HALNON: Okay. You're banking on  
16 the margins that Elijah --

17 MR. JONES: Well, I think what we're  
18 banking on really here is that first of all, there's  
19 no credit in the actual analysis. We're just saying  
20 we're comparing what happens assuming that right at  
21 the boundary of the reactor building that material is  
22 released at the ground level directly to the  
23 atmosphere. Or it's much more realistically likely  
24 that it would be held within piping systems and that  
25 are very large relative to the leak rate, you know.

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1 MEMBER HALNON: Right.

2 MR. JONES: And delaying that release for  
3 hours or more and you know, potentially directing it  
4 to very large volumes and at very low driving heads.  
5 There's really not much to push this material through  
6 the steam system at a high rate.

7 MEMBER HALNON: So that's a good  
8 qualitative argument. Is there quantitative analysis  
9 that shows that or do you -- are you just banking on  
10 the fact -- that's not the right way of saying it, but  
11 are you crediting the fact that you know it's going to  
12 be less and you get a bounding analysis.

13 MR. JONES: That's the point for this  
14 review, for the ISG is that we're not taking any  
15 actual credit. We're considering that this -- that  
16 there is some additional conservatism. This is one of  
17 many places where there's additional conservatism  
18 because there would be a hold up realistically of any  
19 releases that get by the main steam isolation valves  
20 and would not go to the environment as quickly and  
21 may, in fact, be held up in some of these volumes for  
22 a very long period of time.

23 MEMBER HALNON: Okay. Thanks, that helps.  
24 Appreciate that.

25 MS. KHANNA: Okay. Thanks. Steve, thank

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1 you so much. Are there any other staff members that  
2 wanted to convey any other thoughts?

3 MR. PARILLO: Yes, this is John Parillo  
4 and I just wanted to stress to the Committee that  
5 approximately 50 percent of the BWR fleet has taken  
6 numerical credit for a pathway to the condenser using  
7 the guidance that was put out in the '90s, which had  
8 them do walk downs and so on. There was a safety  
9 evaluation.

10 So the arguments about steam leaks and so  
11 on, those would be applicable to those licensees that  
12 have already credited a pathway to the condenser.  
13 What the ISG do is use more updated seismic criteria,  
14 which has been discussed, to say that now we have a  
15 much better idea of what that seismic capability would  
16 be of the power conversion system.

17 And also as I mentioned, in the Appendix  
18 C to Reg Guide 1.183 for the rod drop accident the  
19 credit for a pathway to the condenser is given with no  
20 subsequent characterizations needed on the behalf of  
21 the licensee. So I just thought that might be of  
22 interest to the Committee. Thank you.

23 MS. KHANNA: Okay. Thanks, John.

24 Okay. So I'm going to just provide some  
25 concluding remarks because I know that we need to move

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1 forward. So first of all I want to just say on behalf  
2 of the NRR Management Team we do appreciate the  
3 different views that both Mark and Mike presented  
4 today, and I also appreciate the opportunity that they  
5 ACRS Full Committee provided for us to share our  
6 recommendations of path forward based on the  
7 information that we have heard today.

8 After considering all the views presented  
9 by the staff, including the different views, I believe  
10 that the ISG does not change the licensee's  
11 responsibility to demonstrate compliance with 10 CFR  
12 50.67, nor does it change the acceptable methods for  
13 demonstrating compliance with 10 CFR 50.67.

14 It's important to note that the ISG does  
15 not provide an analysis to replace the licensee's  
16 analysis. It is really to assist the staff in using  
17 engineering judgment and making reasonable assurance  
18 findings on the licensee's submissions. And as  
19 discussed earlier this type of thinking was definitely  
20 directed by the Commission.

21 The ISG was developed to memorialize the  
22 NRC staff's practice on using risk and engineering  
23 insights, again as documented in each of the four MSIV  
24 safety evaluations and as you heard from the staff we  
25 have identified significant conservatisms while also

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1 accounting for some of the uncertainties associated  
2 with an MSIV leakage.

3 I also would like to acknowledge that each  
4 of the four safety evaluations received thorough  
5 reviews by the NRC staff including OGC's no legal  
6 objection prior to the issuance of the staff approvals  
7 on these amendment requests. And then again I do want  
8 to reiterate that we're not using ISG to make a  
9 reasonable assurance finding not to replace the  
10 licensee's analysis.

11 I do recognize that there is an internal  
12 ongoing independent review of the differing views as  
13 we heard earlier, and that's associated with one of  
14 the four safety evaluations with only a small group of  
15 NRC staff that have had access to the detailed  
16 information. When the internal review is complete a  
17 case file including the differing views, the  
18 independent panel report, and a decision memo will be  
19 made available to not only the NRC staff, but also to  
20 the public, however since the review is still ongoing  
21 and not complete yet, the technical staff working on  
22 the ISG and presenting to the Committee do not have  
23 access to the information because the NRC's process to  
24 evaluate differing views limits its access.

25 So after considering the robust and

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1 detailed technical assessments that the staff have  
2 conducted in support of developing the ISG, including  
3 the substantial conservatisms that been identified, as  
4 well as the information that the staff has  
5 communicated today and the differing views that were  
6 presented, I am recommending that the Committee  
7 proceed with approving the ISG as I don't view the  
8 issues raised today as influencing the ISG.

9 My recommendation is based on the  
10 following factors that you've pretty much heard, but  
11 I just want to sum them up very quickly:

12 The staff mainly based its regulatory  
13 finding of adequate protection on the licensee's  
14 deterministic analysis.

15 The staff performed an assessment of the  
16 seismic ruggedness of the power conversion system and  
17 the main condenser to achieve high confidence that the  
18 systems will remain available after a safe shutdown  
19 earthquake for fission product dilution, holdup and  
20 retention.

21 The staff also used engineering judgment  
22 and risk insights to support the deterministic  
23 conclusion. The staff did not use these risk insights  
24 as the main basis for our regulatory findings.

25 And lastly consistent with the statements

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1 of consideration for 10 CFR 50.67 the NRC staff  
2 leveraged these risk insights in a manner that  
3 complements the deterministic approach and supports  
4 the traditional defense-in-depth philosophy.

5 In summary, we're not aware of any errors  
6 in the MSIV SER, nor in the ISG that stand behind --  
7 I'm sorry, and stand behind the assessments that the  
8 staff have completed for both the SE and the ISG. As  
9 the independent review efforts continue to progress  
10 and if there are any significant findings that would  
11 change our recommendation, we will immediately  
12 inform the Committee of any changes that are needed.  
13 And if the Committee determines the need of an  
14 additional meeting, we'll certainly support.

15 We see the ISG separate from the differing  
16 views raised on the FitzPatrick SER, however  
17 recognizing the challenges with these two aspects the  
18 reg guide obviously -- we know that we're very close  
19 to coming to you guys to meet with the Subcommittee on  
20 Reg Guide 1.183 on November 19th. That's the  
21 Subcommittee meeting.

22 And then also with -- knowing that these  
23 differing views are out there we fully -- we  
24 appreciate the fact that all of these do pose a  
25 challenge, but at the end of the day we don't see the

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1 need of a delay as a process for the reg guide, which  
2 includes a 30 to 60-day OMB review which would lead us  
3 to a January issuance date, should allow for us to  
4 consider the resolution of the DPO and any comments on  
5 the reg guide.

6 And with that I'm going to close.

7 VICE CHAIR REMPE: So, Meena, this is Joy  
8 and I'm just kind of struggling with what I'm hearing  
9 from you versus what I see in this slide, and even if  
10 you go to the cover slide, the differing view. The  
11 title of this says it's on ISG and all of -- many of  
12 these bullets pertain to ISG, not the single LAR, but  
13 nothing has been provided by the staff on the ISG?

14 MS. KHANNA: Yes. So I mean, I'll go  
15 ahead and respond. So what we see is the differing  
16 views are specific to the amendment, the license  
17 amendment request SE that was issued. The process  
18 that we've laid out here, again taking into  
19 consideration risk-informed decision making,  
20 everything that you've heard with respect to all the  
21 conservatisms. And there are -- I mean, we do  
22 recognize that there are uncertainties, but even with  
23 considering those uncertainties we believe that the  
24 process that we've identified stands on its own and  
25 it's very consistent with the Commission direction.

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1           And again, I can ask my staff to speak to  
2 this, but we just see them both as very different  
3 issues. One is the review process that we've taken.  
4 And then again this -- it was based on risk-informed  
5 -- right, we used some risk-informing decision making  
6 and the deterministic review that was done as well.  
7 But the issues that were raised on the LAR, again I  
8 would say that those are separate from our review  
9 process.

10           VICE CHAIR REMPE:     So theoretically  
11 speaking if the independent panel were to side with  
12 the differing view on the single LAR, do you think  
13 that maybe the ISG would be changed?

14           MS. KHANNA:           There's a definite  
15 possibility of that. Honestly, unless I see the  
16 decision that's been made from the director's  
17 decision, I wouldn't be able to speak to that because  
18 there's always a chance. And that's why I was saying  
19 we fully respect and appreciate the challenge that --  
20 bottom line we have -- as I mentioned, you had brought  
21 this up earlier as well, right, the Reg Guide 1.183,  
22 we're very close to bringing that to you guys, the  
23 Subcommittee, on November 19th, understanding that  
24 there could be -- there's a process associated with  
25 those differing views and it could be delayed.

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1           But we really -- we feel that the ISG  
2 stands on its own, but I can't -- it wouldn't be fair  
3 for me to say that there would be nothing that would  
4 come out from the differing view evaluation that was  
5 done that would not impact the ISG. I can tell you  
6 that I don't believe that it would, but that's -- I'm  
7 not going to be -- that's not going to be fair unless  
8 we see what the decision is made, if that -- I don't  
9 know if that --

10                           (Simultaneous speaking.)

11           VICE CHAIR REMPE: So again, I guess I'm  
12 still puzzled why the staff has put -- in light of the  
13 fact we aren't aware of any LARs being submitted why  
14 the staff is pushing so much to go ahead and get this  
15 reviewed and the reg guide. It just seems like the  
16 process would be more direct to get this resolved and  
17 then move forward with the other items, but I guess  
18 there's no insights you can give me on that.

19           MS. KHANNA: No, and we fully appreciate  
20 and respect that. If that's the decision that's made,  
21 we don't see -- I mean I'm trying to figure out if  
22 there's any cons in delaying the issuance of the ISG.  
23 Again with the 30 to 60 days that we have to wait to  
24 get the OMB review maybe it will just work out that  
25 everything will be resolved in an appropriate time

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1 frame, but I can't sit here and tell you that there's  
2 any reason for us to move forward except for the fact  
3 that we've completed our work. We see a difference  
4 between the ISG and the issues that were raised today.

5 I mean honestly this is the first time  
6 that the staff have heard all these issues. We have  
7 some time before we issue the ISG. It's still under  
8 concurrence so there is time that we can take  
9 consideration of what we've heard today, which -- and  
10 we can have some more dialog with both Mike and Mark  
11 as appropriate and as needed.

12 Honestly, I hear you. I think at the end  
13 of the day if you determine that you want to wait, we  
14 understand. And then we'll just work to a schedule  
15 that we have knowing that we -- right now we have the  
16 January date for the ISG; and Tekia can definitely  
17 speak to the details of that if you'd like some more  
18 details, but if things don't get resolved by then,  
19 then we can certainly wait until an appropriate time  
20 to be able to make sure that everybody has all the  
21 information that they need to make a decision.

22 CHAIR SUNSERI: Yes, this is Matt.  
23 There's a couple of hands up. I want to take them in  
24 the order that they've come, so we'll go with Mark  
25 Blumberg first. Mark?

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1 MR. BLUMBERG: Yes, I don't know. I think  
2 there's a problem associated with -- and a disjoint  
3 between the -- our differing views and those of the  
4 staff. I think that one of those issues has to do  
5 with this reliance upon conservativisms that aren't in  
6 the license amendments and don't become part of the  
7 licensing basis. It becomes a matter of the staff  
8 basing their acceptance upon what they think how  
9 things should be and not based upon those things that  
10 are in the docket, or on the docket.

11 And the second is that -- and just with  
12 respect to John Parillo's comments, that 50 percent of  
13 the licensees had used methodologies that had credited  
14 the condenser. What's proposed in the ISG is a very  
15 different animal and that's because the staff is  
16 making the judgments that were required in the staff's  
17 SE to approve that alternatively hitched treatment  
18 pathways and that meant that we don't go out and check  
19 to make sure that valves can function in the way that  
20 they're credited in the analysis. We don't go out and  
21 make sure that the procedures are in place to make  
22 sure that those valves will be operated in a manner  
23 that we're crediting. And so it creates a disjoint.  
24 And that's one of the major issues that I see between  
25 what's being proposed in the ISG and what's been

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1 previously done.

2 CHAIR SUNSERI: Thank you. Next is Vicki  
3 Bier.

4 MEMBER BIER: Yes, thanks. Yes, this is  
5 actually in a way kind of similar to Mark's comment  
6 just a minute ago. I guess I'm struggling to figure  
7 out how to think about this because on the one hand it  
8 maybe seems inappropriate if we think of this as staff  
9 giving licensees relief that they haven't asked for,  
10 right? Like shouldn't it be incumbent on the licensee  
11 to make an argument for why particular relief or  
12 differing interpretation or whatever is justified?

13 On the other hand I can also think of it  
14 from the point of view of, okay, in the staff's own  
15 work if they see as -- the situation has changed or  
16 knowledge has improved that they have conservatisms in  
17 their analyses that are no longer justified or  
18 required, then it seems appropriate that fine, they  
19 can go ahead and relax those conservatisms. But I'm  
20 having trouble figure out which of these frameworks  
21 that fits into better and how to interpret this.

22 CHAIR SUNSERI: All right. Good. Thank  
23 you.

24 Dave, back to you.

25 MEMBER PETTI: Okay. I guess with that

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1 we've got about 15 minutes left in this session. We  
2 may end up going over a little bit, but let's get  
3 NEI's -- I think that's right, it's -- no, it's  
4 Entergy that's got comments.

5 MS. PIMENTEL: Right. Good afternoon,  
6 Chairman Sunseri and ACRS Committee members, NRC  
7 staff, and members of the public. My name is Frankie  
8 Pimentel. I'm a senior project manager for  
9 Engineering and Risk at NEI. I just want to thank you  
10 for the opportunity today to share our industry  
11 comments based on our review of the supplemental  
12 guidance for radiological consequences analyses using  
13 the alternative source terms.

14 We believe there are many opportunities  
15 where engineering and risk insights can be applied to  
16 improve risk-informed decision making and we  
17 appreciate the NRC's application of risk insights in  
18 this ISG to improve the realism and the evaluation  
19 techniques supporting decision making.

20 Now I'd like to introduce Greg Broadbent,  
21 the senior staff engineer and Entergy's Corporate  
22 Nuclear Analysis Department, who will present  
23 industry's comments. Thank you.

24 MR. BROADBENT: Thanks, Frankie.

25 Can you guys hear me?

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1 CHAIR SUNSERI: Yes.

2 MR. BROADBENT: Okay. Again, I am Greg  
3 Broadbent. I've got some 25 years or so of experience  
4 in dose analysis from -- starting in 1992 and seeing  
5 the big transition from TID to the alternative source  
6 term for all our plants and looking forward to the  
7 revision to the Reg Guide 1.183 and everything that  
8 we've learned in the last 20 years.

9 With regard to risk-informed regulation  
10 the industry certainly does support the staff pursuing  
11 these risk-informed approaches. As they noted in  
12 their introductory remarks they want to move that  
13 direction, and certainly from our perspective it  
14 allows us to spend our resources in areas that are  
15 most important to safety.

16 And I think there was some discussion  
17 about MSIV leakage, and allowing us to have higher  
18 MSIV leakage rates does reduce the doses that people  
19 get when they have to go in and repair those valves or  
20 fix those valves for relatively minor leakage flow  
21 rates. Also modification budgets and stuff like that.  
22 We would prefer to spend our resources in areas that  
23 are most important to safety.

24 And we have seen some recent successes  
25 including GSI 191 and 50.46 using risk-informed or

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1 statistical-type approaches. And we consider this and  
2 certainly hope that this ISG is the first step in  
3 risk-informing the deterministic radiological  
4 analyses. A lot of other things have been risk-  
5 informed. This is one of the last frontiers really  
6 from our perspective on risk-informing the process.  
7 And the industry certainly supports these approaches  
8 and Reg Guide 1.183 and including them to whatever  
9 detail is necessary in Reg Guide 1.183, the upcoming  
10 revision.

11 Let's see. Did I get everything? Okay.  
12 The ISG conclusions. The power conversion system is  
13 highly likely to remain intact. That's what the ISG  
14 had indicated. It's built to high standards. We have  
15 high confidence in the SSCs and the power conversion  
16 system to provide sufficient volume for holdup and  
17 retention of fission products, and that a steam line  
18 is important for plant operation. If the steam line's  
19 not working, the plant's not working. So it is very  
20 highly likely to remain intact post-accident.

21 I think there was some discussion about  
22 steam leaks. Certainly plants get steam leaks. If  
23 you consider all the piping that we have on the  
24 secondary system of our plants, there can be steam  
25 leaks. They don't happen very often, but if you've

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1 got 1,000 pounds of steam on one side and the  
2 atmosphere on the other, it doesn't take a very big  
3 hold to generate a steam flume. But it's relatively  
4 easy to identify. There are temperatures sensors in  
5 these rooms. The steam gets condensed and it shows up  
6 in leakage and liquid to rad waste.

7 So the piping, the BOP piping does or can  
8 leak, but those are leaks that we fix. If it's in  
9 important rooms, then we may have to shut down. Or if  
10 the leak is big enough, it make take a few days for us  
11 to call somebody out and get it fixed. But in general  
12 that's typically the standard for leaks.

13 And as I mentioned, there's a lot of  
14 piping that can leak, but also from the analysis  
15 perspective there's a lot of piping that can delay the  
16 source terms and provide a played out surface or a  
17 deposition surface for accident mitigation.

18 And as I think previously mentioned, half  
19 the plants have already demonstrated that they do have  
20 structural integrity with very rigorous analyses  
21 consistent with a 1990s vintage BWR Owners Group  
22 report and validates the regulatory PCS credit for  
23 other accident analyses. As I mentioned, half the  
24 plants have demonstrated it for LOCA. A hundred  
25 percent of our plants credit the power conversion

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1 system after a control rod-drop accident. And with  
2 that event there's no additional analysis related to  
3 any sort of seismic robustness for the plant's safe  
4 shutdown earthquake to credit that for the control rod  
5 drop accident.

6 And the ISG does incorporate relevant  
7 operating experience, particularly from Fukushima.  
8 Also the 1990s vintage BWR Owners Group that  
9 originally kind of broached the subject that did use  
10 earthquake data, but it was a non-nuclear facilities  
11 of that time. And we do recommend that there be an  
12 allowance for explicit credit for the conclusions of  
13 the ISG and the upcoming reg guide.

14 And the steam lines are important to us  
15 from an analysis perspective and the realistic  
16 modeling of those steam lines can make a significant  
17 difference in the analysis. The steam lines are  
18 directly coupled to the reactor vessel in boiling  
19 water reactors and the calculated dose from those  
20 steam lines can be very significant, particularly if  
21 there are some very conservative assumptions applied  
22 to that in terms of deposition and leakage rates and  
23 all that.

24 Also from our perspective; and I think the  
25 staff stepped through this with one of their slides,

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1 there's been a lot of uncertainty regarding what's  
2 acceptable in terms of those deposition models. Reg  
3 Guide 1.183 Revision 0 didn't have anything that was  
4 acceptable. There was some work done for one of the  
5 pilot plants and AEB 98-03 that staff has had some  
6 issues with and doesn't want applied. So it's been  
7 kind of a moving target for us and so we'd like to see  
8 something specific in the upcoming reg guide.

9 So our conclusions are just that we can  
10 concur with the ISG that the power conversion system  
11 is a realistic and available holdup volume for fission  
12 products and there is a high confidence that the SSCs  
13 and the power conversion system will provide a volume  
14 for holdup and retention of fission products.

15 We did provide some comments to the ISG.  
16 Our comments were really more focused on applicability  
17 to new plants. Also how this is going to be actually  
18 applied and the upcoming revision to Reg Guide 1.183,  
19 we would suggest that that credit be with little or no  
20 additional analysis consistent with the current  
21 position on the control rod drop accident. And we  
22 recognize that most of those comments, or really all  
23 of those comments were deferred to Reg Guide 1.183  
24 where that will be discussed in more detail.

25 That's all I have in terms of my slides.

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1 Any questions for me?

2 MEMBER PETTI: Members, questions? Thank  
3 you.

4 MR. BROADBENT: No problem.

5 MEMBER PETTI: So with that, members, I  
6 think we have to spend a few minutes just talking  
7 about our path forward.

8 MR. SNODDERLY: I'm sorry. Member Petti?

9 MEMBER PETTI: Yes. Oh --

10 MR. SNODDERLY: You need to ask public --  
11 yes.

12 MEMBER PETTI: Yes.

13 MR. SNODDERLY: If there are any members  
14 of the public --

15 (Simultaneous speaking.)

16 MEMBER PETTI: I'm sorry. Any other  
17 public comments out there? If so, please un-mute  
18 yourself, \*6, provide your comment.

19 Okay. I don't hear any. So with that,  
20 members, we have to figure out a path forward here.  
21 I do have a draft largely based on what we had heard  
22 at the Subcommittee meeting before we heard some other  
23 things today. So I'm interested in people's  
24 perspectives on a path forward.

25 MEMBER KIRCHNER: Dave?

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1 MEMBER PETTI: Yes?

2 MEMBER KIRCHNER: This is Walt. I don't  
3 know that this is a path forward, but may I make an  
4 observation?

5 MEMBER PETTI: Sure.

6 MEMBER KIRCHNER: Let me see if I can  
7 summarize what's been going through my head listening  
8 to today's presentations.

9 We're starting with a problem that  
10 basically involves cost and exposure and tradeoffs at  
11 operating plants. Certainly it seems reasonable from  
12 an ALARA perspective to allow a larger leakage in the  
13 main steam isolation valves such that excessive  
14 maintenance is not being performed which results in  
15 exposure, occupational exposure in particular. So  
16 there are some -- I'll call ALARA, but there are some  
17 dose exposure resource tradeoffs. So that seems to be  
18 at the root of the licensing -- the LARs that are  
19 submitted.

20 When I step back and separate all the --  
21 there's -- I just have a problem with this, that this  
22 is risk-informed, but maybe that's a personal issue.  
23 To me what we see is a best estimate approach to -- a  
24 best estimate real engineering approach to a problem  
25 rather than the stylized Chapter 15 deterministic

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1 approach which; this isn't entirely true, but I'll say  
2 it, only lets you credit safety-related systems that  
3 are demonstrated to survive the SSCs, et cetera, et  
4 cetera.

5 So it's certainly realistic to include the  
6 balance of plant and the volume that that presents for  
7 potential deposition and certainly holdup so it works  
8 both in reducing the source term as well as delaying  
9 it. That seems perfectly logical to me.

10 Some of the arguments we hear about things  
11 are -- again in Chapter 15 space so many conservative  
12 assumptions are laid upon each other. So for example  
13 you're doing the analysis at a higher pressure than  
14 probably would actually be predicted to drive the  
15 source term out of the containment and through a leak  
16 in the main steam isolation valve. I certainly agree  
17 with that, that the -- in actuality the pressures  
18 would likely be lower. That would lower the relief  
19 rate.

20 So what we're seeing is something that  
21 differs from what I'll call traditional Chapter 15  
22 analyses. It's certainly logical. It's certainly a  
23 means for the staff to make the reasonable assurance  
24 determination. We saw this before in resolution of  
25 GSI-191 issues from some of the applicants. I'm

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1 thinking here that this ISG is in a sense creating a  
2 precedent. I could think of other examples where one  
3 would deviate from the results of a rigorous  
4 deterministic Chapter 15 analysis with all of its  
5 conservatisms and come to a better -- I'll call it a  
6 best estimate assessment of how the plant performed  
7 under actual accident conditions.

8 So to me what's at issue here, without  
9 weighing in on a number of process issues, is this  
10 seems to be creating a precedent that's consistent  
11 with some past Commission direction to the staff, yet  
12 I am sensitive to the fact that it -- as was pointed  
13 out by some of the commentators, that it gets you away  
14 from a rigorous interpretation of the regulations and  
15 their application in a standard Chapter 15 analysis.

16 So I just was trying to summarize in my  
17 own mind what we're looking at here. It seems to me  
18 that this ISG represents yet another precedent kind of  
19 event and how we actually analyze nuclear power plant  
20 safety. And I'll stop there.

21 MEMBER PETTI: Yes, it just seems to me  
22 that this is just one on the road of -- as the staff  
23 is being asked to risk-inform more and more and as  
24 when we've talked ourselves about risk-informing  
25 Chapter 15, it's going to morph a little, right? I

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1 mean, it's not going to follow the same exact path  
2 that the historic approaches took.

3 I don't tend to think of this as best  
4 estimate. I'd call it maybe better estimate. I still  
5 think there's a better estimate with still a  
6 conservative view, if you will, because there are  
7 still assumptions, conservative assumptions built in  
8 into the stylized approach here. It's just maybe a  
9 little less stylized than the historic approach.

10 And so that may be just part of what you  
11 end up dealing with as one starts to risk-inform a lot  
12 of these issues, whether they be GSI-191, now this  
13 one. It's part of the evolution process perhaps at  
14 the agency, but again I've only been on the Committee  
15 for two years.

16 CHAIR SUNSERI: So, Dave, I have a  
17 suggestion here, and maybe this will move us forward.  
18 But we're kind of discussing major points right now,  
19 so I would suggest that we do a read-in of the letter  
20 that you have drafted based on the Subcommittee  
21 report. Then we can consider what we've heard today  
22 and what you've put together and discuss it further in  
23 our major comments. And then at that point we can  
24 decide if we have enough information to move forward  
25 with the letter or (audio interference) a later date.

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1 That's my recommendation.

2 MEMBER PETTI: Okay.

3 CHAIR SUNSERI: Anyone else? Anybody else  
4 have a different idea?

5 MEMBER BLEY: Well, this is Dennis. My  
6 own leaning after this; and I was not able to attend  
7 the Subcommittee meeting, so I missed out on that --  
8 after what I heard today I would be really tempted to  
9 put this off for one or two months and get that next  
10 Subcommittee meeting in and perhaps your resolution on  
11 the DPO.

12 CHAIR SUNSERI: Any others?

13 MEMBER BROWN: Yes, this is Charlie. And  
14 Dennis can correct me if I'm wrong, but several years  
15 ago we had another one of the ones when they came  
16 forward with the DPOs also, but the DPO was able to be  
17 discussed because it had conclusions and they'd gone  
18 and addressed each of the issues. And management had  
19 made a decision to go one way or the other. It  
20 doesn't sound like we're there yet on this particular  
21 one unless --

22 MEMBER BLEY: Yes, Charlie's right. I  
23 know there's been a couple of them that we had, and  
24 they were already resolved and just a side issue, even  
25 before that, and it was before I was on the Committee,

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1 (audio interference) to kind of be a cork for a  
2 decision about a DPO. But that was a special case, so  
3 I wouldn't think about that at all.

4 I agree with what Matt said, unless we're  
5 specifically called in the DPO is not our business to  
6 follow, but it would be really nice to see the results  
7 before we say something that maybe ends up being  
8 directly opposite to how it turns out. And I  
9 understood that it's not on this, but it really does  
10 affect this. It could depending on how it gets  
11 resolved by the staff and management.

12 CHAIR SUNSERI: Yes, that's why I was --  
13 you're right, Dennis, and that's why I was suggesting  
14 at least we should -- I don't -- have an open mind is  
15 not the way to say it, but at least if we hear the  
16 letter, read it in; we have time, we can read it in  
17 and then you can say oh, yes, clearly this is impacted  
18 or clearly it's not. I don't know which way it would  
19 go. But anyway, just an idea.

20 MEMBER BLEY: No objection to that. I  
21 just -- if were Dave I would probably say I want to  
22 put it off, but that's -- I think going ahead and  
23 reading it is fine.

24 CHAIR SUNSERI: I don't disagree that  
25 that's where we probably were going to land on this

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1 thing, but I just wanted to -- before just jumping in  
2 and the decision, just kind of get to the conclusion  
3 of where we are today.

4 VICE CHAIR REMPE: But are we still at  
5 that conclusion? We've heard a lot today and what was  
6 in the letter could it have an impact when we weren't  
7 fully informed when we -- when that letter was  
8 drafted?

9 CHAIR SUNSERI: Well, our letter shouldn't  
10 have anything in it that hasn't been presented to us.  
11 I mean --

12 VICE CHAIR REMPE: But we were not aware  
13 of the DPO or the differing view.

14 CHAIR SUNSERI: Well, how does that --  
15 that shouldn't impact anything from a technical  
16 perspective.

17 VICE CHAIR REMPE: Well --

18 (Simultaneous speaking.)

19 CHAIR SUNSERI: -- technical issues,  
20 right?

21 VICE CHAIR REMPE: I'm thinking about the  
22 way that -- how the reg guide's resolved and some of  
23 the technical details if this draft letter has some  
24 recommendations in it that we ourselves may not  
25 support afterwards. And that's why I'm kind of siding

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1 that I would rather not read it in until we've -- we  
2 have all the information. But again, it's just one  
3 member's opinion.

4 MEMBER DIMITRIJEVIC: This is Vesna. I  
5 think it cannot hurt for us to read this letter. Dave  
6 already wrote it. He present some opinions. We can  
7 see what are those opinion depend on these resolution  
8 on -- of DPO, when it's done. So I mean, I think he  
9 can -- Dave usually writes a short letter, so I don't  
10 think -- I didn't see this letter on the SharePoint,  
11 so --

12 MEMBER PETTI: It's very short; you're  
13 right.

14 MEMBER DIMITRIJEVIC: Yes, so I think it  
15 doesn't really hurt us to read it.

16 MEMBER PETTI: So let me just ask a  
17 question, because this is an odd case. We could  
18 recommend that the ISG not be issued until the  
19 differing view is resolved. If it's resolved one way,  
20 then -- and it doesn't have to come back to us, then  
21 we're okay. If it isn't, then we request that they  
22 come back to us because it can affect 1.183. It can  
23 affect -- this is going to roll into the Standard  
24 Review Plan, that we put up a caveat like that that  
25 gives them option A, option B. Is that something --

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1 CHAIR SUNSERI: I mean does that really  
2 buy anything? I mean the staff sounds like they want  
3 to issue the ISG and just saying writing a letter, say  
4 don't issue it until later, I mean does that buy  
5 anything?

6 MEMBER HALNON: This is Greg. Without  
7 trying to do the DPO issue, but DPO, the differing  
8 opinion talks about errors that were made. And if in  
9 fact those -- unless the ACRS does some kind of  
10 analysis or assessment of whether or not we believe  
11 those errors were made and they're being translated  
12 into the ISG, I don't see how we can opine on whether  
13 or not the ISG is okay or not.

14 We have two competent technical opinions  
15 that one says there's an error; one that says not. So  
16 I would be uncomfortable going one way or the other  
17 until a process to determine whether or not they  
18 really were errors or not.

19 CHAIR SUNSERI: Ron?

20 MEMBER BALLINGER: Yes, I'm with Dennis on  
21 this because in the past times we've had a different  
22 opinion. I'm not sure it was a DPO, the last one we  
23 looked at. I think it related to one of the license  
24 renewals and related to corrosion of some kind,  
25 underground piping or something. But in any case we

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1 had a complete resolution of the issue before we went  
2 forward.

3 And I just think that I'm not comfortable  
4 thinking that we're not playing with a full deck when  
5 we make an opinion. We presume, like Matt said, that  
6 we only decide based on what we have been given. We  
7 should be sure that what we've been given is complete  
8 enough so that we can make a proper decision.

9 CHAIR SUNSERI: Thank you.

10 So, Dave, you know more about what's in  
11 your draft letter than any of us, so I think I would  
12 just lean on you for the recommendation. Is it worth  
13 pursuing or do you just want to delay it to a later  
14 time?

15 MEMBER PETTI: I think based on comments  
16 from the members we ought to just delay.

17 CHAIR SUNSERI: Sounds like the right  
18 decision to me.

19 MR. SNODDERLY: Chairman Sunseri, this is  
20 Mike Snodderly. You may want to hear from Meena  
21 Khanna or whosoever the highest manager on the line  
22 about whether they would rather have a letter that  
23 says wait until you resolve the differing view or  
24 whether they would pull it, and also how this -- and  
25 should it be pulled until Reg Guide 1.183 is ready?

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1           So I didn't know if Meena wanted to weigh  
2           in, but -- yes, I mean right now the Committee has  
3           been requested to write a letter and does the staff  
4           want that letter even if it would have this -- and not  
5           a negative recommendation, but a recommendation that  
6           says you ought to resolve this differing view before  
7           you move forward?

8           MEMBER BALLINGER: This is Ron. I think  
9           that's -- I don't know that that's a proper thing. I  
10          think we make our own decisions regardless.

11          MR. SNODDERLY: So and don't forget that  
12          the staff has asked for a letter on the ISG.

13          CHAIR SUNSERI: Yes, but they --

14          MR. SNODDERLY: So if you want to  
15          issue --

16          CHAIR SUNSERI: -- have also said in their  
17          closing remarks that they understood if we decided  
18          that we needed to delay it. So they've already --

19          MR. SNODDERLY: Okay. If you're  
20          comfortable with that, yes, then Scott should -- yes,  
21          just want to make sure we get the logistics right.

22          CHAIR SUNSERI: And I agree with Ron.  
23          It's our decision. I mean --

24          MR. SNODDERLY: Very good.

25          CHAIR SUNSERI: So anybody else?

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1 MEMBER DIMITRIJEVIC: Well, we're going to  
2 have a discussion on 1.183 in the couple weeks, right?

3 MEMBER PETTI: Yes.

4 MEMBER DIMITRIJEVIC: Well, this DPO be  
5 resolved before?

6 MEMBER PETTI: I think it's a good  
7 question to ask our management, what's the schedule  
8 for resolution, if the know at this point.

9 MS. KHANNA: Thank you for the question.  
10 So at this point I can't tell you exactly. There's  
11 various parts of the process that the DPO could end up  
12 in, so it could be a matter of two to three months.  
13 So it just depends on where the DPO goes, to be honest  
14 with you at this point.

15 MEMBER PETTI: But there's a very small  
16 chance that it would be in two weeks before 1.183 --

17 MS. KHANNA: I would say that that's fair  
18 to say. Without knowing all the details, yes, I think  
19 that's fair to say that it won't be done.

20 So if you don't mind, I would like to  
21 recommend that maybe we pursue the Reg Guide 1.183  
22 Subcommittee meeting and then revisit when the  
23 appropriate time is to do the Full Committee meeting  
24 if things haven't been addressed with the differing  
25 views, if that would be something that you guys would

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1 consider.

2 MEMBER PETTI: Yes, I think we can do  
3 that. I think right now the Full Committee for 1.183  
4 is out in -- I think it's in March, so if that had to  
5 slip a month, I think that would probably be okay.

6 MS. KHANNA: Okay. Thank you.

7 CHAIR SUNSERI: Does any member disagree  
8 with delaying this letter report?

9 All right. There you have it. So we will  
10 postpone writing a letter on this until the  
11 appropriate time downstream. Dave will work with  
12 staff. Staff will -- our staff. Our staff will work  
13 with the other side of the -- the other side's staff  
14 to decide when the appropriate time to come back.  
15 We'll move forward with the November I think it's 19th  
16 Subcommittee on the reg guide, and then we'll go  
17 wherever that leads us. That a fair conclusion, Dave?

18 MEMBER PETTI: Yes.

19 CHAIR SUNSERI: All right. Well before we  
20 leave this topic I just want to say one thing: Thanks  
21 to all the presenters on this topic. One of the  
22 values of any ACRS review is that it really creates an  
23 opportunity for a variety of technical viewpoints to  
24 be discussed in what I'll say a transparent public  
25 forum. If you look at our Committee, even our own

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1 Committee composition is intentionally diverse to  
2 promote looking at technical issues from different  
3 perspectives, and certainly we have firsthand  
4 experience with differing views on some topics. So we  
5 appreciate the challenge that's going on here.

6 But however, at the end of the day these  
7 differing views make our reviews stronger and our  
8 conclusions better. And I expect the same kind of  
9 outcome from this topic will occur, so really do want  
10 to thank all of the presenters for taking the time  
11 today and your patience with us as we strive to get  
12 the information we need to make the best decision that  
13 we can on this. So thank you.

14 MEMBER BALLINGER: This is Ron. I'd like  
15 to make a comment, if I could.

16 CHAIR SUNSERI: Sure. Go ahead.

17 MEMBER BALLINGER: I hope that I've heard  
18 it wrong, but I thought that I heard a staff member,  
19 I don't know who it was, say that depending on the  
20 assumptions that they -- an applicant makes, which --  
21 and it's their discretion. That may be where I hope  
22 I'm wrong. They could change the answer by several  
23 orders of magnitude. In spite of the fact that it's  
24 a stylized calculation and all that kind of stuff,  
25 which we understand, that's -- being able to alter the

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1 result in a stylized, even stylized calculation by  
2 several orders of magnitude by choosing assumptions  
3 which are allowed, is that the right way to do things?  
4 I hope I've heard them wrong.

5 MEMBER PETTI: Yes, I don't know. I'd  
6 have to go back and look at the record, the context of  
7 which the statement was made, but I mean, you know --

8 DR. DICKSON: This is Elijah Dickson.

9 MEMBER KIRCHNER: Matt, this is Walt. Can  
10 I follow on to Ron just quickly? One of the things  
11 that when we meet with the staff again I found a  
12 little bit in light of some of the additional comments  
13 we had the differing professional views. This whole  
14 business of what's credited and isn't is bothering me,  
15 not from a logical engineering analysis standpoint,  
16 but from what's in the regulations versus what's in an  
17 ISG or a reg guide. I mean reg guides are not  
18 regulations. Those are recommended approaches or  
19 acceptable approaches to the staff. But the  
20 regulations are the regulations.

21 I'm a little concerned that we heard  
22 differing interpretations of what could be credited  
23 and what not. Are we substantially departing from  
24 what's in the regulations versus what's in the reg  
25 guides? That would be something when we visit with

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1 the staff again I would like to explore and clear up  
2 because I certainly agree with the idea of doing a  
3 much better realistic engineering analysis, but is it  
4 consistent with what the existing statutory  
5 requirements in the regulations are?

6 That's more process than engineering and  
7 safety, but I have a concern there. I just wanted to  
8 note that for the future discussions.

9 CHAIR SUNSERI: Okay. We have two hands  
10 up. I think, Dennis, I see yours, but I want to go to  
11 Elijah Dickson first because his was up, then it was  
12 down, and now it's back up. We'll go to him and then  
13 we'll go to Dennis.

14 DR. DICKSON: Thank you very much. I'll be  
15 quick. Yes, I made the comment that depending on the  
16 assumptions you make in these types of analyses can  
17 impact the final dose results. And there are a  
18 handful of regulatory positions that if you made an  
19 improvement to that regulatory position you can change  
20 that dose result, this figure of merit result by an  
21 order of magnitude or two orders of magnitude. It's  
22 true with the regulatory guidance.

23 Now I had heard just briefly too that  
24 there's discussion between the regulation and the  
25 guidance, right? The regulation itself doesn't

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1 discuss how you get to that particular figure of merit  
2 value. That's all left to regulatory guidance. The  
3 rule itself, 50.67, it's pretty sparse on its  
4 language. It doesn't tell you step by step how you  
5 get to that particular answer.

6 CHAIR SUNSERI: All right. Thank you.

7 Now, Dennis?

8 MEMBER BLEY: Yes, thanks. Nothing  
9 substantive. I just wanted to ask Mike Snodderly,  
10 when the transcript comes in for this one, please  
11 distribute it as -- immediately to all of us. There's  
12 so much useful information in today's discussion and  
13 I'd really like to see that as soon as possible and  
14 even before you get minutes made up or anything like  
15 that. So --

16 MR. SNODDERLY: Yes, of course. Yes, sir.

17 MEMBER BLEY: -- thanks.

18 MR. SNODDERLY: Yes.

19 CHAIR SUNSERI: Anyone else? Okay. Thank  
20 you.

21 So we're done with this topic, we're at a  
22 kind of a point in our agenda where we can't go  
23 forward on anything. And I knew I probably was (audio  
24 interference) until Thursday morning, but we have --  
25 nearly two hours was left in our agenda today.

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1                   VICE CHAIR REMPE:     Matt, there's a  
2 research review letter.

3                   CHAIR SUNSERI: We could do the read-in of  
4 the draft emergency planning rule, if Greg is ready.

5                   And I understand, Joy, that you want to  
6 get the research done.

7                   VICE CHAIR REMPE: Yes, I just thought --  
8 if Greg isn't -- anyway, I thought you weren't going  
9 to allow Greg to read, but yes, after that we --  
10 that's why it's sitting out there. Any time we've got  
11 a spare moment, let's do it.

12                  CHAIR SUNSERI: Right. Greg, are you --

13                  MEMBER HALNON: We can do it, Matt. I  
14 think during our discussion time frame there's going  
15 to be a road map of some of the items that were in and  
16 out of the rule based on EPZ site boundary that I'd  
17 like to be able to have at my fingertips. We asked  
18 the staff to possibly think about doing that for us,  
19 and we didn't give them enough time I don't think,  
20 apparently. So I was working on it to try to get a --  
21 can read the letter in as it stands. I think there  
22 will be some substantive changes based on what we  
23 heard today, but we can read in what we have already  
24 set.

25                  CHAIR SUNSERI: Yes, I'd like to read it

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1 in and at least get some -- the big comments out of  
2 the way so that if you need to do some more homework  
3 or work between now and later in this week in this  
4 meeting schedule, that you'll have an opportunity to  
5 do that and coordinate with whoever you need to. Is  
6 that fair?

7 MEMBER HALNON: Certainly can do that.  
8 Sure.

9 CHAIR SUNSERI: So let's take a 15-minute  
10 break. We'll reconvene at 10 after the hour and then  
11 we'll start with the letter that Member Halnon is  
12 preparing. Okay?

13 Anything else before we go? Dennis, is  
14 your hand still up from last time or you got something  
15 new?

16 MEMBER BLEY: It's still up from last  
17 time. Sorry.

18 CHAIR SUNSERI: No problem. Okay. So we  
19 are recessed until 10 after the hour. Thank you.

20 (Whereupon, the above-entitled matter went  
21 off the record at 3:55 p.m.)  
22  
23  
24  
25

# **Advisory Committee on Reactor Safeguards**

10 CFR Parts 50 and 52  
Emergency Preparedness for Small Modular Reactors  
and Other New Technologies

November 2, 2021

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# NRC Staff Presenters

- Soly Soto Lugo, NMSS – Rulemaking PM
- Eric Schrader, NSIR – Technical Lead
- Charles Murray, NSIR – RG 1.242 Lead
- Michelle Hart, NRR – Senior Reactor Engineer

---

# Background

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# Background

- Proposed rule
  - Published the proposed rule for public comments on May 12, 2020
  - Comment period: total of 135 days (ended on Sept 25, 2020)
- Public comments
  - Received comments from 2,212 individuals and organizations, including 2,087 form letters
  - Identified 649 unique comments on the proposed rule
  - Responses to public comments will be published upon Commission approval of the final rule
- Draft final rule due to the Commission by December 30, 2021

---

# Draft Final Rule Language

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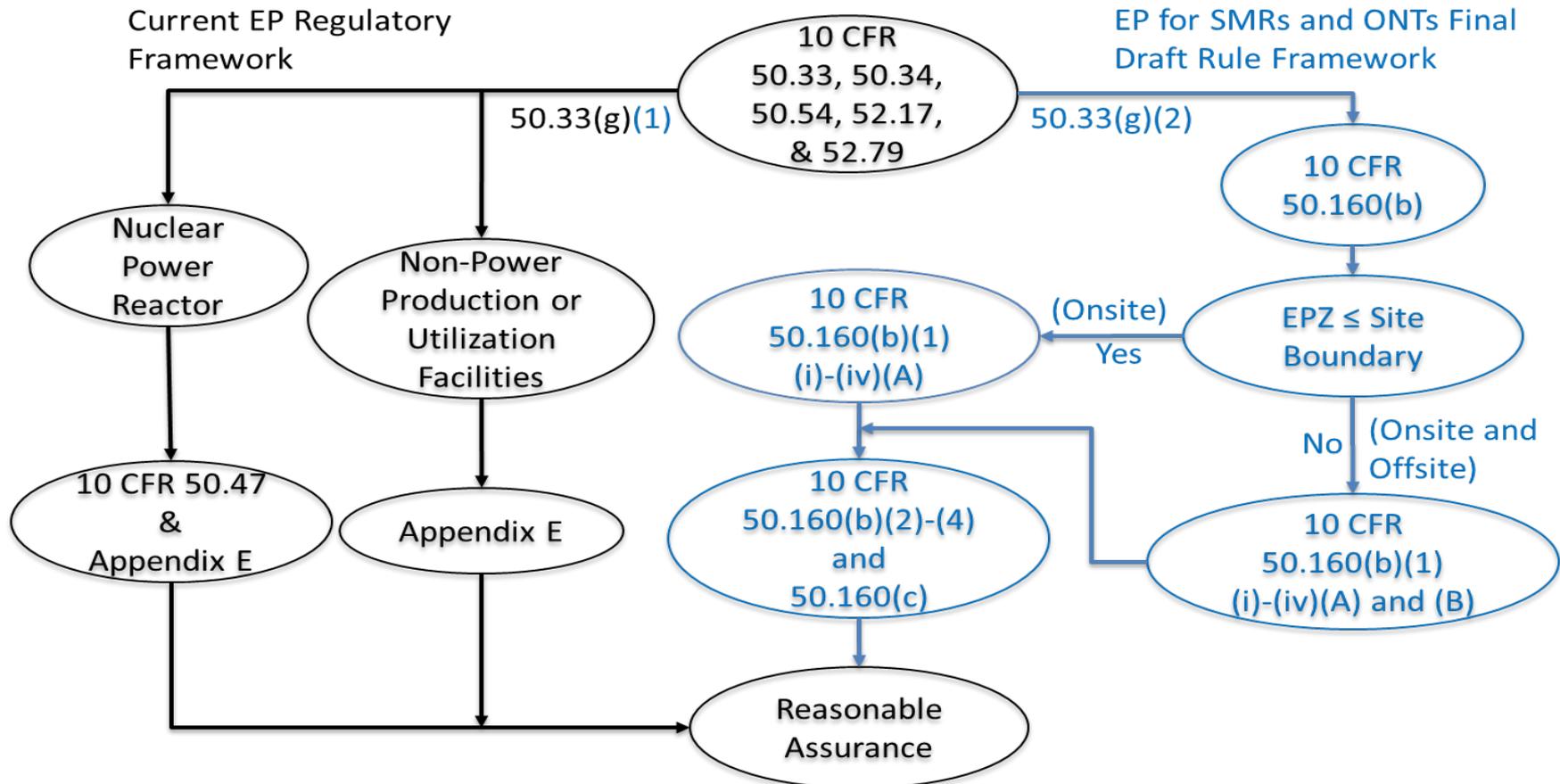
# Draft Final Rule Language

## Technical Basis and Major Provisions

- Graded approach to EP:
  - Performance-Based
  - Technology-Inclusive
  - Risk-Informed
  - Consequence-Oriented
  - Hazard analysis

# Draft Final Rule Language (cont.)

## New Alternative Performance-Based Framework



---

# Draft Final Rule Language (cont.)

- New Alternative Performance-Based Framework
  - Section 50.160(b)(1) demonstrate effective response in drills and exercises for emergency and accident conditions
- Scalable approach for determining plume exposure pathway EPZ size
  - Section 50.33(g)(2) CP, OL, ESP or COL applicants complying with § 50.160 must submit the analysis used to determine the EPZ size

---

# Draft Final Rule Language (cont.)

## Regulatory Oversight

- Section 50.160(b)(1) requires applicants and licensees to use drills and exercises to demonstrate their capabilities in the required emergency response functions
- The NRC staff is in the process of developing a regulatory oversight framework that is technology-inclusive, risk-informed, and performance-based
- Performance Objectives -vs- Performance Indicators

---

# Draft Final Rule Language (cont.)

- EPZ Boundary and Physical Characteristics
  - Section 50.33(g)(2) applicants must propose their EPZ
  - Section 50.160(b)(3) requires applicants to describe in their emergency plans the boundary and physical characteristics of the EPZ
- Requirement to Describe Ingestion Response Planning
  - Section 50.160(b)(4) establishes ingestion response planning requirements

---

# Draft Final Rule Language (cont.)

- Onsite and Offsite Planning Activities
  - Section 50.160(b)(1)(iv)(A) contains required onsite and offsite planning activities for all applicants and licensees
- Offsite Planning Activities
  - Section 50.160(b)(1)(iv)(B) contains required offsite planning activities for applicants with a plume exposure pathway EPZ that extends beyond the site boundary

---

# Draft Final Rule Language (cont.)

- Requirement for Hazard Analysis
  - Section 50.160(b)(2) requires a hazard analysis of facilities contiguous to or near an SMR or ONT facility
- Consideration of Credible Hazards
  - Activate the emergency plan
  - negatively impact implementation of the emergency plan

---

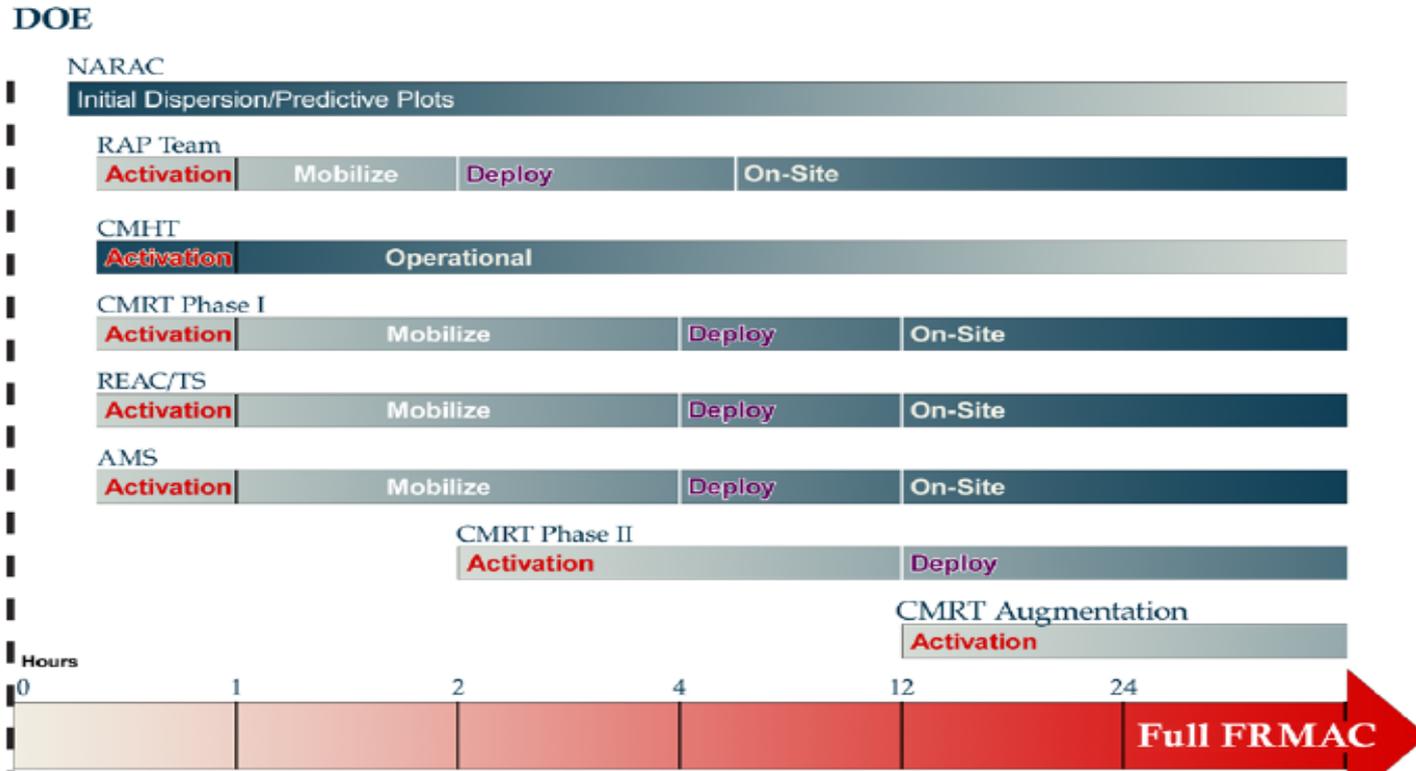
# Presidential Policy Directive 8 / PPD-8, “National Preparedness”

## PPD-8 National Planning Framework requires:

- A Planning Framework, covering five areas - Prevention, Protection, Mitigation, Response and Recovery
- Response and Recovery area - Nuclear/Radiological Incident Annex
- Annexes describe response and resources available
  - Part of the Nuclear/Radiological Incident Annex is the DOE/National Nuclear Security Administration (NNSA) Federal Radiological Monitoring and Assessment Center (FRMAC)

# FRMAC Activation Timeline

## Approximate Readiness Time After Activation – Emergency (Early) Phase



Activation Sequence for Various DOE-Related Assets Once Authorized  
DOE/NV/25946- 980 FRMAC Operations Manual (May 2010)

---

# FEMA and DOE Public Comments

- Federal Emergency Management Agency
  - Supported modifying regulatory framework, but opposed potential for site boundary EPZs
  - Argued the rule does not consider full spectrum of threats and beyond design basis accidents
- U.S. Department of Energy
  - Supported the proposed rule
  - The revised EP framework would provide more appropriate approach for SMRs

---

# Significant Changes to the Proposed Rule

- Revised section 50.33(g)(2) EPZ sizing criteria
- Revised section 50.160(b)(3) to include entry criteria
- Revised sections 50.160(c)(1)-(2) to allow licensees greater flexibility for initial exercise demonstration

---

# Other Changes to the Proposed Rule

- Revised section 50.2 definition of “small modular reactor”
- Revised section 72.32(c) to clarify that the emergency plan that meets the requirements of sections 50.47 or 50.160 satisfies the EP requirements of section 72.32
- Revised section 50.160(b) to state the reasonable assurance finding required in section 50.47(a)(1) apply to section 50.160 applicant

---

# Other Changes to the Proposed Rule

(cont.)

- Added new paragraph 50.47(f) denoting when the offsite emergency response plan requirements in § 50.47(a)(2), (b), and (c)(2) do not apply
- Revised sections 50.160(b)(1)(iii)(F)(1), (3) and (4) to refer to “applicable response organizations”
- Revised section 50.160(b)(1)(iv)(B)(4) to ensure ETEs include area within the site boundary

---

# Other Changes to the Proposed Rule

(cont.)

- Clarified that an applicant complying with section 50.160 needs to submit an emergency plan of a “participating” Tribal government
- Relocated requirements for site familiarization and maintenance of emergency plan to section 50.160(b)(1)(iv)(A) to ensure requirements are applicable to all applicants and licensees

---

# Draft Regulatory Guidance

RG 1.242, “Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light Water Reactors, and Non-Power Production or Utilization Facilities”

---

# Draft Regulatory Guidance

- **Conforming changes to the regulatory guide**
  - Made conforming changes based on changes to the draft final rule language
  - Included additional reference documents
  - Enhanced the guidance on accident likelihood, source term, timing of the accident sequence, and meteorology
  - Added the definition of “safe conditions” to the glossary

---

# Draft Regulatory Guidance (cont.)

- Appendix A, “General Methodology for Establishing Plume Exposure Pathway Emergency Planning Zone Size”
  - Provides a general methodology acceptable to the NRC for the analysis for establishing plume exposure pathway EPZ size
  - Added Section A-3.1, “Event Selection,” which discusses the applicant’s consideration of accident likelihood

---

# Draft Regulatory Guidance (cont.)

- Appendix B, “Development of Information on Source Terms”
  - Provides guidance to develop source terms for plume exposure pathway EPZ size evaluations

---

# Draft Regulatory Guidance (cont.)

- Appendix A-3.1 “Event Selection”
  - Use licensing basis events as candidate radiological release scenarios
  - Considerations
    - Internal and external initiators
    - All sources
    - Multi-module and multiunit
    - Event likelihood including uncertainty
    - Timing of the releases

---

# Questions

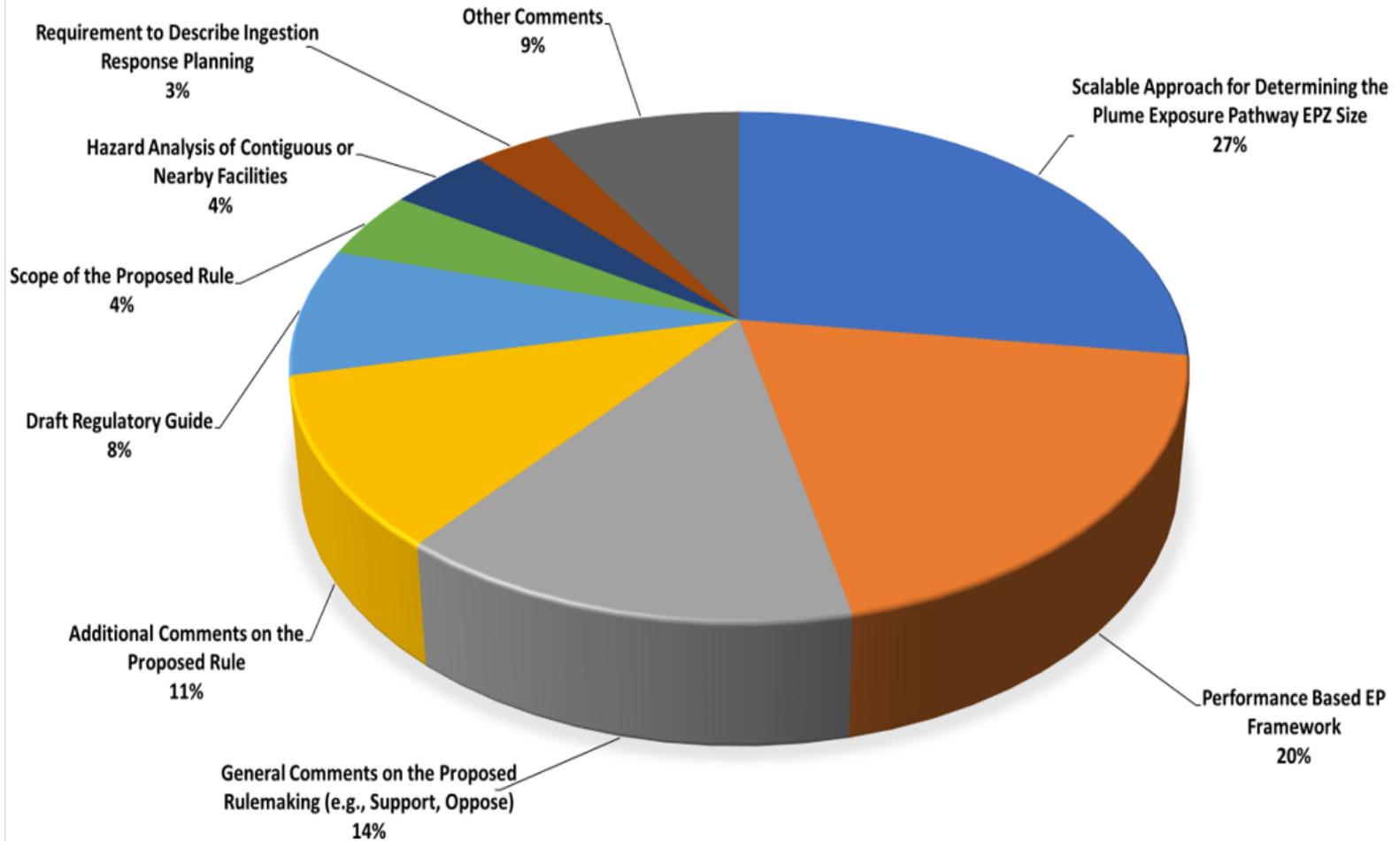


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# Acronyms and Abbreviations

- AMS – Aerial Measuring System
- ACRS – Advisory Committee on Reactor Safeguards
- CFR – Code of Federal Regulations
- CMHT – Consequence Management Home Team
- CMRT – Consequence Management Response Teams
- CP – construction permit
- COL – combined license
- DOE – Department of Energy
- EP – emergency preparedness
- EPZ – emergency planning zone
- ESP – early site permit
- ETE – evacuation time estimate
- FEMA – Federal Emergency Management Agency
- FRMAC – Federal Radiological Monitoring and Assessment Center
- NARAC – National Atmospheric Release Advisory Center
- NMSS – Office of Nuclear Material Safety and Safeguards
- NRC – U.S. Nuclear Regulatory Commission
- NRR – Office of Nuclear Reactor Regulation
- NSIR – Office of Nuclear Security and Incident Response
- OL – operating license
- ONT – other new technologies
- PM – project manager
- REAC/TS – Radiation Emergency Assistance Center/Training Site
- RAP – Radiological Assistance Program
- RG – Regulatory Guide
- SMR – small modular reactor

## PUBLIC COMMENTS RECEIVED ON THE EP SMR/ONT PROPOSED RULE ORGANIZED BY TOPIC





# Key Messages



Classification

Product Set #: [Exercise/Real Event]  
[Location City, State]  
[Event Type] at [Date, Time]

## Predicted Evacuation and Sheltering Areas Based on EPA/DHS Guides

Applicable within first hours/days while radioactive cloud is present

### Key Points

- Protective actions are based on dose that can be avoided .
- Areas shown do not include dose received before [insert time and date] .
- Greatest hazard is due to exposure to the radioactive cloud. Evacuation before radioactive cloud is present is best, but avoid evacuation in the radioactive cloud.
- Radioactive cloud is expected to clear the contoured areas by [insert date/time].
- Sheltering-in-place may be preferable to evacuation in some situations,
  - If radioactive cloud is present or its arrival is imminent,
  - For certain populations needing special consideration (hospitals/nursing homes, prisoners, elderly....),
  - Other hazards are present which complicate or impede evacuation (severe weather, competing disasters...).
- Sheltering followed by a delayed evacuation may be best, if radioactive decay is very rapid and shelter provides adequate shielding.
- Predicted dose is accumulated over 4 days ([insert date/times, e.g. 16 Oct 2008 12:30 PDT to 20 Oct 2008 12:30 PDT]).
- Predicted dose assumes individuals are unsheltered and unprotected.
- Use the “Radioactive Cloud has Passed” map after radioactive cloud passes.

Briefing Product for Public Officials  
Current: [insert time and date]  
Check for updates

Technical Details: FRMAC Home Team 702-794-1665  
Advice & Recommendations: A-Team 770-488-7100

Classification

page 2 of 3

FIGURE D-7. MODELED EVACUATION AND SHELTERING AREAS (PLUME PHASE) BRIEFING PRODUCT KEY POINTS

# Supporting Graphics

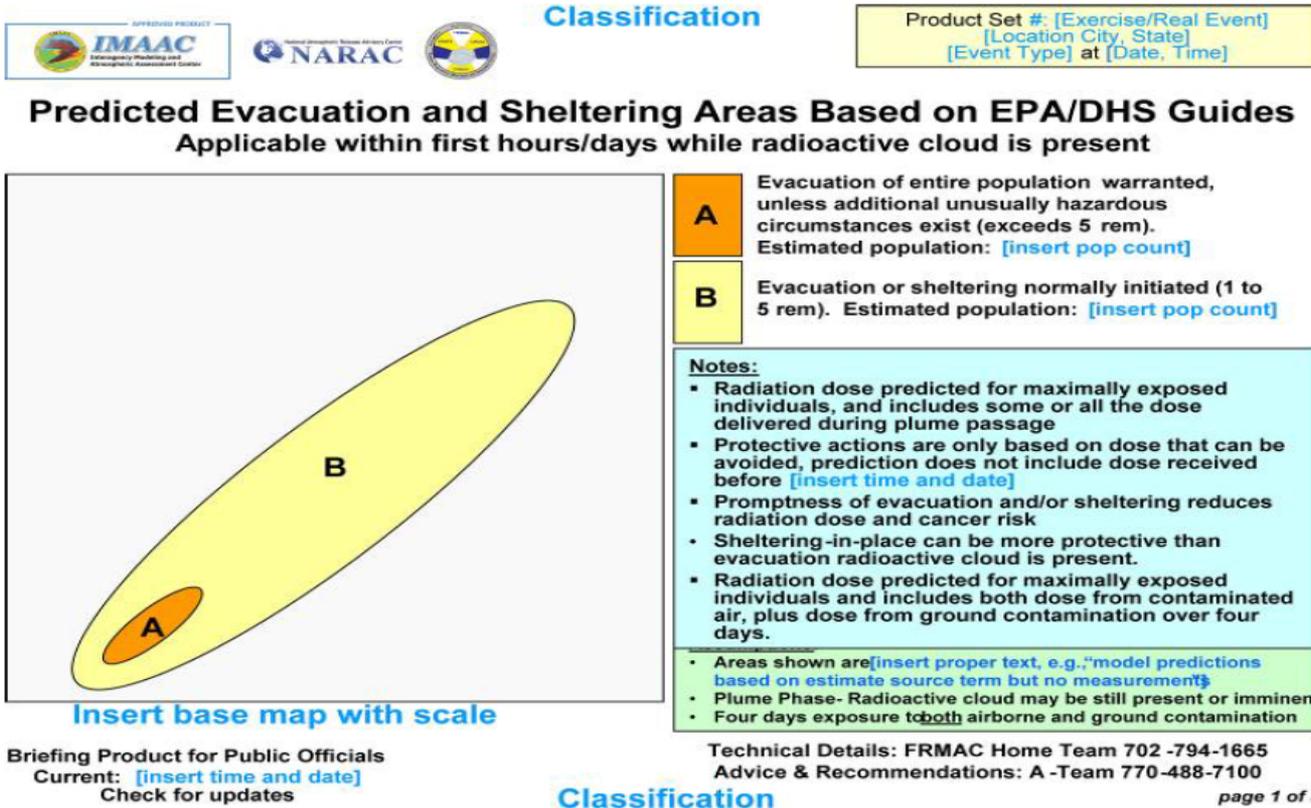


FIGURE D-6. MODELED EVACUATION AND SHELTERING AREAS (PLUME PHASE) BRIEFING PRODUCT GRAPHIC

# Speaker Notes



Classification

Product Set #: [Exercise/Real Event]  
[Location City, State]  
[Event Type] at [Date, Time]

## Predicted Evacuation and Sheltering Areas Based on EPA/DHS Guides Applicable within first hours/days while radioactive cloud is present

### Presenter Notes – Additional Information

- PAG – Protective Action Guideline, projected dose at which a specific protective action to reduce or avoid that dose is warranted.
- Protective actions are based only on dose that can be avoided, not dose acquired prior to implementation of the protective action.
- Areas shown do not include dose received before [insert time and date]
- Areas shown are [insert proper text, e.g., "model predictions based on estimate source term but no measurements"]
- Reduce radiation exposure to minimize long-term cancer risk. Evacuation and sheltering reduce radiation exposure.
- Exposure to the radioactive cloud presents the greatest hazard, because dose results from radiation by the cloud, inhalation of radioactivity, plus radiation from contamination on the ground.
- Completion of evacuation before plume arrival is best. Evacuation in the radioactive cloud is likely to result in more dose than sheltering until after it passes. Evacuees in the cloud should cover mouth and nose with available filter materials.
- Evacuation and shelter guidance based on EPA/DHS guidelines for the Early Phase
  - "Evacuation (or, for some situations, sheltering) should normally be initiated at 1 rem."
  - "Sheltering may be the preferred protective action when it will provide protection equal to or greater than evacuation, based on consideration of factors such as source term characteristics, and temporal or other site-specific conditions."
  - "Because of the higher risk associated with evacuation of some special groups in the population (eg. those who are not readily mobile), sheltering may be the preferred alternative for such groups as a protective action at projected doses up to 5 rem."
  - "In addition, under unusually hazardous environmental conditions use of sheltering at projected doses up to 5 rem to the general population (and up to 10 rem to special groups) may become justified."
- Sheltering followed by delayed evacuation may be best if radioactive decay is very rapid (e.g., radiiodine or nuclear detonation).
- Radioactive cloud is expected to clear the contoured areas shown by [insert date/time, e.g. 16 Oct 2008 14:00 PDT].
- A different map must be used after the radioactive cloud has passed, which is based only on the radioactivity deposited and excludes the radioactive cloud.

### **Briefing Product for Public Officials**

Current: [insert time and date]  
Check for updates

### Presenter Notes – Technical Background

- Guidance based on EPA and DHS PAGs, as given in:
  - "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," (EPA 400-R-92-001, May 1992).
  - "Protective Action Guides for Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents," (Federal Register, Vol. 71, No. 1, Jan. 3, 2006, pg 174).
- The PAG for evacuation (or, as an alternative in certain cases, sheltering) is expressed in terms of the projected sum of the effective dose equivalent from external radiation and the committed effective dose equivalent incurred from inhalation of radioactive materials from exposure and intake during the early phase."
- Predicted dose is known as Total Effective Dose Equivalent (TEDE) and includes the following:
  - External irradiation by the radioactive cloud plus inhalation of the contaminated air as it passes
  - Also includes external irradiation by ground contamination, plus dose due to radioactivity taken into the body by inhalation of contaminated dust (resuspension)
- DRLs used to define areas shown are (insert actual values for both upper & lower DRLs with units, e.g. 1.5 mR/h & 0.3 mR/h or 30  $\mu\text{Ci}/\text{m}^2$  & 6  $\mu\text{Ci}/\text{m}^2$ )
- Predicted dose is accumulated over 4 days ([insert date/times, e.g. 16 Oct 2008 12:30 PDT to 20 Oct 2008 12:30 PDT]).
- Predicted dose assumes maximum possible exposures, but only considers dose that can be avoided by protective actions. Doses received prior to this point in time are not considered.
- Radioactive contamination is expected outside the contoured areas, but not at levels expected to exceed federal guidelines for evacuation or sheltering based on current information.
- Additional technical and background information is provided in the Consequence Report containing the detailed, technical version of this calculation.
- Briefing Products are intended for presenting common operating picture to key leaders and decision makers. Other more technical products are available (Standard Products).
- Contact the FRPCC Subcommittee for Environment, Food and Health (Advisory Team) for advice and recommendations. Available by calling CDC Emergency Operations Center (EOC) at 770-488-7100.

Classification

Technical Details: FRMAC Home Team 702-794-1665  
Advice & Recommendations: A-Team 770-488-7100

page 3 of 3

FIGURE D-8. MODELED EVACUATION AND SHELTERING AREAS (PLUME PHASE) BRIEFING PRODUCT SPEAKER NOTES

DOE/NV/25946- 980 FRMAC Operations Manual (May 2010)

**NEI Remarks on the SMR & ONT EP Final Rule and Guidance  
Meeting of the Full ACRS on November 1, 2021**

Thank you for the opportunity to make remarks on the NRC's final rule and guidance for SMR and ONT EP. My name is Marc Nichol, Senior Director of New Reactors at the Nuclear Energy Institute. The comments below are made on behalf of the nuclear energy industry.

We have been engaging with the NRC staff on performance-based EP for advanced reactors since the issue was first identified in 2010 and we strongly support issuance of the final rule. The Commission's Advanced Reactor Policy Statement has encouraged the nuclear industry to develop designs with enhanced safety features. The industry has responded to this policy goal with designs featuring smaller cores and reliance on passive safety systems – these features reduce the potential for accidents and increase the time available to take mitigation or protective actions. The overall lower risk provides a sound rationale for the EP changes proposed by the NRC staff.

The NRC's rule recognizes the enhanced safety of advanced reactor designs and establishes EP requirements that are commensurate with the potential consequences to the public from an accident. Most advanced reactors are expected to demonstrate that they can meet the dose-based consequence limits for the plume exposure Emergency Planning Zone at distances much less than the 10-mile radius used by current operating reactors. In all cases, the applicant will have to provide the NRC with a site-specific technical justification for the proposed EPZ size. In many cases, an advanced reactor may present a lesser hazard to the public than some non-nuclear facilities, such as petrochemical facilities.

The rule uses essentially the same EP technical basis as that underlying the requirements applicable to currently operating reactors and therefore will maintain the same level of public protection. There will be no reduction in defense-in-depth; rather, EP activities are appropriately scaled to reflect the potential hazards posed by a facility. The rule provides clear and reasonable regulatory requirements for designers, applicants and licensees. We support the performance-based approach used in the rule as it will allow for innovation and flexibility in addressing the EP requirements. It also aligns with the NRC's prior approval of EP for the TVA Clinch River ESP.

We believe there is one area where the rule would benefit from additional clarity. The rule states that the plume exposure pathway EPZ must include the area in which the public dose exceeds 1 rem TEDE over 96 hours from the release of radioactive materials from the facility "considering accident likelihood and source term, timing" of the accident sequence, and meteorology. However, the proposed rule and guidance does not fully address the subject of "accident likelihood;" for example, how unlikely must an event be to not be considered for a

**NEI Remarks on the SMR & ONT EP Final Rule and Guidance  
Meeting of the Full ACRS on November 1, 2021**

sizing analysis for an emergency planning zone. The lack of sufficient detail in the proposed guidance to inform an application leaves the determination of which events should be included or excluded to be clarified during the NRC review; potentially through NRC requests for information and applicant revisions of the documentation. As a current example, we understand that the lack of this clarity has been a challenge in the NRC's review of the NuScale topical report on the EPZ methodology. There should be clear guidance with respect to which internal and external events are included (e.g., cutoff frequencies and uncertainty bounds) and consistency between the application of the guidance to light-water and non-light-water designs. Absent better definition/criteria on this topic, the NRC's goal to create regulatory stability, predictability, and clarity through this rule will not be fully met.

To summarize, we believe the new EP framework will be beneficial for the licensing of advanced reactor designs and provide reasonable assurance of adequate protection for the public. The rule provisions are consistent with the Atomic Energy Act, Commission's "Policy Statement on the Regulation of Advanced Reactors," and past Staff Requirements Memorandums. We also note that in addition to meeting NRC requirements, a facility owner/operator will responsibly engage with State and local elected officials, emergency management agencies, and communities to gain public confidence in the siting of an advanced reactor facility. Such engagements would include working with communities to put emergency response capabilities in place, even in cases where an offsite EPZ is not required.

Finally, the rule supports the safe and efficient deployment of a new generation of U.S.-designed reactors, all producing carbon-free power – an outcome that's good for our economy and national security, and one that supports global efforts to mitigate climate change.

# UCS Comments on the Draft Final EP Rule for SMRs and ONTs

Edwin Lyman  
Director of Nuclear Power Safety  
Union of Concerned Scientists

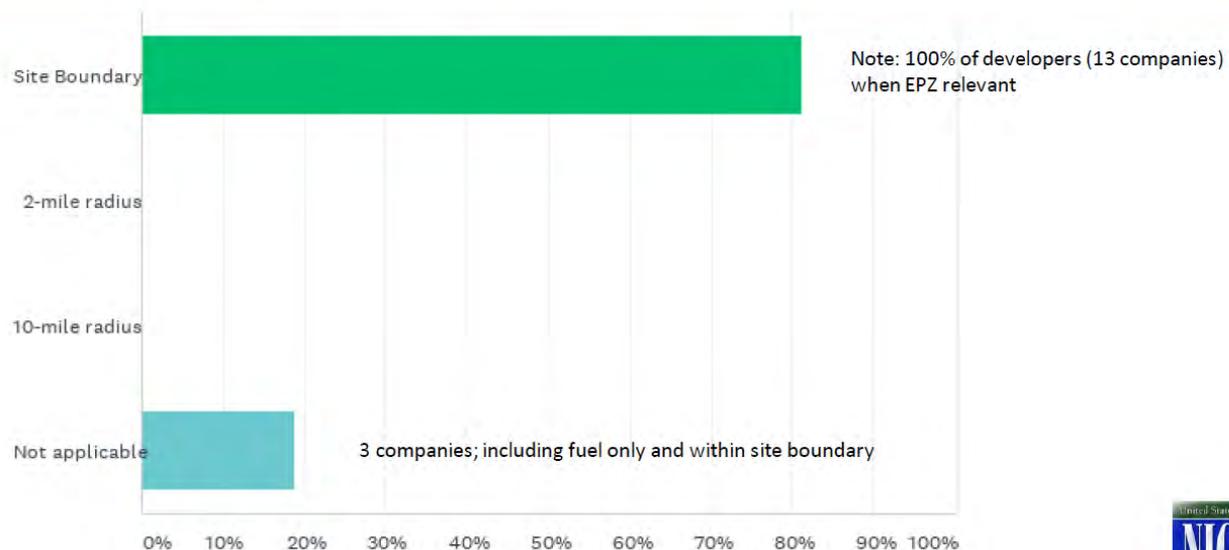
Presentation to the ACRS  
November 2, 2021

# General comments

- UCS would welcome a science-based revision to emergency planning requirements that strives to use the best available information to better align protective measures to radiological risks, while fully accounting for uncertainties and the need for defense-in-depth
  - An objective rule would acknowledge up front that EPZs could be larger or smaller than 10 miles
- Unfortunately, the draft final rule is a far cry from this goal. Its purpose seems largely to provide cover for reactor vendors who have already publicly claimed that their designs do not need an offsite EPZ
  - Presumption is that only smaller EPZs would result for any SMR or ONT, regardless of the details of the technology
  - Disregards one of the major lessons of Fukushima: the essential value of planning for the unexpected!

# 2021 Nuclear Industry Council vendor survey

Q16: What is the appropriate Emergency Planning Zone for your technology?



**(N.B.: The answer is already predetermined!)**

# No Offsite EPZ, No EP requirements

- The draft final rule would provide a “get-out-of-jail-free” card for power reactor applicants seeking to avoid any offsite EP requirements
  - a step function if the EPZ is determined to be within the site boundary
- Entire offsite EP burden then falls on public emergency management agencies: an unfunded mandate
  - May lack the necessary radiological expertise
  - Could lead to disproportionate impacts on disadvantaged populations, depending on local economic conditions and resources

# Concern: Cumulative effect of RIPB licensing initiatives

- General reductions in defense-in-depth despite the “common-cause” reliance on the PRA in the LMP, etc.
- The rule should not be an option for FOAK reactor designs, but only for reactors that have accumulated significant operating experience to validate the PRA

# Concern: Event selection

- The rule should be specific enough to prevent applicants from fine-tuning selection and analysis of events to achieve the desired result: no offsite EPZ
  - Example: Arbitrarily chosen seismic event frequency cutoff in NuScale draft Topical Report on EPZ size
- But vague rule and guidance language opens the door for back-calculating from desired outcome
  - Proposed rule: used undefined term “spectrum of credible accidents” for evaluating off-site emergency phase doses
  - Draft final rule is even **less** specific: “considering accident likelihood and source term, timing ... and meteorology.” (§50.33(g)(2))
  - Draft guidance: “Licensing basis events” (is also left undefined in the regulations)

# Comments of DOE Deputy Under Secretary Jay Tilden

- On July 22, 2020, DOE Deputy Under Secretary for Counterterrorism and Counterproliferation Jay Tilden submitted independent comments critical of the EP draft rule (ML20204A847):
  - “The proposed EPZ strategy may not provide the same defense-in-depth [as the current framework] against the full spectrum of nuclear accident scenarios ... given the lack of operational history for SMR technologies, the source term determination and evaluation of credible accident scenarios are purely theoretical ... this circumstance should lead the NRC ... to be more conservative ...”
- On July 23, NNSA Administrator Lisa Gordon-Hagerty requested that Mr. Tilden’s comment be withdrawn
- On September 25, Tilden and DOE Assistant Secretary for Nuclear Energy Rita Baranwal submitted joint comments that stated “the new NRC approach [for EPZ size] ... will assure public safety”
- Mr. Tilden’s original comments should not be so easily discounted

# Concern: Additional hurdle

- Draft final rule contains a second vague condition for an offsite EPZ: there must be a need for “predetermined, prompt protective measures.” Staff have not clearly explained what this means
- “AND” statement means that applicants will have a second way to avoid offsite EP requirements even if the plume EPZ extends beyond the site boundary
- Appears inconsistent with the EPA PAG (Protective Action Guide) requirement underlying the first condition ( $< 1$  rem in 4 days)

Concern: Does not address acute exposures, thyroid dose

- Draft final rule is inconsistent with previous planning basis for EP because it does not clearly address protection from “immediate, life-threatening doses” from the “worst” core-melt sequences
  - Low-probability, high-consequence initiating events could be screened out completely
- Does not include thyroid dose early phase PAG for infants which could be limiting in some scenarios

# Concern: Inconsistent scope

- Why are non-LWRs (such as a fast reactors) of any size in the scope of the rule, but not large LWRs?
- Large LWRs could have EPZs > 10 miles utilizing this methodology
- No reason to believe *a priori* that large non-LWRs could not experience accidents with severe off-site consequences

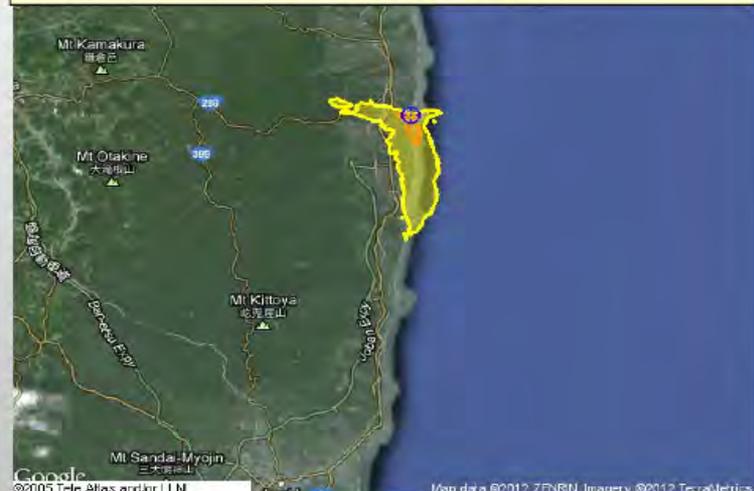
# NARAC Fukushima simulations

## Total Effective Dose Includes External Ground-Shine, Air Immersion, and Internal Committed Effective Dose

Total Effective Dose (TED) is the adult whole body dose from inhalation and air immersion (due to the initial plume and resuspension) as well as ground-shine



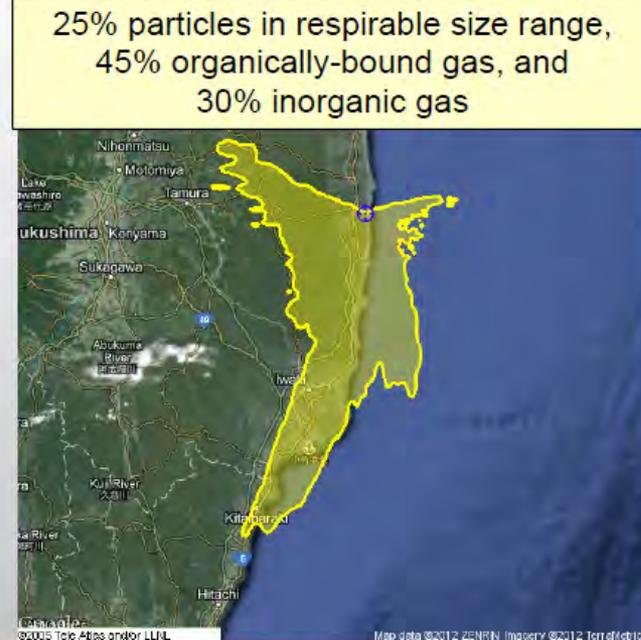
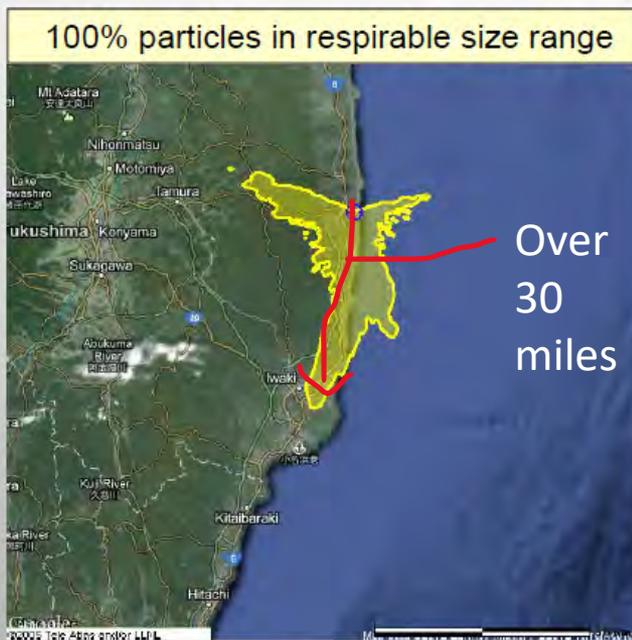
50-year Committed Effective Dose is the adult whole body internal dose from inhalation using a weighted sum of doses to various organs



Contours show predicted areas greater than 50 mSv / 5 rem (orange) and 10 mSv / 1 rem (yellow) for 4 days of exposure based on the "baseline simulation for 2011 March 14-16 TED levels are early phase upper and lower limits U.S Protective Action Guide levels for evacuation / sheltering

# NARAC (cont.)

## Iodine Gas-Particle Partitioning Assumptions Lead to Different Predicted Downwind Extent of Thyroid Dose



- 70-year committed 1-year old child thyroid dose for iodine inhalation over 2011 March 14-16
- 50 mSv / 5 rem contour is early phase U.S. Protection Action Guide level for KI administration
- Both inorganic and organically-bound gases show higher dose and downwind extent than particulates
- Inorganic and organically-bound iodine gas thyroid dose estimates are predicted to be similar

# Clinch River Breeder thyroid doses at 0.41 miles (1000 MWe)

RADIOLOGICAL CONSEQUENCES OF  
HYPOTHETICAL LOF-HCDA

	<u>10 CFR 100</u>	<u>Off-Site Doses (REM)</u>				
		<u>Representative</u>				
		<u>Parametric Cases</u>				
		<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
<u>2 Hr S.B. (0.41 mi)</u>						
Bone	150	0.093	0.926	9.11	131.7	1893
Thyroid	300	0.0063	0.063	0.616	8.90	128.7
Lung	75	0.005	0.050	0.488	7.05	101.4
Whole Body	25	0.028	0.258	1.54	3.04	5.5

# PRISM (380 MWe) fast reactor doses

Table 3-5: Case Study Overview – Regulatory Dose Perspective

Case Number	Scenario Description			Offsite Consequence (rem)		
	Transient	Type	Primary System Boundary	Total Dose <sup>1</sup> (3 Miles)	Total Siting Dose <sup>1</sup> (200m)	Total 1 Yr Groundshine Dose <sup>2</sup> (3 Miles)
1	PLOF+	Burner	Intact	8.7E-4	0.29	1.1E-3
2	PLOF+	Burner	Degraded	1.8	490	2.0
3	UTOP+	Burner	Intact	2.9E-3	0.71	4.3E-4
4	UTOP+	Burner	Degraded	5.8	1500	1.6
5	PLOF+	Breeder	Intact	8.0E-4	0.21	1.2E-3
6	PLOF+	Breeder	Degraded	1.3	340	2.0
7	UTOP+	Breeder	Intact	1.8E-3	0.47	3.9E-4
8	UTOP+	Breeder	Degraded	3.5	940	1.6

<sup>1</sup> Compared to 25 rem

<sup>2</sup> Compared to 2 rem

Grabaskas, D. et al. “Regulatory Technology Development Plan Sodium Fast Reactor: Mechanistic Source Term – Trial Calculation, ANL-ART-49, Vol.1., Oct. 2016

# Concern: Lack of inclusion of sabotage events

- Draft final rule does not (explicitly) consider the potential for hostile actions as an external event initiator that could affect issues such as event timing, progression, and severity, and thus could factor into the EPZ size determination

# Concern: Lack of specifics on site-wide analysis

- Draft final rule and guidance provide no details on how applicants should “consider” multi-module accidents and interactions, and how to address other potential sources of radiological release (spent fuel storage, on-site processing)
- Important because accumulated spent fuel storage could prove to be the largest single potential source of release onsite (see, e.g. NuScale)

**From:** [Becker, Gary](#)  
**To:** [Shodderly, Michael](#)  
**Subject:** [External\_Sender] Advance comment for ACRS Full Committee Meeting on EP for SMRs  
**Date:** Monday, November 01, 2021 3:06:21 PM  
**Attachments:** [image001.png](#)

---

Mike,

Tomorrow I intend to make some comments during the public comment portion of the EP meeting. I wanted to provide an advance summary if it might aid the Committee in their preparations and deliberations. Depending on the substance of tomorrow's discussions, I may provide appropriate additional details orally and follow-up in writing.

*At I stated at the ACRS subcommittee meeting in September, NuScale is concerned about the lack of clarity in the new rule and RG 1.242. The final rule language states that the plume exposure pathway EPZ must include the area in which the public dose exceeds 1 rem TEDE over 96 hours from the release of radioactive materials from the facility "considering accident likelihood and source term, timing of the accident sequence, and meteorology." But neither the proposed rule nor the Reg Guide adequately address that subject of appropriate "accident likelihood," i.e., how unlikely must an event be to not be considered for an EPZ sizing analysis. The proposed rule and Statements of Consideration lack any indication to an applicant as to an acceptable event frequency envelope, while the Reg Guide provides very little more. RG 1.242 offers "licensing basis events" (LBEs) as a starting point for consideration, but for LWRs the definition of LBEs is of little help; moreover it is inconsistent with the scope of LBEs for non-LWRs using the NEI 18-04 approach and for facilities employing a "maximum hypothetical accident." Then, within the set of LBEs, RG 1.242 does not prescribe or suggest an acceptable accident likelihood screening threshold.*

*NRC Staff acknowledged in SECY-97-020 that, to make changes to the EP requirements, it would "require significant expenditure of staff resources" to address "the probability level, if any, below which accidents will not be considered for EP" and "the use of increased safety in one level of the defense-in-depth framework to justify reducing requirements in another level." Faced with that task in modifying the current framework for SMRs and ONTs, the Staff have promulgated a rule without addressing the probability level in a meaningful manner. In SECY-15-0077, Staff noted they "may require future Commission direction" in "determining appropriate accidents to be evaluated," but Staff have neither offered nor sought such direction. The rule and guidance defer the question of accident likelihood to individual applicants to resolve with the Staff. NuScale believes NRC should provide, in either the rule or the guidance, clear direction on the scope of internal and external events to be included in EPZ sizing (e.g., cutoff frequencies and uncertainty bounds). In particular, NuScale believes the treatment of some external hazards, such as earthquakes, require special attention in the new rule because they were only crudely considered in the technical basis underlying the existing EP requirements (i.e. WASH-1400 and NUREG-0396).*

*Consistent with the rule's stated intent to increase "predictability," the final rule and RG 1.242 should provide clear, well-supported, and reasonable guidance on which internal and external events are to be included in EPZ sizing; that guidance should be risk-informed and performance-based, and should*

*be consistent between light-water and non-light-water designs. We believe these are essential, high-level, subjective questions that are being deferred to a time and manner least appropriate for their consideration—individual applicants that will be seeking expeditious review of their EP during the licensing of a particular site.*

Regards,



**Gary Becker**  
**Regulatory Affairs Counsel**

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**From:** [Becker, Gary](#)  
**To:** [Shodderly, Michael](#)  
**Subject:** [External\_Sender] RE: RE: Advance comment for ACRS Full Committee Meeting on EP for SMRs  
**Date:** Wednesday, November 03, 2021 7:06:53 PM  
**Attachments:** [image001.png](#)

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Thank you Mike. Here is a written version of my comments yesterday for the record. //

At the outset, overall NuScale believes this rulemaking is needed, appropriate, and in many respects well considered.

However, as I stated at the ACRS subcommittee meeting in September, NuScale is concerned about the lack of clarity in the new rule and RG 1.242, particularly on the issue of event selection for EPZ sizing. I sent some advanced written comments yesterday that I won't recount in full here. In essence, there's nothing in the rule and very little in the guidance to guide us on appropriate "accident likelihood," i.e., how unlikely must an event be to not be considered for an EPZ sizing analysis. The conversation I heard today did nothing to help ease my concerns. In response to questions today, NRC have indicated that basically they can't provide any detailed information on event selection now. Most troubling was the suggestion that we need to "find all of the potential large releases," looking to every event in the so-called "licensing basis" of Chapters 15 and 19. Surely that can't be the standard, because a PRA such as NuScale's essentially evaluates every sequence regardless of frequency. And non-LWRs using NEI 18-04 are able to limit the bounds of accident frequency to their LBEs, which have a frequency of greater than  $5E-7$ . LWRs don't even get that level of guidance, let alone anything to guide us in further screening. NRC pointed to the need for prompt protective measures as one criterion, which does not answer the question of how unlikely an event to consider. And we don't think it is a question specific to sites or technologies--we believe the issue of accident likelihood and event selection is essential to the EPZ sizing aspect of this rulemaking. And it is a generic question that speaks to the policy of how unlikely an event preplanned emergency actions should be developed for; in other words what is reasonable to consider. The rule, with respect to EPZ sizing, does not achieve regulatory predictability, and in fact doesn't seem to be a "risk-informed" rule at all--how can the rule be risk-informed if it doesn't define the frequency side of the risk equation?

As I noted in my written comments, the guidance's section on "event selection" is of little help. But Section 3.7 "Probabilistic Dose Aggregation" does give us some clues on how we might make EPZ sizing risk informed and performance based. That section discusses how NUREG-0396 examined the conditional probability of various exceeding dose criteria and concluded the 10 mile EPZ was of sufficient size such that projected doses from the traditional DBAs and "most" core melt sequences would not exceed PAG levels outside the EPZ, and for the worst core melt sequences immediate life threatening doses would not generally occur outside the EPZ. RG 1.242 states that the methodologies used for event selection, identification of source terms, modeling of releases, and aggregation of potential offsite doses should provide similar confidence that appropriate offsite planning will be identified

This framework may provide an opportunity to bring greater clarity on event selection to the rule and guidance. I'll note that in SECY-97-020, Staff acknowledged that two aspects of modifying the EP

framework would be (1) addressing the probability level of accidents to consider in emergency planning, and (2) the use of increased safety in one level of the defense-in-depth framework to justify reducing requirements in another level. NUREG-0396 began with a starting point of a cumulative probability of a core melt accident of approximately 1 in 20,000 (5E-5) per reactor year. A core damage probability on the order of the Safety Goals established later. For those core melt accidents, NUREG-0396 found that the 10 mile EPZ resulted in a 30% chance of exceeding PAG levels. The resulting probability of exceeding PAG doses at 10 miles for a LLWR is 1.5E-5 per reactor year (one chance in 50,000 per reactor-year) (with uncertainty). Clearly and explicitly tying the EPZ sizing methodology to this performance level--a likelihood of exceeding PAGs at the EPZ boundary of about 1E-5--would be risk-informed, performance based, consistent with the Commission's Safety Goals, and allow, as envisioned in SECY-97-020 for the "use of increased safety in one level of the defense-in-depth (core damage prevention) to justify offset requirements in another level (EP)." In fact, it would seem to address Mr. Lyman's concern over a reduction in overall defense-in-depth quite well. Invoking the analogous performance level of the 10 mile EPZ (that is, a 1.5E-5 likelihood of exceeding PAGs) does not alone answer the question of event frequency, especially when it comes to some external hazard event initiators. Work would still need to be done, but it seems like an appropriate starting point.

In conclusion, NuScale does not believe it's appropriate to defer detailed consideration of event selection to an applicant seeking to implement the guidance. We believe this question is essential to the rulemaking effort and needs to be resolved on a generic basis subject to Commission approval as part of the rulemaking process.



**Gary Becker**  
**Regulatory Affairs Counsel**

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**web:** [www.nuscalepower.com](http://www.nuscalepower.com)

**office:** 541.360.0549

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**From:** Snodderly, Michael <Michael.Snodderly@nrc.gov>

**Sent:** Tuesday, November 2, 2021 8:58 AM

**To:** Becker, Gary <gbecker@nuscalepower.com>

**Subject:** RE: RE: Advance comment for ACRS Full Committee Meeting on EP for SMRs

Of course. I'll notify you when letter writing for this matter starts at this email address.

---

**From:** Becker, Gary <[gbecker@nuscalepower.com](mailto:gbecker@nuscalepower.com)>

**Sent:** Tuesday, November 02, 2021 11:54 AM

**To:** Snodderly, Michael <[Michael.Snodderly@nrc.gov](mailto:Michael.Snodderly@nrc.gov)>

**Subject:** [External\_Sender] RE: Advance comment for ACRS Full Committee Meeting on EP for SMRs

Thank you Mike. With the change in schedule today (no ACRS deliberation on the EP rule), would you possibly be able to inform me for when that deliberation is rescheduled? I won't be able to tune into other sessions to keep abreast of the fluid schedule.

Thank you,



**Gary Becker**  
**Regulatory Affairs Counsel**

**email:** [gbecker@nuscalepower.com](mailto:gbecker@nuscalepower.com)

**web:** [www.nuscalepower.com](http://www.nuscalepower.com)

**office:** 541.360.0549

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**From:** Snodderly, Michael <[Michael.Snodderly@nrc.gov](mailto:Michael.Snodderly@nrc.gov)>

**Sent:** Monday, November 1, 2021 1:06 PM

**To:** Becker, Gary <[gbecker@nuscalepower.com](mailto:gbecker@nuscalepower.com)>

**Subject:** RE: Advance comment for ACRS Full Committee Meeting on EP for SMRs

I will forward these comments to the Members and make sure they are added to the transcript.

---

**From:** Becker, Gary <[gbecker@nuscalepower.com](mailto:gbecker@nuscalepower.com)>

**Sent:** Monday, November 01, 2021 3:06 PM

**To:** Snodderly, Michael <[Michael.Snodderly@nrc.gov](mailto:Michael.Snodderly@nrc.gov)>

**Subject:** [External\_Sender] Advance comment for ACRS Full Committee Meeting on EP for SMRs

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*point for consideration, but for LWRs the definition of LBEs is of little help; moreover it is inconsistent with the scope of LBEs for non-LWRs using the NEI 18-04 approach and for facilities employing a “maximum hypothetical accident.” Then, within the set of LBEs, RG 1.242 does not prescribe or suggest an acceptable accident likelihood screening threshold.*

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Regards,



**Gary Becker**  
**Regulatory Affairs Counsel**

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**From:** [YOUNG, David](#)  
**To:** [Burkhart, Larry](#)  
**Cc:** [Snodderly, Michael](#)  
**Subject:** [External\_Sender] Comment on today's ACRS discussion concerning the SMR & ONT EP Rule  
**Date:** Thursday, November 04, 2021 11:31:59 AM

---

Please see the comment below.

FEMA does not have regulatory authority to set EP requirements for NRC licensees; that authority resides with the NRC. FEMA's role is to evaluate the adequacy of offsite plans and response capabilities **if** the NRC has determined that an offsite EP program is needed. The NRC consults with FEMA during licensing reviews and their input is considered in licensing decisions.

The proposed rule includes an EPZ sizing criterion that requires the plume exposure pathway EPZ to include areas where predetermined, prompt protective measures are necessary. Predetermined, prompt protective measures would not be necessary if an Offsite Response Organization (ORO) has sufficient time to assess an accident (including discussions with the licensee) and determine what protective measures should be implemented. So if the applicant can demonstrate through their EPZ sizing analysis that releases exceeding EPA PAGs do not occur until late in a sequence (after many hours), there is no need for prompt protective measures, and the associated advance planning. It is also important to keep in mind that every facility will have an onsite E-Plan/EP program with capabilities to mitigate the effects of an accident.

Some additional points: 1) There is ample evidence that OROs can implement effective ad hoc evacuations. With many hours before a significant release, there is no reason to believe that an effective evacuation could not be performed. 2) If a collocated facility (e.g., a chemical plant) could present a hazard to a community, then that hazard would be addressed through other FEMA planning and funding processes (i.e., not the REPP). 3) Since 2001, Congress has appropriated over \$53 billion for state and local homeland security and emergency preparedness. That funding, and associated FEMA planning guidance and training, have enabled effective all-hazards response plans. 4) As documented in recently published NUREG/CR-7285, "Nonradiological Health Consequences from Evacuation and Relocation," evacuations introduce significant health risks to the public. They should be a high hurdle to their implementation. 5) Mandating an offsite EP program with no technical basis would impose an unnecessary burden, which would seem to violate direction given in Congressional acts and Executive Orders.

**David Young** | Senior Technical Advisor  
Nuclear Security and Incident Preparedness  
Nuclear Energy Institute  
(202) 739-8127



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**From:** [YOUNG, David](#)  
**To:** [Shodderly, Michael](#); [Burkhart, Larry](#)  
**Subject:** [External\_Sender] Another comment for ACRS consideration  
**Date:** Thursday, November 04, 2021 12:55:06 PM  
**Attachments:** [image001.png](#)

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Concerning the 1980 law, Public Law 96-295, cited in the deliberations this morning (as I understood the conversation), please see the comment below. This comment is from a previous NEI letter that addressed the topic.

...., we respectfully disagree with FEMA’s suggestion in its comments on the proposed rule that congressional action may be necessary for the NRC to finalize this rulemaking. Specifically, under the heading “Initial Premises and Assumptions,” FEMA states:

FEMA acknowledges NRC decisions on obtaining and maintaining operating licenses are based, in part, on a composite review of offsite emergency capabilities and those provided by the licensee within the plant. The NRC has the authority, utilizing FEMA’s input, to determine the relative importance of offsite emergency preparedness in the licensing decision. Thus, we assume that adequate offsite emergency planning and preparedness are still considered essential to obtaining and maintaining an operating license. Also, FEMA believes community preparedness is a shared responsibility and a critical component of preparedness is the local community’s participation in identifying risk and building the appropriate capabilities to mitigate against the identified risk.

To the extent that the proposed rule alters these premises regarding the consultative relationship between the NRC and FEMA and the relative importance of offsite emergency planning and preparedness, FEMA believes any change in consultation requirements would involve a matter of significant public policy which may ultimately have to be resolved by Congress as was done in the passage of the NRC Authorization Act of 1980, Public Law 96-295.<sup>10</sup>

First, in our view, this proposed rulemaking does not seek to alter the “premises regarding the consultative relationship between the NRC and FEMA.” Rather, consistent with NRC’s broad statutory authority, the proposed rule recognizes that the current emergency preparedness requirements and guidance were developed with a focus on large, light-water reactors and seeks to provide a framework for small modular reactors (SMR) and other nuclear technologies (ONT) that considers the advances in designs and safety research. The proposed rule puts forward a performance-based approach to emergency preparedness for SMRs and ONT, which includes the possibility that an SMR or ONT’s plume exposure EPZ may not extend beyond the site boundary. Offsite emergency planning for such facilities would not be required by the NRC.<sup>11</sup>

<sup>9</sup> See, e.g., *Mass v. US NRC*, 856 F.2d 378, 383 (1<sup>st</sup> Cir. 1988) (finding that offsite emergency planning falls within the NRC’s area of expertise and that “NRC is specifically authorized and directed to determine whether emergency plans adequately protect the public.”); *Mass v. US NRC*, 878 F.2d 1516, 1524 (1<sup>st</sup> Cir. 1989) (upheld NRC’s decision to allow restart of the Pilgrim nuclear power plant, despite a FEMA finding that the licensee’s emergency preparedness plans were inadequate and concluding that “although the NRC must base its ultimate finding on a review of FEMA’s findings and determinations, it need not give those findings conclusive weight.”); *State of Ohio ex rel. Celebrezze v. US NRC*, 868 F.2d 810, 813 (6<sup>th</sup> Cir. 1989) (“The responsibility for evaluating and approving the plans is shared between [FEMA] and the NRC . . . but final decision-making authority on a plan’s adequacy rests with the NRC.”).

<sup>10</sup> “FEMA Comments: Nuclear Regulatory Commission 10 CFR Parts 50 and 52, [NRC-2015-0225] RIN 3150-AJ68 Emergency Preparedness for Small Modular Reactors and Other New Technologies, Federal Register Notice, dated 12 May 2020,” July 20, 2020 (FEMA Comments), at pg. 2.

<sup>11</sup> See Proposed Rule, at pgs. 28,448, 28,452.

But for facilities where the plume exposure EPZ extends beyond the site boundary – i.e., SMR and ONT facilities requiring specific, offsite radiological emergency preparedness planning –

the current NRC/FEMA consultation process would remain unchanged. The proposed rule also makes clear that “[t]he NRC’s proposal not to require offsite planning activities for facilities with plume exposure pathway EPZs at the site boundary” does *not* affect FEMA’s responsibility for overall emergency management and providing assistance to State and local response organizations.<sup>12</sup> Nor does it affect the responsibility of State and local governments to establish and maintain comprehensive emergency management plans.<sup>13</sup>

Further, neither the early NRC authorization legislation discussed above, nor the decisions of the U.S. Courts of Appeals in this area, support the notion that this rulemaking “involve[s] a matter of significant public policy which may ultimately have to be resolved by Congress.”<sup>14</sup> Although FEMA seems to rely upon the 1980 Authorization Act to support this proposition, that narrowly-tailored legislation does not – 40 years later – constrain the NRC’s ability to engage in this rulemaking using its current appropriated funds. In fact, on its face, the 1980 Authorization Act authorizes funds to be appropriated for the fiscal year 1980.<sup>15</sup> This specific authorization further conditions the use of any fiscal-year-1980 funds authorized to be appropriated on the Commission making certain findings regarding State, local, or utility emergency preparedness plans – either in consultation with FEMA or on its own.<sup>16</sup>

Fiscal Year 1980 funds were appropriated to the NRC both before and after enactment of the 1980 Authorization Act.<sup>17</sup> There is no indication in the 1980 Authorization Act itself, or either of the relevant Appropriations Acts, that the restrictions provided in the 1980 Authorization Act were intended to survive the NRC’s use of funds appropriated for the 1980 fiscal year.<sup>18</sup> Indeed, as noted below, at least one federal court has described the 1980 Authorization Act as “expired.” And absent explicit language to the contrary, there is a strong presumption against construing substantive provisos or general provisions in annual appropriations as permanent legislation.<sup>19</sup>

Contrary to the suggestion in the FEMA comments, the early NRC Authorization Acts provide insight into Congress’ intent when it authorized the funds to create the current emergency preparedness regulatory framework. In our view, that intent was clear: Congress directed that NRC consult with FEMA on the adequacy of offsite emergency preparedness in the licensing and regulation of utilization facilities in situations where offsite emergency planning was necessary. However, Congress left the ultimate

<sup>12</sup> Proposed Rule, at pg. 28,449.

<sup>13</sup> *Id.*

<sup>14</sup> FEMA Comments, at pg. 2.

<sup>15</sup> 1980 Authorization Act, at Sec.101(a).

<sup>16</sup> *Id.*

<sup>17</sup> See “Energy and Water Development Appropriation Act, 1980,” Pub. L. 96-69, Title IV – Independent Agencies (Sept. 25, 1979) (“1980 Appropriations Act”); “Supplemental Appropriations and Rescission Act, 1980,” Pub. L. 96-304, Title I – Independent Agencies (July 8, 1980) (“1980 Supplemental Appropriations Act”).

<sup>18</sup> Both the 1980 Appropriations Act and the 1980 Supplemental Appropriations Act appropriate funds to the NRC for the Fiscal Year 1980 “to remain available until expended.” The 1980 Authorization Act conditions use of funds authorized to be appropriated for Fiscal Year 1980. While the “no year” approach to funding means that all of the funds appropriated for Fiscal Year 1980 were not required to be utilized in that fiscal year, there is no indication that the restrictions in the 1980 Authorization Act were intended to survive exhaustion of those funds.

<sup>19</sup> See, e.g., “Principles of Federal Appropriations Law: Chapter 2 The Legal Framework,” United States General Accountability Office (Fourth Ed., 2016 Revision) (“Since an appropriation act is made for a particular fiscal year, the starting presumption is that everything contained in the act is effective only for the fiscal year covered. Thus, the rule is: A provision contained in an annual appropriation act is not to be construed to be permanent legislation unless the language used therein or the nature of the provision makes it clear that Congress intended it to be permanent.”). *Id.* at pg. 2-86.

responsibility for making decisions regarding the adequacy of both on-site and offsite radiological emergency planning squarely with the Commission. In fact, the D.C. Circuit specifically held in 1991 that “the 1980 Authorization Act, an *expired* fiscal appropriations law, . . . did not limit the licensing discretion otherwise conferred on the Commission by Congress.”<sup>20</sup> The court further concluded that Congress “left to the NRC’s discretion the

specific requirements of emergency planning,” including the authority to “develop generic standards that would reasonably assure the public safety without having to examine the specific safety consequences of each emergency plan for each plant.”<sup>21</sup>

Finally, this proposed rulemaking is consistent with the Congressional expectations embodied in the Nuclear Energy Innovation and Modernization Act (NEIMA), as enacted on January 14, 2019. Specifically, in NEIMA, Congress directed the NRC to establish a risk-informed, technology-inclusive framework to license and oversee advanced nuclear technologies. In doing so, it specifically identified emergency preparedness as an area to be addressed by the NRC.<sup>22</sup> Thus, if any congressional direction were required for the NRC to pursue this issue (and it is not), it seems that Congress provided that direction in Section 103 of the NEIMA.

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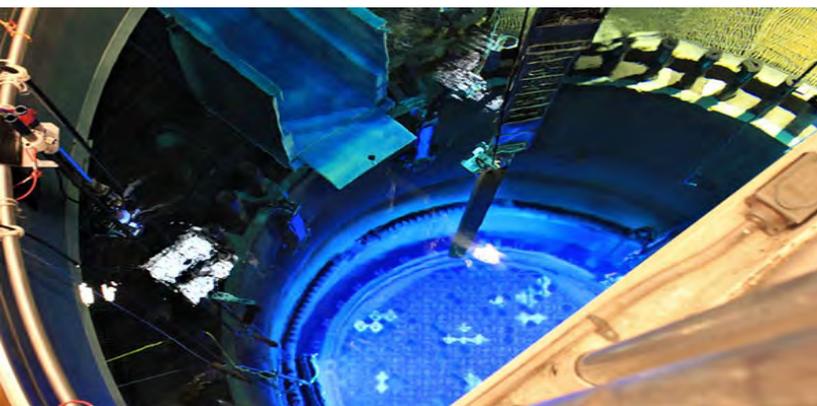


# “Supplemental Guidance for Radiological Consequence Analyses Using Alternative Source Terms”

## DRA-ISG 2021-XX

Meena Khanna, Deputy Director, Division of Risk Assessment  
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November 2, 2021



# Introductory Remarks

Becoming a more modern, risk-informed regulator:

- Licensing, other regulatory decisions, and backfit/forward fit actions must be risk-informed. (SRM-SECY-19-0036, SRM-SECY-18-0049)
- Improved realism, evaluation techniques, and additional information are applied to improve risk-informed regulatory decision making. (ML19319C832)
- Culture re-alignment is needed to ensure that we identify and resolve challenges and roadblocks for the appropriate and consistent integration of risk insights.

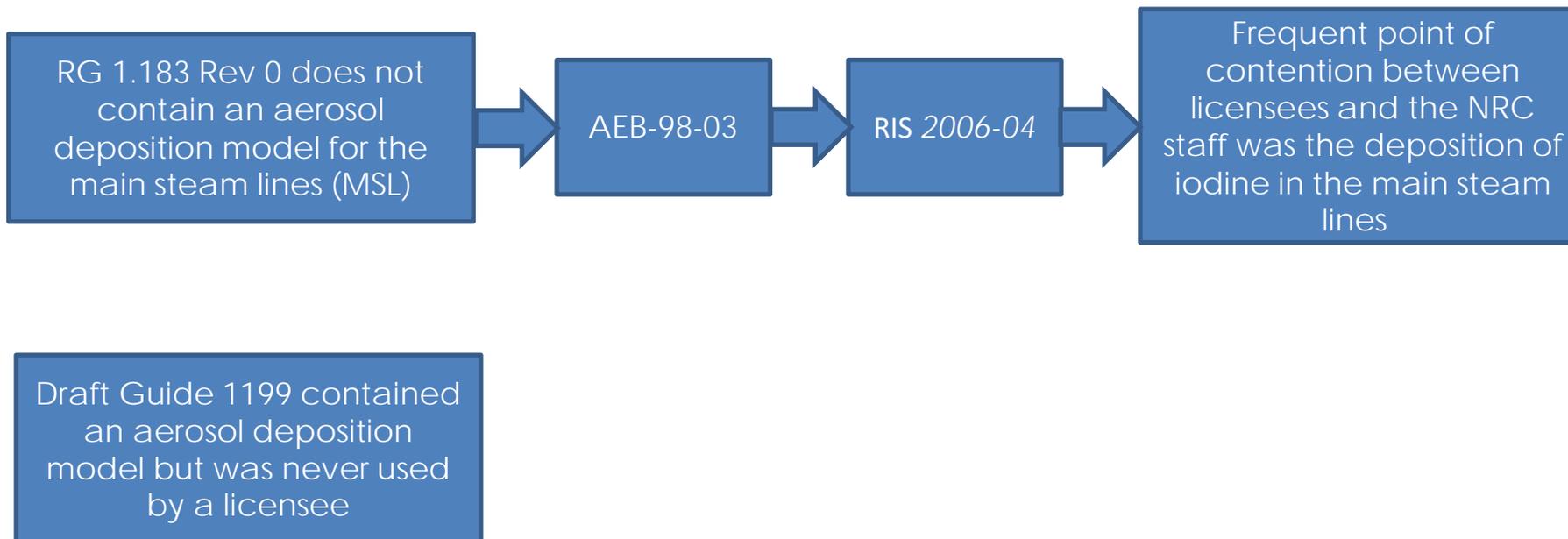
# Outline

- Background and context (deterministic review using risk insights)
- Overview of the Interim Staff Guidance (ISG)
- Changes to the ISG based on Public Comments
- Public Comments regarding the ISG

## § 50.67 Accident source term.

- “ b) *Requirements.* (1) A licensee who seeks to revise its current accident source term in design basis radiological consequence analyses shall apply for a license amendment under § 50.90. The application shall contain an evaluation of the consequences of applicable design basis accidents previously analyzed in the safety analysis report.”
- “ (2) The NRC may issue the amendment only if the applicant's analysis demonstrates with reasonable assurance that.....”

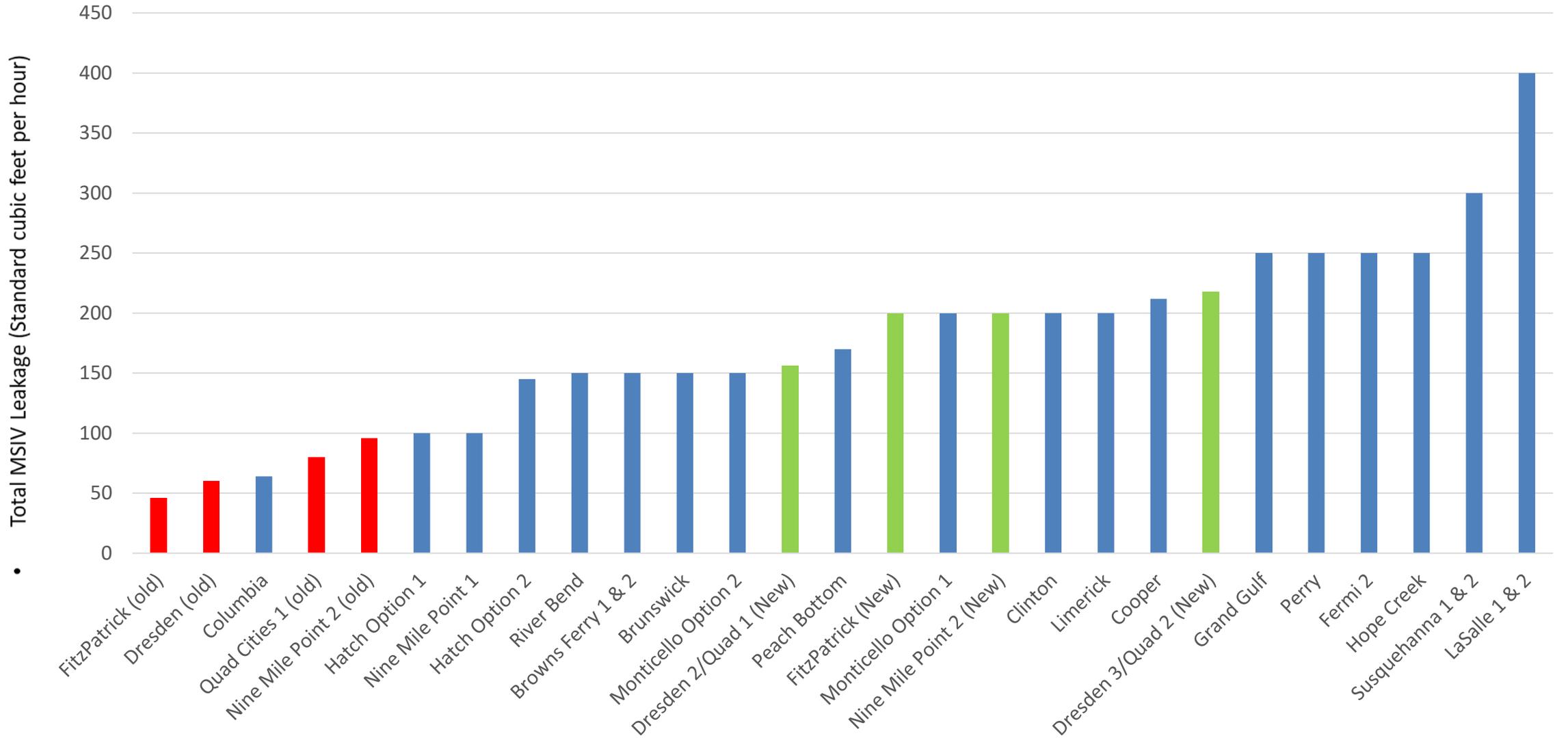
## Regulatory Guide 1.183 Main Steam Line Challenges



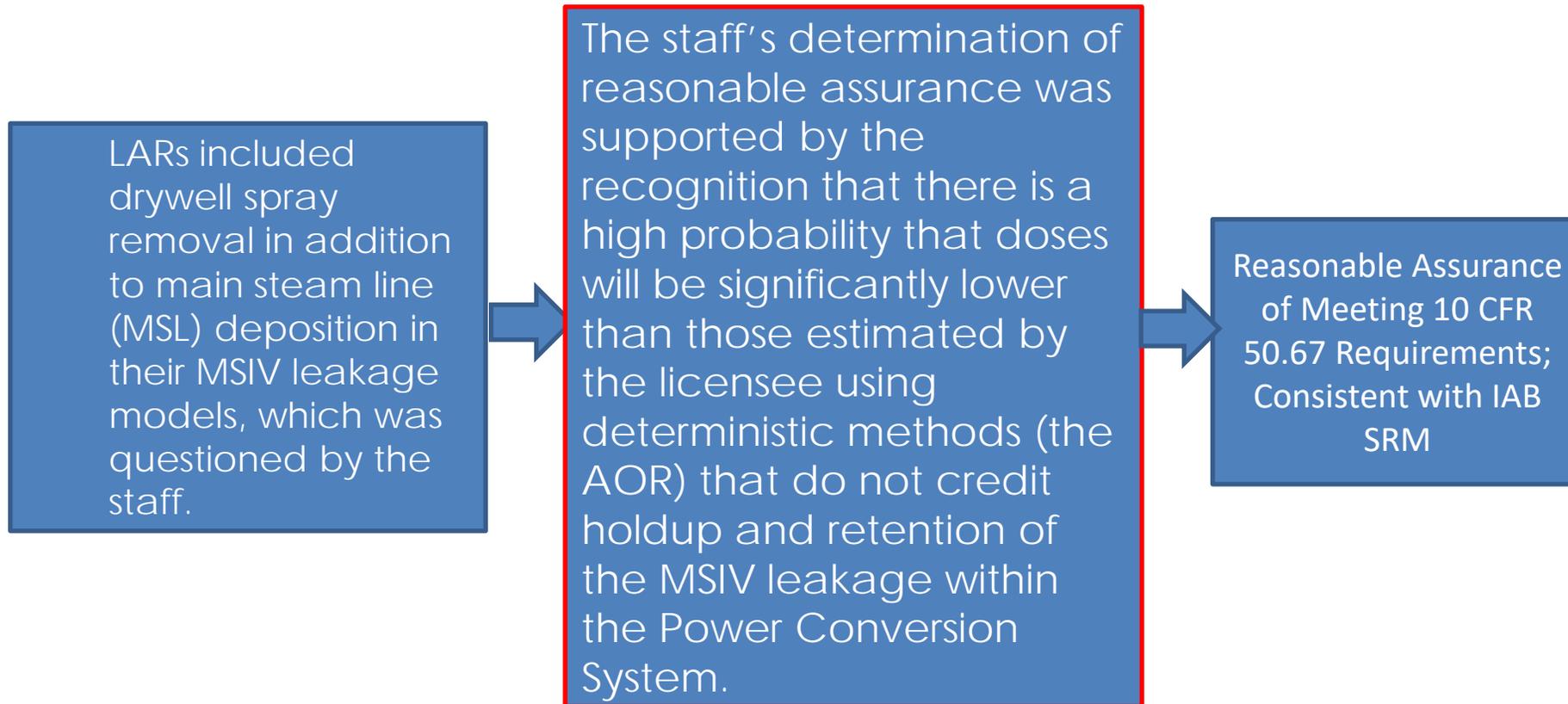
# 4 MSIV Leakage LARs Submitted from March to October 2019 Using RG 1.183 Rev. 0

- LARs included drywell spray removal and main steam line (MSL) deposition in their MSIV leakage models generally consistent with RIS 2006-04 and past precedent.
  - LIC-206 invoked by PM for multi-disciplinary risk insights
  - Staff questioned how the drywell sprays would impact subsequent MSL aerosol deposition
  - Licensees provided a sensitivity analysis examining the impact of several parameters
  - Of the parameters evaluated, a pathway to the condenser provided a substantial dose reduction

# Total MSIV TS Allowable Leakage - BWR Fleet 2021



## Using Risk Insights to Support Reasonable Assurance in the Review of LARs



# Using Risk Insights to Support Reasonable Assurance in the Review of LARs (Cont'd)

- All four MSIV leakage LAR reviews were completed using a team approach.
- Each safety evaluation includes a section on risk and engineering insights to support staff's reasonable assurance finding.
- ISG has been developed to memorialize staff's practice.

# Draft RG 1.183 Rev. 1 (DG-1389)

- Staff efforts underway using an integrated team to revise RG 1.183, "Alternative Radiological Source Terms for Evaluating DBAs at Nuclear Power Reactors."
- An ACRS meeting has been scheduled for November 19, prior to the issuance of DG-1389 for public comment.
- DG-1389 contains MSIV leakage models as well as a streamlined procedure to allow credit for an intact power conversion system.

# Technical Context for ISG

- Review challenges due to input parameter uncertainty
- Most dose calculations do not credit any SSCs beyond outboard MSIVs
- Quantitative credit for holdup in condenser through 1999 safety evaluation (SE) on a BWROG TR
  - Not used by four LARs due to resource challenges in meeting SE conditions
- Realistic pathways for fission products exist through the power conversion system (PCS)

# Assumed Release Path per RG 1.183

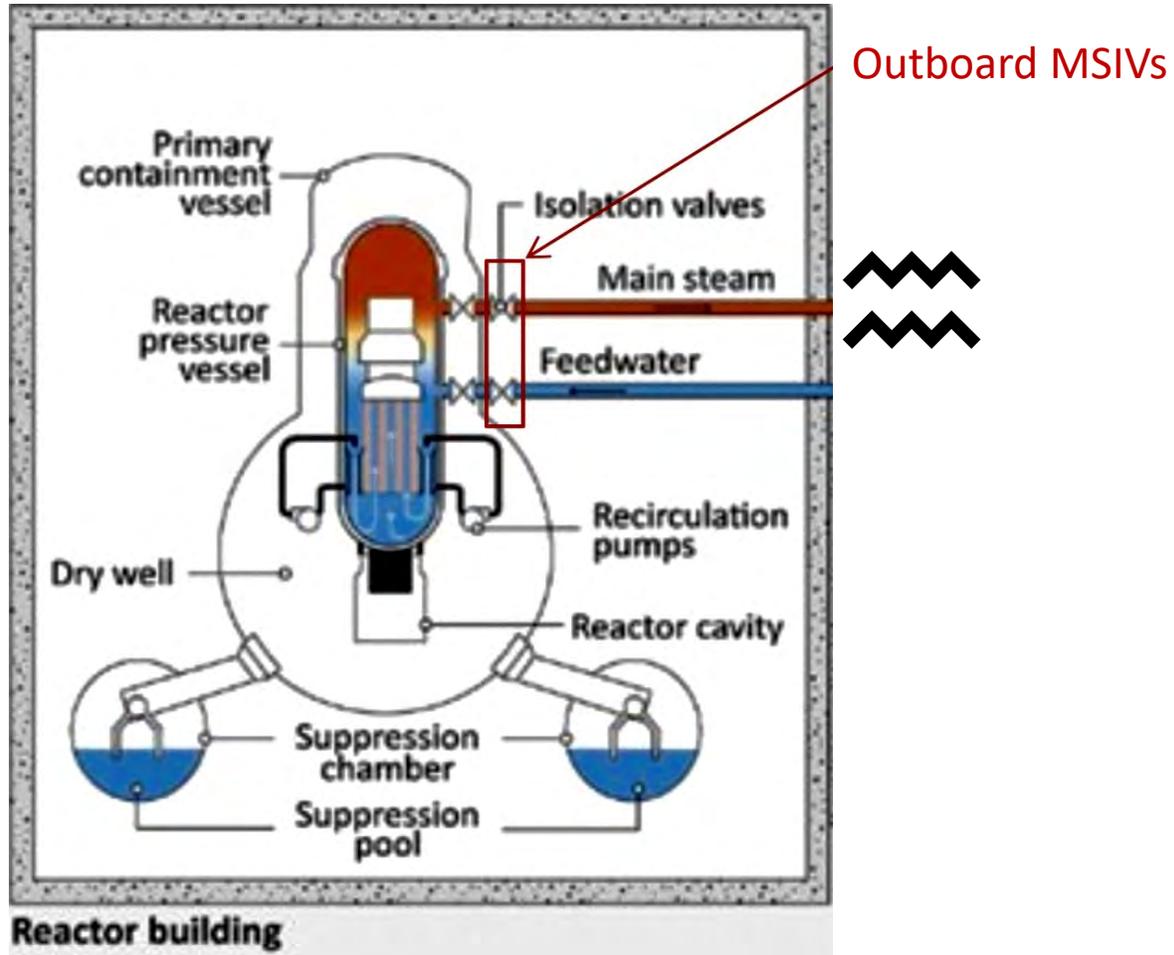


Diagram Courtesy: IAEA

# ISG Release Path Considerations

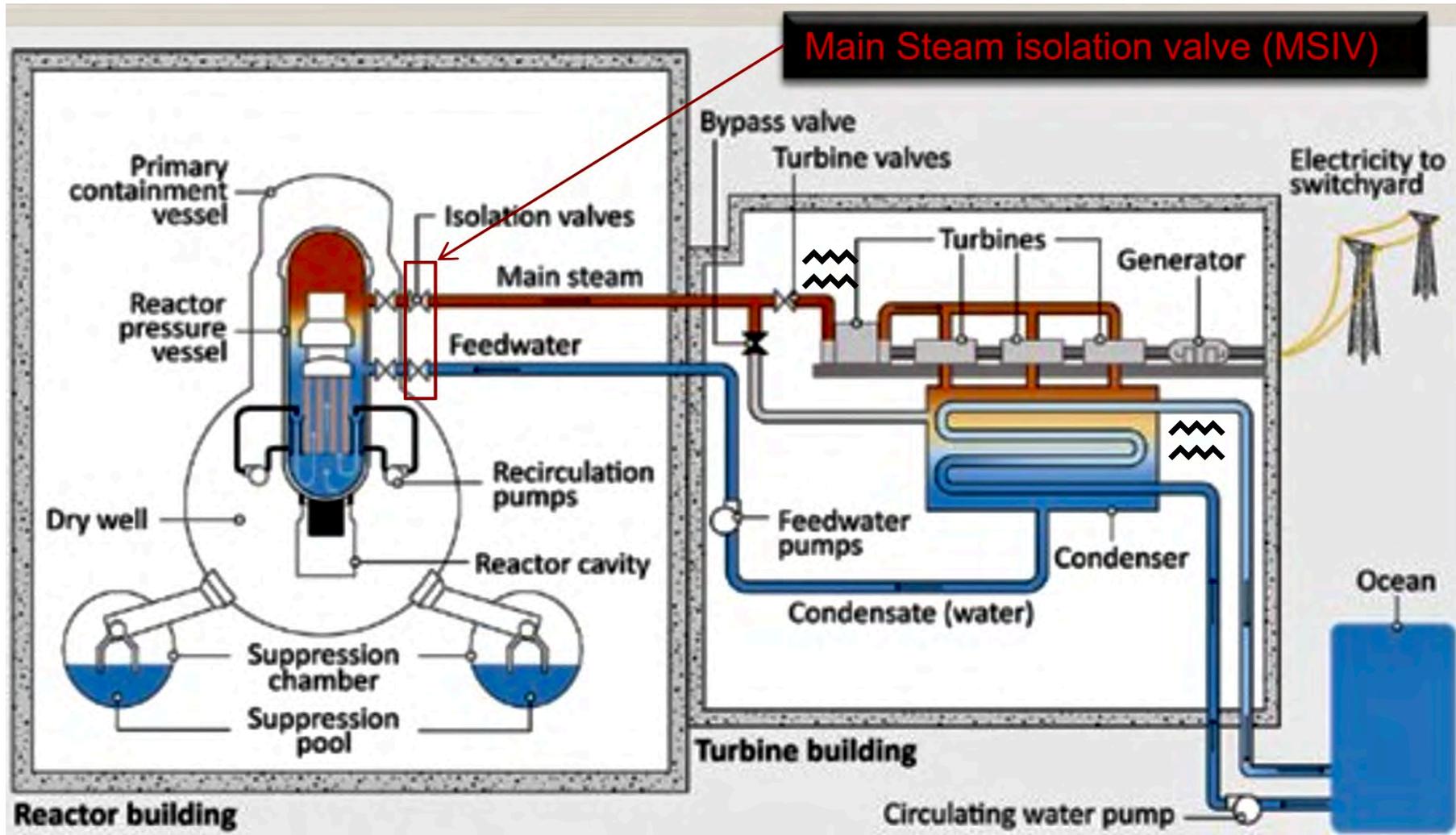
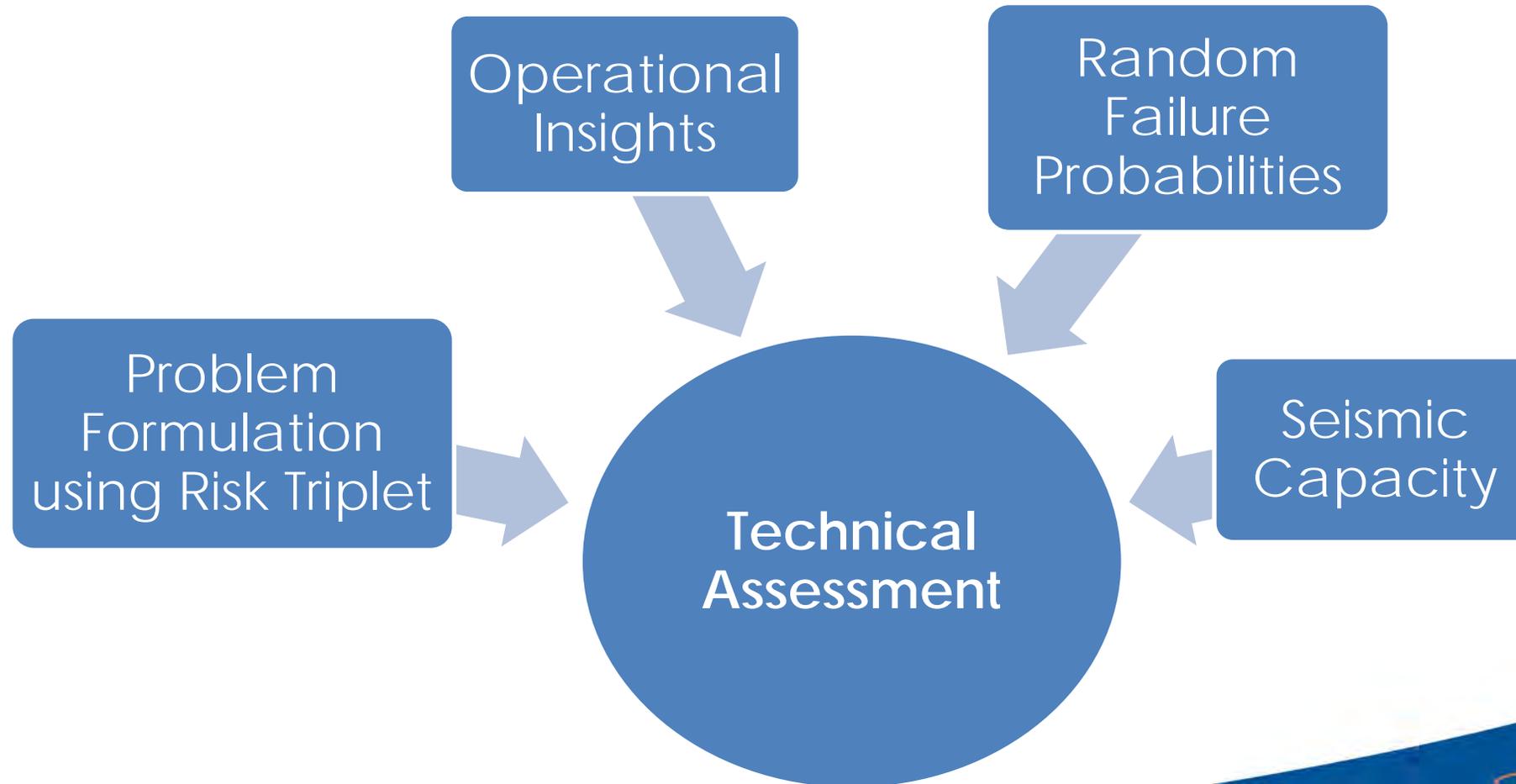


Diagram Courtesy: IAEA

# Key Inputs to the Technical Assessment Supporting ISG



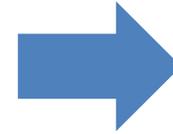
# Approach for Seismic Capacity Evaluation in Technical Assessment Supporting ISG

## Fragility Data

- Multiple and diverse sources
- Recent seismic probabilistic risk assessments (PRAs)

## Operating Experience - Walkdowns

- North Anna
- Kashiwazaki-Kariwa
- The Great Tohoku Earthquake of 2011



Lower Bound Median  
Fragility to  
Encompass Seismic  
Failure Modes



Representative Risk  
Estimation

# Primary Insight from Technical Assessment Supporting ISG

**High probability** that doses will be **lower** than those estimated strictly using traditional deterministic methods, which **include accepted assumptions**, that **do not credit** hold-up and retention of the Main Steam Isolation Valve (MSIV) leakage within the power conversion system (PCS)

# Objective and Expectations of ISG

- **Objective:** Near-term formal regulatory footprint for staff's use of primary insight from technical assessment
- **Expectations:**
  - Used by staff to offset uncertainty in input parameter(s) for deterministic calculations
  - Supports staff's reasonable assurance finding during reviews
  - Transitioned to Standard Review Plan Section 15.0.1
- **Caveats:**
  - **Does not change the licensee's responsibility** to demonstrate compliance with 10 CFR 50.67
  - **Does not change acceptable methods** for demonstrating compliance with 10 CFR 50.67

# Changes to the ISG Since the ACRS Subcommittee Meeting

- OGC provided editorial comments to the ISG for clarity that were incorporated. OGC also added a section regarding Backfitting and Issue Finality Discussion.
- Staff included a new Attachment C with the analysis of public comments.
- Staff provided clarification regarding the modeling uncertainty related to the ISG.

# Public Comments Received on ISG

- 33 comments received
  - 13 comments received from NEI, 19 anonymous comments, and 1 comment from Liberty Toussaint
  - 1 of the comments resulted in a change to the ISG
- The full text of the comments and associated resolution are provided in ADAMS at ML21278A372
- The following table provides a summary rollup or categories of public comments, followed by slides with general explanations, for the disposition of the various types of comments

General Topic of Comment	# of Comments
<b>Comments regarding purpose/applicability/background of ISG</b>	5
<b>Comments regarding formal credit to applicant's design basis</b>	5
<b>Comments regarding use of risk insights</b>	3
<b>Comments regarding ISG and RG 1.183 review process</b>	3
<b>Question regarding uncertainty</b>	1
<b>Comments regarding ISG should not be approved or is contrary to existing regulations</b>	14
<b>Comments regarding use of RG 1.174</b>	2

# Public Comment # NRC-2021-0106-DRAFT-0017

“The NRC staff's approach to handling uncertainties in the ISG is deficient in that it only addresses parameter uncertainties. Modeling uncertainties are ignored, altogether, when it is generally known that modeling uncertainties dominate parameter uncertainties in the evaluation of risk.”

Resolution: Section 2.5 of Appendix A of the ISG was updated for clarity.

- Section 2.5 of the Appendix A to the ISG explicitly addresses parametric and modeling uncertainties in the selected lower bound median fragility value.
- Parametric uncertainty is accounted for through the use of the lognormal uncertainty factors for the lower bound median fragility. Conservatism is included within the ISG as well as the unchanged conservatism in the deterministic dose calculations that address modeling uncertainties. Further, as noted in RG 1.174, modeling uncertainty arises when “the industry’s state of knowledge is incomplete, and opinions may vary on how the models should be formulated.” The fragility values in the sources referenced in Appendix A to the ISG were developed using state-of-practice methods, which also address modeling uncertainty.

## Public Comment #NRC-2021-0106-DRAFT-0008

The proposed ISG does not meet the principles of Regulatory Guide 1.174 and 1.177 for risk-informed changes to the current licensing basis.

Resolution: The staff does not agree with this comment.

- The ISG uses engineering and risk insights to provide support for the NRC staff to reach a reasonable assurance conclusion that the applicable regulations have been met when evaluating traditional deterministic analyses containing parameters with associated uncertainty.
- Therefore, the ISG is not the sole decision-making basis for the MSIV leakage analysis review. MSIV leakage LARs are not formally risk-informed using the guidance in RGs 1.174 and 1.177.
- Further, the use of risk insights by the staff is not limited to risk-informed LARs, as demonstrated by LIC-206.
- Because the ISG is going to be used to support the staff's reasonable assurance findings when evaluating traditional deterministic MSIV leakage analyses containing parameters with associated uncertainty, it needs to be used in conjunction with the deterministic analysis reviews, which provide the primary basis.
- Defense-in-depth exists in the dose analysis because of the assumption of the maximum hypothetical accident (MHA).

## Generalized Public Comment Regarding Purpose/Applicability/Background of ISG

The ISG was developed, and the technical assessment identified the PCS as a realistic and available hold-up volume for fission products. The ISG also concludes that there is high confidence in the SSCs in the PCS to provide a volume for holdup and retention of fission products. Why isn't the Staff incorporating this risk-informed methodology into Regulatory Guide (RG) 1.183?

### Resolution: Comment out of Scope.

- This comment is out of scope of the ISG because it relates to RG 1.183, which is a separate guidance document.
- Once the draft of RG 1.183 is complete, the public will be given an opportunity to provide comments on the guidance document prior to issuance.

## Generalized Public Comment Regarding Formal Credit to Applicant's Design Basis

Several ISG comments related to obtaining formal “credit” in the licensee’s design basis

### Resolution: Comment out of scope.

- This comment is out of scope of the ISG because it relates to RG 1.183, which is a separate guidance document.
- The ISG only relates to the staff’s reasonable assurance determination and does not provide credit or change the licensee’s design basis.
- Once the draft of RG 1.183 is complete, the public will be given an opportunity to provide comments on the guidance document prior to issuance.

# Generalized Public Comment Regarding Use of Risk Insights

Why is the staff using PRA rather than bounding deterministic analysis? The NRC is confusing the use of PRA and quantitative health objectives with the intent of the regulations in 10 CFR Part 20 and 10 CFR 50.67.

Resolution: The NRC staff disagrees with the comment.

- The ISG cannot and does not change any of the regulations.
- The ISG does not specify or change the acceptable methods for performing dose calculations to meet the regulations in 10 CFR Part 20 and at 10 CFR 50.67.
- The ISG does not alter the licensee's analysis of record to meet 10 CFR 50.67.
- The ISG provides support for the NRC staff to reach a reasonable assurance conclusion that the applicable regulations have been met when evaluating traditional deterministic analyses containing parameters with associated uncertainty.
- Further, the technical assessment for the ISG uses neither a probabilistic risk assessment as defined in NUREG-2122 nor does it rely on the quantitative health objectives.

# Generalized Public Comment Regarding ISG and RG 1.183 Review Process

The draft ISG represents a substantial departure from the design basis of boiling water reactors.

Resolution: The NRC staff disagrees with the comment.

- The ISG does not change or result in departures from the design basis of boiling water reactors.
- The ISG does not alter the licensee's analysis of record to meet 10 CFR 50.67 or any system qualifications.
- The ISG provides support for the NRC staff to reach a reasonable assurance conclusion that the applicable regulations have been met when evaluating traditional deterministic analyses containing parameters with associated uncertainty.
- NRC's process for interim staff guidance documents is being followed for this ISG. This process, described in LIC-508, "Development, Issuance, and Closure of Interim Staff Guidance Documents for the Office of Nuclear Reactor Regulation," involves internal review, review by ACRS, OGC, and members of the public.
- The jurisdiction of the Atomic Safety and Licensing Board Panel (ASLBP) is generally limited to reviewing contested matters in NRC adjudications.

# Generalized Public Comment Regarding ISG Should Not be Approved or Contrary to Existing Regulations

The proposed ISG allows plants to operate with degraded safety equipment credited for mitigating the release of radiation adversely affecting operators in the control room.

The proposed ISG appears to be an aggressive attack on the regulations intended to protect workers and the public from exposure to radiation.

Resolution: The NRC staff disagrees with the comment.

The ISG does not specify or change the acceptable methods for performing dose calculations to meet the regulations.

- The ISG does not alter the licensee's analysis of record to meet 10 CFR 50.67.
- This ISG provides support for the NRC staff to reach a reasonable assurance conclusion that the applicable regulations have been met when evaluating traditional deterministic analyses containing parameters with associated uncertainty.
- The ISG does not provide any quantitative "credit" for condenser holdup, which would change the licensee's analysis of record. Quantitative "credit" for condenser holdup is the purview of RG 1.183.

# Takeaways

- ISG will result in consideration of large holdup volume in future MSIV leakage LARs
  - Offsets uncertainty in input parameter(s) for deterministic calculations
  - Supports reasonable assurance finding during reviews
  - Applicable if quantitative credit is not included in licensee's calculations
- ISG does not change licensee's responsibility to demonstrate compliance with 10 CFR 50.67
  - Acceptable methods for demonstrating compliance remain unchanged
- ISG is expected to be transitioned to SRP Section 15.0.1
- Formal condenser holdup credit for licensees is being considered in a revision to RG 1.183

# Backup Slides

# Risk Insight References

- U.S. Nuclear Regulatory Commission, NUREG/CR-7110, Volume 1, Peach Bottom SOARCA, May 2013, ML13150A053
- U.S. Nuclear Regulatory Commission, PRAB-02-01, "Assessment of BWR Main Steam Line Release Consequences," October 2002, ML062920249
- General BWR plant design regarding Defense-in-Depth to deter the release of iodine

# Iodine Pathway in SOARCA

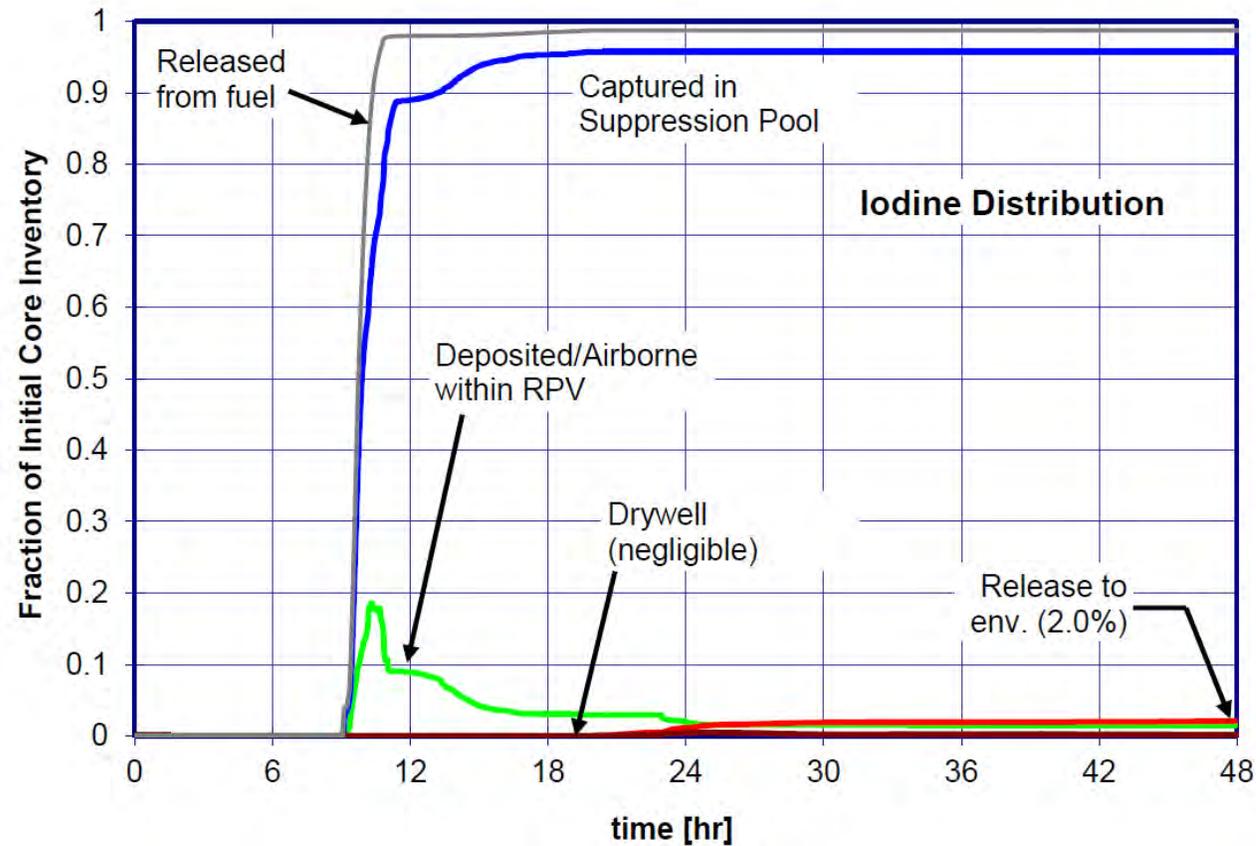


Figure 5-12 LTSBO iodine fission product distribution

# Cesium Pathway in SOARCA

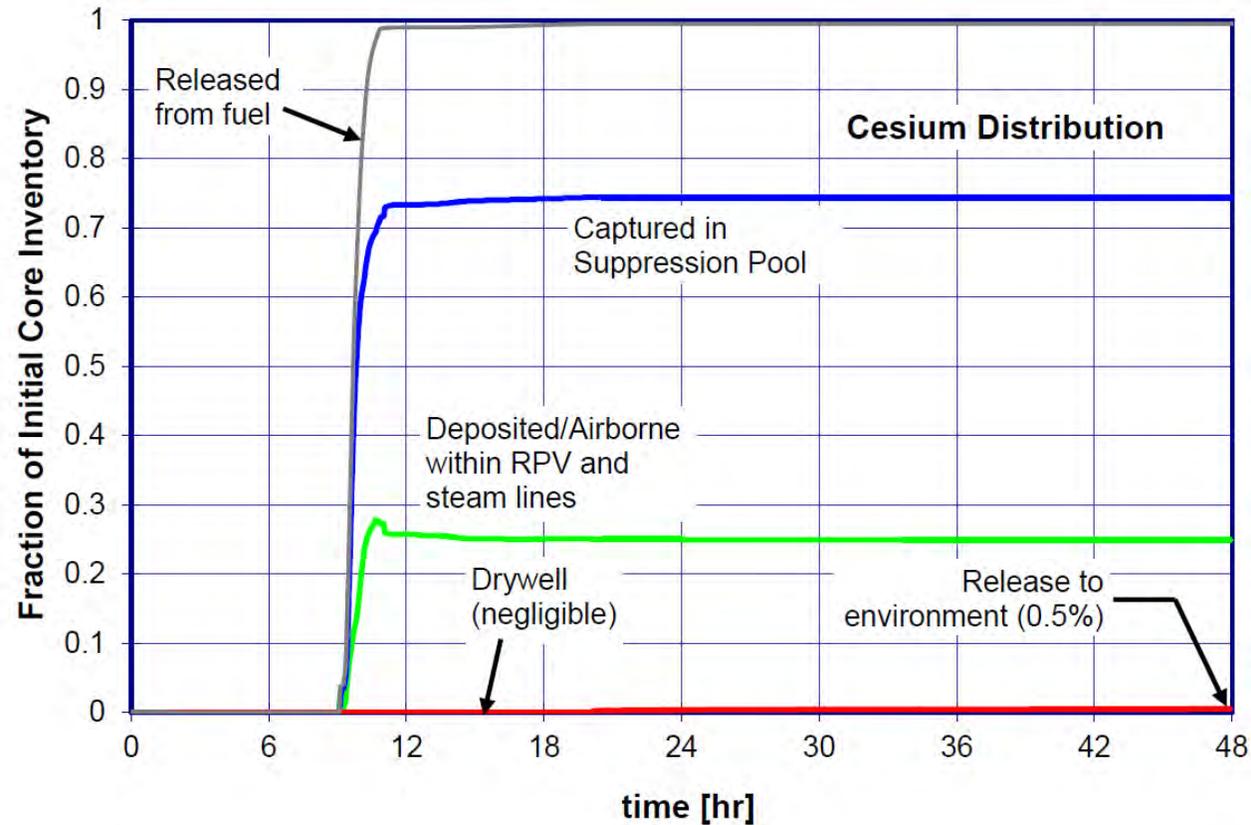


Figure 5-13 LTSBO cesium fission product distribution

# RG 1.183 Source Term (Rev. 0)

**Table 1**  
**BWR Core Inventory Fraction**  
**Released Into Containment**

<b>Group</b>	<b>Gap Release Phase</b>	<b>Early In-vessel Phase</b>	<b>Total</b>
--------------	--------------------------	------------------------------	--------------

Noble Gases	0.05	0.95	1.0
Halogens	0.05	0.25	0.3
Alkali Metals	0.05	0.20	0.25
Tellurium Metals	0.00	0.05	0.05
Ba, Sr	0.00	0.02	0.02
Noble Metals	0.00	0.0025	0.0025
Cerium Group	0.00	0.0005	0.0005
Lanthanides	0.00	0.0002	0.0002

# Increased Containment Leakage has Small Impact (SOARCA)

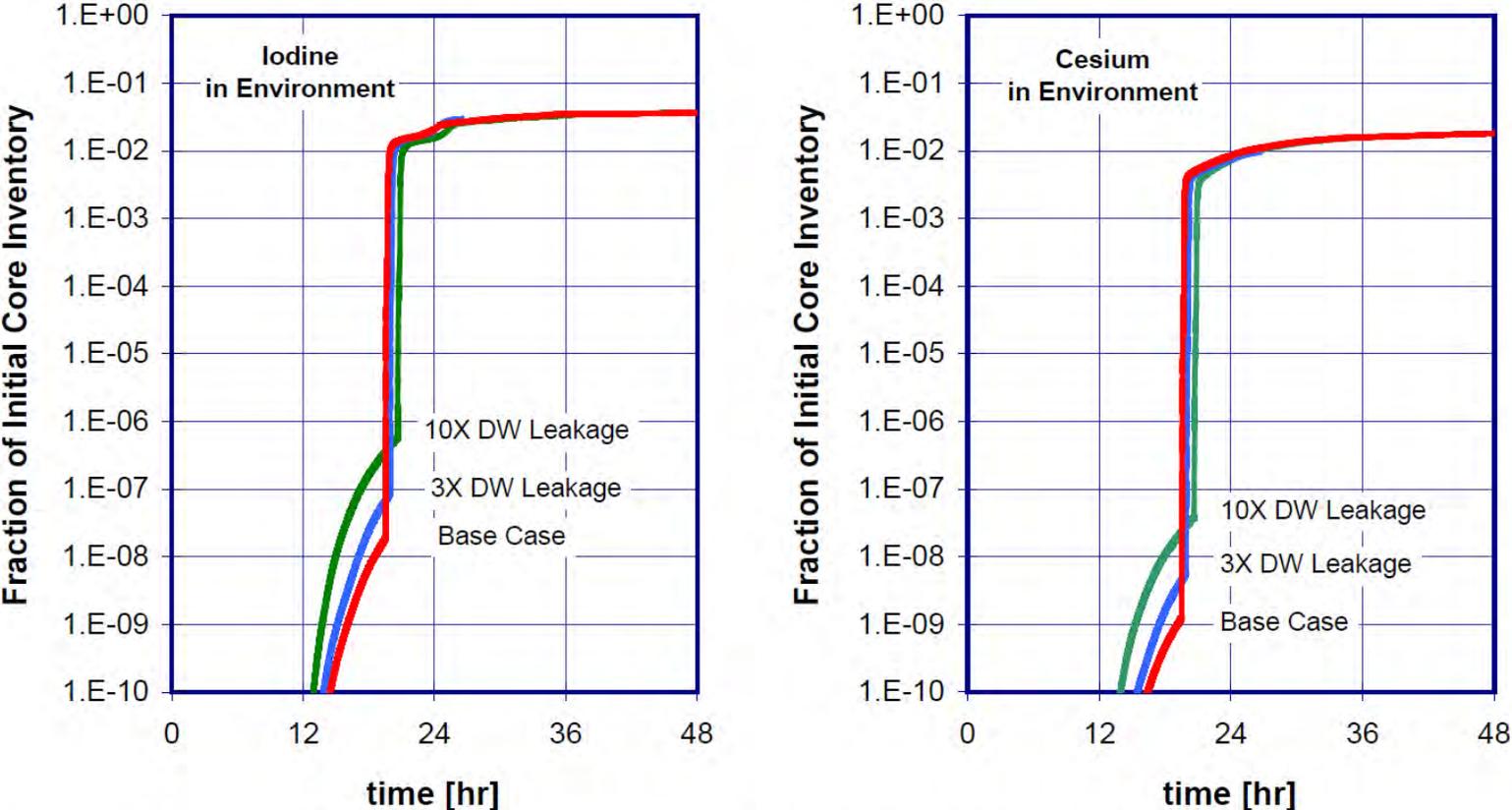
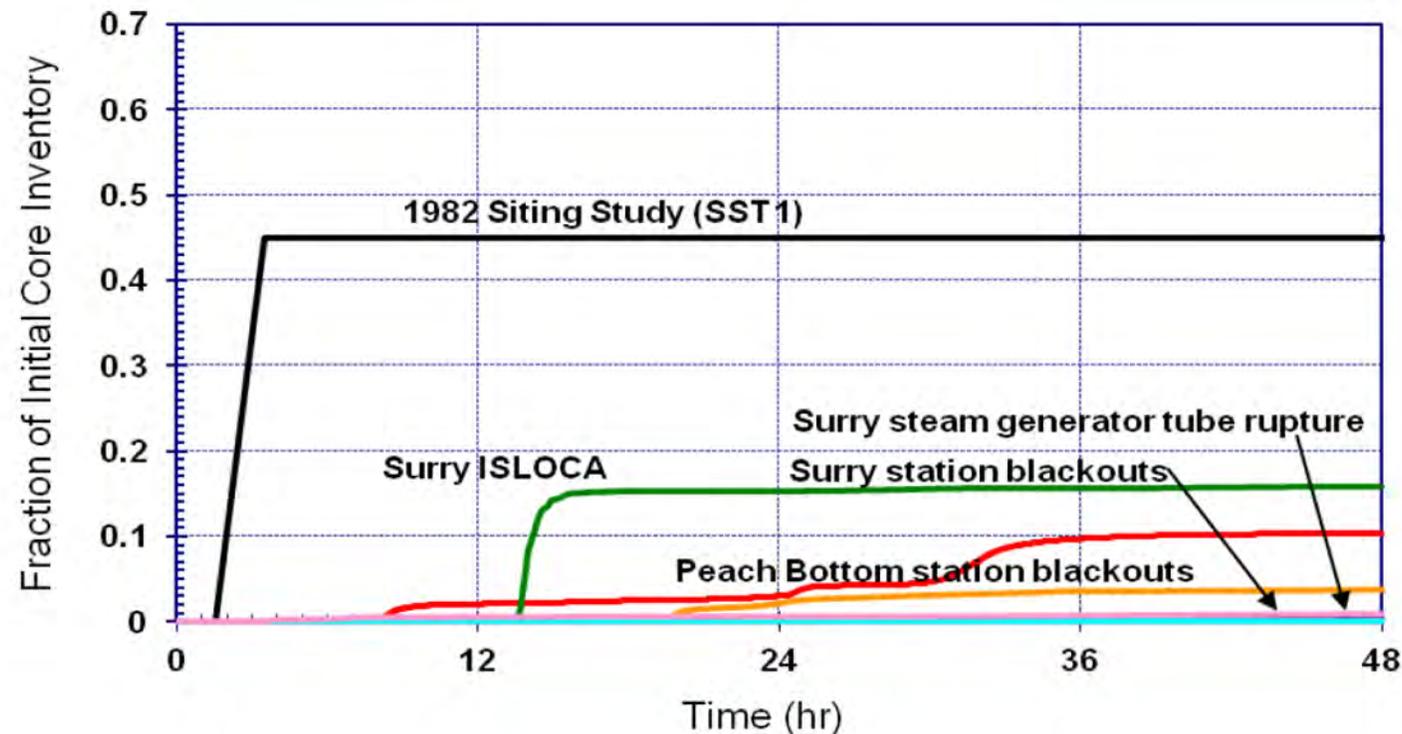


Figure 5-61 Effect of increased containment leakage on the release of iodine to the environment

# Realistic SOARCA releases much less than earlier studies

1982 Siting Study SST1 case calculated an iodine release of 45 percent and a cesium release of 67 percent of the core inventory.



**Figure ES-1** Iodine release to the environment for SOARCA unmitigated scenarios and the 1982 Siting Study SST1 case

# General Iodine Suppression or Deposition Mechanisms that provide Defense-in-Depth (primarily non-credited)

	Flooding or covering	Spraying	Deposition/Filtering	Holdup/Decay
Reactor	ECCS acceptance Criteria design  Flooding: LPCI HPCI RCIC  Suppression Pool	HPCS LPCS	Dryers Separators Schroud	Redundant MSIV Closure
CTMT or DW		CTMT or DW Spray	Surfaces	Redundant CTMT isolation valves
MSIVs			Large Volume of piping prior to inboard MSIV	Redundant MSIVs
Beyond 2nd MSIV		Raining, if released	Various	PCS and Condenser

# DRA-ISG-2021-01, "Supplemental Guidance for Radiological Consequence Analyses Using Alternative Source Terms"

Mark Blumberg, NRR/ARCB  
Michael Markley, NRR/DORL/LPL2-1  
November 2, 2021

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# DIFFERING VIEWS OF NRC EMPLOYEES

- A stated purpose of ISG is to resolve differences between licensee's methods and assumptions and those deemed acceptable to the NRC.
- ISG asserts it does not change methods acceptable to demonstrate conformance with 10 CFR 50.67 but uses assumptions that conflict directly with the RG 1.183 methodology.
- The ISG and its engineering insights are based largely on methods used by the NRC staff to approve four license amendment precedents containing numerous errors and do not meet 10 CFR 50.67 based on the licensee's submitted analysis.
- The errors in one of these license amendments have been confirmed by an independent panel. The panel results are not publicly available.
- One of the errors, associated with the main steam line deposition model, involved the NRC staff approving a calculation with a model that is known to be orders of magnitude in the non-conservative direction.
- The ISG engineering insights conflict directly with our knowledge and review of prior issues and phenomena.
- Credited pathways relied upon in the ISG are not required to be used by licensees or be based on docketed information confirming the pathway can be operated in the manner credited.
- Non-industry public comments raise valid technical and regulatory concerns and are not addressed sufficiently by NRC staff.

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DIFFERING VIEWS OF NRC EMPLOYEES:  
DO NOT REPRESENT POSITIONS OF NRC MANAGEMENT



# ACRS Meeting on DRA-ISG-2021-01

**Greg Broadbent, Entergy**

**Frankie Pimentel, Sr. Project Manager - Engineering and Risk**

**November 2, 2021**

# Risk-Informed Regulation

- Industry supports NRC efforts to risk-inform regulatory approaches
  - Risk-informing allows licensees to spend resources in areas that are most important to safety
  - Recent successes include GSI-191 resolution and 50.46 using risk-informed or statistical approaches
  
- This ISG is the first step to risk-informing deterministic radiological analyses
  
- Industry supports including these approaches in Reg Guide 1.183, Rev. 1

# ISG Conclusions

- Power Conversion Systems (PCS) highly likely to remain intact post-accident
  - PCS is built to high standards
  - High confidence in the SSCs in the PCS to provide sufficient volume for holdup and retention of fission products
  - Important system for plant operation
- Approximately half of plants have already demonstrated structural integrity with rigorous analyses
  - Validates current regulatory PCS credit for other accident analyses
    - ◆ Control Rod Drop Accident – no additional analysis related to “seismic robustness” at a plant’s SSE is needed for this deterministic dose analysis

NUCLEAR. CLEAN AIR ENERGY

# ISG Conclusions

- ISG incorporates relevant operating experience as well as recent post-Fukushima seismic risk insights and walkdowns
  - NEDC-31858P used earthquake experience data, primarily from nonnuclear facilities
- Recommend that explicit credit for the conclusions of this ISG approach is included in Reg Guide 1.183, Rev. 1

# Steamline Deposition Credit

- Realistic modeling of the deposition in the steamline is important for BWRs
  - Directly coupled to the reactor vessel
  - Calculated dose for MSL is significant due to very conservative assumptions
  
- Significant regulatory uncertainty regarding acceptable models in RG 1.183 Revision 0
  - Revision 0 of RG 1.183 does not contain an aerosol deposition model for the main steam lines

# Conclusions

- Industry concurs that:
  - The PCS is a realistic and available hold-up volume for fission products
  - There is high confidence in the SSCs in the PCS to provide a volume for holdup and retention of fission products
  
- Industry comments provided application of ISG
  - Applicability to new plants
  - Application in RG 1.183 Rev. 1
    - ◆ Suggest credit for PCS with little or no additional analysis consistent with the approved approach for the control rod drop accident
  - Staff deferred all comments to RG 1.183 decision-making