

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

Title: Joint Fire Protection and Probabilistic Risk  
Assessment Subcommittee

Docket Number: N/A

Location: Videoconference

Date: May 5, 2021

Work Order No.: NRC-1503

Pages 1-53

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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JOINT FIRE PROTECTION AND PROBABILISTIC RISK

ASSESSMENT SUBCOMMITTEE

+ + + + +

WEDNESDAY

MAY 5, 2021

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The Subcommittee met via Videoconference,  
at 9:30 a.m. EDT, Dennis Bley, Chairman, presiding.

COMMITTEE MEMBERS:

DENNIS BLEY, Chair

VICKI BIER, Member

CHARLES H. BROWN, JR. Member

VESNA B. DIMITRIJEVIC, Member

GREG HALNON, Member

WALTER L. KIRCHNER, Member

JOSE MARCH-LEUBA, Member

DAVID A. PETTI, Member

JOY L. REMPE, Vice Chairman

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1 MATTHEW W. SUNSERI, Member

2

3 ACRS CONSULTANT:

4 STEPHEN SCHULTZ

5

6 DESIGNATED FEDERAL OFFICIAL:

7 HOWARD KENT

8 WEIDONG WANG

9

10 ALSO PRESENT:

11 VICTORIA ANDERSON, NEI

12 THINH DINH, NRR

13 SCOTT MOORE, Executive Director, ACRS

14 CHARLES MOULTON, NRR

15 SHILP VASAVADA, NRR

16 JENNIFER WHITMAN, NRR

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

9:30 a.m.

CHAIR BLEY: Good morning, the meeting will now come to order. This is a joint meeting of the Advisory Committee on Reactor Safeguard Fire Protection and Probabilistic Risk Assessment Subcommittees.

I'm Dennis Bley, Chairman for the probabilistic Risk Subcommittees and Matt Sunseri is Chairman of the Fire Protection Subcommittee.

ACRS Members in attendance are Joy Rempe, Charlie Brown, Walt Kirchner, Dave Petti, Vesna Dimitrijevic, Jose March-Leuba, Greg Halnon, and our consultant Steven Schultz, who's also in attendance.

We're expecting a couple of others but I don't see them here. Kent Howard and Weidong Wang are the ACRS Staff that are the designated federal officials for this meeting.

The purpose of today's meeting is to discuss the revisions to Reg Guides 1.189, Fire Protection for Nuclear Power-plants, and 1.205, Risk-informed Performance-based Fire Protection for Existing Light-water Nuclear Power-plants, as well as an overview of NFPA 805 and 10 CFR 50.38(c).

The revision to Reg Guide 1.189 includes

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1 many changes to areas such as transition from  
2 operating plant to permanent shutdown status, multiple  
3 changes to electric circuit station blackout  
4 improvisation with risk-informed reg guides.

5 Reg Guide 1.205 and the associated 10 CFR  
6 50.38(c) and NFPA 805, in their reply to operating  
7 plants the SAB believes that their operating plants  
8 with the long-standing non-compliances are rules  
9 50.38(b), Appendix R, which drove licensees to  
10 implement NFP 805.

11 However, the changes brought by that  
12 process are significant. We think it's also likely  
13 that the guidance in this reg guide will become the  
14 basis of reviews of fire protection PRAs associated  
15 with the license applications.

16 To the extent that a risk-informed  
17 performance-based fire protection program for combined  
18 license application would be similar in the 805  
19 program.

20 The reason that we requested today's  
21 briefing is that very few of our current Members were  
22 on board 10 to 15 years when we reviewed the 50.48C  
23 implementation.

24 The joint Subcommittee will gather  
25 information, analyze relevant issues, and formulate

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1 their proposed positions and actions as appropriate.  
2 However, at the Subcommittee's discretion many matters  
3 will be considered for presentation to the full  
4 Committee if necessary.

5 The ACRS was established by statute and is  
6 governed by the Federal Advisory Committee Act, FACA.  
7 We have since implemented FACA in accordance with its  
8 regulations found in Title 10 of the Code of Federal  
9 Regulations Part 7.

10 The Committee can only speak to its  
11 published letter reports. We hold meetings to gather  
12 information and perform preparatory work that will  
13 support our deliberations at full Committee meetings.

14 The rules for participation in all ACRS  
15 meetings including today's were announced previously  
16 in the Federal Register.

17 The ACRS Section of the U.S. NRC public  
18 website provides our charter bylaws, agendas, letter  
19 reports, and transcripts of all full and Subcommittee  
20 meetings including side presentations.

21 Committee notice and agenda for this  
22 meeting were posted there. As stated in the Federal  
23 Register notice and in the public meeting notice  
24 posted at the website, member of the public who desire  
25 to provide written or oral input to the Subcommittee

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1 may do so and should contact the designated federal  
2 official five days prior to the meeting as  
3 practicable.

4 Today's meeting is open to the public  
5 attendance and there will be a time set aside at the  
6 end of the meeting for spontaneous comments from  
7 members of the public attending or listening to our  
8 meeting.

9 Due to the COVID-19 pandemic, today's  
10 meeting is being held over Microsoft Teams, the ACRS,  
11 NRC, and Nuclear Energy Institute Staff are attendees.  
12 There is also a telephone bridge line around  
13 participation to the public.

14 A transcript of today's meeting is being  
15 kept, therefore, we request that the meeting  
16 participants on the bridge line identify themselves  
17 when they're asked to speak and to speak with  
18 sufficient clarity and volume so that they can be  
19 readily heard.

20 But at this time I ask the attendees on  
21 Teams and on the bridge line keep their devices on  
22 mute to minimize disruptions and unmute only when  
23 speaking.

24 We will now proceed with the meeting and  
25 I call upon Jennifer Whitman, our Chief of the

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1 probablistic risk assessment licensing Branch of the  
2 NRR to make her remarks. So, Jennifer, please go  
3 ahead?

4 MS. WHITMAN: Good morning, as was said,  
5 my name is Jennifer Whitman and I'm currently the  
6 Acting Deputy Director of the Division of Risk  
7 Assessment in the Office of NRR.

8 So, I'd like to start off by thanking the  
9 Committee by providing the Staff the opportunity to  
10 share with you the changes that we've made to two of  
11 the Regulatory Guides that address fire protection and  
12 provide an overview of the framework of 10 CFR 50.38c  
13 for the risk-informed performance-based fire  
14 protection programs, which incorporate portions of  
15 NFPA 805.

16 The Staff in industry have done a lot of  
17 great work since Reg Guide 1.189 and Reg Guide 1.205  
18 were last updated in 2018 and 2009 respectively. I  
19 really want to thank all of the Staff including our  
20 partners in the Office of Research for the work that  
21 was done to put the guidance together that has been  
22 incorporated in these revisions.

23 So, the revisions you'll hear about today  
24 incorporate the latest guidance and all that great  
25 Staff and industry work with respect to circuit

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1 analysis and the close-out of the frequently asked  
2 questions process that was utilized as nearly half of  
3 the industry transitioned to NFPA 805.

4 So, both of the Regulatory Guides were  
5 issued for public comment and the Staff didn't  
6 encounter any substantial disagreements on those  
7 proposed revisions.

8 So during our presentation today the Staff  
9 will provide details on the revision and an overview  
10 of how address the comments that we receive from both  
11 industry and the public.

12 The Staff is not requesting that the ACRS  
13 write a letter on the Reg Guides but as always, if the  
14 Committee wishes to do so we'll welcome it. So, I'd  
15 like to thank you again for your time and  
16 consideration and just indicate that we look forward  
17 to addressing any questions or feedback from the  
18 Committee.

19 And so with that, I'll turn things over  
20 to Chuck Moulton.

21 MR. MOULTON: I'm Charles Moulton, fire  
22 protection engineer, NPRA Licensing Branch B, Division  
23 of Risk Assessment in the Office of Nuclear Reactor  
24 Regulation.

25 Today's presentation will start with a

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1 brief discussion of the revisions to the two fire  
2 protection Reg Guides 1.189, Fire Protection for  
3 Nuclear Power-plants, and 1.205 Risk-informed  
4 Performance-based Fire Protection for Existing Light-  
5 water Nuclear Plants.

6 It will then be followed by an overview of  
7 risk-informed performance-based fire protection under  
8 10 CFR 48(c) as well as a discuss of specific technical  
9 topics related to the implementation of that rule.

10 So, the main purpose of the revision for  
11 Reg Guide 1.189 and the other Reg Guide as well was  
12 the incorporation of updated guidance, specifically  
13 guidance on fire-induced circuit failures.

14 This material was essentially endorsing  
15 portions of a new revision of NEI-00-01 implementation  
16 guidance for post-fire safe shutdown circuit analysis  
17 based on the material found in NUREG CR-7150 joint  
18 assessment of able damage and planification of effects  
19 from fire, AKA JACQUE-FIRE, three volumes of that  
20 report.

21 1.189 also incorporated organizational  
22 changes and format changes to align with the current  
23 Regulatory Guide format at the NRC. So, we received  
24 25 public comments, due to those comments we made  
25 various clarity edits in sections of the reg guide, as

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1 well as increasing the discussion of some of the  
2 circuit analysis details from the NUREG and NEI-00-01  
3 to incorporate more text in the reg guide rather than  
4 at the end simply referencing those documents.

5 There were a few comments that were not  
6 incorporated, one was about changing the definition of  
7 not adversely affects safe shutdown to remove  
8 discussion of sufficient safety margins in the text  
9 section on the standard license condition and self-  
10 approval of changes.

11 The Staff's position was that this text  
12 has been unchanged since Revision 1 of the reg guide  
13 in 2007 and has been successfully used by the fleet  
14 with no problems or issues known to the Staff.

15 The other comment that we received that we  
16 did not incorporate was to expand the guidance in this  
17 reg guide to include passively safe advanced reactor  
18 designs. The Staff felt this was beyond the scope of  
19 the current revision.

20 Additionally, 10 CFR Part 53 is under  
21 development to include these reactor designs and will  
22 have separate implementing guidance, including for  
23 fire protection, so on a separate reg guide  
24 completely.

25 MEMBER MARCH-LEUBA: Charles, this is

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1 Jose, just for my information, the understanding is  
2 Part 53 will invalidate every single reg guide that is  
3 in the books and we'll have to write a new one?

4 MR. MOULTON: No, but the implementation  
5 plan for Part 53 is to have a separate reg guide for  
6 the plants licensed under that part of the rule.

7 MEMBER MARCH-LEUBA: Reg guide for fire?

8 MR. MOULTON: Yes.

9 MEMBER MARCH-LEUBA: So, you already had  
10 discussions for the fire reg guide. For other reg  
11 guides, will that be applicable or not? Or should I  
12 ask the 53 guys?

13 MR. MOULTON: You should ask the 53 guys,  
14 I don't know that answer.

15 MEMBER MARCH-LEUBA: Thank you.

16 CHAIR BLEY: Dennis Bley following up on  
17 that. Has work begun on a revision of this reg guide  
18 to fit in with Part 53 or is that something in the  
19 future?

20 MR. MOULTON: That's in the future. The  
21 work on the rule language text just began last week.

22 CHAIR BLEY: Thank you.

23 MR. MOULTON: The specific fire protection  
24 rule language I mean.

25 CHAIR BLEY: Understood, go ahead.

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1 MR. MOULTON: Okay, so the changes for  
2 1.205, again to incorporate updated guidance this reg  
3 guide endorses NEI 0402 new revision and that document  
4 incorporates the outstanding closed NFPA 805  
5 frequently asked questions.

6 And in addition to that, we also included  
7 --

8 MEMBER REMPE: Sorry, I didn't hear you,  
9 could you repeat what you said? It broke up.

10 MS. WHITMAN: On mine it looks like Chuck  
11 is still frozen.

12 CHAIR BLEY: I think we've lost him.  
13 Chuck, if you can hear us you might have to drop off  
14 and come back. We had this problem for a while, or if  
15 one of you from the Staff could give him a quick call  
16 and let him know we can't hear him any longer, that  
17 would be helpful.

18 MEMBER MARCH-LEUBA: I'm doing that.

19 CHAIR BLEY: Thank you.

20 MEMBER BROWN: Dennis, this is Charlie,  
21 you said something in your opening remarks and I  
22 forgot the nuance of it. There's two documents, 1.205  
23 and the other is 1.89 I guess or 189.

24 Those are two different reg guides, you  
25 said one of them applies to operating plants only,

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1 when I was looking at them I was trying to figure out  
2 what the difference was and didn't see it. What's the  
3 other one apply to?

4 CHAIR BLEY: Everybody I think, the Staff  
5 can correct us on that but I think that one is  
6 continuing. It's 1.205 that was third to implement  
7 the NFPA 805 material that was resumed at the current  
8 operating fleet.

9 And they pretty well worked their way  
10 through all of those already.

11 MEMBER BROWN: 1.189 is what, for new  
12 design plants or everybody also?

13 CHAIR BLEY: Everybody, 1.189 is  
14 everybody.

15 MEMBER BROWN: So, 1.205 is effectively  
16 the implementation of 805?

17 CHAIR BLEY: Correct.

18 MEMBER BROWN: Now I got it, thank you  
19 very much.

20 MR. MOULTON: All right, I'm back.

21 MEMBER MARCH-LEUBA: Chuck, it may help if  
22 you turn your radio off, maybe that's it.

23 MR. MOULTON: Okay, can you see the slide  
24 again?

25 MEMBER REMPE: Yes.

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1 MR. MOULTON: So, I think this is where I  
2 dropped off.

3 MEMBER BROWN: Actually, the slide got  
4 smaller for some reason on that screen.

5 MR. MOULTON: Yes, because I'm not in full  
6 screen --

7 (Simultaneous Speaking.)

8 -- slideshow again.

9 MEMBER BROWN: Sorry about that, thank  
10 you.

11 MR. MOULTON: So, the new revision of  
12 1.205 endorses the NEI implementation guidance for  
13 adopting the risk-informed performance-based fire  
14 protection program, that new revision which  
15 incorporates the remaining outstanding NFPA 805 last  
16 questions that had been closed out prior to the  
17 conclusion of that process.

18 Also, it includes the updates fire induced  
19 circuit failure guidance, again endorsing portions of  
20 NEI 00-01 and the JACQUE-FIRE reports.

21 We received six public comments that  
22 resulted in expanded discussion of NFP 805 Section 1.7  
23 equivalency to closer align the reg guide text with  
24 what the issued license conditions actually say.

25 That's the presentation on the reg guides.

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1 Now we can move into the features of the fire  
2 protection program under 10 CFR 50 48(c).

3 So the rule endorses NFP 805, it was  
4 issued in 2004 and incorporates the standard by  
5 reference with exceptions, clarifications, and  
6 supplementations.

7 This new rule is a voluntary alternative  
8 to the existing prescriptive deterministic fire  
9 protection regulations usually known as Appendix R.

10 So, the features of 805 are that the  
11 requirements are applied to all phases of plant  
12 operation, there are fundamental program elements and  
13 design features for fire protection systems that are  
14 established and allows the nuclear safety performance  
15 criteria to be satisfied deterministically or using a  
16 performance-based approach.

17 Implementation of the performance-based  
18 approach includes the inspiration of risk, defense  
19 in-depth, and safety margin considerations. The 805  
20 allows licensees to self-approve certain changes in  
21 the fire protection program using performance-based  
22 methods.

23 This is similar to the standard license  
24 condition for plants that have not adopted the rule.  
25 We have a table describing the differences so 805 has

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1 the concept of achieving safe and stable conditions  
2 for the fuel versus hot shutdown and cold shutdown  
3 requirements in Appendix R.

4 805 also has the concept of a success path  
5 rather than a train and again, Appendix R is only  
6 applicable at power operation.

7 MEMBER HALNON: Chuck, this is Greg  
8 Halnon, just real quick, on the self-approved changes,  
9 how does the NRC give oversight?

10 Is it inspections willingly or do the  
11 licensees have to report 5059 with their changes to be  
12 sent to you to do some reviews? Give me just a quick  
13 breakdown on how the oversight is on those self-  
14 approved changes.

15 MR. MOULTON: So, I'll touch on this a  
16 little bit more later on but essentially, the  
17 licensees are required to document plant change  
18 evaluations including considerations of the safety  
19 margins and those are in documents that are available  
20 for inspection.

21 MEMBER HALNON: So, there's been a  
22 periodic fire protection inspection regime that they  
23 do then?

24 MR. MOULTON: Yes, now there's a threshold  
25 where a change is too major for self-approvals, those

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1 changes need to be approved by the Staff.

2 MEMBER HALNON: If I have more questions  
3 I'll get you later on.

4 CHAIR BLEY: Chuck, Dennis Bley again, do  
5 you have two microphones open? At least where I am  
6 I'm hearing a lot of echo, it might just be the  
7 connection.

8 MEMBER REMPE: It looked like it was  
9 coming from Greg when Greg was asking his question.

10 CHAIR BLEY: Okay, go ahead.

11 MR. MOULTON: So, other differences, the  
12 lighting requirements for operator actions are  
13 performance-based in 805 and deterministic in Appendix  
14 R.

15 For 805 operator actions are also  
16 demonstrate compliance on the performance-based  
17 approach and not also demonstrate compliance without  
18 Staff approval for Appendix R.

19 And also in 805, the radiological release  
20 criteria from firefighting activities are explicit in  
21 the standard.

22 MEMBER KIRCHNER: This is Walt Kirchner,  
23 just one quick question on that comparison between --  
24 what does it mean actually in practice to say no  
25 deterministic emergencies while editing the

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1 requirements?

2 As a former operator I would like to know  
3 for sure I had some lighting availability.

4 MR. MOULTON: So, in practice it doesn't  
5 mean much necessarily but in 805 part of the -- the  
6 open-ended actions to be credited for the PRA and for  
7 performance-based compliance need to be determined to  
8 be feasible.

9 Part of the feasibility evaluation is the  
10 lighting for the operators where they're taking the  
11 action and their transit routes. So, practically,  
12 there may not be a lot of difference.

13 MEMBER KIRCHNER: A follow-on to Greg's  
14 question, I was trying to think what that meant in  
15 terms of you, the Staff, doing, say, an inspection or  
16 an audit of a licensee's program.

17 MR. MOULTON: So, a licensee will have a  
18 documented feasibility evaluation for each action that  
19 will include consideration of lighting.

20 TD: This is Thinh Dinh, under Appendix R  
21 you need to have fixed emergency lighting and under  
22 the PA you can use portable, that's pretty much the  
23 difference.

24 MEMBER KIRCHNER: Thank you, that's what  
25 I was guessing was the distinction, thank you.

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1 MR. MOULTON: Okay, so license condition.  
2 This is where we get into self-approval of program  
3 changes. So, risk-informed changes to the fire  
4 protection program without prior approval are  
5 available if the risk succession of the chain shows  
6 acceptance criteria are met.

7 There's either a risk decrease or a delta  
8 CBF and delta of less than  $1e$  to the  $-7$ , that's  $1e$  to  
9 the  $-8$ , respectively. These acceptance criteria and  
10 the acceptance criteria for risk changes in the  
11 initial transition reviews were developed starting  
12 from the Reg Guide 1.174 guidelines.

13 The risk-informed changes that are self-  
14 approved must also be consistent with the defense  
15 in-depth and maintain safety margin, and the approach  
16 methods and data need to be acceptable to the NRC.

17 Practically, that means peer-reviewed PRA  
18 are methods that have been approved for 805  
19 applications in general, methods that have been  
20 demonstrated to bound the risk change.

21 There are other changes that can be made  
22 without prior approval, changes that have no more than  
23 minimal risk impact, certain functionally equivalent  
24 changes to Chapter 3, that is the fundamental fire  
25 protection program features and design elements,

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1 changes that are adequate for the hazard for certain  
2 fire protection active and passive systems, fire  
3 alarms, fire protection discretion systems and fire  
4 barriers.

5 Also, with 805 there's a transition period  
6 and there's a transition license condition. During  
7 the transition period the plant cannot self-approve  
8 risk-informed changes unless it's no more than a  
9 minimal impact or it's a risk decrease.

10 There are lists of modifications and  
11 permatic implementation items that are necessary for  
12 a full compliance and a commended schedule for the  
13 completion of those items for the typically  
14 modifications that have compensatory measures  
15 involved.

16 Those compensatory measures must be kept  
17 in place until the completion of the modification.

18 CHAIR BLEY: Chuck?

19 MR. MOULTON: Yes?

20 CHAIR BLEY: Are there still many plants  
21 in the middle of this process?

22 MR. MOULTON: Yes, there are three units,  
23 Davis-Besse and the two Hatch units.

24 CHAIR BLEY: Okay, and just for our  
25 information, are they almost finished, are they

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1 expected to be complete, say, sometimes this year or  
2 no?

3 MR. MOULTON: Davis-Besse is expected to  
4 be complete next year and Hatch, because of outage  
5 timing to do some of the modifications, both units are  
6 expected to be completed in 2024.

7 CHAIR BLEY: Okay, thanks.

8 MR. MOULTON: So, a couple technical  
9 topics for implementation of 805, success path, a  
10 success path is a comprehensive list of systems and  
11 equipment and their inter-relationships.

12 The components required to achieve each of  
13 the nuclear safety performance criteria make up  
14 success paths.

15 The components required to achieve and  
16 obtain nuclear safety functions and components whose  
17 fire-induced failure could prevent the operational  
18 results in the mal-operation of these components  
19 needed to meet the nuclear safety criteria are also  
20 incorporated in the nuclear success path.

21 So, this approach identifies the systems  
22 per nuclear safety criteria and considers the  
23 essential mechanical and environmental support and  
24 sessional electrical systems for each of those other  
25 systems, identifies the equipment that are various

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1 operations concerns and is performance-based.

2 Every system and equipment identification  
3 definition includes the related cables to that piece  
4 of equipment or system. Moving on, recovery actions,  
5 in Appendix R these are generally known as Operator  
6 Manual Actions.

7 Recovery actions are essentially operator  
8 actions outside of the main control room or primary  
9 control station that are required to at least help  
10 achieve the nuclear safety performance criteria.

11 You can see here a flow chart and recovery  
12 actions generally fall into two groups, actions that  
13 are required to demonstrate the availability of a  
14 success path, and those that are simply assist in  
15 achieving the quoted safety criteria.

16 The difference is that for recovery  
17 actions required to demonstrate the availability of a  
18 success path, the additional risk of the recovery  
19 action versus the deterministic separation criteria  
20 needs to be evaluated and reported to the NRC as part of  
21 the transition to this new program.

22 Otherwise, the feasibility and/or  
23 liability requirements, the proceduralization  
24 requirements, and the inclusion in the PRA are the  
25 same for both types.

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1           MEMBER HALNON: Chuck what is the primary  
2 control station, is that the fire protection panel?

3           MR. MOULTON: So, we were just getting  
4 there. This was a big discussion the last time we did  
5 a revision of this reg guide.

6           Essentially, it's either the ultimate  
7 shutdown panel when command and control has been  
8 transferred there from the main control room, or a  
9 dedicated shutdown panel that is the only location  
10 where a piece of equipment could be controlled from.

11          MEMBER HALNON: So, it could be a local --  
12 (Simultaneous Speaking.)

13          MR. MOULTON: It could be, there are not  
14 actually a ton of those.

15          MEMBER HALNON: So, primary control  
16 station doesn't necessarily indicate another spot that  
17 everything comes in the ultimate shutdown panel? It  
18 could be distributed throughout the plant?

19          MR. MOULTON: Well, generally it's one  
20 spot, it's the spot where command and control resides  
21 at that moment.

22          MEMBER HALNON: You're talking about the  
23 integrated Command and control?

24          MR. MOULTON: Yes, so basically, we're  
25 talking about for the ultimate shutdown panels control

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1 room abandonment.

2 MEMBER HALNON: Okay.

3 MR. MOULTON: So, performance-based  
4 analysis, the nuclear safety criteria evaluation is  
5 from the fire area by fire area basis. If a fire area  
6 has a valiance from the deterministic separation  
7 requirements, the licensee has a few choices.

8 They can modify the plant to gain  
9 compliance, they can use the fire risk evaluation  
10 approach, or they could use the fire modeling  
11 approach, which essentially shows that risk is  
12 negligible.

13 99 percent or plus of the time, the fire  
14 risk evaluation approach was used. If a recovery  
15 action to start with that a success path is available,  
16 the additional risk must be assessed.

17 CHAIR BLEY: Chuck, if I use a fire risk  
18 evaluation approach I've also got to include the fire  
19 modeling to support my risk assessment, right?

20 MR. MOULTON: Yes, but in the standard  
21 there's two separate approaches. In practice the  
22 standard with the plant change evaluations which we'll  
23 be getting to next drive the licensee to use the fire  
24 risk evaluation approach, which includes as part of it  
25 the use of fire modeling.

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1 (Simultaneous Speaking.)

2 CHAIR BLEY: -- not quite, but thanks,  
3 that helps.

4 MR. MOULTON: In any case, using a  
5 recovery action to demonstrate the availability of a  
6 success path requires the use of the performance-based  
7 approach using one of the general approaches, either  
8 fire risk evaluation or fire modeling.

9 MEMBER KIRCHNER: Chuck, this is Walt  
10 Kirchner. In practice, do you find lots of variances  
11 in the actual plants in terms of deterministic  
12 separation requirements?

13 MR. MOULTON: I would say there are quite  
14 a few, I would also add that in general the variances  
15 are concentrated in a few fire areas.

16 MEMBER KIRCHNER: I'm trying to think  
17 where things come together where a designer laying out  
18 a plant would have problems with the deterministic  
19 separation coming into the control room panels.

20 MR. MOULTON: Control room, cable  
21 spreading room, allow switchgear rooms, some general  
22 ops-building areas.

23 MEMBER KIRCHNER: But in summary, as  
24 Dennis was suggesting, when you do a fire risk  
25 evaluation, part of that requires actual modeling,

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1 which I always think of as deterministic but that's  
2 different. The deterministic separation you're  
3 talking about is just fire code distances and such?

4 MR. MOULTON: Deterministic separation  
5 criteria are for the separation with detection and  
6 suppression, a one-hour fire barrier with the  
7 detection and suppression or a three-hour fire  
8 barrier.

9 MEMBER KIRCHNER: Thank you.

10 MR. MOULTON: So, plant change evaluation,  
11 this is essentially the same thing as the fire risk  
12 evaluation performance-based approach.

13 The risk-informed evaluation of a change  
14 to a previously approved program element and  
15 integrated assessment of risk defense in-depth and  
16 safety margins, and it shows that the public risk from  
17 fire and nuclear fuel damage accidents is low, that  
18 adequate defense in-depth safety margins are  
19 maintained.

20 So, in summary, the revisions to these two  
21 reg guides reflect the guidance available to the  
22 Staff. The Staff found no substantial obligations or  
23 alignment issues from the public comments and the NFP  
24 805 provides the framework for a risk-informed  
25 performance-based fire protection program.

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1 And that is the end of my slides.

2 CHAIR BLEY: Thank you very much. I'll  
3 ask the Members if any Member have any questions for  
4 Chuck before we move on?

5 MEMBER KIRCHNER: I do, Dennis, this is  
6 Walt. Chuck, going back to my colleague, Jose's,  
7 earlier questions, when I looked at 1.205 and this  
8 risk approach, it seemed to me this would be a good  
9 fit for any reactor, any generic reactor.

10 And hence, I would have assumed that 1.205  
11 could be adopted as part of the guidance for any 10  
12 CFR 53 rulemaking.

13 Is that a good assumption on my part to  
14 think that this reg guide would actually work for,  
15 essentially, all reactors, not just LWRs?

16 MR. MOULTON: In general, I think they  
17 could, the difficulty I see is the rule language in  
18 50.48(c) that discusses transition and some of the  
19 assumptions in the standard that a new licensee, no  
20 matter what the design, will not have the benefit of.

21 MEMBER KIRCHNER: So, in this case we  
22 don't have a transition because one would expect if  
23 the rule language is explicit with regards to GDC-3 or  
24 something comparable to GDC-3 then you would start at  
25 a high level at be consistent with 50.48(c), would you

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1 not?

2 MR. MOULTON: The thing is that let me  
3 speculate a little bit since we're talking about  
4 designs that haven't actually been developed yet.

5 The guidance that comes out for Part 53  
6 will be substantially similar to what's in the 805  
7 standard in terms of the general concepts and  
8 requirements at a high level, that is correct.

9 It's the details that are complicated by  
10 the concept of, for example, the technology-neutral  
11 framework and approach that the Agency is taking.

12 So, for LWRs there's no concern about,  
13 say, toxicity or flammability of any sort of coolant  
14 involved, and that's the case for every advanced  
15 design.

16 MS. WHITMAN: This is Jennifer Whitman,  
17 the other thing, too, is a lot of the guidance in  
18 1.205 is addressing the transition from the  
19 deterministic to the risk-informed performance-based.

20 And so a lot of that will not apply to the  
21 new designs because they're never going to have the  
22 original deterministic framework. They're going to be  
23 starting with the reinforce performance-based  
24 framework.

25 So, while, like Chuck said, a lot of the

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1 high-level concepts will remain the same, at this  
2 point in time, as Chuck said, the rule language for  
3 Part 53 is just starting to be worked on.

4 We anticipate it will be cleaner and  
5 easier for everyone if there's new guidance  
6 specifically for the advanced reactor fire protection.

7 MEMBER BROWN: Can I ask a question?

8 MS. WHITMAN: Yes.

9 MEMBER BROWN: Technology-neutral  
10 performance-based, that's chilly ground. Obviously  
11 understand technology-neutral relative to my basic  
12 area of digital INC and everything like that, how can  
13 fire protection be technology-neutral?

14 Don't you have to spray it with water,  
15 foam, or suppress the oxygen for fire-controlled  
16 doors? I'm really struggling with the technology-  
17 neutral approach to fire protection.

18 MR. MOULTON: So, the hazards encountered  
19 by fire protection activities are different in a non  
20 light-water reactor, and also the requirements for  
21 what is exactly safe and stable as a concept involves  
22 maybe different for a non-large light-water reactor.

23 MEMBER BROWN: How does technology-neutral  
24 get -- that's very difficult for me to understand.

25 MR. MOULTON: I look at different

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1 materials. A sodium reactor is a sodium reactor, you  
2 really don't want it to touch water. What do you with  
3 sodium, the regular sodium, in its elemental state in  
4 a laboratory?

5           Isn't it in oil to keep it from exploding,  
6 catching fire?

7           MS. WHITMAN: I was going to say we're  
8 talking about technology-neutral from the rule  
9 framework perspective so the rule is going to say  
10 something along those lines of what GDC-3 currently  
11 says, you have to protect against fire and fire  
12 hazards and you have to maintain no radiological  
13 releases or meet the criteria.

14           How you do that in any given type of  
15 reactor, we might need to provide guidance for what  
16 that means but the rule will be such that any  
17 technology could come in and demonstrate how they are  
18 planning to meet the rule.

19           Does that help?

20           MEMBER BROWN: I'll give up.

21           MEMBER KIRCHNER: Charlie, I was thinking  
22 along the lines you were, too. Jennifer, it seems to  
23 me your framework here on 1.205 would work and, yes,  
24 a lot of it had transitioned from 48A to C but  
25 ignoring that for the moment, the requirements that

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1 you put forth with the 805, and I hope I'm getting my  
2 numbers correct.

3 And your defense in-depth, it seems to be  
4 that. Obviously, what suppressions you use will  
5 depend on the technology but the generic framework you  
6 have just struck me as it would cover most  
7 technologies, at least at a high level in terms of how  
8 you would proceed with a fire protection program,  
9 especially your defense in-depth concepts.

10 MR. VASAVADA: This is Shilp Vasavada from  
11 the NRC Staff and I just wanted to, again, add some  
12 perspective to the discussion as well as mention maybe  
13 the rule and the guidance, the framework, that is  
14 being discussed and laid out.

15 That framework supports of technology  
16 includes the implementation because at a high-level,  
17 you can say what to do although how to do, you can get  
18 to a certain level of granularity but obviously, then  
19 there can be technology and design-specific  
20 differences which have to be reviewed by the Staff.

21 As an example, for the sodium cold, using  
22 a risk-informed performance-based having a, let's say,  
23 PRA to identify the vulnerabilities or whether there  
24 is a risk or not in a particular fire area, that can  
25 be done for any technology including the sodium cold

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1 reactor.

2 And then if there is, let's say they have  
3 a double-wall system where their outer wall, the outer  
4 annulus is in order so that the sodium cannot interact  
5 with air.

6 But there is a breach and there's a fire  
7 against the pressure detection and all of that has to  
8 be in place. It may be different for that one but  
9 that would be handled on that particular  
10 design-specific basis.

11 I hope that helps.

12 MEMBER BROWN: For fire,  
13 performance-based, if it won't put out the fire, you  
14 use something that does, that means it's automatically  
15 performance-based.

16 This is a very interesting area to discuss  
17 from the standpoint of performance-based fires you  
18 could put out, or it's not. And if it's something  
19 that doesn't put it out, then it's obviously not  
20 performing and you go to something else.

21 MR. MOULTON: In this case,  
22 performance-based is not generally discussing at the  
23 level of whether a suppression system is functional or  
24 not to put out a fire, but rather at the nuclear  
25 safety criteria level of achieving safe shutdown.

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1                   MEMBER HALNON:    Charlie, this is Greg  
2 Halnon, I kind of just compartmentalized in my mind  
3 the reg guide puzzled by written takes care of a  
4 couple things.

5                   One, it's really focused on transition  
6 plants because you know the plants had it before and  
7 it endorses any NEI document that's totally focused on  
8 transition as opposed to building in the design, and  
9 like you said, the transition required.

10                  Therefore, it could be a much more  
11 straightforward and smaller reg guide or at least more  
12 step by step. Rather than endorsing the NEI document,  
13 it would be more focused on the risk-informed aspects  
14 built into the design originally.

15                  Many of the existing operating plants when  
16 they transition, one of the reasons they transition is  
17 because they have so many exceptions or exemptions to  
18 Appendix.

19                  And they had to weigh the cost of  
20 transitioning versus fixing those exemptions and  
21 that's the focus of many of these plants that had  
22 transitioned to 805 was how do I get rid of these  
23 exemptions to Appendix R because they're very  
24 expensive, typically, to fix.

25                  So, anyway, that's how I compartmentalize

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1 why this reg guide would work from the standpoint of  
2 the overall framework of risk-informed yet the focus  
3 of the reg guide, I don't know, it might be confusing  
4 for somebody to take it word for word and establish a  
5 program with an advanced reactor.

6 MEMBER BROWN: Okay, just griding through  
7 1.189 and 1.205, they're very complicated, they're  
8 very expansive, and they cover tons of requirements  
9 and discussions in terms of things that ought to be  
10 done.

11 I just thought putting out fires was a  
12 little bit more you looked at what you had, you  
13 determined what you needed to put it out or suppress  
14 it or not allow it to start.

15 And you would not put wood in a place  
16 where you knew you had fire hazards as opposed to  
17 something that's non-flammable. So, it just boggles  
18 my mind that this is that difficult. Now, Greg, I was  
19 not in commercial plants.

20 In regular nuclear plants it's all steel  
21 just about so fire hazards are far smaller quantities  
22 and sizes, they're more oil-and-fuel-based for the  
23 most part. So, I'll give up.

24 MEMBER BIER: This is Vicki, I think I  
25 have a question for Staff that may help clarify this.

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1 MEMBER BROWN: Thank you.

2 MEMBER BIER: It seems to me that you  
3 totally are coming from a perspective of  
4 performance-based is, well, you test the fire  
5 protection equipment every month and does it work or  
6 not?

7 But my understanding, if I'm not wrong, is  
8 that performance-based actually does some type of risk  
9 assessment or analysis to predict acceptable  
10 performance overall. So, I don't know if Staff wants  
11 to comment on that briefly?

12 MR. MOULTON: That's more risk-informed in  
13 my view.

14 MEMBER BIER: Okay, so I may be  
15 misinterpreting --

16 MR. MOULTON: Performance-based is instead  
17 of deciding what -- because we're mainly focused on  
18 separation between redundant pieces of equipment,  
19 performance-based is demonstrating that in any fire  
20 that will occur in a fire area you'll have at least  
21 one available to shut the plant down.

22 MEMBER BIER: But how do you demonstrate  
23 that?

24 MR. MOULTON: Using fire modeling.

25 MEMBER BIER: So, it's based on analysis?

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1 MR. MOULTON: Yes.

2 MEMBER BIER: Just not based in PRA?

3 MR. MOULTON: Correct.

4 MEMBER BROWN: But you said shut the plant  
5 down. We shut the plant down in light-water reactors  
6 with scrambling the plant. You still have to put out  
7 the fire even if you scram the plant.

8 MR. MOULTON: Scramming the plant is not  
9 the --

10 MEMBER BROWN: You said safety --

11 MR. VASAVADA: This is Shilp, can I just  
12 jump in? I think, as Chuck mentioned, it's about  
13 meeting the nuclear safety objectives.

14 Essentially, the key safety functions, you  
15 still have to have reactivity control and as Chuck was  
16 pointing out, you need to demonstrate that you can  
17 have that even if you have a fire in a fire area.

18 So, the deterministic ways, you have 20  
19 feet of separation, you can say if one train goes away  
20 does the other train, performance basis, all of what  
21 Chuck mentioned.

22 It can be fire modeling, it can be risk  
23 assessment, it can be a combination of both.

24 MEMBER BROWN: So, it could be two feet  
25 apart as opposed to 20 feet part in the end?

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1 MR. VASAVADA: It could be but then they  
2 would have to, again, in a performance-based manner,  
3 and correct me if I'm wrong, demonstrate that they  
4 would still be able to meet the nuclear safety  
5 objectives with that separation.

6 Or they might have to take a variation  
7 from the deterministic requirements and make a plan  
8 modification to be able to achieve that.

9 MEMBER BROWN: Okay, well, thanks, I will  
10 let us get on with this, thank you for being patient.

11 CHAIR BLEY: Thanks, everybody, thanks for  
12 the presentation, Chuck. I think you have nothing  
13 more?

14 MR. MOULTON: I have nothing more.

15 CHAIR BLEY: We're about to take a break  
16 before we move on. When we come back we'll hear from  
17 Victoria Anderson from NEI and before we go I want to  
18 correct my opening remarks because of the display  
19 problem.

20 I didn't see that Vicki Bier was with us  
21 this morning as a Member but she's already spoken up  
22 that she was here so we've got that on record.

23 At this time, we'll release us for 20  
24 minutes approximately, let's come back at 10 minutes  
25 until the hour. We are in recess.

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1 (Whereupon, the above-entitled matter  
2 went off the record at 10:28 a.m. and  
3 resumed at 10:50 a.m.)

4 MS. ANDERSON: All right, so I'm Victoria  
5 Anderson with NEI, I am a technical advisor for Risk  
6 and Engineering and I've had responsibility for fire  
7 protection topics at NEI for close to 10 years now so  
8 I'll be giving a little bit of industry perspective on  
9 our comment of draft guide 1359, which would be the  
10 latest revision of Reg Guide 1.189.

11 So, we do appreciate the endorsement of  
12 our most recent revision of NEI 00-01, which really  
13 helps improve regulatory stability and predictability.

14 As Mr. Bolton indicated earlier, there  
15 were very few, if any, exceptions in the endorsement  
16 so we did appreciate that and we also appreciated that  
17 the majority of our comments were incorporated into  
18 the latest draft of the reg guide.

19 We did see a couple of comments in Section  
20 1182 that weren't incorporated and Mr. Moulton had  
21 referenced that these comments were on portions of the  
22 Reg Guide that hadn't been changed since 2007.

23 I would like to point out that in each  
24 draft revision that's been issued for comment, we have  
25 made these comments and we continue to believe these

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1 changes are necessary to ensure we have regulatory  
2 clarity and fire protection.

3 So, the first is an inappropriate  
4 reference to sufficient safety margins. In this case,  
5 we don't really need to have parity with Reg Guide  
6 1.205.

7 I think Mr. Moulton also referenced that  
8 we had comments on the standard fire protection  
9 license condition because we see that is inconsistent  
10 with relevant generic letters.

11 So, again, we've previously provided these  
12 comments and we believe they remain critical to ensure  
13 that we have consistency in all documents guiding fire  
14 protection regulation. That's all I have, I'm  
15 available for any questions.

16 CHAIR BLEY: Thanks, Victoria, it's nice  
17 to have you back with us, it's been a while. Any  
18 questions from the Committee?

19 MEMBER HALNON: This is Greg, I was  
20 searching for that 1.1.8.2 and I guess I can't find it  
21 in the reg guide that was sent out to us in 1.189 Rev  
22 4, am I in the right Reg Guide?

23 CHAIR BLEY: I was having a hard time  
24 finding that section.

25 MR. MOULTON: Excuse, it's actually

1 1.8.1.2.

2 MS. ANDERSON: Sorry about that.

3 MEMBER HALNON: Got it now, thanks.

4 CHAIR BLEY: Anything else? Victoria,  
5 thank you very much and thanks to the Staff for their  
6 presentations.

7 Unless some Members have comments, and  
8 I'll go around to them in a few minutes, it's not our  
9 intent to write a letter on these two revisions to the  
10 reg guides that this is primarily for the benefit of  
11 the Members to see where things sit at this time for  
12 a little bit of how we got there on fire protection  
13 and associated risk assessments.

14 Can we get the public line open, please?  
15 It's open?

16 MR. KENT: Dennis, I know they were having  
17 problems earlier and I know they're trying to work on  
18 it but Thomas, are you there, or Makeeka? So, Thomas,  
19 the public line is open now, right, because I heard it  
20 say mute off.

21 MEMBER BROWN: While we have that, Greg,  
22 you couldn't find 1.1.8.2?

23 MEMBER HALNON: They corrected it, it was  
24 just a transposition error. It's 1.8 --

25 MEMBER BROWN: I missed that

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1 clarification, I'm sorry, thank you.

2 MR. KENT: Hang on, Dennis. Thomas,  
3 Makeeka, I heard the public line say mute off, is it  
4 open now? Please verify.

5 MR. MOORE: This is Scott Moore, I'm on  
6 the public line.

7 MR. KENT: Okay, so it's open then.

8 CHAIR BLEY: So, at this time, if there's  
9 anyone who would like to make a comment, please  
10 identify yourselves and give us your comment, please.

11 (Simultaneous Speaking.)

12 MR. DASHIELL: Unfortunately, I can't  
13 unmute the public line.

14 CHAIR BLEY: I heard talk over talk but I  
15 think we can close the public line, I don't think  
16 there's anyone.

17 MR. MOORE: I'm on the public line now,  
18 can you hear this in the room?

19 CHAIR BLEY: Yes.

20 MR. MOORE: So, anybody else on the public  
21 line, if you have any comments, go ahead and talk.

22 CHAIR BLEY: The silence is deafening, I  
23 think we'll close the public line, thank you, Scott.

24 MR. MOORE: At this time I'll turn to the  
25 Committee but if there's anyone who thinks we need to

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1 write a letter, please speak up and if you have any  
2 other comments, go ahead.

3 MEMBER BIER: Dennis?

4 CHAIR BLEY: Yes.

5 MEMBER BIER: I don't think this rises to  
6 the level that we would need to write a letter but I  
7 think there is a philosophical point that I want to  
8 raise regarding what performance-based means in this  
9 context.

10 And it may be something the Committee has  
11 already discussed extensively in the past. And  
12 excuse, I'll go on a few-minute tangent but hopefully  
13 brief.

14 If you look at the history of  
15 performance-based regulation, it really started I  
16 think in areas like pollution control from smoke  
17 stacks, where we used to say you needed this kind of  
18 scrubber and then people said, well, that's hampering  
19 innovation in scrubber design so why don't we just say  
20 your pollution has to be less than such and such and  
21 any technology by which you meet that is totally fine.

22 So, that's real physical performance,  
23 you're measuring exactly the thing you want to control  
24 and however you control it is fine. In  
25 performance-based regulation for many parts of nuclear

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1 safety, component availability and so forth, you're  
2 not measuring the exact performance you want to  
3 control.

4 Is the reactor going to have a meltdown or  
5 whatever, but you're measuring tangible things, how  
6 bad is the maintenance backlog, how bad is the  
7 availability of certain components when you test them,  
8 et cetera.

9 So, there's kind of a disconnect because  
10 you can have managing to the indicator that people get  
11 the measured performance down without necessarily  
12 always getting the risk down.

13 But at least you're measuring physical  
14 performance of something, and in fire regulation, and  
15 it's not only for nuclear, there's performance-based  
16 fire regulation in the commercial world for buildings  
17 and whatever, you're not really measuring physical  
18 performance like smoke detectors and fire  
19 extinguishers work when you test them, you're  
20 measuring calculated performance based on some type of  
21 fire model or whatever.

22 And so that introduces a new level of  
23 complexity or departure of not only are you not  
24 measuring the exact thing you want to measure but  
25 you're measuring it by calculation, not in the

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1 physical world, and that means the assumptions of the  
2 calculations are really important.

3 And I think you see a little bit of that  
4 in the comments on the earlier draft where industry  
5 was saying please clarify for us which kind of cabinet  
6 fire scenarios we should be considering.

7 Because in the extreme you can have a  
8 situation where we may specify certain scenario fires  
9 for which performance has to be demonstrated and you  
10 can demonstrate performance for those fire scenarios  
11 by putting all the fire extinguishers where the  
12 postulated fire starts.

13 You have a big room in the scenario fire  
14 starts in one corner so you put all of your fire  
15 extinguishers in that corner and you get good  
16 performance in your fire model but maybe lousy  
17 performance in the real world because there's other  
18 scenario fires that are possible.

19 So, like I said, I don't think there's  
20 necessarily a problem here that we need to comment on  
21 but I just wanted to raise that as something to be  
22 aware of, that performance-based, although the  
23 terminology has gotten to be common, it means  
24 different things in different contexts and I think we  
25 need to be aware of that.

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1           So, anyway, sorry for the long tangent and  
2           if this is something that's already been discussed in  
3           the past.

4           CHAIR BLEY: It has been discussed many  
5           times but that was a very cogent summary of it all.  
6           It almost makes me want to ask you to put together a  
7           white paper for the Committee, I think it would be  
8           very helpful.

9           Anyone else in the Office?

10          MEMBER HALNON: This is Greg, I would like  
11          to hear if it's appropriate what the Staff's rationale  
12          is behind not incorporating the comment on if there  
13          were sufficient safety margins.

14          To me I always point out some vague or  
15          subjective words and I just would like to hear what  
16          the response is for that if it's appropriate.

17          CHAIR BLEY: Sure, does someone on the  
18          Staff want to address that for us, please?

19          MR. VASAVADA: Chuck, you want to go?

20          MR. MOULTON: Okay, I'll go, part of the  
21          comment about sufficient safety margin along with the  
22          other comments on that section was that the text in  
23          this reg guide and going back to Revision 1 could not  
24          be applied to the other plants that have the earlier  
25          definition in their licensing basis without a backfit.

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1           So, Staff agrees with that, however, at  
2 the same time, none of the earlier versions of the reg  
3 guide have been deleted from the Staff list of  
4 guidance.

5           So anyone who has one of the earlier  
6 versions continues to use that to demonstrate  
7 compliance, plus it had been a long-standing change  
8 over ten years and we had not known any problems with  
9 its implementation.

10           And finally, we were trying to focus the  
11 efforts of our revision to be narrowly tailored to  
12 adding the new circuit analysis guidance rather than  
13 going through and editing the entire 100-plus pages of  
14 material.

15           MEMBER HALNON:     So, what determines  
16 sufficient, is that just a long-standing  
17 understanding?

18           MR. MOULTON:   Yes.

19           MEMBER HALNON:   Okay, I assume that's  
20 where the industry was coming from, was that it's  
21 subjective and what the industry may feel is  
22 sufficient may be different than what the NRC may feel  
23 is sufficient.

24           Is that the rub here?

25           MR. MOULTON:   It may be but I would add

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1 that detail also exists in the fire risk evaluations  
2 under the risk-informed performance-based rule.

3 MEMBER HALNON: So, there's other  
4 resources to go to help define or establish what is  
5 sufficient?

6 MR. MOULTON: Yes.

7 MEMBER HALNON: Okay, thanks, Chuck, I  
8 appreciate that.

9 MEMBER BROWN: This is Charlie Brown, on  
10 the same subject in that same section, is there a  
11 commonly understood, in the commercial world, metric  
12 relative to maintaining safe shutdown.

13 Any time you shutdown you like to know  
14 you're in a safe shutdown condition. In my old world,  
15 if the watch hit the bottom, we would effectively  
16 safely shutdown.

17 That's an overall general statement and  
18 that's why over the last 12 years, I've applied the  
19 same the process and I've made comments on other  
20 issues, that safe shutdown is larger on the bottom and  
21 you're subcritical.

22 And you stay that way, again, like Greg  
23 just said, throwing in the other words about  
24 sufficient safety margins, that adds an element of  
25 swishiness to, hold it, does that mean our tolerances

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1 get less?

2 Is there something else? So, that's why  
3 I was asking the question.

4 MEMBER KIRCHNER: This is Walt, there are  
5 a number of policy SECYs that address safe shutdown,  
6 some of them are referenced in the first of these two  
7 reg guides, I can give you those.

8 But basically, in short, it's everything  
9 that you say but also controlling decay heat and  
10 retaining, essentially, core coolability and fuel  
11 integrity.

12 So, scram and shutdown in terms of  
13 reactivity controls are necessary but not sufficient.  
14 So, maybe offline I can just --

15 MEMBER BROWN: Walt, I understand and I  
16 agree with that, I would agree that's the other  
17 condition we think about.

18 But there, there's something you do,  
19 you're cooling the core, you've got your systems up so  
20 that you're temperatures aren't increasing.

21 Those types of things, those are  
22 metrically known, whereas sufficient safety margin is  
23 kind of a squishy word. I understand the industry's  
24 the process on it, that's why I was asking the  
25 question relative to safe shutdown.

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1 I agree with you, thank you for the  
2 additional editions.

3 MEMBER HALNON: This is Greg, a lot of the  
4 sufficient margin revolves around having enough  
5 secondary water source to continue to cool the core  
6 and remove heat.

7 That's one of the big NFPA 805 issues in  
8 transition, making sure there's no secondary water.

9 So, it is incumbent upon sufficient to  
10 show by analysis that you're going to be able to  
11 maintain a stable condition, whether it's a hot  
12 shutdown, a cold shutdown, or whatever the case may  
13 be, wherever you want to be from your license  
14 perspective.

15 MEMBER BROWN: So, from your perspective  
16 is being in the commercial world, you and Matt had to  
17 deal with that, you're all comfortable with that but  
18 then NEI is not?

19 MEMBER HALNON: Again, the subjectivity of  
20 it bothers me only from the standpoint of who is the  
21 final authority and if that final authority's  
22 expectations are clear and if it's a conversion of  
23 other resources coming in where you can go point to as  
24 long as the word actual sufficient, there's a goal  
25 post that we continue to move.

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1           And that's my point but from my  
2 remembrance of what we did in the commercial world,  
3 there was very expensive modifications taken to put  
4 additional emergency feedwater and other types of  
5 feedwater in place, maybe not quality-oriented but  
6 certainly from an NF P805 separation in fire protected  
7 independence.

8           So, you could maintain a condition of safe  
9 shutdown, whatever you define that as. So, the  
10 sufficient word gets adjudicated I think in the  
11 license application and with the analysis behind that.  
12 And then I guess it gets questioned from there.

13           The problem is I don't think there's any  
14 hard fast number or definition of what sufficient is.  
15 And my sense is that's where the industry is having a  
16 little bit of an issue with.

17           It's all about predictability in your  
18 license amendment and making sure you don't spend  
19 money where you don't have to.

20           MEMBER BROWN: I understand that, thank  
21 you.

22           CHAIR BLEY: So, I understand from the  
23 silence here it seems we're in a good frame and the  
24 numbers are getting back and forth to just listen.  
25 But if anything we've discussed raises your concerns

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1 feel free to make a comment at this time.

2 MR. MOULTON: I would add in the last ten-  
3 plus years that this text has been in this reg guide,  
4 I'm aware of no enforcement action where the  
5 definition of what sufficient safety margin is has  
6 been an issue.

7 CHAIR BLEY: Thank you, and that's because  
8 there's been no problem. So, any other Members care  
9 to say anything? I want to thank the Staff for their  
10 presentations and the discussions, and NEI as well.

11 I guess I should alert you this afternoon  
12 we begin our full Committee meeting and tomorrow I  
13 think we have our planning meeting.

14 And it's not impossible that at that time  
15 some Members of the Committee might take some of these  
16 areas and write a letter.

17 So, it's still a possibility even though  
18 the Subcommittee hasn't suggested it today. With  
19 that, I'll --

20 (Simultaneous Speaking.)

21 MR. KENT: Dennis?

22 CHAIR BLEY: Yes?

23 MR. KENT: Excuse me, this is Kent. The  
24 public line is open now, the problems were resolve so  
25 could you reopen it again or how do you want to do it?

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1 CHAIR BLEY: It is open now or not?

2 MR. KENT: It is, it's been resolved, it's  
3 open.

4 CHAIR BLEY: We'll give him another chance  
5 but if there's anyone on the public line who would  
6 like to make a comment, please identify yourself and  
7 make your comment. Hearing none, this meeting is at  
8 its close and at this time we are adjourned.

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

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**CERTIFICATE**

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Joint Fire Protection and Probabilistic Risk Assessment Subcommittee

Docket Number: N/A

Location: Video Teleconference

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings as recorded on tape(s) provided by the NRC.



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# Fire Protection Regulatory Guides and NFPA 805 Overview

Briefing to the Advisory Committee on Reactor Safeguards  
May 5, 2021

Charles Moulton  
Fire Protection Engineer  
PRA Licensing Branch B  
Division of Risk Assessment  
Office of Nuclear Reactor Regulation

# Outline

- Fire Protection Regulatory Guide Revisions
  - Revision 4 to 1.189 “Fire Protection for Nuclear Power Plants”
  - Revision 2 to 1.205 “Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants”
- Overview of Risk-Informed, Performance-Based Fire Protection Program [10 CFR 50.48(c)]
- Specific Technical Topics for Implementation of 10 CFR 50.48(c)
- Summary

# Changes in RG 1.189, Revision 4

Purpose of revision was to include updated guidance

- Incorporates guidance on fire-induced circuit failures
  - Endorses portions of Nuclear Energy Institute (NEI) 00-01, “Guidance for Post Fire Safe Shutdown Circuit Analysis,” Revision 4
  - NUREG/CR-7150, “Joint Assessment of Cable Damage and Quantification of Effects from Fire (JACQUE-FIRE),” Volumes 1, 2, and 3
- Organizational changes to align with current regulatory guide format

# Changes resulting from public comments

- 25 public comments received
- Expanded discussion of circuit analysis details from NUREG/CR-7150, Volume 3 and NEI 00-01
- Various clarity edits

# Unincorporated comments

- Revise definition of “not adversely affect safe shutdown” to remove discussion of “sufficient safety margins”
  - Current text included since RG 1.189, Revision 1, published in 2007
  - Has not prevented successful use of RG 1.189 by the industry and the staff
- Expand guidance to include passively safe advanced reactor designs
  - Beyond the scope of the current revision
  - Part 53 is under development and will have separate guidance

# Changes in RG 1.205, Revision 2

Purpose of revision was to include updated guidance

- Endorses NEI 04-02, “Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c),” Revision 3
  - Incorporation of remaining NFPA 805 Frequently Asked Questions
- Latest guidance on fire-induced circuit failures
  - Endorses portions of NEI 00-01, “Guidance for Post Fire Safe Shutdown Circuit Analysis,” Revision 4
  - NUREG/CR-7150, “Joint Assessment of Cable Damage and Quantification of Effects from Fire (JACQUE-FIRE),” Volumes 1, 2, and 3

# Changes from public comments

- 6 public comments received
- Expanded discussion of NFPA 805 Section 1.7 equivalency for closer alignment with issued license condition text

# Features of a Fire Protection Program Under 50.48(c)

# 10 CFR 50.48(c) background

- Endorses NFPA 805
  - Rule issued June 16, 2004
  - Incorporates by reference the 2001 Edition of NFPA 805 with exceptions, clarifications, and supplementations
  - Risk-informed, performance-based fire protection program is a voluntary alternative to the existing prescriptive, deterministic fire protection regulations (i.e., “Appendix R”)

# NFPA 805 Features

- Requirements are applied during all phases of plant operation
- Establishes fundamental fire protection program elements and design requirements for fire protection systems and features
- Allows the nuclear safety performance criteria to be satisfied deterministically or using a performance-based approach
- Implementation of the performance-based approach includes an integrated assessment of risk, defense-in-depth, and safety margin
- NFPA 805 allows licensees to self approve certain changes to their fire protection program using performance-based methods

# Differences from “Appendix R”

## **NFPA 805**

- All phases of operation
- Achieve & maintain fuel in safe and stable condition
- One “success path” free from fire damage

## **Appendix R**

- Power operation
- Hot shutdown and cold shutdown requirements
- One “train” free from fire damage

# Differences from “Appendix R” (continued)

## NFPA 805

- No deterministic emergency lighting requirements
- Feasible recovery actions allowed for compliance in performance-based approach
- Radiological release criteria are explicit

## Appendix R

- Deterministic requirements for emergency lighting
- Operator manual actions cannot be used to demonstrate compliance with III.G.2
- Radiological release criteria are implicit

# NFPA 805 License Condition

## Major Elements

# Self-approval of program changes

- Risk-informed changes to FPP without prior NRC approval
  - Risk assessment of the change shows acceptance criteria are met:
    - risk decrease, or
    - $\Delta$ CDF less than  $1 \times 10^{-7}$ /year (yr) and  $\Delta$ LERF less than  $1 \times 10^{-8}$ /yr
    - Acceptance criteria were developed starting from RG 1.174 guidelines
  - Consistent with defense-in-depth and maintains sufficient safety margins
  - Risk assessment approach, methods, and data shall be acceptable to the NRC
    - methods used in the peer-reviewed fire PRA model
    - methods that have been approved by NRC for use in NFPA 805 applications
    - methods that have been demonstrated to bound the risk impact

# Self-approval of program changes (continued)

- Other changes that may be made without prior approval
  - Changes that Have No More than Minimal Risk Impact
  - Changes to Chapter 3 fundamental requirements
    - Functionally equivalent to the corresponding technical requirement
    - Adequate for the hazard; only applies to 4 sections of Chapter 3:
      - “Fire Alarm and Detection Systems” (Section 3.8);
      - “Automatic and Manual Water-Based Fire Suppression Systems” (Section 3.9);
      - “Gaseous Fire Suppression Systems” (Section 3.10); and,
      - “Passive Fire Protection Features” (Section 3.11).

# Transition license condition

- Cannot self-approve risk-informed changes unless there is no more than a minimal risk impact
- Modifications and programmatic implementation items
  - Necessary for full compliance
  - Committed schedule for completion
- Maintain appropriate compensatory measures in place until completion of the modifications

# Specific Technical Topics for Implementation of 10 CFR 50.48(c)

# Success Path

# What is a “success path”?

- A comprehensive list of systems and equipment and their interrelationships
- The components required to achieve the nuclear safety performance criteria
- Components required to achieve and maintain the nuclear safety functions and components whose fire-induced failure could prevent the operation or result in the maloperation of those components needed to meet the nuclear safety performance criteria

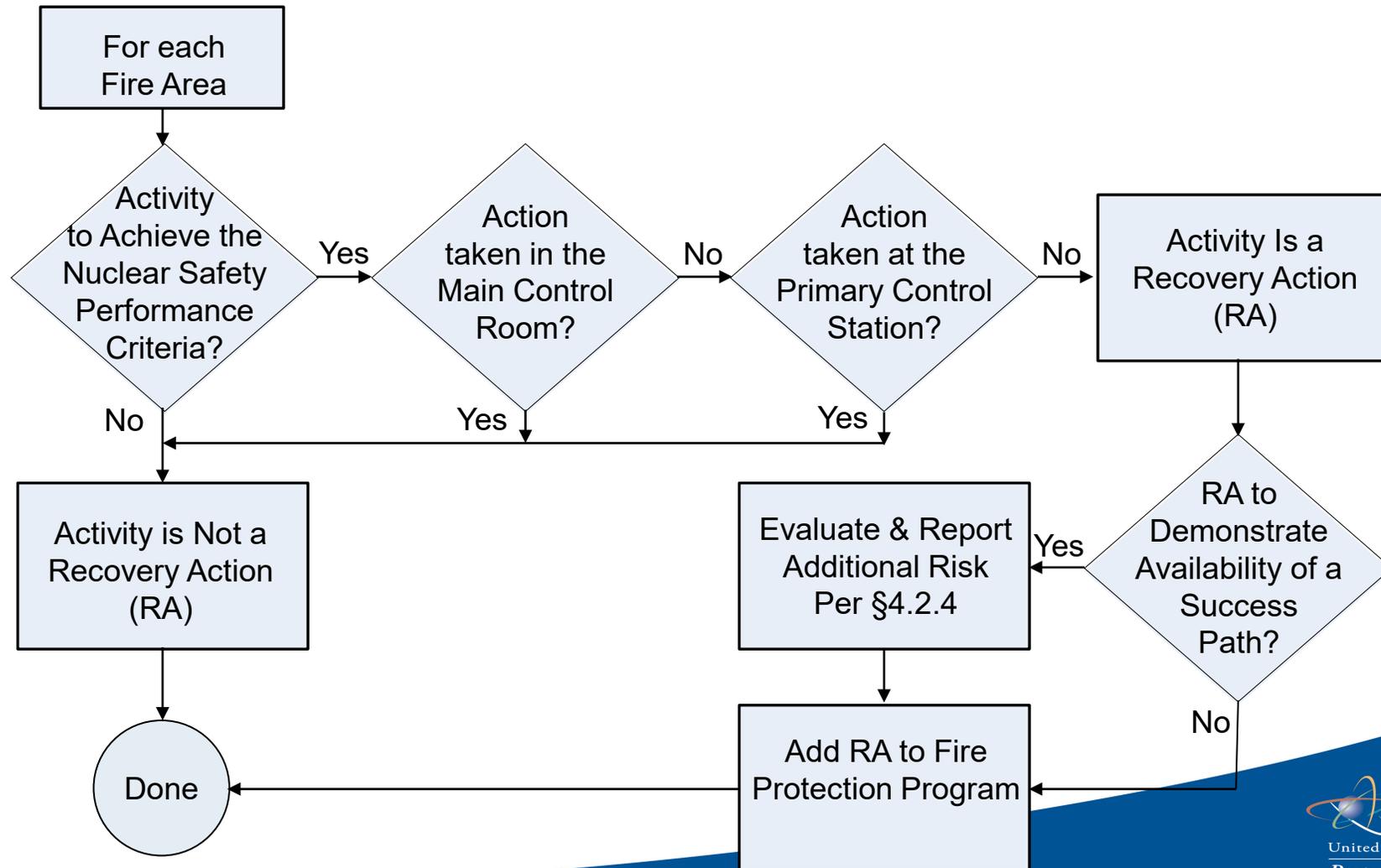
# “Success path” approach

- Identify plant systems required to achieve each of the nuclear safety criteria
- Also consider the essential mechanical/environmental support and essential electrical systems
- Equipment identification
  - Identify equipment required to achieve the nuclear safety objectives
  - Identify equipment whose spurious operation could prevent achieving the nuclear safety objectives
  - Performance-based
- All system and equipment identification includes related cables

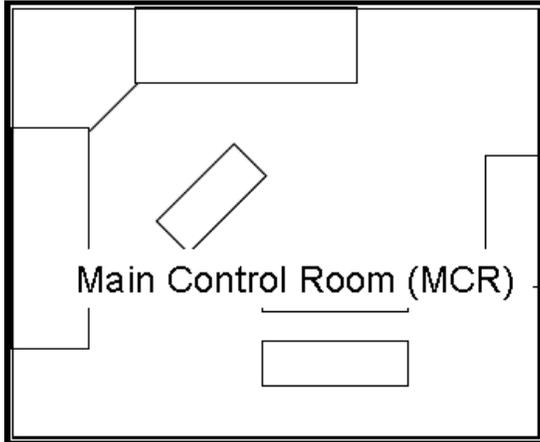
# Recovery Actions

Formerly “Operator Manual Actions”

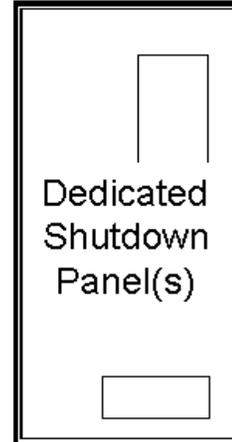
# Recovery Actions in NFPA 805



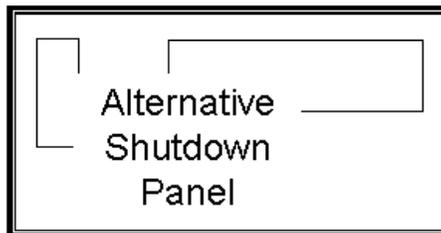
# Primary control station



Control Room actions are not recovery actions



Dedicated Shutdown Panel actions are not recovery actions\*



Alternative Shutdown actions are not recovery actions\* provided:

- Primary command & control
- Requisite controls, indications, & communications
- Multiple components controlled from location

\* When command and control is shifted from the MCR

# Performance-Based Analysis

# Performance-based approach overview

- If a fire area has a variance from the deterministic separation requirements, the licensee may
  - Modify the plant
  - Use fire risk evaluation approach
  - Use fire modeling approach (shows risk is negligible)
- If a success path recovery action is involved, the additional risk (compared to deterministic compliance) must be assessed
  - May use fire modeling or fire risk evaluation approaches
  - May be qualitative or quantitative; bounding is allowed

# Plant Change Evaluations

- Risk-informed evaluation of a change to a previously approved fire protection program element:
  - integrated assessment of risk, defense-in-depth, and safety margins
- Ensures public risk from fire-induced nuclear fuel damage accidents is low and that adequate defense-in-depth and safety margins are maintained
- Similar to Fire Risk Evaluation performance-based approach

# Summary

- Revisions to RG 1.189 and 1.205 reflect latest guidance
- No substantial objections or alignment issues from public comments
- NFPA 805 provides the framework for a risk-informed, performance-based fire protection program

# Acronyms

- AHJ – Authority Having Jurisdiction
- CDF – Core Damage Frequency
- CFR – Code of Federal Regulations
- FAQ – Frequently Asked Question
- FPP – Fire Protection Program
- GDC – General Design Criteria
- IEEE – Institute of Electrical and Electronics Engineers

# Acronyms (continued)

- JACQUE-FIRE – Joint Assessment of Cable Damage and Quantification of Effects from Fire
- LERF – Large Early Release Frequency
- MCR – Main Control Room
- MSO – Multiple Spurious Operation
- NEI – Nuclear Energy Institute
- NFPA – National Fire Protection Association
- NRC – Nuclear Regulatory Commission

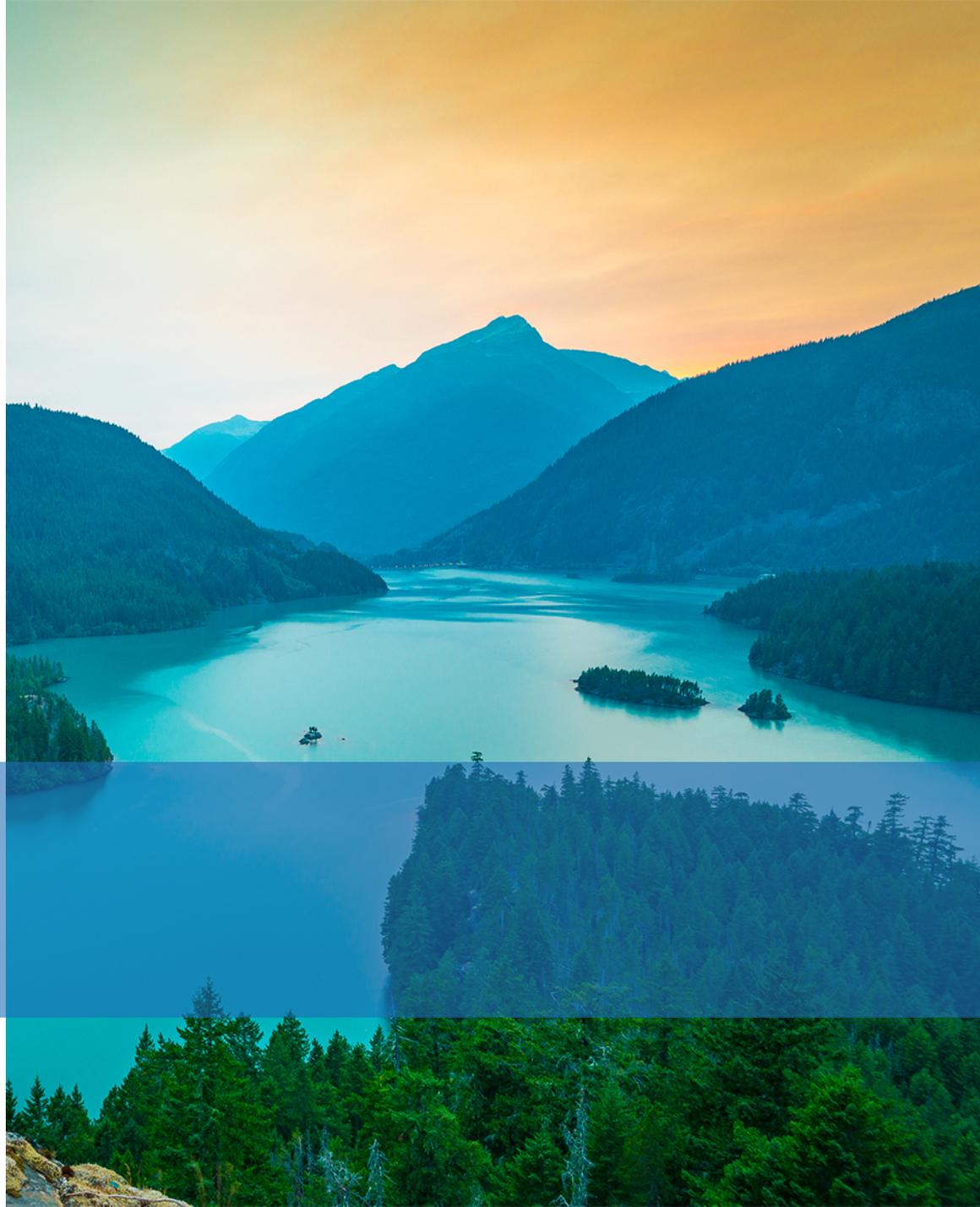
# Acronyms (continued)

- PRA – Probabilistic Risk Assessment
- PSA – Probabilistic Safety Assessment
- PWR – Pressurized Water Reactor
- RA – Recovery Action
- RG – Regulatory Guide
- UFSAR – Updated Final Safety Analysis Report

# Industry Comments on DG-1359

ACRS Plant Operations  
and Fire Protection  
Subcommittee Meeting

May 5, 2021



# Industry Feedback on DG-1359 Comment Resolution

- NEI appreciates endorsement of 2019 revision of NEI 00-01 to improve regulatory stability and predictability
- Majority of industry comments incorporated into latest RG draft
- Vital comments on Section 1.1.8.2 not incorporated
  - Inappropriate reference to “sufficient safety margins”
    - ◆ Parity with RG 1.205 is unnecessary
  - Definition of “standard fire protection license condition” inconsistent with GL 86-10 and GL 88-12
  - Language remains unchanged from previous revisions of RG 1.189
    - ◆ Industry has previously provided these comments and believes they remain critical