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**NUCLEAR REGULATORY COMMISSION**

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                              Fukushima Subcommittee

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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FUKUSHIMA SUBCOMMITTEE

+ + + + +

WEDNESDAY

SEPTEMBER 18, 2013

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear  
Regulatory Commission, Two White Flint North, Room T2B3,  
11545 Rockville Pike, at 1:00 p.m., Stephen P. Schultz,  
Chairman, presiding.

COMMITTEE MEMBERS:

STEPHEN P. SCHULTZ, Chairman

J. SAM ARMIJO, Member

SANJOY BANERJEE, Member

DENNIS C. BLEY, Member

JOY REMPE, Member

MICHAEL T. RYAN, Member

GORDON R. SKILLMAN, Member

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NRC STAFF PRESENT:

WEIDONG WANG, Designated Federal Official

RAJ AULUCK, NRR/JLD/JPSB

JEROME BETTLE, NRR/DSS/SCVB

ROBERT DENNIG, NRR/DSS/SCVB

NAGESWARA KARIPINENI, NRR/DSS/SCVB

TIM MCGINTY, NRR/DSS

ALSO PRESENT:

PHIL AMWAY, CENG

RANDY BUNT, Southern Nuclear

PATRICK FALLON, DTE Energy

JEFFREY GABOR, Erin Engineering

STEVEN KRAFT, NEI

GREGORY KREUGER, BWR Owners Group

THOMAS PARKER, Excel Energy

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

(12:57 p.m.)

CHAIR SCHULTZ: This meeting will now come to order. This is a meeting of the Fukushima Subcommittee, a standing subcommittee of the Advisory Committee on Reactor Safeguard. I'm Stephen Schultz, Chairman of the subcommittee.

ACRS members in attendance are Joy Rempe, Dennis Bley, Sam Armijo, Mike Ryan, Gordon Skillman.

The Designated Federal Official is Weidong Wang. In this meeting the subcommittee will review the development of interim staff guidance, for compliance with commission order EA-13-109.

Issued in June, this is an order modifying licenses with regard to reliable hardened containment vents capable of operation under severe accident condition. It applies to all operating boiling water reactors with Mark I and Mark II containment.

In large part, this staff guidance endorses the industry report prepared by the NEI Filtering Strategy Working Group, NEI 13-02. This afternoon we will hear a presentation from the NRC staff, and from the representatives from the NEI working group.

We have received no written comments or requests for time to make oral statements from members

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1 of the public, regarding today's meeting. The entire  
2 meeting will be open to the public to attendance.

3 The subcommittee will gather information,  
4 analyze relevant issues and facts, and formulate  
5 proposed positions and actions, as appropriate for  
6 deliberation by the full committee.

7 The rules for participation in today's  
8 meeting have been announced as part of the notice for  
9 this meeting, previously published in the Federal  
10 Register. A transcript of the meeting is being kept,  
11 and will be made available as stated in the Federal  
12 Register notice.

13 Therefore, we request that all participants  
14 in this meeting use the microphones located throughout  
15 the meeting room when addressing the subcommittee. All  
16 participants should first identify themselves, and  
17 speak with sufficient clarity and volume so that they  
18 may be readily heard.

19 We do have participants on the phone line  
20 this afternoon. To effectively coordinate their  
21 participation in this meeting we will placing the  
22 incoming lines on mute until the public comment period  
23 near the end of this meeting, unless there's some reason  
24 the presenters at the meeting need to call on individuals  
25 who are on the phone.

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1           This meeting is preliminary to a session  
2 we plan to hold at the next full committee meeting on  
3 October 2nd. Pending the full committee deliberations  
4 we anticipate writing a committee letter at that  
5 meeting.

6           This work constitutes a very important step  
7 leading to improving civil reaction and response for  
8 BWRs with Mark I and Mark II containments. And  
9 additional steps are going to follow this presentation  
10 today, in Phase II of the work. We will now proceed  
11 with the meeting.

12           Since the interim staff guidance endorses,  
13 with clarification and exceptions, the NEI guidance  
14 document, we're going to begin the agenda with a  
15 description of the details of the guidance by industry  
16 representatives. And then follow with staff remarks  
17 and their direction within the interim staff guidance.

18           First I'd like to call on Tim McGinty, from  
19 the staff, a Director within NER/DSS, to lead us in these  
20 discussions with opening remarks. Tim.

21           MR. MCGINTY: Thank you, Steve. Good  
22 afternoon. My name's Tim McGinty. I'm the Director  
23 of the Division of Safety Systems, in the Office of  
24 Nuclear Reactor Regulations.

25           I'd like to thank the subcommittee members

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1 for this opportunity to engage in a public dialogue  
2 regarding the cooperative industry and staff effort to  
3 develop an interim staff guidance to install reliable  
4 hardened vents, that are severe accident capable, for  
5 BWR Mark I and Mark II containments.

6 First you'll hear a presentation by  
7 industry that includes the functional requirements,  
8 including severe accident elements, design attributes,  
9 and areas to achieve alignment with the staff that still  
10 remain, including anticipatory venting.

11 The staff is going to follow with an  
12 overview of the commission's direction and the June 2013  
13 order. Over the last six months the staff has worked  
14 closely with NEI and the BWR Owners Group, on the  
15 industry development of NEI-13-02, the Industry  
16 Guidance for Compliance with the order.

17 Staff agreed to review and endorse to the  
18 extent possible a guidance document for the severe  
19 accident capable, reliable hardened containment vent  
20 system. Implementation of the order is divided into  
21 Phase I and Phase II.

22 Current work is for Phase I, which is a  
23 capability to vent from the wetwell. Phase II is for  
24 a drywell vent, or alternative venting strategies that  
25 would obviate the need for a drywell vent. Phase II

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1 and rule making work are to proceed concurrently because  
2 of the nexus between the two.

3 Significant work has been done in the  
4 development of an interim staff guidance that addresses  
5 Phase I work. At least a half dozen public meetings  
6 and webinars have taken place between the NRC's staff  
7 and industry, with presence and comments from and by  
8 other stakeholders.

9 The meetings took place in a cordial  
10 atmosphere, with open exchange of ideas. With the  
11 result that a significant amount of consensus has been  
12 reached. A few items still remain to be worked out as  
13 the staff and industry continue to meet.

14 The challenge faced by both the industry  
15 and the staff is that, as a result of the commission's  
16 direction in the SRM for SECY-12-0157, the actions to  
17 be taken are divided into three parts. The first two  
18 parts being Phase I and Phase II of the sever accident  
19 capable vent system. And the third part being the rule  
20 making.

21 It has been quite a task to maintain  
22 boundaries between the three parts. Recognizing that  
23 there is interdependency between them all. Given this  
24 condition, the staff appreciates the industry's efforts  
25 in making progress towards order implementation.

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1           And with that said, I wanted to again say  
2 that I'm looking forward, that the staff is looking  
3 forward to providing the subcommittee the information  
4 that they can consider to support the full committee  
5 meeting in October. And I turn it back to you, Steve  
6 Schultz.

7           CHAIR SCHULTZ: Thank you, Tim, for a very  
8 comprehensive introduction to today's meeting. With  
9 that, I would like to turn over the first portion of  
10 the meeting to Steve Kraft from NEI, to lead us through  
11 the industry presentation and discussion.

12           MR. KRAFT: Thank you, Mr. Chairman.  
13 Chairman Schultz, Chairman Armijo, members of the  
14 committee, we appreciate your kindness in inviting us  
15 to speak with you today, on a topic of great importance  
16 to the industry, and to the NRC. That is the industry  
17 guidance to implement the modified hardened vent order.

18           As you can see on our first slide. Please  
19 advance the slide. Oh, you're doing that. Thank you.  
20 I thought there was someone else.

21           MALE PARTICIPANT: You had to wake me up.  
22 Sorry.

23           MR. KRAFT: As you can see on our first  
24 bullet, we wish to associate ourselves with the remarks  
25 of Tim McGinty on the cooperative nature of this

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1 endeavor.

2 I've been involved in numerous efforts,  
3 long before the Fukushima accident, in these kinds of  
4 activities. And, you know, some are smoother than  
5 others. And I think this one was particularly smooth  
6 and workmanlike endeavor, in that as Tim mentioned,  
7 there are some open items.

8 We will discuss them with you. NRC staff  
9 will discuss them with you. We then have other meetings  
10 scheduled to attempt to come to alignment on those items.

11 Numerous exchanges and public meetings.

12 I think the word numerous understates the  
13 number of times we got together. And I want to say how  
14 much I appreciate NRC staff's senior management's  
15 attention to this. There were, in addition to Tim,  
16 there were a number of other individuals coming in and  
17 out, paying attention, asking questions.

18 And we have been reporting both to our  
19 senior management and to NRC's senior management, that  
20 this has been a very fruitful endeavor. The industry  
21 is working toward a common design, or I should say,  
22 design elements implement the order. So I think that  
23 you'll see through the owners groups activities in the  
24 future, some of that activity.

25 This is a good point for me to stop and make

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1 some introductions. First, let me point out that while  
2 this presentation is on behalf of NEI and the BWR Owners  
3 Group, I want to point out that the relationship between  
4 the BWR Owners Group, NEI and even the PWR Owners Group,  
5 are all seamless.

6 Every domestic member of the BWR Owners  
7 Group is a member of NEI. As you see here in front of  
8 you, my colleagues from the industry, and others in the  
9 room are on both sets of committees. And I think in  
10 this instance it would be hard pressed to tell you the  
11 difference, you know, when one person is from one and  
12 one person's from the other.

13 Everyone has the best interest of the entire  
14 enterprise at heart. And I mean that in the broadest  
15 sense. So with that, I will let my colleagues introduce  
16 themselves, indicating name, their title, and how they  
17 fit in to the post Fukushima activity. Tom, we'll start  
18 with you.

19 MR. PARKER: Sure. My name is Tom Parker,  
20 and I work at the Excel Energy Plant in Monticello.  
21 I've been involved with the Fukushima effort there for  
22 the last couple of years. And I'm the Chairman of the  
23 BWR Fukushima Response Committee.

24 MR. KRUEGER: Good afternoon. My name is  
25 Greg Krueger. I work for Exelon. I'm currently the

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1 Risk Management Director for the fleet at Exelon. I  
2 serve as the Chairman of the Containment Strategy  
3 Subcommittee, working for Tom, for the Fukushima effort.

4 MR. GABOR: I'm Jeff Gabor. I work for  
5 Erin Engineering. We're actually working with EPRI to  
6 provide the technical support to both the implementation  
7 of a severe accident capable vent, and the rule making  
8 on filtering strategies.

9 MR. BUNT: Randy Bunt with Southern  
10 Nuclear. I work with our Severe Accident Management  
11 Group at Southern Nuclear. And have been involved with  
12 it since the Fukushima event back in 2011. And I'm the  
13 Vice Chair of the Fukushima Response Committee, for the  
14 BWR Owners Group. And part of the, Vice Chair for the  
15 Containment Subcommittee.

16 MR. KRAFT: So you see, we have here bonified  
17 members of both the industry at large, and officers of  
18 the BWR Owners Group. We are joined in the room by  
19 several other individuals.

20 As questions come up, depending upon how  
21 we, you know, think they ought to be answered, you may  
22 call on one of these other individuals in the room here.

23 And before I turn it over to Greg to present the bulk  
24 of the information, let me just pick up something that  
25 Tim pointed out.

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1           Our presentation is really in three chunks.  
2           There is the discussion of NEI 13-02, the bulk of which  
3 will be delivered by Greg. We then have some other items  
4 that we want to discuss, that have, as Tim said, a nexus  
5 to this activity. But not necessarily completely on  
6 point with that activity. That being participatory  
7 venting, which Tom will discuss.

8           And then, because of the importance of, and  
9 the connection of the rule making to the order, Jeff  
10 Gabor will then go through a very brief discussion on  
11 where we are in our views on how that rule making should  
12 progress. So with that, unless there are questions on  
13 the general statements we have made, I would turn it  
14 over to Greg.

15           MEMBER ARMIJO: I have a question.

16           MR. KRAFT: Yes, sir.

17           MEMBER ARMIJO: The group there, you're  
18 sort of, you're the leadership of this activity. But  
19 how deeply into the industry do you get input? I know  
20 where you guys --

21           A number of different plants, with a number  
22 of different arrangements and, you know, operations and  
23 engineering people in those different plants have  
24 perhaps different problems. How do they, have they  
25 contributed to the development of this? And if so, how

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1 do they work? How does this all come together?

2 MR. KRAFT: Let me take a crack at that.

3 And then if I have to turn it over to, I guess Tom.

4 Because I think he's probably closest to some of this.

5 The BWR Owners Group is really the key to everything  
6 you just asked about.

7 And the reason being that, yes, these other  
8 people have been directly involved. We get input in  
9 every manner possible. All the documentation has been  
10 reviewed by the owners group. I'm saying it right,  
11 aren't I, Terry? Has gone through the owners group.

12 There are committees galore in the owners  
13 group and NEI. So the detailed information up and down  
14 comes through the owners group. However, the other  
15 question is, the industry's leadership on post  
16 Fukushima, and all issues nuclear.

17 Through our chief nuclear officers we have  
18 a Fukushima response steering committee, that is  
19 actually going to meet with the NRC steering committee  
20 tomorrow. And they direct what this, and other groups  
21 like us, do in the post Fukushima response. It is made  
22 up of about a third of the CNO cadre in the industry.

23 They report to a group called the Nuclear  
24 Strategic Issues Advisory Committee, NSIAC, at NEI,  
25 which is all the chief nuclear officers. There are

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1 other related committees. EPRI has a group, it's called  
2 the Power Council. INPO has a group, it's called the  
3 Executive Advisory Group.

4 It's all the same people in different  
5 formations. The answer there is, everyone has to be  
6 in their swim lanes. INPO has a role, EPRI has a role.  
7 And it has a role with the owners group also.

8 MEMBER ARMIJO: Yes, Steve, I think I  
9 understand that.

10 MR. KRAFT: But my point is that  
11 information --

12 MEMBER ARMIJO: Down to the trenches.

13 MR. KRAFT: I'm saying --

14 MEMBER ARMIJO: That's what I'm interested  
15 in.

16 MR. KRAFT: That's my point. Information  
17 flows to the trenches both ways. From us to the owners  
18 group, out to the engineering operations staff, up  
19 through the CNOs, and out through their connections in  
20 their own plant. So the operations and engineering  
21 people are hearing it in two ways.

22 They're hearing it from the owners group,  
23 but their bosses are also telling them, that's the way  
24 I want it done. So you're seeing that happening from  
25 both perspectives. And so it's actually a pretty

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1 effective way of doing it.

2 MR. KRUEGER: This is Greg Krueger. To  
3 answer, or amplify Steve's answers, we've had active  
4 operations staff with licenses. We've had design  
5 individuals that understand piping design, valve  
6 design, engineering, licensing. All of those  
7 individuals brought together on to the committee.

8 MEMBER ARMIJO: Well see, that's what I was  
9 getting at. They guys down in the trenches that know  
10 their plants.

11 MR. KRUEGER: Right.

12 MEMBER ARMIJO: Say they either have  
13 terrific ideas, that might turn out to be best practices.

14 Or, saying, you know, what you're proposing just won't  
15 work for my plant. You're putting me in a box that I  
16 can't get out of.

17 MR. KRAFT: That information is flushed up  
18 through the owners group. And so, since you've asked  
19 more detail. In November, in addition to an industry  
20 workshop on implementation of the order, on November  
21 12 and 13, we will also then, the following day and a  
22 half, have an engineering workshop, sponsored by the  
23 owners group, to get into those very detailed --

24 MEMBER ARMIJO: Okay.

25 MR. KRAFT: -- nuts and bolts. So we are

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1 trying to get, you know, touch everyone we have to touch  
2 in all of this activity. So I have to say, it's pretty  
3 comprehensive from where I'm sitting.

4 MEMBER ARMIJO: Okay, very good. Thank  
5 you.

6 CHAIR SCHULTZ: But, Steve, that step is  
7 still coming up. That is to say, is this a workshop  
8 that's being proposed --

9 MR. KRAFT: Yes. The workshop on the 12th  
10 and 13th in Baltimore will be a discussion of the order  
11 and implementation of the order, to the level, I suspect,  
12 of what's in NEI 13-02.

13 Then the next step would be the engineering  
14 discussion, which the owners group will take on. But  
15 it will happen the following day. So there's no loss  
16 of momentum in this discussions. We haven't really  
17 worked out the agenda, you know, fully.

18 We'll be inviting NRC staff, of course, and  
19 yourselves if you'd care to join in that, for that  
20 meeting. But that's -- And we've done this before.

21 We had similar workshops on implementation of all the  
22 original Fukushima orders.

23 We've had a specific workshop on FLEX, which  
24 is our way of implementing 049. So this is a, you know,  
25 one of many sort of steps that we do in this way.

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1 CHAIR SCHULTZ: Maybe we'll address it  
2 later with either Greg's comments or Jeff's. But what  
3 I'm interested in hearing is whether the group feels  
4 at this point in time, whether the review of the NEI  
5 13-02 approach has been fully vetted within the group,  
6 to the level of the individual utilities that are going  
7 to need to --

8 MALE PARTICIPANT: Think tank.

9 CHAIR SCHULTZ: -- implement it. And  
10 whether the response had been, if you will, all but  
11 unanimous to be able to support the guidance going  
12 forward.

13 MR. PARKER: We've been working for what,  
14 probably the last six months. And we've had a lot of  
15 chance to get feedback from individual utilities. I  
16 think to kind of amplify on Greg's amplification, that  
17 having two active SROs on the actual group that was  
18 developing and reviewing this ISG, was extremely  
19 valuable to the group, to make sure that we haven't  
20 forgotten some of the end users.

21 MR. BUNT: I'm sure. Randy Bowman. To  
22 further answer your question, in a meeting in late July  
23 we went over all of the active sections at that time  
24 with a group of 35 to 40 members from our sites that  
25 were participatory into it.

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1           And we spent a whole day going through the  
2 details of it. They had a copy of the document. We  
3 got feedback back from them and adjusted those,  
4 incorporated those comments in that going forward. And  
5 in the follow up meeting with the NRC staff to show those  
6 comments, and all.

7           CHAIR SCHULTZ: Thank you. Okay, Greg,  
8 why don't you pick it up.

9           MR. KRUEGER: Okay. With that, this is  
10 Greg Krueger. We're going to step through some  
11 functional requirements and some design attributes, and  
12 not go through the entire document. But try to step  
13 back and hit on some key elements here.

14           The unique challenge here is that this is  
15 an engineered feature we're putting into the facility,  
16 that has to remain functional and operational in a severe  
17 accident environment, which is well above and beyond  
18 what typically we have engineered before.

19           And so that makes it very unique and  
20 challenging, in terms of trying to define what  
21 parameters we should design to, how to address some of  
22 the unique issues that come along with severe accidents.

23           So one of the functional requirements is  
24 obviously severe accident capability. And that is to  
25 make sure that should we have a core damage event, which

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1 does generate hydrogen and radionuclides, and  
2 temperatures above those of saturation, that in fact,  
3 the vent would perform its function.

4 In other words, relieve the pressure from  
5 containment, as well as the constituents that come along  
6 with a core damage event. And, you know, the intent  
7 here -- And we'll get to a diagram later to look at  
8 how we believe these will translate into actual design  
9 requirements. But certainly that puts a limit on the  
10 ability of the vent, and what it can and can't do in  
11 relation to the containment.

12 Of course, one of the requirements is to  
13 limit containment pressure, or over pressurization, as  
14 a result from either loss of decay heat removal, or an  
15 extended ELAP, or some other type of beyond design basis  
16 event.

17 And that's to limit both the pressure and  
18 containment itself, to make sure that we have a  
19 controlled engineered feature that could relieve  
20 pressure, rather than the containment failing in an  
21 unknown location. As well as being able to control  
22 pressure to make sure that we could reduce it, such that  
23 we could inject with low pressure systems, or use other  
24 means of injection to protect the core.

25 So there's a multi modal design that we have

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1 to consider when we move through the design steps here.

2 Again, what's unique here in 109, relative to the older  
3 order, is that we have to show venting capability both  
4 from the wetwell and from the drywell under ELAP  
5 conditions.

6 What I'll say, the old order from last year  
7 was very focused on wetwell venting under saturated  
8 conditions. And by expanding the scope here to severe  
9 accident capability, venting from the drywell and some  
10 of those conditions that you might see certainly  
11 provides a much different challenge.

12 The fourth bullet, control the use of common  
13 systems within the plant and between the units. That's  
14 a key insight from the events at Fukushima a few years  
15 ago. It was evident that hydrogen moved from one place  
16 to another.

17 Obviously, that is not where we want an  
18 engineered feature, or we don't want an engineered  
19 feature to fail in such a way that that would occur again.

20 So consideration of any interfaces between  
21 systems, because we are dealing with ventilation systems  
22 here, and the connection of those ventilation systems  
23 to containment. And normal systems needs to be  
24 prevented, as well as any connection between the units.

25 When we look back at Generic Letter 89-16,

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1 the original hard pipe vent for the Mark I, the focus  
2 of that was to remove decay heat, assuming that it was  
3 occurring on one unit. The vent, and all the functional  
4 requirements that are contained within this document,  
5 understand that we can have a site event, not just a  
6 unit event.

7 And that we would need to simultaneously  
8 vent from potentially multiple units, not just unit.

9 And therefore the connections would have to be sized  
10 such that you could do that. Or you would have to have  
11 separate event paths.

12 MEMBER SKILLMAN: Greg, on your bullet 3

13 --

14 MR. KRUEGER: Yes.

15 MEMBER SKILLMAN: -- as you well described.

16 The piping in the valves need to be designed for a wide  
17 range of functional performance requirements.

18 And what we learned at TMI 2, is that the  
19 utilities themselves weren't really equipped to make  
20 many of the hardware changes. They went out and bought  
21 circuits.

22 To what extent is fulfillment of bullet 3  
23 going to test the resources that are available for the  
24 changes for the Mark I and Mark II containments? In  
25 terms of either architect-engineer support, or in house

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1 engineering capabilities.

2 MR. KRUEGER: What we're trying to do is  
3 recognize that there are limitations. And that we need  
4 to be specific. In other words, yes, if left too broad  
5 the understanding of severe accident conditions, and  
6 what that might mean with regard to buying or designing  
7 a valve or a vent, is not that well know across the  
8 industry or the architect-engineers that might be  
9 involved.

10 What we're trying to do is provide specific  
11 design points or limits, or conditions to make sure that  
12 we can meet the function. In other words, we'll talk  
13 later about drywell temperature, a selection of the  
14 drywell temperature.

15 That selection is there knowing that from  
16 a valve and piping stand point we can design to that  
17 control point, even though the capability of those  
18 components might be much greater than that.

19 So we're trying to, through the use of very  
20 specific items within this document, as well as  
21 appendices, is to try to think of all of the possible  
22 permutations and conditions that people would have to  
23 design to. So that we can box that in a little better  
24 than maybe we have had in the past, in response to other  
25 events.

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1 MEMBER SKILLMAN: Okay. Well let me just  
2 pull a little bit further --

3 MR. KRUEGER: Sure.

4 MEMBER SKILLMAN: -- on this string.  
5 These plants, many of these plants are old. Some are  
6 pre-DDC. And consequently the newer plants have a code  
7 data record. And the designers know exactly what  
8 portion of ASME to begin at the piping systems. And  
9 some of the older plants probably were hit and miss in  
10 some of this plan.

11 And so my question is, how is the  
12 modification envisioned by your team, so that the plants  
13 end up with a robust treatment of this piping that is  
14 in accordance with their license, that doesn't take them  
15 to a new design space that they don't need to be in?

16 MR. KRUEGER: Yes, that is a challenge.  
17 There's a spectrum across the fleet, as you well  
18 imagine, given the age of some of the units, from a BWR  
19 2 Mark I, all the way to, you know, the newer Mark IIs.  
20 And the design requirements are different.

21 We do have some global statements,  
22 obviously, with regard to making sure unique GDC  
23 requirements for containment isolation understand what  
24 those are. In some cases I would imagine there might  
25 have to be evaluations, given the lack of understanding,

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1 or traceability of where, you know, that particular  
2 containment penetration or valve might be.

3 What's called a resurrection of a design  
4 to make sure that it's clean, before we tap off and then  
5 go forward with the vent. So, you know, I don't have  
6 a lot of specifics for you. But certainly that's --

7 MEMBER SKILLMAN: So this is envisioned --

8 MR. KRUEGER: That wouldn't be a challenge.

9 MEMBER SKILLMAN: This is envisioned in  
10 your documentation?

11 MR. KRUEGER: Yes, we have, when Steve  
12 talked about some common design elements within the BWR  
13 Owner's Group, in addition to this document we are not  
14 only having meetings but trying to develop other tools  
15 such that we can provide the correct instruction and  
16 information to the broad set of BWRs rather than having  
17 each plant trying to figure it out themselves on those  
18 elements. So there's going to be information well above  
19 and beyond that just that's contained in the NEI Guide.

20 MR. KRAFT: I don't know that we mentioned  
21 this, but there will be a separate BWR Owner's Group  
22 Engineering Guidance. I think I did mention it that  
23 we would get into some of these details, because the  
24 questions, there are obvious questions about you don't  
25 want this all over the lot.

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1           You don't want it all over the lot just not  
2 from the standpoint of what are the best practices which  
3 is a primary driver, you want to make it as standardized  
4 as possible for NRC review and inspection. Because,  
5 you know, different inspectors, different guidance  
6 sometimes leads to different results plant by plant and  
7 that doesn't help anybody -- NRC or the industry. So  
8 there will be a lot of that work.

9           If you look at the example most recently  
10 in implementation of FLEX, I think the idea that there  
11 are, you know, standard connections, standard, down to  
12 a standard, you know, screw fittings and threads and  
13 things like that all come out of that. The use of FAQs.

14           It wasn't necessary in the spent fuel pool  
15 instrumentation order. That was a fairly simple  
16 comparison to a lot of these. There was a lot of  
17 commonality as a result of certain market conditions  
18 but I can say that relative to instrumentation, but  
19 that's not the same thing. So I think there's going  
20 to be a great deal of that kind of help to the individual  
21 utilities.

22           But there is variations. We've been told  
23 that there are Mark IIs that just don't have the kind  
24 of vent we're talking about and they're going to have  
25 to go through a lot more. We have plants -- Greg has

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1 told me about a couple of his plants where the piping  
2 run for the -- you know, when we put these vents in in  
3 the first place for the Mark Is, you found the pathway.

4 Well, that means you've got a lot of turns  
5 and angles and elbows that are hydrogen tracks. It's  
6 going to have to be changed. You want straight, clean  
7 lines to avoid that problem. That doesn't necessarily  
8 apply in every single plant, right, those are a plant  
9 by plant bases.

10 And I don't know whether, I've not been that  
11 engaged with the Owner's Group over the years, but I  
12 would be surprised if there aren't plant visits made,  
13 you know, when we get down the line which you don't want  
14 people creating more problems for themselves or  
15 misreading the guidance or anything like that.

16 CHAIR SCHULTZ: Okay. Greg and Steve,  
17 thank you. Okay.

18 MEMBER REMPE: I had a question related to  
19 containment accident pressure. The NEI document does  
20 acknowledge that it will be incorporated if this goes  
21 forward but there's no details. And we recently ran  
22 it in EPU to Monticello, and I was just kind of -- with  
23 a containment accident pressure credit being given.  
24 And I just wondered if you had any additional details  
25 about the discussions on how that will be addressed.

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1 MR. KRUEGER: I don't know if you want to  
2 talk about --

3 MR. PARKER: Tom Parker. The procedure  
4 that we'll talk a little bit later about that we're going  
5 to use to actually open the vent will have protection  
6 in it to make sure it's not opened at the incorrect time.

7 So, for example, in the LOCA it wouldn't be allowed  
8 to be opened because you'd have RHR pumps available to  
9 remove the decay heat so there would be no need to open  
10 the vent, and the procedures would not permit it under  
11 those conditions.

12 MEMBER REMPE: So there will be some  
13 thoughts given to the various scenarios, and they  
14 require it and the operators will have specific  
15 procedures that will stipulate when you can and can't?

16 MR. PARKER: For example, in our EOPs  
17 there's a specific discussion in there about net  
18 positive suction head for RHR pumps.

19 MR. KRAFT: This actually touches on a lot  
20 of the discussion we've had in anticipatory venting with  
21 the NRC staff in terms of the vent being open, you know,  
22 in anticipation of one scenario, but then all of sudden  
23 the scenario takes a turn, right, and can you get that  
24 vent closed, and those sorts of things.

25 And we're working through a white paper that

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1 describes how that would work out. Tom's area. So no,  
2 this is something we're very well aware of. Lots of  
3 different modes here you had to be very careful of,  
4 right.

5 MR. KRUEGER: Well, that's the real  
6 challenge. There are a number of sequences or paths  
7 you can go down and beyond design basis accidents or  
8 severe accidents, and not inadvertently impacting one  
9 type of sequence or one series of sequences but designing  
10 something, you know, for the achievement of another  
11 sequence.

12 So the balance is what I think is  
13 challenging. That's why I say it's a very unique  
14 challenge to try to put together a document such as this  
15 to balance all of those attributes.

16 MEMBER BLEY: Some of the things you folks  
17 talked about included possible visits to the plant,  
18 possible -- well, we have impacts on operations,  
19 operating procedures. How is INPO factored into what's  
20 going on here? Are they part of the group somehow or  
21 are they just going to see it when you're done and  
22 incorporate it into what they do when they come out to  
23 visit plants?

24 MR. KRAFT: INPO is not part of this group.  
25 They were invited, but I think INPO focuses more on,

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1 as we say, after the fact. But they are working on a  
2 major, what we call an IER, of picking up all the  
3 Fukushima activities to take, you know, the plant where  
4 it's beyond just NRC requirements. I'm not real  
5 familiar with all the details of that Greg. I don't  
6 know if you've been --

7 MR. KRUEGER: No. But again INPO's role  
8 is much focused on operational excellence. So we're  
9 focused on the design and --

10 MEMBER BLEY: Developing things that will  
11 impact operations --

12 MR. KRUEGER: Yes.

13 MEMBER BLEY: -- and things they would  
14 inspect or those they'd want to see. But they're just  
15 at most observing or just waiting --

16 MR. KRUEGER: At the moment, in this case.  
17 Correct. I would expect more involvement as we move  
18 further down the line.

19 MEMBER BLEY: Okay, thanks.

20 MR. KRUEGER: And the last bullet on this  
21 slide addresses all venting modes. In many cases, you  
22 know, we're using existing penetration. That existing  
23 penetration already has a function. It might be a  
24 function to DNR containment that goes through the  
25 stand-by gas treatment system, and it might be teeing

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1 off between the containment isolation valves to then  
2 form the new vent path.

3 But there are multiple missions for this  
4 vent that we also have to consider. Already mentioned  
5 was the anticipatory venting, and Tom will talk to that  
6 a little bit. But then there's venting pre-core damage  
7 to reduce the pressure such that we can get low pressure  
8 injection systems to inject.

9 There is a venting under severe accident  
10 conditions which is a different venting mode, if you  
11 will. And that there's venting to limit total offsite  
12 dose by venting the containment and allowing what I'll  
13 call a pressure band to exist to absorb some type of  
14 future event that might occur.

15 So there's multiple layers that go into  
16 trying to figure out how to best design the pipe and  
17 not inadvertently, as mentioned, impact, you know, some  
18 of those other modes.

19 CHAIR SCHULTZ: You've outlined a number  
20 of challenges.

21 MR. KRUEGER: It's a number of challenges.

22 CHAIR SCHULTZ: I look forward to the next  
23 slide.

24 MR. KRUEGER: Moving on to the next slide,  
25 as already mentioned by the NRC, this is a two-phased

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1 approach. We're focused mainly on the wetwell vent at  
2 the moment. However, we did include information  
3 relative to the conditions within the drywell because  
4 there will be some common portions of the piping, and  
5 obviously we have to consider or at least recognize the  
6 fact that those common portions could see those elevated  
7 temperatures on the, what's called the back side of the  
8 wetwell vent valve.

9 So felt it necessary to at least have some  
10 description and criteria set forth from a drywell  
11 temperature perspective to make sure that from a design  
12 we're considering that potentiality as we move forward  
13 in the first phase.

14 The second is we, you know, took awhile and  
15 maybe struggled a little bit about the design versus  
16 capability of system components. Certainly you can  
17 design to a given parameter. In a beyond design basis  
18 world, the severe accident world, we're looking more  
19 best estimate than we are a conservative bounding  
20 evaluation.

21 And how do you best design the components  
22 or the pipe to be able to meet the functional  
23 requirements, and how do you account for the capability?

24 Many engineered features, whether they be in a nuclear  
25 facility or maybe even outside in the rest of the world,

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1 are overdesigned from an engineering perspective. You  
2 can design to a point knowing that the capability of  
3 those components actually does exceed beyond that point.

4 And how do we measure that or take credit for that  
5 additional capability when designing it such that we  
6 don't set the design criteria or the parameters at a  
7 very extreme condition and basically are looking for  
8 valves that can withstand 1,000 degrees?

9 I mean that's really what we're dealing with  
10 here, struggling with, is how to bring that back to  
11 something that's reasonable from a design and purchasing  
12 standpoint and yet still allow its functionality to  
13 occur beyond that point.

14 And so we're going to have to deal with  
15 obviously a hydrogen generation from a severe event  
16 which is unique. Steam is different than hydrogen in  
17 terms of leakage across boundaries. Obviously hydrogen  
18 being, hydrogen deflagration detonation is of concern  
19 within the pipe itself.

20 Even though there may have been a reasonable  
21 hydrogen and nitrogen mix within containment, once the  
22 hydrogen moves through the pipe to another location that  
23 mixture could change with regard to oxygen. Now we have  
24 to consider where in the pipe, you know, we might have  
25 to deal with a detonable mixture that may not have been

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1 detonable, actually, in the containment itself.

2 Core concrete interaction brings  
3 radionuclides, brings all types of aerosols that come  
4 along with the flow stream that are very unique. That  
5 are well beyond in what we would normally consider from  
6 a steam type system.

7 And then obviously higher temperatures in  
8 saturation and radiation levels. As already mentioned,  
9 where's the pipe go? You know, where it goes matters  
10 because now you've got radiation. In the past, or under  
11 Generic Letter 89-16, we were dealing with temperatures  
12 and maybe high temperatures around 350 degrees, but we  
13 weren't dealing with, you know, radiation that might  
14 come along with a core damage type event or some core  
15 degradation event. So very different in terms of design  
16 and where you put the pipe and where it goes.

17 Last, we did take a quote from the order  
18 and specifically criteria 1.2.10 which is that the  
19 hardened containment vent system, shall be designed to  
20 withstand and remain functional during severe accident  
21 conditions understanding the conditions that might  
22 occur, but it's not required to exceed the current  
23 capability of the limiting containment components.

24 And we've provided a diagram a little later,  
25 a few slides later, to try to go over conceptually how

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1 we're moving in that direction and trying to map out  
2 how best to pick those design points.

3 MR. KRAFT: I just want to emphasize that  
4 when we worked with NRC on the order, the word  
5 "capability" was very carefully used. It's not design,  
6 it's what's capable. And you'll see that reflected in  
7 some other information going forward. Just wanted to  
8 highlight for the committee.

9 MR. KRUEGER: Design attributes. Of  
10 course, within the document there are a long list of  
11 design attributes and the NRC slides do get into a little  
12 more detail with regard to these. But some of the high  
13 level ones -- simplified operator actions with redundant  
14 controls.

15 It's key, now that we're dealing with these  
16 kinds of conditions already mentioned from a severe  
17 accident standpoint. You're not going to be standing  
18 next to the vent pipe. You're not going to be operating  
19 the vent, you know, physically right at the valve.

20 There are stand-off distances or designs  
21 that have to be employed to make sure that the operators  
22 -- this is a manually initiated system as is all decay  
23 heat removal for BWRs, so it's a manually initiated  
24 system and you have to have not only the engineering  
25 available to make sure that it occurs, but make sure

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1 the operators can do that in a reasonable matter.

2 Inadvertent actuation. That's a topic  
3 that's come up in the past. Again, we don't want an  
4 inadvertent actuation of the vent to occur when it isn't  
5 required to occur or at the wrong time. So we also have  
6 to build in key lock switches, potentially rupture disks  
7 or other types of engineering functions to make sure  
8 that that does not inadvertently occur, you know, when  
9 we don't want it to occur.

10 Again, one of the key functional attributes  
11 here is we not only want to vent, we want to vent when  
12 we understand it's best to vent. And that's not all  
13 the time in a specific sequence or scenario.

14 And habitability, we have a section,  
15 Section 6 within this document that goes through some  
16 of the habitability/accessibility concerns in terms of  
17 minimizing time for the operators at the vent controls.

18 Even though they might be a stand-off distance, there's  
19 still limitations with regard to where you go and how  
20 you do it and how much time you spend.

21 The prevention of cross flow, already  
22 mentioned between building systems and units. That is  
23 obviously key in moving forward. And the reason we've  
24 got this as a higher level design attribute is, for many  
25 dual unit sites the standby gas treatment system is

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1 shared between the two units.

2 And under the Generic Letter 89-16 designs,  
3 some of those designs were just bypassing the filtration  
4 trains which is a common element, and it's recognition  
5 that, in fact, that might not be the best type of design  
6 moving forward in trying to implement the 109 order.

7 Protection from flammable gas ignition both  
8 from a hydrogen perspective and a CO perspective should  
9 there be core concrete interaction. There is  
10 considerable discussion within the document relative  
11 to that as well as a separate appendix on hydrogen and  
12 how to calculate hydrogen deflagration detonation and  
13 understand how to design the pipe should you have that  
14 within the pipe.

15 Randy, do you have anything to add on that  
16 in terms of attributes?

17 MR. BUNT: Only that we're looking at it  
18 and we understand it's one of the areas that we need  
19 discussion on is the instrumentation and the ignition  
20 sources for the instrumentation for some of the key  
21 elements out there to make sure that they are protected  
22 so the instruments continue to perform at the function  
23 we understand is going to continue to work on meeting  
24 the right criteria established for that.

25 But we do look at the environment around

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1 it as well as the dynamics that go along with the hydrogen  
2 flow and possible deflagration that may happen in the  
3 piping.

4 MR. KRUEGER: A couple of other bullets  
5 here. Initial 24-hour --

6 CHAIR SCHULTZ: Just a moment. How broad  
7 is your definition of protection with regard to  
8 flammable gas ignition and protection from that could  
9 imply addition of systems associated with hydrogen  
10 control, and is it meant that way here?

11 MR. BUNT: It's not meant that way here.  
12 What we're looking at here is protection of the  
13 components inherent that are part of this vent system.

14 An example would be for the rad monitor that's going  
15 to be utilized for the vent system to have the  
16 appropriate, namely, explosion-proof enclosure for that  
17 connectivity would be an area that we've got open for  
18 discussion with the staff going forward as to how do  
19 we look at that not only in terms of the piping, then  
20 also looking at the dynamic loading that would be for  
21 the instrument gives for something that's internal to  
22 the piping system to make sure that that can respond  
23 to any type of perturbations that may happen internal  
24 to the pipe.

25 That's what we mean by here it's talking

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1 about the vent system itself, but not the tier 3 item  
2 still out there to look at the hydrogen control in the  
3 buildings provided that there was some leakage at that  
4 point.

5 CHAIR SCHULTZ: Thank you.

6 MR. KRUEGER: The order requires initial  
7 24-hour operation with installed equipment. That  
8 basically means the power and air supply, should you  
9 have air operated valves, is sufficient to maintain that  
10 without additional, you know, outside equipment being  
11 brought in.

12 However, there's a recognition that venting  
13 is not necessarily just opening once and closing it.

14 There could be longer term implications with regard  
15 to venting following a severe event, and that there's  
16 a need for longer term operation or at least a design  
17 such that we can hook up alternate instrument air,  
18 alternate power such that we can continue that operation  
19 moving past 24 hours. Not clear where that ends, but  
20 certainly past that.

21 And last, wetwell design that's consistent  
22 with the saturation conditions within containment. The  
23 only reason that we put this bullet on the slide is to  
24 differentiate that from the drywell conditions. We do  
25 agree that, and I believe the NRC agrees that the wetwell

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1 design parameters of saturation do apply to that piece  
2 of the vent pipe. However, there's still discussion  
3 ongoing with regard to the drywell section.

4 So with that topics for further alignment,  
5 and again there's additional information in the NRC  
6 slides. But we do align on generally these elements,  
7 the design value as mentioned, instrument qualification  
8 and what does that mean.

9 As Randy indicated, we're focused on the  
10 instrumentation that is attached and associated with  
11 the vent pipe directly and, you know, there's some  
12 discussion that still needs to happen with regard to  
13 that.

14 Anticipatory venting, the time we'll talk  
15 about in a few minutes. And two items, accident  
16 management in terms of use of the EPGs and Severe  
17 Accident Guidelines. The reason we have that in there,  
18 as mentioned that thing is a manually initiated process.

19 The Emergency Procedure Guidelines as well as the  
20 Severe Accident Guidelines, which would be employed in  
21 a severe event once you have the core damage, have a  
22 number of parameters in which the operator would open  
23 the vent on.

24 And I think it's important to at least  
25 reference those to make sure that we got as mentioned

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1 earlier the operations focus in there. This is not just  
2 the design of an engineered feature, but it's the  
3 interaction between that feature, where you are in  
4 accident space, what conditions you're seeing and how  
5 you interpret those via the EPGs and SAGs to implement  
6 this vent.

7 So I think that is important to marry those  
8 two at least at a high level in the document to make  
9 sure that those are aligned.

10 CHAIR SCHULTZ: So marriage at a high  
11 level, is that in fact going to be sufficient? I'm  
12 thinking of the level of detail that had gone into some  
13 of the preliminary analyses associated with these issues  
14 when we were -- and we're still working on the vent filter  
15 issue, and a lot of work had been done associated with  
16 accident management analysis.

17 MR. KRAFT: Yes. Yes.

18 CHAIR SCHULTZ: And we got into a very deep  
19 level of activity and discussion associated with the  
20 what ifs and the whereabouts associated with that. So  
21 to say actually the management at a high level is going  
22 to address this, I'm wondering if that's going to be  
23 sufficient.

24 MR. KRUEGER: Right. I would ask Pat  
25 Fallon or -- to answer from an operator's or operations

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1 point of view in the interaction of EPGs with the vent.

2 CHAIR SCHULTZ: If you could just state  
3 your name before you begin that would be good.

4 MR. AMWAY: Okay. Good afternoon. My  
5 name is Phil Amway with Constellation Energy, and I'm  
6 the Fukushima Fleet Technical Lead with the Fukushima  
7 Lessons Learned, and just before that I was a licensed  
8 operator at Nine-Mile 2.

9 So as far as dovetailing of the HCVS, severe  
10 accident capable order, in with accident management EPGs  
11 and SAMGs, you know, our EOP flow charts are very  
12 specific in terms of when you answer in a specific EOP  
13 flow charts, and then within the EOP flow charts what  
14 actions you would actually have to do to control  
15 containment pressure starting off with the least  
16 significant actions depending on the event you have to  
17 the more significant. And that would include in the  
18 subset of actions that are for containment pressure  
19 control, the first thing I would do is, can I maintain  
20 my containment pressure with normal means?

21 And as Greg pointed out, this design covers the  
22 whole range of capabilities on my vent system which would  
23 be the normal vent purge system, the use of standby gas.

24 And that's how we would normally maintain containment  
25 pressure, which this system would be a part of and be

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1 connected to, would be through a two-inch line to the  
2 GTS, standby gas treatment system.

3 And then if that action is unsuccessful,  
4 then I have to move on to more significant actions which  
5 would be my containment sprays. So I would try to spray  
6 my suppression chamber first, attempt to make that  
7 action work. If I'm unsuccessful I'd move on to the  
8 drywell spray feature. That's a more significant  
9 action. There's some other checks I'd have to do before  
10 I initiate that action.

11 But in the case of the ELAP, my spray  
12 capability does not exist because I don't have power.

13 You know, I don't have the ultimate heat sink. First  
14 of all I don't know have the power to power the large  
15 pumps. So then beyond that as my containment pressure  
16 continues to rise, that's where I'm going to get into  
17 the steps that tells me two vents, okay. So now with  
18 this vent capability that's how that's going to be  
19 interrelated into my accident management strategies,  
20 the EPG/SAMGs, and use of the HCVS to actually execute  
21 that vent strategy.

22 MR. PARKER: Maybe I could amplify. Tom  
23 Parker. We have a separate subcommittee that works on  
24 developing the procedural guidance for all the BWRs,  
25 and no one is here today from that committee. They're

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1 in Mexico training operations personnel there.

2 But they've looked at the events that's  
3 happened at Fukushima and come up with lots of good  
4 recommendations, and that's part of what I'll be talking  
5 about with respect to some of our, what we think of the  
6 lessons learned from Fukushima.

7 But they have been studying the graphs of  
8 what's happened there from the data that we do have and  
9 trying to develop better procedural guidance based upon  
10 the events that happened in Japan. So does that answer  
11 your question?

12 CHAIR SCHULTZ: I think the combination is

13 --

14 MR. FALLON: Okay, one more. Pat Fallon,  
15 licensed operator Fermi 2, and I actually am a back-up,  
16 not on the EPC but a back-up for our plant representative  
17 with that. And realistically, operators have to have  
18 a procedure to be guided on what to do with all these  
19 tools that we're creating, whether they're new tools  
20 or old tools.

21 In our case we have an 89-16 vent that we  
22 have guidance on when to use that. The ELAP basically  
23 takes that away from us. The new vent will eliminate  
24 those vulnerabilities of that 89-16 vent. And we have  
25 guidance on when to use that now, plus it's a more

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1 advanced tool and can be used further into the SAGs than  
2 what we currently have with less impact, if you will.

3 So we do need to create and use the SAG  
4 guidance on it and we don't want to leave an operator  
5 in a position where he doesn't have guidance on how to  
6 operate something, so we're going to create the  
7 necessary procedural tools for that.

8 The EPC is in the process right now.  
9 They're doing a SAG Rev 3 and an EPG Rev 3 where they're  
10 going to incorporate the lessons learned out of  
11 Fukushima to give us that guidance as operators. Does  
12 that answer your question?

13 CHAIR SCHULTZ: As I said, the combination  
14 does, and at least it sets me on the right direction.

15 MR. KRAFT: Well, also just to cap that we  
16 talked about the rulemaking. Once we get through the  
17 rulemaking where there will be additional, perhaps,  
18 plant modifications, we fully expect another round of  
19 changes to the procedures and more training. So it's  
20 an ongoing process that's going to play out over by a  
21 number of years going forward.

22 CHAIR SCHULTZ: But the schedule here is  
23 a shorter circuit than is the rulemaking.

24 MR. KRAFT: Correct.

25 CHAIR SCHULTZ: I understand that's going

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1 to influence. And what I'm trying to get in my head,  
2 and I'm sure that the committee is as well, is this is  
3 a great example of a number of different features that  
4 are coming all together and pointing directly at this  
5 project. And it's a very complex web that we're in the  
6 middle of here with regard to this work.

7 I understand other influences will come in,  
8 but we've got the first crack that winds up in 2015,  
9 and the second piece in 2016, so it's going to be quite  
10 a challenge.

11 MR. AMWAY: Steve, how this interrelates  
12 though, I would see this as a step towards that overall  
13 strategy. That you have to have this hardware in place  
14 to be able to effectively use that filtering strategies  
15 that would come out in the EPG site space.

16 CHAIR SCHULTZ: Right, and the key is the design  
17 and implementation of that hardware so that what we think  
18 of or what influences us in the future is going, that  
19 the design is going to be effective to accommodate that.

20 MR. KRAFT: Tomorrow at the joint steering  
21 committee meeting, the CNOs from our side will discuss  
22 what they saw and learned on a trip to Japan last week  
23 where we looked at Kashiwasaki-Kariwa, Fukushima  
24 Daiichi and Fukushima Daini.

25 And I was along with them and I'll tell you,

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1 if you haven't done this it's a singular experience to  
2 do this. The lessons from Daini have not been mined  
3 sufficiently, in my opinion. That is where it worked.

4 We're all too often looking for root causes where it  
5 didn't work, let's look for root causes where it did  
6 work.

7 One of the items that we discussed with the  
8 CNOs, you know, when we were close proximity for a week  
9 with them, that they pointed out to us was that what  
10 they noticed in the response at Daini was the integrated,  
11 in-depth understanding of how the whole machine works,  
12 by in this case the plant superintendent Mr. Masuda,  
13 but generally speaking. And the questions  
14 they're asking themselves are, are we training  
15 correctly, are we giving the right in-depth knowledge,  
16 which goes right to your point, Chairman, on how  
17 operators respond and what they have to know to respond.

18 And think for a moment. You start with  
19 operating procedures, you get into your, you know,  
20 ultimately your EOPs. They're still procedures. This  
21 happens -- push that button, turn that handle. And then  
22 all of sudden we cross a threshold and you say, okay,  
23 now be creative. Here's a couple of bits of guidance,  
24 go follow your lines, go, you know.

25 And the point Pat was making was a really

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1 good one. You've still got to proceduralize it so the  
2 operators can follow it, but you also have to be creative  
3 enough to figure out what's the right response. And  
4 I think that that was a major learning and we'll see  
5 that reflected in some way going forward.

6 To your point, INPO will be involved in that  
7 as well, which early days in trying to assemble the full  
8 set of lessons learned, but it will be done fairly  
9 quickly. And again, tomorrow is the first discussion  
10 of that with the NRC steering committee.

11 MR. GABOR: Additional comment, Jeff  
12 Gabor. I'd add that I don't think it was brought up  
13 yet is that the plants, the BWRs also have technical  
14 support guidance. Which is yet another level of  
15 information below the EOPs and the EPG that provides  
16 them with, like Steve said, with the flexibility and  
17 the ability to assess where they're at, determine where  
18 they're at in the accident and determine what the best  
19 course of action is.

20 And something like venting obviously is a  
21 pretty serious decision to have to make. But there is  
22 guidance provided in the TSGs to help them, help them  
23 through that.

24 MR. BUNT: Randy Bunt speaking. Exactly  
25 to your point is why we included a subsection in the

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1 NEI 13-02 document on procedures, but to back to Greg's  
2 point, it was more about high levels because we wanted  
3 to have the broader people that would be reading that  
4 document to understand the procedure interaction.

5 But as you've heard from everyone else, that  
6 procedure in and of itself has a dedicated process, has  
7 a lot of review factors and a lot of lessons learned  
8 that are being implemented in its own right, in its own  
9 process.

10 And that's what we were saying is from a  
11 high level point, for the 109 order, we're just making  
12 an awareness and there wasn't any intent for the NRC  
13 to indorse that process because it had its own  
14 independent process. But we needed to be sure that all  
15 the people involved were aware of the interaction and  
16 that that's where accident management was happening,  
17 was through that procedure interface.

18 CHAIR SCHULTZ: Thank you.

19 MR. KRUEGER: And the last bullet here, in  
20 terms of topics for further alignment, we did have an  
21 Appendix Echo on Generic Letter 89-16. So why have  
22 that, that seems somewhat tangential to everything else  
23 here.

24 But it's a recognition that in fact we did  
25 install hardened vents for Mark I under that Generic

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1 Letter. I want to make sure that as we move forward  
2 in this implementation, that this implementation covers  
3 the attributes of what was recorded in that Generic  
4 Letter.

5 In other words, we still need to meet those  
6 other requirements for loss of decay heat removal which  
7 doesn't assume a loss of offsite power, doesn't deal  
8 with some of the other boundary conditions we're dealing  
9 with here.

10 But that was really the intent of Appendix  
11 Echo, it wasn't anything more than that to make sure  
12 that utilities understood, we still need to meet, sort  
13 of like design basis, you still need to meet you other  
14 regulatory requirements as we move along.

15 MR. BUNT: And from a paperwork cleanup  
16 standpoint, we wanted to say that we were getting that  
17 document off of the table because 109 is a more broader  
18 document that carried those elements in it. So instead  
19 of just having people to have a conflict back in design  
20 world, whatever, saying I've got two different documents  
21 out here that are telling me information, which one is  
22 the governing document.

23 And we wanted to make sure that it was clear  
24 that 109, Order 109 was the governing document with NEI  
25 13-02. So that's why we, to go along with that Greg

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1 said, to make that there we still had, we want to know  
2 what was after before MI and started there.

3 But you also wanted to make sure that there  
4 was not a conflict if somebody picked this up ten years  
5 from now and saying, I've got a Generic Letter plus I've  
6 got an order, how do they relate to each other.

7 MR. KRUEGER: Okay, and my last slide for  
8 my portion of the presentation is the diagram on the  
9 hardened containment vent system and how we sort of went  
10 about selecting the vent design conditions for the  
11 drywell portion.

12 This is a simplified diagram, if you want  
13 to believe that, but it is a composite. What it is,  
14 it really is, it's a composite of information much of  
15 which came in the 1980's about the capability of  
16 containment.

17 We're going to back to that portion of the  
18 order that says, don't make the vent a super vent that  
19 goes well beyond the capability of containment, make  
20 sure that it's aligned with what you know.

21 And most of the sources of information for  
22 this diagram are NUREG CRs that looked at electrical  
23 penetrations under severe acts and conditions, drywell  
24 head leakage, Chicago Bridge & Iron study relative to  
25 pressurization of containment and where it might fail

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1 under saturated conditions or otherwise. And this is  
2 that composite.

3 And what we're trying to demonstrate here  
4 is when you look at the design envelope in the lower  
5 left hand corner, many of the BWRs, this is a  
6 generalization, but many are designed at 340 degrees  
7 and about 60 psi. That's the design limits.

8 We do integrated leak grade tests around  
9 62 pounds, somewhere around there. So it's pretty  
10 consistent. The design envelope is to the left.

11 And when we talk about what design is as  
12 compared to capability, if you look at everything that's  
13 not in red. Basically that's some measure of the  
14 capability of containment even though it was designed  
15 to that smaller square, that smaller design envelope  
16 in the left-hand corner, its capability is beyond that  
17 square.

18 It really can withstand and we saw it in  
19 the events in Japan that in fact the containment did  
20 withstand higher pressures. It did ultimately fail at  
21 different locations, but it did not fail at 60 pounds,  
22 it did not fail at 70 pounds. You know, there was  
23 actually capability or capacity beyond that design.

24 And what we do find though from Chicago  
25 bridge & Iron and these other studies is that as you

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1 increase the temperature, so one aspect of the vent is  
2 under saturated conditions. That's why I say it's very  
3 straightforward.

4 Saturated conditions are in the 350 range  
5 and the containment pressure capability is up near 120.

6 Well beyond the design capability.

7 So you know when you're designing a wetwell  
8 vent for just a pre-core damage, you're venting under  
9 the FLEX scenarios. You're getting a pretty tight  
10 regime, a pretty reasonable regime.

11 But as you increase the temperature,  
12 obviously the capacity of a equipment to withstand  
13 higher temperatures at those high pressures, degrades.

14 And that's what this is trying to show is that at the  
15 lower temperatures the containment capability or  
16 ultimate strength is pretty high. About double of what  
17 its design is.

18 As you go up with temperature, now we're  
19 dealing potentially with high, dry head leakage,  
20 stretching of the bolts, degradation of the seal in the  
21 material that might be within that joint, the hatches  
22 that go in the containment. Those all start, now come  
23 into play as do the containment penetrations.

24 And once you get to, what I'll call fairly  
25 high temperatures, 700/800/900 degrees, the capability

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1 of containment degrades rapidly in terms of its  
2 retention capability. We want to make sure that, one,  
3 we vent well before you ever get to those boundary  
4 conditions.

5 So you're going to hear about anticipatory  
6 venting which is very much in front of that to make sure  
7 that we either vent the pressure off or we allow room  
8 should there be some type of event to occur with a spike,  
9 that we still have that capability.

10 MEMBER BLEY: Greg, conceptionally this  
11 makes good sense.

12 MR. KRUEGER: Right.

13 MEMBER BLEY: Are the numbers on here  
14 relevant to all BWRs?

15 MR. KRUEGER: They're close. They're,  
16 most BWR Mark I's are at the 60 pound range.

17 MEMBER BLEY: Okay.

18 MR. KRUEGER: So Mark II's are at the 45,  
19 in terms of the design envelope. Most of the studies  
20 here were done for the Mark I's in the 80s.

21 MEMBER BLEY: For the, okay.

22 MR. KRUEGER: Yes, most.

23 MEMBER SKILLMAN: What is the --

24 MR. KRUEGER: Go ahead.

25 MEMBER SKILLMAN: What is the basis of the

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1 ultimate capability? Is that a guess, is that your Y  
2 axis of 120 psig cold temperature?

3 MR. KRUEGER: There was actually a Chicago  
4 Bridge & Iron study done in 1987 that looked at the  
5 reference bought, basically Peach Bottom, and looked  
6 at the pressurization of containments. Looked at the  
7 head bolts, the seal material, the hatch and all of those  
8 attributes and actually did a finite element analysis  
9 that went up and showed it would fail at about 156.  
10 This is sort of bringing it back down from that saying,  
11 well where would you have confidence that you're not  
12 really stretching that capability.

13 MEMBER SKILLMAN: This is for both Mark I's  
14 and Mark II's?

15 MR. KRUEGER: Yes. It's more for Mark I's.  
16 Mark II's are a little different, but Mark I is a steel  
17 containment with a gap and then a biological shield  
18 around it. So it's designed to move a little.

19 There's a bellows, there are attributes of  
20 Mark I's that Mark II's don't have. Many Mark II's are  
21 steel-lined concrete containments, so they're not steel  
22 containments.

23 And so the way that the containment  
24 interacts or responds to pressurization is different.

25 Is what I'll say. But in general this is meant to try

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1 to capture all of the BWRs in a reasonable way.

2 MEMBER SKILLMAN: Thank you.

3 MEMBER BLEY: Greg, this figure isn't in  
4 the --

5 MR. KRUEGER: It is not.

6 MEMBER BLEY: -- guidance document. Is  
7 there a background or basis document perhaps that lays  
8 out the things you're going to be doing based on this?

9 MR. KRUEGER: We actually have discussed  
10 this both amongst the task force for developing this  
11 document as well as the filtering strategies task force.

12 MEMBER BLEY: Yes.

13 MR. KRUEGER: Because this plays into that  
14 as well.

15 MEMBER BLEY: Sure.

16 MR. KRUEGER: And one thought is, well it  
17 will be in the next tier document down so that people  
18 can visualize and see --

19 MEMBER BLEY: So you were thinking about  
20 touching --

21 MR. KRUEGER: Yes, yes.

22 MEMBER BLEY: Okay.

23 MR. KRUEGER: Again, people get very  
24 specific about very specific points and that's not it.

25 This is just to show capability. And we drew this

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1 square, this proposed design for the drywell vent  
2 because it's a reasonable design point well beyond the  
3 design envelope in terms of temperature and a little  
4 bit higher in pressure.

5 It happens to correspond for the BWRs when  
6 the calculations are done for the EPGs, for the emergency  
7 procedure guidelines for the primary containment  
8 pressure limit. Many calculations end up with this  
9 temperature right around 545.

10 So that's sort of why it was selected.  
11 Could it be a little different then that, it could be.

12 But it was just to put some bounds on this envelope  
13 such that we could design to that or build or order  
14 components to that point, knowing that the capability,  
15 again, is a little further to the right and a little  
16 further up in pressure.

17 MR. BUNT: I think that goes to Mr.  
18 Skillman's question earlier about, do we have the  
19 capability from the engineering manufacturing phase to  
20 do something and that's why we were looking at providing  
21 a design value instead of a capability value but that's  
22 what engineers, designers and manufacture to build to.

23 MR. KRUEGER: Any other questions on this  
24 diagram? If not, I'll turn it over to Mr. Parker.

25 MR. PARKER: Again, my name is Tom Parker

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1 and I'll talk a little bit about the procedure that's  
2 going to allow operators to open the vents. Basically  
3 how, when implied we want to open the vent and get the  
4 search points in the procedures.

5 I think before Fukushima I had appreciation  
6 for the vent that's a little different than I do today.

7 I looked at it as an item to make sure that we didn't  
8 over pressurized the containment.

9 And what I've learned since then is that  
10 the vent is an excellent heat removal term and provides  
11 a lot of other features in coordination with RCIC  
12 extending its length of operation.

13 Of course if RCIC is drawing off the  
14 suppression pool and the suppression pool is being  
15 heated up by the decay heat, then RCIC uses that same  
16 water to cool the bearings for RCIC. And if that  
17 temperature gets too high, then the RCIC pump can fail.

18 So that's one, how that ties into venting  
19 is venting can move the energy from the suppression pool  
20 keeping the temperature of the suppression lower,  
21 extending the life of RCIC.

22 The heat removal during this event is rather  
23 limited. Our normal heat removal, if we had a local  
24 for example, would be to use the RHR pumps, as we talked  
25 a little bit about earlier, and the coordination with

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1 the RHR service water pumps to remove the decay heat  
2 from the suppression pool.

3 In this case, the decay heat removal system  
4 is not removable because we don't have power to operate  
5 it. So that's one tie-in with the question on the  
6 containment accident, pressure with respect to the fact  
7 that these pumps aren't going to have any energy to  
8 operate. So under these conditions venting would be  
9 a, would be permitted.

10 Not only do we cool the torus but we're  
11 cooling the containment and we're keeping the  
12 containment function reliable. Ultimately we want to  
13 make sure that the containment doesn't fail.

14 Certainly we can see some examples where  
15 containment failure happened in Japan and certainly  
16 that's a very, we want to learn lessons from that event.

17 Another advantage that the vent has is it's  
18 fairly simple. We don't have to roll out any equipment  
19 or provide new equipment.

20 We may modify the vent certainly associated  
21 with the order to make it more reliable. However right  
22 now the Mark I's have hardened vents.

23 They require DC power to operate a solenoid,  
24 in most cases, and then compressed gas. Either air or  
25 nitrogen to hold the valves open during venting.

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1           The operators are trained on the use of this  
2 equipment right now. We have that in our emergency  
3 operating procedures.

4           We're proposing to make a small change to  
5 those to improve those procedures for this event. But  
6 right now the operators are trained on this equipment,  
7 they know how to use the equipment and minimal support  
8 systems. Did you have a question?

9           MEMBER SKILLMAN: I did. On your first  
10 bullet, I don't understand the addition of the, F-L-E-X,  
11 the FLEX on that bullet. It seems to me the FLEX is  
12 after 24 hours, this anticipatory venting is probably  
13 in the first 24 hours?

14           MR. PARKER: That would be correct.

15           MEMBER SKILLMAN: So I don't understand  
16 what FLEX has to do with this discussion?

17           MR. PARKER: We would use the, the FLEX  
18 procedure has, or the process, has three phases. And  
19 the first phase would be to use the plant install  
20 equipments, so maybe zero to eight hours.

21           Phase 2 would then take us out probably  
22 beyond 24 hours somewhat. And then Phase 3, you're  
23 correct, is after 24 hours. So the FLEX, Phase 1 and  
24 for Phase 2 would be the most likely spot where we would  
25 be using the vent, opening the vent. So that's why we

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1 added the term FLEX in there.

2 MR. KRAFT: Well FLEX applies, not just to  
3 the offsite resources, right? It applies to, as Tom  
4 just said, the first phase is installed equipment,  
5 second phase is onsite portable equipment.

6 MR. PARKER: Right.

7 MR. KRAFT: And then the offsite equipment.  
8 So the, learning from Fukushima it's not clear when  
9 you're going to have to, on any given scenario, vent  
10 to maintain RCIC operation, right?

11 I mean on Unit 1 at Fukushima they could  
12 have, well that was isolation plant and it was on off  
13 and they didn't know it was off. That's another matter.

14 But the point being that when one plant RCIC  
15 ran pretty close to 70 hours. Another plant RCIC cut  
16 out after it was like 40 hours and another 16 hours of  
17 low pressure injection. Or the other way around, I  
18 forget which one.

19 So you want to vent on time. And it's  
20 during that entire period of time you might have to vent.

21 This goes to exactly the point that we were  
22 talking about with the staff is, when do you imagine  
23 opening up that vent. And you'll show them on the next  
24 slide the procedural change that has the vent opening  
25 under ELAP conditions earlier then you would have ever

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1 imagined.

2 MEMBER SKILLMAN: My point is that they  
3 have FLEX identified in that first bullet, seems to be  
4 out of place. Because for your anticipatory venting,  
5 you're venting, I would think, within the first 16 or  
6 20 hours. And FLEX is certainly beyond that.

7 MR. KRAFT: No, that is not true. FLEX  
8 starts the moment you lose you ELAP, have an ELAP. FLEX  
9 does not kick in 16 hours later.

10 CHAIR SCHULTZ: You're talking about the  
11 onsite capabilities, correct?

12 MR. KRAFT: Yes, onsite capabilities,  
13 installment capabilities.

14 CHAIR SCHULTZ: FLEX component, nearly  
15 FLEX component.

16 MR. KRAFT: Right.

17 MR. BUNT: Much of the strategy to maintain  
18 core integrity so that you don't get core damage,  
19 starting at the point of ELAP until the point of, that  
20 all site services get restored to a point, so that's  
21 when you have the three phases.

22 MR. KRAFT: Okay.

23 MR. BUNT: So when you talk about  
24 mitigation strategies and FLEX, we're talking about that  
25 whole gambit of things that say, from a time that an

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1 external event occurred until we get to the point that  
2 we're in a favorable point at the end of it. At the  
3 end of where Phase 3 would be and we start going into  
4 recovery.

5 So that's the whole gambit of where FLEX  
6 is. And then for anticipatory venting, in order to not  
7 get core damage, if we say that is a element of FLEX,  
8 that's one of the tools that's utilized to mitigate the  
9 consequences through getting core protection, to get  
10 enough adequate core coolant.

11 So FLEX is the response ELAP. If you go  
12 back to our first slide, that's what we meant by the  
13 vent has to function in multiple modes.

14 And one of the modes that a vent would be  
15 functioning in would be in a FLEX ELAP type response  
16 to mitigate core damage. And that would be the  
17 preferred way to respond to a hazard versus it  
18 progressing to a severe accident event.

19 MR. KRAFT: Now having said that, all true,  
20 I think something that Phil and I have talked about a  
21 lot is that the event starts and you don't know it's  
22 going to be an ELAP. You don't know that that black  
23 swan is coming.

24 So how do operators know what action do I  
25 take, when do I start stripping loads, when do I start

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1 thinking about opening up the vent? That's where the  
2 in depth knowledge of how the machine works. It's so  
3 important to know that. Phil, you want to --

4 MR. AMWAY: Yes, this is Phil Amway again.

5 When we have, the station blackout is pretty self  
6 evident in terms of the control room. You can see the  
7 annunciation, the loss of power.

8 The question then becomes, okay, well how  
9 long does that station healthy, right. And so in that  
10 additional event response that we're going to do in  
11 addition to stabilizing reactor parameters, we're going  
12 to be sending people out and making calls to the  
13 electrical dispatcher to say, you know, we've had a loss  
14 of power and from your end, what do you see as progression  
15 as far as when it's coming back to the plant.

16 We already have agreements in place that  
17 say, you know on a priority basis, you need to restore  
18 a nuclear plant early as opposed to other locations.

19 But then at the same time, I need to send people down  
20 to my diesel generators to figure out, A, why they didn't  
21 start and is there a fast recovery path.

22 And then look at the switch yard too. I  
23 mean is the switch yard essentially attacked or has some  
24 major event occurred that created significant damage  
25 to the switch yard.

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1           And from within that in that first hour,  
2 I am going to be making that determination of whether  
3 this is a station blackout, that's within the current  
4 four hour framework of the station blackout, or is it  
5 something greater that's going to push me into the  
6 extended loss of AC power capability.

7           So initially my actions are going to be  
8 insane and then at some point as they gather more  
9 intelligence as far as how long that loss of power  
10 condition is going to last, we try to be into looking  
11 at this anticipatory venting as a strategy for long term.

12           MEMBER SKILLMAN: I made my comment because  
13 I viewed FLEX as those actions to hookup equipment that  
14 is already not hooked up.

15           MR. PARKER: That would be --

16           MEMBER SKILLMAN: Okay, and so, having been  
17 through one of these big accidents, I will tell you there  
18 is time compression for an accident. And the 16 or 20  
19 hours could be gone like that.

20           MEMBER BLEY: Absolutely.

21           MEMBER SKILLMAN: And if you're going to  
22 be in the moment dealing with the accident saying, hey  
23 guys, go out there and hook up all that gear, you will  
24 only achieve that if you practice that over and over  
25 again. And if it's not practiced, you will not have

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1 that FLEX gear hooked up and you are going to be venting  
2 without FLEX.

3 MALE PARTICIPANT: Undoubtedly.

4 MEMBER SKILLMAN: That's my point.

5 MR. PARKER: And our key, at least as we  
6 go through it, still we're trying to understand how to  
7 do this. We want to make sure and give the operators  
8 as much time as possible because you're exactly right,  
9 although it's not necessarily a short time event,  
10 there's still a huge number of things to decide and  
11 that's why the procedures are going to be very important  
12 for the operator in those conditions.

13 MEMBER SKILLMAN: And I agree with this  
14 gentlemen. You're in the moment, you're asking  
15 yourself, is this going to be a short-term loss of  
16 offsite, long-term extended loss of AC.

17 And those are unknowns as the event  
18 progresses because you don't know what you don't know.

19 You're in the moment and it's overtaking you.

20 And figure you'd have a damage assessment  
21 and other information, you may or may not know when's  
22 the time to start hooking up your FLEX equipment.

23 MR. PARKER: Most of us are using one hour  
24 as kind of a landmark event to decide, are you going  
25 to get power, are you assured you're going to get power

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1 back quickly or not. And if you're not assured that  
2 you're going to get it back very quickly, then you need  
3 to get into setting up your portable equipment --

4 MEMBER SKILLMAN: Yes.

5 MR. PARKER: -- as well as making sure  
6 because you can't wait for four hours to make that  
7 decision. You need to make it right away.

8 MEMBER SKILLMAN: Okay.

9 MR. AMWAY: To answer that question a  
10 little bit though, that FLEX, the term FLEX, includes  
11 that installed piece of equipment that I have which is  
12 my reactor core isolation cooling system. And so  
13 whether it's long-term, short-term SBO, station  
14 blackout, that RCIC pulse is what I'm going to use.

15 And now as I learn more about the accident  
16 and how long it's going to be, then it's the anticipatory  
17 venting which will also be installed equipment that I  
18 don't have to connect and hook up to, is also available  
19 to me to prolong the use of that reactor core isolation  
20 cooling system.

21 So it's all a part of FLEX, it's just  
22 installed equipment versus having to actually go out  
23 and hook something up to connect it.

24 MR. BUNT: I think it's the disconnect in,  
25 when you, most people talk about FLEX, the preponderance

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1 of information that's provided as that Phase 2 type of  
2 FLEX.

3 MEMBER SKILLMAN: Yes.

4 MR. BUNT: Or the Phase 3 which is the  
5 region response. And the Phase 1 is covered a lot with  
6 procedures and enhancements to existing site functions.

7 And I can understand where FLEX, when you  
8 think about, you're thinking about the extra equipment  
9 as opposed to the installed equipment.

10 MEMBER SKILLMAN: Yes.

11 MR. BUNT: Again, that's why we were saying  
12 that this is, when we listed here is that global FLEX  
13 strategy that's Phase 1, Phase 2 and Phase 3. Not just  
14 the Regional Response Center items that are out there  
15 with the longer duration or even the plant portable  
16 equipment, which is the Phase 2, and that's what we meant  
17 by FLEX.

18 MEMBER SKILLMAN: Thank you. That's very  
19 helpful, thank you.

20 MR. PARKER: Just to reiterate what Phil  
21 said, that's really important here, the question about  
22 the timing too, because the earlier the venting the  
23 cooler we can keep the torus, the longer we can operate  
24 with RCIC before we do have to count on other systems.

25 MEMBER BLEY: I would like to make a

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1 comment. Any those of you who have extensive operating  
2 experience you guys maybe you'll agree with me or not  
3 but I think you will. You got an hour to decide.

4 I don't know of a case, where we had a major  
5 problem, where within an hour somebody said, we're dead,  
6 we're not going to solve that I need ten more minutes,  
7 I almost got this baby, give me a little more time.  
8 It wasn't until you tore some lines apart and found rags  
9 inside the oil lines on the diesel or something and you  
10 said, oh god, I give up.

11 But it's going to be a hard decision to make  
12 because you're always going to be getting reports from  
13 the field. I can get this report.

14 MR. PARKER: You bet you. I mean that's  
15 the way operators think, you know, I can make this work  
16 --

17 MEMBER BLEY: Yes.

18 MR. PARKER: -- and I can fix this. I'll  
19 get it for you.

20 MR. KRAFT: Yes, again --

21 MEMBER BLEY: Makes the four hours pretty  
22 quick.

23 MR. PARKER: And that's why we want to have  
24 a hard line at one hour, I can say you don't jet for  
25 four hours, if you think about this. After one hour,

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1 if you're not sure you're going to get it back you've  
2 got to get into the actions for setting up the portable.

3 MR. KRAFT: Again, the learning from Daini,  
4 once the event happened and they had one incoming line  
5 available but the voltage was fluctuating all over the  
6 place, we saw the other plants both fossil and nuclear  
7 had been lost off the grid.

8 And the site superintendent began sending  
9 people out to make calls on different parts of the plant  
10 wondering whether he was going to see them again, I might  
11 add, and eventually determined, made calls to the  
12 dispatcher about sure up that line.

13 And when the tsunami, the tsunami wiped out  
14 their sea water pumps. So they went down, the group  
15 went down to the sea water, the exchange building and  
16 this is exactly what would happen.

17 The maintenance guy said, boss we'll tear  
18 it down and rebuild it in an hour and he said, nothing  
19 doing, find another one and they started laying nine  
20 kilometers of cable. Cable sections that you couldn't  
21 pick up in 30 hours in the dark.

22 I mean like dark. And the cable, we saw  
23 it, it ran back all the way behind panels and they were  
24 within two hours of melting the core.

25 MEMBER BLEY: But, you know, can a guy make

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1 that decision --

2 MR. KRAFT: Exactly right.

3 MEMBER BLEY: -- at the time.

4 MR. KRAFT: Exactly my point.

5 MEMBER BLEY: It's hard --

6 MR. KRAFT: Exactly right. That was the  
7 main discussion we had with the CNOs is the leadership,  
8 on-shift leadership. Because what Phil will tell you,  
9 because Phil was also a certified emergency director,  
10 is that when that hits, you're shift superintendent is  
11 your emergency director. No one else, you haven't shown  
12 up yet.

13 MR. AMWAY: Right.

14 MR. KRAFT: You're not there for an hour,  
15 right?

16 MEMBER SKILLMAN: If we can get there.

17 MR. KRAFT: Exactly.

18 MEMBER SKILLMAN: If we can get there.

19 MR. KRAFT: Precisely right. And that's  
20 exactly what we're trying to do now with the procedures,  
21 with the, we're going to talk about better kind of  
22 training.

23 I think you're exactly right, Steve, it all  
24 filters in on this one and we're going to see things  
25 develop as a result. So --

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1 MEMBER BLEY: Let me just say, I really wish  
2 INPO were in with you guys on this from the beginning.  
3 You know, this stuff you said is obviously true.

4 When we started in the Navy nuclear program  
5 we knew you had to have an integrated knowledge and  
6 really understand the statement. When we started in  
7 commercial plants we did and then by the time of TMI  
8 we kind of forgot it.

9 After TMI we knew it again. Now we're  
10 saying what we really got to get that guy who really  
11 fully understands this place. How do we stay there and  
12 I think the INPO guys are the ones who might help us  
13 --

14 MR. KRAFT: And I think you're exactly  
15 right about that. And I recall in one of our many quiet  
16 moments saying to any number of CNOs, what would have  
17 happened if Masatu-san had been in Italy on vacation  
18 with his family?

19 MEMBER ARMIJO: It would have been  
20 different.

21 MEMBER BLEY: Yes.

22 MEMBER ARMIJO: I met with him a year after  
23 the accident.

24 MEMBER BLEY: It was about a year ago.

25 MEMBER ARMIJO: Very impressive

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1 individual. Obvious leader and, in addition to his  
2 knowledge of the plant, he inspired his people who were  
3 worried about their families. There was a Tsunami.  
4 People forget that.

5 They're worried about their families, they  
6 stayed put and they saved the plant. So, you know, I  
7 think that --

8 MEMBER BLEY: But you don't make a guide  
9 like that --

10 MEMBER ARMIJO: You can't --

11 MEMBER BLEY: The guidance documents and  
12 proceedings.

13 MEMBER ARMIJO: Exactly. Exactly. And  
14 so I think that's a tough problem to solve. How do you  
15 get people like that? How do you keep people like that?  
16 And make sure there's just one.

17 MR. PARKER: And I think we need to improve  
18 the procedures to make that work.

19 MEMBER ARMIJO: Yes, your procedures will  
20 --

21 MR. PARKER: Keep in the rule base, and not  
22 into what they're trying to develop what the procedure  
23 steps should be. So I hope that is one of the things  
24 that we're going to get out of this event.

25 MEMBER ARMIJO: My guess, if he had had FLEX

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1 equipment, like we're thinking now, his job would have  
2 been a whole lot easier. He wouldn't have had  
3 helicopters flying stuff in from Tokyo, or other plants.

4 Or dragging nine kilometers of cable. But I think more  
5 emphasis should be placed on that issue of training and  
6 leadership.

7 MR. PARKER: Absolutely, yes.

8 MR. BUNT: And I think when you look at the  
9 FLEX strategy, and some of the activities that are done  
10 there, there are two committees that are INPO driven  
11 committees. One of them training, development. And  
12 one on emergency response coordination, that are working  
13 that. And they're working with the FLEX structure.

14 And anticipatory venting is probably  
15 mentioned in the first bullet here, is that is all part  
16 of that piece of it. And the area that we're talking  
17 about here to get more INPO involvement, when we talk  
18 about into the severe accident range, that is an area  
19 that we can go back and further investigate.

20 But for a lot of the modes of the venting,  
21 and the FLEX piece of it, there is already an INPO  
22 integration of that. And there is some standard  
23 planning, some standard structure that's going into  
24 that. And there are two taskings that are working on  
25 that.

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1 MEMBER BLEY: Okay. We heard from them  
2 early on but I haven't heard anything from them in a  
3 long time.

4 MR. KRAFT: Again, this is one of these  
5 areas where there's a nexus to a lot of things. I will  
6 speak with the Fukushima Steering Committee leadership  
7 and say, you know what, we need to schedule some time  
8 back with the ACRS to talk about these other, call them  
9 the software side of the equation, and I'll make a  
10 commitment to do that.

11 MALE PARTICIPANT: Thank you, Steve.

12 MR. KRAFT: All right.

13 MEMBER SKILLMAN: I'd like to make a point  
14 that we made when we were up with the people at Peach  
15 Bottom here back in July. One of the questions that  
16 we had, Greg had --

17 MR. KRUEGER: Yes, I was there.

18 MEMBER SKILLMAN: Okay, you heard the  
19 question and that is how do you know where the transition  
20 occurs? You're moving out of EOPs, you're going into  
21 your SAMGs and how do the decision makers know when  
22 they've gone past this for the decisions that need to  
23 be made?

24 MR. AMWAY: Would you like me to answer that  
25 question?

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1 MALE PARTICIPANT: Go ahead because you --

2 MEMBER SKILLMAN: Sure, yes, please.

3 MALE PARTICIPANT: You need to state your  
4 name, please.

5 MR. AMWAY: Oh, Phil Amway. The  
6 transition out of the EPGs, which is related to the plan  
7 of the emergency operating procedures to the severe  
8 accident management guidelines, has very specific  
9 points within the EOPs that say if you meet these  
10 conditions exit all EOPs and enter the SAMGs.

11 Once you've made that decision, you're not  
12 trying to coordinate between two sets of procedures.

13 You are fully out of the emergency operating  
14 procedures. You are fully in to the severe accident  
15 management guidelines.

16 Now some of the strategies, the equipment  
17 you use, are going to be the same. However, you're not  
18 trying to be in both at the same time. You're either  
19 in the EOPs, you stay there, you exit, you get into the  
20 SAMGs and you're in there executing those strategies,  
21 so it's very clear. The guidance is clear there now  
22 and it would remain so in the rev 3.

23 MEMBER SKILLMAN: Okay, now, what you've  
24 done is you explained the paper trail. That's good.

25 What we were concerned about is the intellectual trail

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1 of management.

2 Who says with a procedure changing from the  
3 EOPs to the SAMGs the leadership is now with either the  
4 shift supervisor, the shift foreman, the plant manager?

5 It's moved to the superintendent of all nuclear plants.

6 How is it clear that the decision-making authority,  
7 the individuals, are where they are supposed to be when  
8 you get to this point?

9 MR. AMWAY: Okay, and I'm going to answer  
10 how it works in my plant and I've got some other  
11 colleagues here that can answer the question for their  
12 plant if it differs.

13 But as the emergency operating procedure  
14 director, which is an SRO, licensed SRO, they'll be  
15 running the emergency operating procedures. When they  
16 get to that point where they are exiting the EOPs,  
17 entering the SAMGs, he is still directing that  
18 initially, okay.

19 And I'll say the way it's supposed to work,  
20 and we understand under severe conditions you may not  
21 make it in the hour, but once you engage the emergency  
22 response organization, that they're supposed to be able  
23 to staff the facilities within 60 minutes.

24 Whatever that time occurs, whether it's 60  
25 minutes, which is the normal design, or somewhat longer

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1 in an extreme event, the control room staff is still  
2 maintaining control of the actions from that point in  
3 the SAMGs doing the execution. That's always a formal  
4 turnover between the in control room staff executing  
5 the procedures and the transition to the technical  
6 support center, okay?

7 Now, this is where I'm going to my specific  
8 facility. We have the SAMGs in our control room. Now,  
9 we put them up on the table. We put them over top of  
10 the EOPs. We mark them up. We follow our paths through  
11 and we execute.

12 Now, the technical support center, once  
13 they staff up, they get their turnover, they understand  
14 where they're at, they are then going to help us and  
15 make recommendations as far as based on where you're  
16 at in the accident these are the strategies and the  
17 priorities we think you need to execute.

18 And then we will then, as operators, execute  
19 those actions, provided, you know, we're in  
20 communication discussing it, getting that alignment and  
21 agreement.

22 So the way I see it is it's not so much that  
23 I'm transitioning to the TSC and I'm just waiting for  
24 them to tell me what to do. It's more of a collaborative  
25 effort.

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1           It's an extension of my technical  
2 capability and understanding to have that outside  
3 expertise in the TSC which has a lot of, you know,  
4 operations/engineering type folks that can help me in  
5 that decision making process and how I'm executing my  
6 SAMGs.

7           MEMBER ARMIJO: Like you make the decision?

8           MR. AMWAY: Yes.

9           MEMBER BLEY: That's good. I wish we heard  
10 the same thing from everybody we talk to. We don't.

11          MEMBER REMPE: What if you disagree?

12          (Simultaneous speaking.)

13          MEMBER REMPE: Everybody recognizes that  
14 and --

15          MR. AMWAY: Yes.

16          MR. FALLON: Well, I come from a plant that  
17 has a slightly different structure. So Pat Fallon once  
18 again, SRO at Fermi and I'm also a qualified technical  
19 engineer down in the ERO organization.

20                 So where Phil is, we would be in the exact  
21 same spot if our TSC was not manned. All the operators  
22 are trained on both the EPGs and the SAGs so they all  
23 understand the flow charts and we all practice them  
24 probably as much as the ERO does, okay, so everyone has  
25 an idea of what they need to do next.

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1           If there's nobody down there to call and  
2 get relief, it's still yours. You're an operator. You  
3 live with it. You know, you have to do what you have  
4 to do for that plant.

5           If there is a staff TSC, we actually have  
6 a turnover checklist between the technical engineer and  
7 the control room so that he gets all the information  
8 they've got on where you are in terms of the status on  
9 the flow chart, what equipment's operating, everything,  
10 so we go through all of that.

11           The tech engineer down in the TSC for us  
12 has basically a core team of folks that he uses, a thermal  
13 hydraulics engineer whose sole mission is to look for  
14 degrading core geometry, indications of fuel failure,  
15 indications of the next step toward real RPV breaches,  
16 looking for RPV breach. That's his main function.

17           There's an INC engineer to look at all of  
18 the instrumentation that you're seeing, to make sure  
19 that you're getting proper indications of things. He  
20 has alternates identified as to what he should use, okay,  
21 including core thermal couples, pressure indicators,  
22 temperature indicators, all that, okay?

23           That team meets with the tech engineer and  
24 the emergency directors in the TSC and they will  
25 formulate a here's how we're going to proceed on the

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1 SAG charts and they will consult also with the  
2 controlling staff.

3 They'll also bring into that the expertise  
4 that Phil talked about, having the engineers that says  
5 right now I can't get 400 gallons a minute. I need to  
6 get another system going.

7 And they're probably going to be doing  
8 things that are beyond what the procedures say to get  
9 that other pump going, to get that other injection source  
10 going, okay?

11 Bring back power, whatever they need to do,  
12 and then use the whole staff of the TSC to do that and  
13 stay in communication with the control room because  
14 they're going to have to execute the plan.

15 So it's a little bit different. Some  
16 plants, they shift that decision-making and formulation  
17 of the plan and where you're going on the SAG charts  
18 down to the TSC. Other places they leave it up in the  
19 control room.

20 Both cases I believe, though, it's a  
21 cooperative effort between the engineers and the  
22 operators to get it going.

23 MR. AMWAY: And I agree with what Pat's  
24 saying. I mean, it's cooperative so whether really  
25 retained in the control room or in the TSC, I don't know

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1 of anybody that would be in the TSC that's going to say,  
2 no, you have to do it this way if a licensed operator  
3 is telling them this is why you can't do it that way  
4 and this is the alternate course of action, so.

5 MR. FALLON: One other item. All of our  
6 tech engineers are former shift managers or SROs, so  
7 it's really an SRO to an SRO. He's just directing other  
8 resources that aren't available.

9 MEMBER SKILLMAN: Okay, thank you. Thank  
10 you.

11 MR. PARKER: Back to the slide. Also the  
12 one advantage to the venting is using the latent heat  
13 of vaporization, of course, which is a very efficient  
14 heat removal transfer.

15 We obviously are using installed equipment,  
16 the RCIC equipment. We don't need to roll it out. It's  
17 all installed and ready to use. There's a lot of talk  
18 about procedures, so let's go to the next slide.

19 This is talking about some changes that  
20 we'll make in the EOPs, not the SAMGs, but the EOPs and  
21 that's where the operator would make the decision of  
22 opening the containment vent or not.

23 This is a new criteria that we've added.  
24 It's actually an override that is going to jump through  
25 some of the steps that Phil was talking about and going

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1 through the pressure leg on the flow chart.

2 And this override would allow the operator  
3 to jump around those steps, many of which we would not  
4 have power to perform anyway and if containment  
5 pressure's greater than the scram setpoint for  
6 containment pressure, which is around 2 psig in most  
7 plants, and, this is an important and here, and it's  
8 required for core cooling.

9 So if we have RHR pumps running, we don't  
10 need to use the vent for containment cooling and,  
11 therefore, we could not open the vent in a case where  
12 we're using the RHR pumps and preserving the cap also.

13 So since we don't have RHR pumps, we are  
14 going to require the vent to cool the core. That is,  
15 at this point, our primary decay heat removal or  
16 mechanism from the containment and certainly opening  
17 the vent also will lower off-site doses in the future  
18 if we can protect the containment.

19 First of all, if we can keep the core cool,  
20 keep RCIC running, keep water on the core, vent the  
21 containment, we should get in the situation where we  
22 don't have any fuel failure.

23 And certainly if we have fuel failure,  
24 there's a potential for the containment to fail also,  
25 so we believe that what we're doing here by venting is

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1 preserving the ability to isolate the containment and  
2 the containment function.

3 Another feature, as we noted in the footnote  
4 on this slide, is venting also lowers the suppression  
5 pool pressure and allows us to depressurize a reactor  
6 further with the SRVs. That allows us to use portable  
7 pumps if we need to, if RCIC fails or when RCIC, we choose  
8 not to use RCIC anymore.

9 So that's what I have to say on venting and  
10 we've had a lot of discussion and good questions on that.

11 If there aren't other questions, I'll turn that over  
12 --

13 MEMBER BLEY: Well, I'm just sitting here  
14 toying with, this is a fairly clear operational decision  
15 point. Well, the first one's very clear. The second  
16 one I don't know how clear it is to the operators until  
17 you get the guy who really has the integrated knowledge  
18 of the plant.

19 The chart that Greg showed us earlier has  
20 this on temperature pressure criterion which aren't  
21 quite like this and I wonder how those things get  
22 integrated or if that's still work to come.

23 MR. PARKER: Well I guess maybe, Phil, you  
24 could help us here. Do you feel this is a clear decision  
25 whether you have core cooling or not or, you know, I'm

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1 thinking if you don't have RHR you don't have containment  
2 cooling.

3 MR. AMWAY: Yes, that's right but to back  
4 it up a little bit, you know, what you actually see in  
5 the override has each of the steps in the EOPs including  
6 overrides have bases documentation that's developed and  
7 supporting of those steps. So, I mean, the idea is  
8 you're trying to fit this whole procedure on a flow  
9 chart. Obviously you can't put all this --

10 MEMBER BLEY: Is this actually implemented  
11 now somewhere?

12 MR. AMWAY: No. It's not.

13 MEMBER BLEY: For anybody, for any plant?

14 MR. AMWAY: Where it is right now is the  
15 BWROG has approved it as EOP/SAG rev 3. Now it's up  
16 to each individual plant --

17 MEMBER BLEY: To apply it.

18 MR. AMWAY: -- to take that generic and  
19 apply it to plants specific.

20 MEMBER BLEY: And build that kind of  
21 second-level documentation across there.

22 MR. AMWAY: That's right. So now that  
23 second-level documentation, my bases documentation that  
24 supports this revision, could help me define what that  
25 really means.

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1                   MEMBER BLEY:    Okay.    Well, I can see  
2 getting there.    The level offsite dose is what I was  
3 saying.    Not many guys would know exactly what would  
4 get them that and maybe a lot of us don't know until  
5 you really do some careful analysis.    That's going to  
6 pay off and it really depends on knowing exactly where  
7 you are, would even have a shot at it.

8                   MR. FALLON:    Pat Fallon once again.  
9 Follow up on Phil's comment.    The bases documents right  
10 now let us know, like, if we're going to use an override,  
11 I'll use kind of a for example, but the ATWS override  
12 that says I can't get all of the rods in.

13                   I go to a different chart.    This one, it'd  
14 be an override and I've seen the one that's going into  
15 our plant.    It says I don't have any power to do any  
16 of my containment pressure control methods, right?

17                   Then I would have to vent if I want to  
18 control containment pressure so that I could keep the  
19 torus temperature low, right, and basically prevent that  
20 core from being damaged.

21                   So those two right away, in the bases  
22 document, it would describe that what I'm doing is trying  
23 to prevent core damage so I don't have to worry so much  
24 about the containment function while I'm using it to  
25 remove decayed matter.

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1 MEMBER BLEY: And it sounds like you're  
2 actually close to having at least a draft.

3 MR. FALLON: We have a draft of the chart  
4 but we haven't finished all of our bases documents and  
5 as an operator and former operator you know that bases  
6 questions on the EOPs are absolutely the favorite target  
7 of training so everybody's going to know those.

8 CHAIR SCHULTZ: So that's the part of  
9 getting to the point of taking the action to open the  
10 vent and --

11 MR. FALLON: And understanding is key.

12 CHAIR SCHULTZ: -- in the particular case  
13 that we've described.

14 MR. FALLON: Right.

15 CHAIR SCHULTZ: What Tom had, you had also  
16 said and, Greg, you talked about it before, I know Jeff  
17 has it in his mind, and that is opening and closing the  
18 vent. And so what guidance is in the process associated  
19 with determining the closing part of that equation, of  
20 that process, closing the vent?

21 MR. GABOR: This is Jeff.

22 CHAIR SCHULTZ: What are you looking for  
23 next?

24 MR. GABOR: I'll take a cut at it. Yes,  
25 obviously as Tom pointed out, this venting action is

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1 being taken prior to core damage. So this is a clean,  
2 what I would classify as a clean vent situation.

3 The way that the guidance is put together  
4 is if the conditions that put you into that override  
5 no longer exist, then you don't take those actions.  
6 You don't follow through with that action.

7 So if this event would progress to core  
8 damage -- let's say RCIC was lost at, you know, 72 hours  
9 Steve said at Unit 2 Fukushima, 60 some hours. So if  
10 RCIC was lost, you no longer have that condition that  
11 put you into that venting situation.

12 The other thing that you would see is if  
13 you did get into the conditions, as Phil pointed out,  
14 that take you to core damage or take you to the point  
15 where you transfer over to the severe accident  
16 guidelines, it's very clear there what your set of  
17 priorities are and when you would vent.

18 And, again, the operators would not be  
19 seeing, the signals would not be seeing the guidance  
20 that would tell them to keep that vent open and they  
21 would close it.

22 MR. AMWAY: Just to expand upon that just  
23 a little bit. So once I get in this override and I've  
24 made the decision I need to open the vent bad because  
25 I'm trying to preserve adequate core cooling RCIC

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1 operation, so there's two things that could get me out  
2 of that.

3 One is power comes back. Now I have  
4 alternate means for removing decay heat so now that  
5 override does not apply anymore and I re-close the vent  
6 and go back to my normal steps and sequence, removing  
7 decay heat from the containment.

8 The other one being is if I'm trying to use  
9 this reserve RCIC and for some reason RCIC fails, for  
10 whatever reason it fails and that was my only injection  
11 capability, now that override only covers that series  
12 of steps which would normally envelope by normal means  
13 of removing heat, which is containment sprays. They  
14 weren't available.

15 Now I use this vent path and it only goes  
16 down to the point of maintaining adequate core cooling.

17 One of the things that's going to drop me  
18 out of the EOPs and into the SAMGs is I lose adequate  
19 core cooling so RCIC fails, level drops, I no longer  
20 have adequate core cooling. Now I'm below that  
21 override. I'm dropping out of the EOPs into the SAMGs.

22 When I make that entry into the SAMGs, I  
23 have to re-evaluate. So if my vent's open going in,  
24 I need to close that vent path off and now I'm into the  
25 SAMGs strategies for execution.

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1 MR. FALLON: Pat Fallon once again and  
2 following up on Phil's. Basically when you're in the  
3 EOPs or the SAMGs you're in multiple legs. So the leg  
4 Phil's describing is the pressure control leg for the  
5 containment.

6 I'm also in the reactor control leg for  
7 water level. So if I'm running RCIC, I got a system  
8 that's doing his function. If I lose RCIC, that leg  
9 will give me further instructions on what to do, one  
10 of which would be probably to depressurize so I get my  
11 low pressure injection systems going and stay in EOPs.

12 I wouldn't have to actually drive myself to the SAGs,  
13 okay?

14 So we're in multiple legs. We do  
15 everything that they'd like to instruct us to do so you  
16 might have different guidance in a different leg on what  
17 to do with containment pressure to allow you to inject.

18 MR. GABOR: Guess I'll add one thing.  
19 Having said that, and it's a good segue into the rule  
20 making, because what the impact of that action of not  
21 closing it could affect our filtering strategies, our  
22 mitigation strategies after the cores become damaged,  
23 where FLEX is dealing with preventing core damage, and  
24 we've shared this multiple occasions with the staff.

25 When we view the types of scenarios that

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1 we have to deal with for filtering strategies, we have  
2 to consider the one you're talking about, the case where  
3 the anticipatory vent was used early but there was a  
4 failure to re-close it and to see what impact that has  
5 on our filtration strategies. So it's a good question  
6 to ask. We have to deal with it on the rulemaking.

7 MR. BUNT: My point was if there's an  
8 assessment that's made as you transition or are you in  
9 one of the legs going to the other leg in that assessment  
10 evaluation of plant conditions going forward and that  
11 assessment would drive you to certain conditions and  
12 certain actions going forward.

13 MR. PARKER: So to summarize what we're  
14 doing here with the new procedure change is we're  
15 lowering the setpoint where we would open the vent to  
16 above the scram setpoint.

17 Certainly you're not going to open it at  
18 two pounds. It's just not enough dp to drive much out  
19 the vent at that point, but that's going to give the  
20 operator some flexibility to determine when to open the  
21 vent.

22 Certainly the other option or the other  
23 advantage of venting we talked about was lowering  
24 pressure and such that if RCIC is lost we will have at  
25 that time the portable pump stage.

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1           If we didn't, Phil was explaining what would  
2 happen, but certainly our normal expectation here is  
3 that we would be in Phase 2. We'd roll out our portable  
4 equipment, hook it up, lower the reactor pressure and  
5 be able to keep the core cooled with the portable  
6 equipment.

7           So if there aren't any other questions, I'll  
8 turn this over to Jeff to talk about rulemaking.

9           MR. GABOR: We have one slide. I got one  
10 slide. That's all they've given me.

11          CHAIR SCHULTZ: This is a surprise.

12          (Laughter)

13          MR. GABOR: No, what we wanted to do is just  
14 to kind of give you a window into where we're at on  
15 rulemaking activities.

16          We've had a large number of good technical  
17 exchanges with the NRC staff on this and we've got  
18 another full day planned tomorrow to get into a lot more  
19 of the details of where we're going with basically  
20 developing the technical basis for the rulemaking.

21          The rulemaking is going to assume that this  
22 severe accident event, EA-13-109 mod, has been done and  
23 is in place, so all this discussion up till now that  
24 you've heard provides the basis for what we're going  
25 to assume in terms of the plant design.

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1           In addition to that, as you just heard from  
2 Tom, there's a lot of post-Fukushima lessons learned,  
3 this anticipatory venting issue, some other things that  
4 we also will assume and use that to drive our technical  
5 bases development as we go on.

6           A big part of that technical bases  
7 development is, and we were told by the SRM to look at  
8 the dominant scenarios. So we've put a lot of effort  
9 into creating we call it a core damage event tree to  
10 take all of this information that you've heard in terms  
11 of the operator actions, the expected operator actions,  
12 to create some credible scenarios that we really need  
13 to focus our filtering strategy investigation on. Like  
14 I say, we're going to have another meeting with the staff  
15 tomorrow to get into that even further.

16           Once we have identified kind of the dominant  
17 scenarios that get us to core damage, we now have  
18 developed a, NRC calls it the APET, the accident  
19 progression event tree or containment event tree, where  
20 we now take those core damage scenarios and progress  
21 all the way through to potential release to the public.

22           And that's where we'll be able to  
23 investigate several alternatives. With the support of  
24 the staff, we've identified kind of a priority list on  
25 what are the strategies that we really want to focus

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1 some attention on.

2 We have FLEX equipment in the plant, not  
3 designed necessarily for severe accident mitigation,  
4 designed to prevent core damage with potentially some  
5 I'll say minor modifications, no such thing as a minor  
6 modification to a nuclear plant, but with some  
7 modifications the use of that system in a severe accident  
8 environment could be achieved.

9 So we're going to look at things like being  
10 able to use that pump as an RPV, injection into an RPV,  
11 whether that RPV has failed and fuel's melted out on  
12 the floor or not. Obviously if that mitigation could  
13 be achieved early enough, you could potentially keep  
14 the core in the RPV.

15 We also are looking at strategies to  
16 utilize, again, that pump or a pump like that to put  
17 water inside the drywell. Might not have to be up all  
18 the way into the drywell spray headers but just to get  
19 water coverage on the floor.

20 Obviously if the vessels fail and I put it  
21 in the vessel, it's going to end up on the floor as well  
22 but this would be a separate investigation to look at  
23 modifications or alternatives that would give water to  
24 the floor of the containment.

25 A couple others that I'll mention would be

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1 the installation of what we classify as a small filter,  
2 external engineered filter. By small we don't mean a  
3 low DF or a low decontamination. We mean lower  
4 capacity.

5 Probably a small filter wouldn't handle the  
6 same heat load that a larger filter would handle.  
7 Smaller filter wouldn't be able to sustain the aerosol  
8 loading that a larger filter could do.

9 So we're going to analyze the value, the  
10 benefit of a small filter and also a larger more, I'll  
11 call it traditional like the ones that are installed  
12 perhaps in your.

13 So the industry's created their containment  
14 event tree, the core damage event tree. We've got a  
15 pretty good handle on what the scenarios are really going  
16 to drive the release and now we can begin to analyze  
17 our alternatives to look at the benefits of them.

18 And then last thing I guess I'd just mention  
19 is early on in our discussions with the NRC staff we  
20 obviously looked at the SRM and we looked at what kind  
21 of performance goal are we really after here? You know,  
22 how good is good enough? What's our target?

23 We identified, and the SRM obviously does  
24 this as well, and we looked at what the SRM said. I  
25 think in a lot of cases we offered some, I'll call them

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1 perhaps some minor modifications to the goals and the  
2 objectives.

3 And then clearly the performance measures.

4 I mean, how are we going to know, like I said, that  
5 it's good enough, that our filtering strategy is  
6 successful?

7 And one of the things we did look at is,  
8 much like the recent spent fuel pool evaluation that  
9 the NRC did, we looked at the margin to the quantitative  
10 health objectives.

11 Obviously the plants as they currently  
12 exist meet the QHO, but we looked at how can a filtering  
13 strategy extend that margin to the QHO even further?

14 For example, we looked at the SORCA results  
15 and we plotted the various scenarios from SORCA which  
16 basically gave us a release and a individual linked  
17 cancer fatality risk and we compared that with the QHO.

18 We can look at the cases that were run in  
19 the EPRI study and also in SECY-12-0157 and we can put  
20 those up against the QHO and we can see, okay, for an  
21 overall decontamination factor in containment of 1,000  
22 what kind of a margin to the QHO does that give us?

23 Some of the things that we found is that  
24 for DFs even as low as, say, 100 or so we still had maybe  
25 several orders of magnitude margin to the QHO.

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1           What we're trying not to do is to draw a  
2 line in the sand on a decontamination factor. So we've  
3 offered and had good discussion with the staff on various  
4 ways that we can determine if a given filtering strategy  
5 is really beneficial.

6           Obviously the industry is also looking at  
7 the cost-benefit part of that equation as well, so we're  
8 kind of approaching this from a lot of different angles  
9 to help us prioritize what kind of filtering strategy  
10 really makes sense and has the, you know, most bang for  
11 the buck for us.

12           So that's really all I wanted to lay out.

13           Like I say, we've had many meetings. We've got another  
14 key meeting tomorrow and I'm sure we'll be back here  
15 talking to you as we get further and further into the  
16 rule making.

17           MR. KRAFT:       So that, Mr. Chairman,  
18 concludes our prepared comments by the Committee.

19           CHAIR SCHULTZ: I'd just like to say, Jeff,  
20 with regard to that last note, that I'm glad to hear  
21 that discussions are still keeping many options open  
22 as you go forward and work through the analysis and the  
23 discussions about possible solutions and you're  
24 refining all of that but, again, you're not closing  
25 options that could be beneficial.

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1 MR. GABOR: We're not.

2 CHAIR SCHULTZ: Any other comments or  
3 discussions, questions? All right, with that, I would  
4 like to call a recess to the meeting and come back with  
5 the staff's presentation. I will call the meeting back  
6 to order at 3:15.

7 (Whereupon, the foregoing matter went off  
8 the record at 2:55 p.m. and went back on the record at  
9 3:12 p.m.)

10 CHAIR SCHULTZ: I'd like to call the  
11 meeting back into session. We now have the opportunity  
12 for this presentation and discussion with the staff,  
13 and I'd like to call on Raj Auluck to open that  
14 presentation.

15 MR. AULUCK: Thank you, Steve. Good  
16 afternoon. I'm Raj Auluck. I'm an NRC project manager  
17 in the Japan Lessons Learned Project Directorate within  
18 the Office of Nuclear Reactor Regulation. With me today  
19 are the lead technical staff members from NRR, Mr.  
20 Nageswara Karipineni and Jerome Bettle, who will be  
21 presenting the bulk of the presentation. Other staff  
22 members who participated in preparing this Draft Interim  
23 Staff Guidance are also present in the audience and are  
24 prepared to answer any questions you may have.

25 I'll briefly go over the meeting agenda and

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1 overview and the schedule. This is the order of the  
2 presentation. As you may recall, Commission  
3 SECY-12-0157 was issued in November 2012. It  
4 incorporated comment from the public stakeholders and  
5 the ACRS. SECY provided options to address questions  
6 about maintaining containment integrity and limiting  
7 the release of radioactive materials if venting systems  
8 were used during severe accident conditions.

9 The Staff Requirements Memoranda on this  
10 SECY was issued on March 19th, 2013. In it, the  
11 Commission directed the staff to take certain actions,  
12 and these are noted on this slide. It required  
13 licensees to upgrade or replace the reliable hardened  
14 vents required by Order EA-12-050 with a containment  
15 venting system designed and installed to remain  
16 functional during severe accident conditions. It  
17 directed the staff to develop a technical basis for  
18 filtering strategies with drywell filtration and severe  
19 accident management of containments. It directed staff  
20 to develop and propose their final rules. And,  
21 separately, it directed the staff to seek Commission  
22 guidance on the use of qualitative factors in regulatory  
23 decisions.

24 As directed in the SRM, the staff engaged  
25 external stakeholders throughout the development

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1 process. There were five public meetings held between  
2 issuance of the Staff Requirements Memoranda in March  
3 and mid May when the draft was completed.

4 The revised order EA-13-109 was issued on  
5 June 6th, 2013. It included a two-phase approach to  
6 ensure implementation of adequate protection and  
7 cost-justified enhancement with minimal delays. This  
8 order superseded Order EA-12-050. Since the  
9 requirements of EA-12-050 were also reflected in the  
10 revised order, the licensees were no longer expected  
11 to comply with the requirements of EA-050.

12 I'll just go over briefly the scope of the  
13 two phases. Phase 1 involves upgrading the venting  
14 capability from the containment wetwell to provide  
15 elaborate severe accident-capable hardened vents to  
16 assist in preventing core damage and, if necessary, to  
17 provide capability during severe accident conditions.

18 As noted on this slide, the revised order added severe  
19 accident capability.

20 And this is a time line of implementation  
21 of Phase 1. It includes submission of the integrated  
22 plans for staff review by June 30, 2014.

23 And Phase 2 involves providing additional  
24 protection for severe accident conditions through  
25 installation of a reliable severe accident-capable

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1 drywell vent or development of a reliable containment  
2 venting strategy that makes it unlikely that a licensee  
3 would need to vent from the containment drywell during  
4 severe accident conditions. As you heard before,  
5 earlier today, the staff is continuing discussions with  
6 stakeholders on developing strategies and severe  
7 accident management, which would assist in the  
8 development of a technical analysis in support of the  
9 proposed rule. The rulemaking technical analysis is  
10 to be provided to the Commission in December of 2014  
11 and the proposed rule in December 2015.

12 The next slide just provides a time line  
13 of implementation of Phase 2. But today's focus of this  
14 briefing is on Phase 1 of the order only.

15 This one is on the schedule of the ISG.  
16 This highlights the ISG schedule. We have the ACRS full  
17 committee scheduled for October 2nd. The ISG was  
18 published this morning in the Federal Register for  
19 public comment. The Federal Register number is 78 FR  
20 57418.

21 Again, I would like to highlight the fact  
22 that we had substantial interaction with the  
23 stakeholders. As noted on this slide, we had six public  
24 meetings since issuance of the order in June. In  
25 addition, this copy was also discussed at the Senior

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1 Managers Joint Steering Committee meetings between the  
2 NRC and NEI. There were two separate meetings in the  
3 past three months.

4 As we'll discuss later, there are still a  
5 few issues which are required for the discussions. We  
6 have a schedule of a next public meeting next Monday,  
7 September 23rd, to discuss those issues and any  
8 follow-up questions we may have from the subcommittee.

9 Also, as mentioned earlier, an industry  
10 group working under the NEI volunteered to develop a  
11 guidance document for the NRC staff review and  
12 endorsement. The scope of this guidance document, NEI  
13 13-02, is broader than the scope of Phase 1 of the order.

14 The draft ISG is endorsing this guidance document with  
15 clarifications and exceptions. With this, I will  
16 introduce Nageswara Karipineni, who is a senior reactor  
17 system engineer in Containment and Ventilation Branch  
18 in NRR and who will lead the staff's presentation on  
19 the draft ISG.

20 MR. KARIPINENI: Thank you, Raj. I tried  
21 to capture the purpose of the Order EA-13-109 because  
22 there's all these requirements stated in different  
23 places but never in any one comprehensively described  
24 in this model, five or six lines. So I tried to capture  
25 these things here. Decay heat in the order, licensees

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1 or the industry believes that it can help in other ways  
2 in removing the decay heat.

3 So I said, okay, we'll assist in the removal  
4 in the decay heat with vents to containment atmosphere  
5 and controls the containment pressure within acceptable  
6 limits during those accident conditions (before and  
7 after core damage, including a breach of the vessel by  
8 molten core debris) for which containment venting is  
9 relied upon to preserve the capability to restore  
10 containment integrity. And what we meant by that is,  
11 you know, if you open it, you know, you have to restore  
12 it back in by closing it. It has to fully function during  
13 all these. That's the best definition I could come up  
14 with after reading several documents. We may find that  
15 it may do a couple of other things in the future, but,  
16 right now, that's what it is.

17 MEMBER ARMIJO: That's all you could find.

18 That seems like enough.

19 MR. KARIPINENI: Okay. Again, Phase 1,  
20 Phase 2 you have heard so many times. Phase 1 right  
21 now in the order is the wetwell vent. It is an adequate  
22 protection issue, as well as a cost-justified safety  
23 enhancement.

24 Phase 2 is the drywell vent or reliable  
25 venting strategies that makes it unlikely for venting

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1 from drywell. And that's a cost-enhanced safety  
2 enhancement. Right now, in the guidance document, not  
3 the ISG, the NEI 13-02, there are sections in that  
4 appendices that were left blank that will be wrote down  
5 in the future.

6 There are different time lines for  
7 implementation, particularly between Phase 2 and  
8 rulemaking. It was done in a way they all converge at  
9 some point, and we all agree what they are because there  
10 was quite a bit of nexus between the two.

11 The order, which is actually attachment to  
12 the communication that was sent to the industry to all  
13 these Mark I and Mark II containments, contains an order  
14 of requirement, and I tried to capture that here in the  
15 same order, as well as in our ISG. The past requirements  
16 are the implementation of Phase 1 and Phase 2, which  
17 I just talked about, and then -- go back to the next  
18 one. Okay. Go back. It's HCVS functional  
19 requirements divided into performance objectives and  
20 design features.

21 The performance objectives mostly talked  
22 about minimizing the reliance on operator reactions.

23 It talks about plant operators exposure to occupational  
24 hazards: heat, radiological condition, etcetera,  
25 determine safe radiological conditions, and then

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1 provide that controls and indications shall be  
2 accessible and functional under a range of plant  
3 conditions.

4 NEI 13-02, the key components provided in  
5 the guidance document, they would consider the heat  
6 stress impact, radiological conditions by use of  
7 selection of proper locations for these points, use of  
8 shielding, and make sure that the responders would not  
9 be placed in dose fields above the ERO guidance.

10 Other conditions are ease of vent valve  
11 operation. Again, they discuss about readily  
12 accessible locations. And the operations would not  
13 involve any use of jumpers, lifted heads to defeat  
14 interlocks, etcetera.

15 The third one is the -- I'm giving some main  
16 ones, not everything that was discussed in the document,  
17 obviously. The independent 24-hour electrical and  
18 pneumatic supplies by permanently installed equipment,  
19 that comes straight out of the order because it clearly  
20 stated that it need to be like that.

21 And the location of the controls in areas  
22 where sustained operation is possible, accounting for  
23 the radiological conditions in the vent pipe, and making  
24 sure that the locations of such will not place the  
25 operators above the maximum safe entry points allowed

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1 by the plant safety guidance.

2 These locations, again, will consider the  
3 temperatures. They have these plant safety manuals  
4 that also talk about temperatures, obviously, what can  
5 happen if you lose ventilation of the cooling systems.

6 They will look at those guidance that will provide they  
7 install at the proper locations to place the control  
8 panels. Lack of ventilation, obviously, will be  
9 considered because they're already looking at the fact  
10 that they don't have any ventilation.

11 Then the order gave a slew of requirements  
12 to the design features. These requirements talk about  
13 the vent capacity, the effluent discharge locations,  
14 minimizing the unintended cross flow, the 24-hour  
15 operation, capability to operate from the main control  
16 room or a remote location, means to monitor the status  
17 of the vent system, monitor the effluent discharge,  
18 withstand and remain functional during severe accident  
19 conditions. And it talks about the hydrogen issue,  
20 ensure that the flammability limits are maintained.  
21 And then it talks about testing, inspection,  
22 maintenance, etcetera.

23 These features, again, are addressed in NEI  
24 13-02, in several sections of the document. Some of  
25 these key features are that the heat removal capability

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1 will be determined based on auditable calculations that  
2 we can review; the effluent discharge through the main  
3 plant stack or a different stack, provided the different  
4 stack would be at least taller than the nearest power  
5 block building and also it will be located away from  
6 any ventilation openings. And they will consider the  
7 features for minimizing the cross flow by use of valves  
8 or leak-tight dampers because of the interconnections  
9 with the ventilation systems in standby gas treatment  
10 and check valves. We haven't come across any exact use  
11 of check valves, but it was included in the document.

12           These interfaces will be designed such that  
13 they remain closed if they're already closed at the time  
14 of the accident, or they will automatically close if  
15 they're open at the time of the need to open the vent.

16  
17           The document also talks about the  
18 preventing inadvertent actuation, key locks,  
19 administrative controls, etcetera. Minimum 24-hour  
20 operation of installed equipment. Basically, that  
21 being that, when an operator decides to open the vent,  
22 he can go to the control panel either in the main control  
23 room or at a remote location. Just by maneuvering one  
24 or two switches, the vent will go open. That's the whole  
25 idea here. There's no operator to walk any places, take

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1 any manual actions.

2 Monitoring the vent valve positions,  
3 containment pressure indications, effluent radiation  
4 monitor, all these things are included in the document.

5 As far as hydrogen goes, they dealt with it in two  
6 places: in the main document itself and also in an  
7 Appendix H to the document.

8 There were several methods described there  
9 how they want to design for prevention of hydrogen  
10 migration, etcetera. They mention nitrogen inerted,  
11 steam inerted, exclusion of oxygen by pressurizing some  
12 portions of the vent system if there's a need for that.

13 And then, finally, they will design the vent pipe to  
14 tolerate a detonation/deflagration. A couple of  
15 documents that were mentioned in this regard are the  
16 NUREG/CR-2475, and the Appendix H also made reference  
17 to quite a few documents as to how to design that system,  
18 where they're getting that information, etcetera.

19 There was a -- I don't have it written here.

20 There was a document that was taken from a new reactor  
21 site. There's a NEDO-33572 that was done for ESBWRs  
22 that consider the gas migration and detonation and  
23 piping, and it takes some guidance from there also.

24 Operation, inspection, and testing.  
25 Basically, most of the requirements are checked every

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1 once per operating cycle. Out of service times for the  
2 vent system were also addressed there: what if one  
3 control location is lost, what if both control locations  
4 are lost, and how much time they are giving themselves  
5 to fix the issue, etcetera. Lead testing, initially,  
6 before operation, as well as every three cycles they  
7 will do that because we put quite a bit of emphasis on  
8 the hydrogen part.

9 They would validate the procedures by  
10 open/close testing of the system often, and every two  
11 operating cycles there would be a complete test:  
12 actually run the switches and make sure they're open,  
13 go through all the interfacing locations and make sure  
14 they are closed, etcetera.

15 The third part of the order talked about  
16 quality standards. The standards are discussed in two  
17 parts. One is the containment isolation barrier  
18 itself, and the second is beyond the isolation barrier.

19 The containment isolation barrier, the statement in  
20 the NEI 13-02 that it will be designed to the same  
21 requirements as the connected system or consistent with  
22 the current design basis of the plant.

23 Components not required to be seismically  
24 designed by the design basis of the plant, they claimed,  
25 consistent with our order, that they will be designed

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1 for reliable and rugged performance that ensures HCVS  
2 functionality. They quote a couple of documents for  
3 that.

4 Basically, my belief is that if the vent  
5 is running through safety-related areas or  
6 safety-related buildings, different plants have  
7 different criteria. Some have actually designed them  
8 to be a safety-related pipe. As a matter of fact, with  
9 HCVS, any pipe in those buildings. Some plants have  
10 designed them only to 201 requirements. So the design  
11 basis for that plant is what the industry would like  
12 to follow but always ensure that the functionality of  
13 HCVS will remain under seismic conditions.

14 The guidance doesn't go too far into the  
15 details about stress analysis and all these things.  
16 But I would tend to say that whatever the design for  
17 the plant is, they would follow the same criteria, except  
18 for the fact that the functionality of the system has  
19 always got to be maintained.

20 CHAIR SCHULTZ: So can we just look -- I  
21 want to be sure I understand this part. The staff,  
22 there's not an exception here. The staff feels that  
23 what is in NEI 13-02 meets the objective of the order  
24 --

25 MR. KARIPINENI: Yes.

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1 CHAIR SCHULTZ: -- with regard to these  
2 features?

3 MR. KARIPINENI: I believe so, yes.

4 CHAIR SCHULTZ: Good. Thank you.

5 MR. KARIPINENI: But it's not the exact  
6 criteria that all plants would be following. There  
7 would be some differences between the plants is all I  
8 was trying to imply here. Some plants, they use a  
9 Seismic Category 1 building, the system, even though  
10 it is non-seismic, non-safety related, may have been  
11 designed for Seismic Category 1 requirements, in which  
12 case they will do that. In some cases, it's not, but  
13 they will make sure that the functionality is maintained  
14 in their design. It leaves a lot open for them when  
15 it is just stated as rugged performance. As long as  
16 we're satisfied that however it is for different plants,  
17 you know, it is going to withstand in a seismic and  
18 afterwards of a seismic event with the function as  
19 required, that's --

20 CHAIR SCHULTZ: But what I was getting at  
21 is that the statement that you have here, taken from  
22 the NEI 13-02, you feel has provided that guidance --

23 MR. KARIPINENI: Yes, yes --

24 CHAIR SCHULTZ: -- for each --

25 MR. KARIPINENI: Yes --

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1 CHAIR SCHULTZ: -- to move forward, if they  
2 choose to adopt this guidance, which is something that  
3 we hope they all do. But if they do, then the  
4 implementation will be compliant and there will be  
5 sufficient consistency, given the nature of their own  
6 licensing conditions?

7 MR. KARIPINENI: I think so, yes, yes.

8 CHAIR SCHULTZ: Good. Thank you.

9 MEMBER SKILLMAN: Do you have any, any  
10 sense that some of the BWR owners will not follow the  
11 NEI guidance?

12 MR. KARIPINENI: The NEI guidance always  
13 gives them the option of proposing other ways. They  
14 can always come and tell us that they would like to do  
15 it a little bit differently. We will know that in  
16 advance, and then we'd have to say okay or not okay.  
17 But, basically, at this point, this is the guidance  
18 to the industry. However, it always states that the  
19 industry, if they have other approaches, you can always  
20 submit it to NRC and get their okay.

21 MEMBER SKILLMAN: They'll submit it for  
22 evaluation, yes. Okay, thank you.

23 MR. DENNIG: This is Bob Dennig. I just  
24 wanted to say that, as far as knowledge of what the  
25 licensees intend to do or not do, the owners group folks

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1 might have a better handle on that than we would. I  
2 don't think we have any direct information that, you  
3 know --

4 MEMBER SKILLMAN: Steve, did you want to  
5 comment here?

6 MR. KRAFT: Yes, Steve Kraft. Guidance is  
7 that: guidance. Same thing as reg guides from NRC.  
8 But the industry membership knows that if you don't  
9 follow the NRC as sort of say, hey, this is the way we'd  
10 like to do it, then you are going to be subjected to  
11 a review by the staff that may delay or whatever. That's  
12 not to say people don't come up with different ways of  
13 doing it. I mean, this is not a universal thing, to  
14 be sure.

15 But I think in this instance, because you  
16 have the extra added layer of the owners group going  
17 through the engineering guidance, you'll see a really  
18 good strict adherence to this, especially since we want  
19 to make sure that there's not a lot of variation in terms  
20 of NRC reviews, I mean, down to the point where we still  
21 have to add templates for reports and things along those  
22 lines. And those have proven to be very successful over  
23 the years.

24 So my expectation is you'll see pretty good  
25 compliance with this. But, then again, you know, it's

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1 not the law, it is guidance.

2 MEMBER SKILLMAN: What I took away from the  
3 presentation that you gentlemen made, the industry made,  
4 was that there's a pretty high level of endorsement from  
5 the execs and from the plant people and from the design  
6 people for the BWR Mark I and Mark IIs, this is the way  
7 we should do it, let's get on with it.

8 MR. KRAFT: Right.

9 MEMBER SKILLMAN: That's kind of what I  
10 took away from what you gentlemen were saying.

11 MR. KRAFT: Well, you know, it's funny.  
12 Where you run into problems is not so much we're not  
13 going to do that. Where you run into problems is  
14 overkill on the part of utility engineering staff. You  
15 know, you take this guidance and you say, okay, now we're  
16 going to do this with great gusto, and that's not what  
17 management intended and it's not what's required. So  
18 it's really never the other way. It's really, it's,  
19 you know, overkill of what you're doing, which doesn't  
20 harm the safety aspect of it but it does unnecessarily  
21 raise the complexity and everything else and the ease  
22 of installation and stuff like that. Do you want to  
23 comment on --

24 MR. KRUEGER: Yes, I mean, I would agree  
25 with -- this is Greg Krueger from Exelon. I would agree

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1 with everything said. The intent is to try to maximize  
2 the benefit of the owners group by making things  
3 consistent. There should be no reason for each BWR,  
4 each utility to go out and design some unique aspect  
5 of the vent.

6 The allowances here are the recognition  
7 that they have been built over a span of 20 years. The  
8 GDCs, some of the design requirements that have changed  
9 as time moved on have to be addressed. So, you know,  
10 at some plant, you might have to, you know, there might  
11 be some requirement to have only seismic 2 over 1 in  
12 a reactor building. There might be some higher-level  
13 guidance, and we don't intend to try to overrule that  
14 part. You know, the guidance will still say you have  
15 to meet your design and licensing requirements for your  
16 particular site. But everything else will be as  
17 consistent as we can drive that.

18 CHAIR SCHULTZ: Thank you. I appreciate  
19 you picking up on that because I wanted to get to it,  
20 and I'll make my comment now. There are so many facets  
21 to this rock that I would really hope for full  
22 organizational support for the overall effort from each  
23 of the licensees because there are so many different  
24 features and directions associated with all of the  
25 different parts of the puzzle. And it's very clear from

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1 the discussions and from the documentation in the  
2 meetings that a lot of work is going into addressing  
3 this for this particular issue, but it's influenced by  
4 many other issues. So if deviations start to occur,  
5 it's going to be very complicated to address those  
6 deviations and pull it back in together.

7 MR. KRAFT: Well, we intended to be mindful  
8 of that, Mr. Chairman. First off, we didn't ask NRC  
9 to endorse EPG Rev 3, but it's in there because you have  
10 to know how the operators are going to operate in order  
11 to design correctly, particularly in such complicated  
12 beyond design basis severe accident space.

13 Secondly, you'll notice that the document  
14 does not follow the number and sequence of the order,  
15 which other guidance documents in the Fukushima series  
16 have. And the reason for that is that Greg and one other  
17 company, Constellation, got together with the people  
18 who would lead the design and asked the question: what  
19 would be easiest for you to follow? And we came up with  
20 an outline vetted by people who would lead the design  
21 that's easier for them to follow. It isn't easier for  
22 NRC to follow, right? So there isn't an appendix that's  
23 a crosswalk. That's a new thing for us, not following  
24 the NRC numbering sequence, because we decided this is  
25 so complex let's just lead people through it as

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1 efficiently as possible.

2 CHAIR SCHULTZ: And the staff has worked  
3 on that piece of it in their ISG to make that connection  
4 to the order. I appreciate that.

5 MR. KARIPINENI: The other aspect of the  
6 seismic thing is it was clearly stated in the NEI that  
7 all the supporting analyses that were found for the  
8 seismic part of it is it will be auditable and it will  
9 be available for us for review, just in case we want  
10 to do that.

11 Then the order, the requirements in the  
12 order, the next requirements in the order are  
13 programmatic requirements. They talk about, the order  
14 talks about developing, implementing, and maintaining  
15 procedures, and train appropriate personnel in the use  
16 of the vent system.

17 The components, key components in NE 13-02,  
18 there will be procedures to operate, test, and maintain,  
19 and there's requirements there that they will system  
20 startup, shutdown, and off-nominal conditions; standby  
21 status; a number of things like that, and how they will  
22 coordinate with the procedures, the EOPs, the SAGs, and  
23 the FLEX; how they will demonstrate using the drills,  
24 tabletops, or exercises with other Post Fukushima  
25 measures.

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1 Training will include initial and  
2 continuing training of the personnel and it will  
3 reference the guidance and procedures from EOPs, SAGs,  
4 and FLEX. And the training will also be refreshed on  
5 a periodic basis consistent with their plant procedure  
6 control process.

7 What we took out of the document is that,  
8 in general, we endorse the guidance provided in NEI  
9 13-02. However, there are a few areas that we are either  
10 not endorsing now, we need to clarify, and provide some  
11 exceptions to what we are saying here.

12 We had extensive discussion in a previous  
13 session on the EPGs, SAGs, and the EOPs, SAMGs, etcetera.

14 In the process of the meetings we had, they did bring  
15 these revised EOPs, SAGs and assured us where the changes  
16 are happening and all that. These are not formal  
17 submittals. We just got to see them for two or three  
18 hours. Because they're proprietary, you know, they  
19 took them away from us, basically.

20 In any case, the point we're trying to bring  
21 here is most of the procedures as to how to operate the  
22 HCVS is part of the work that we'll be doing in the future  
23 under Phase 2 in the rulemaking. What exactly, you  
24 know, is this doing for these other phases we are working  
25 toward, how are you going to operate that? Until we

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1 come to some conclusion on all those things, we are not  
2 ready to endorse these procedures that they reference  
3 pretty extensively throughout the document. So we made  
4 a clear statement in the guidance document that right  
5 now we are not endorsing them.

6 CHAIR SCHULTZ: But I was trying to get an  
7 appreciation for how you would classify this, and I think  
8 you've explained it well that it has to do, it's not  
9 that this is an area that you're not endorsing, you just  
10 have not had sufficient either time or information or  
11 a connection to the overall process to be able to endorse  
12 it at this time?

13 MR. KARIPINENI: Connection to the overall  
14 process with the impending work that is happening in  
15 the next year or two.

16 CHAIR SCHULTZ: And the dialogue  
17 continues.

18 MR. KARIPINENI: And the dialogue  
19 continues. The other concern we have is, if you're  
20 designing to these current revision level of your  
21 documents which you're revising from Revision 2 to  
22 Revision 3, it's not yet even done, if you design for  
23 that, does the designer, could it potentially violate  
24 some of the other requirements? That's one of the  
25 concerns we have. We had them add a statement into the

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1 NEI 13-02 that the order takes precedence over these  
2 procedures. In spite of that, we still want to state  
3 clearly right now that we are not ready to endorse these  
4 procedures.

5 CHAIR SCHULTZ: Okay. These next pieces,  
6 whenever you get to the clarification and exceptions,  
7 I want to be sure that we really understand the staff's  
8 position on those. As you said, I know you've worked  
9 hard, clearly, in the Interim Staff Guidance. But I  
10 want to be sure that we do, in fact, fully understand  
11 those today. Thank you.

12 MR. KARIPINENI: The anticipatory venting,  
13 the reason we are saying here right now we are not  
14 reviewing this part of it is because a process is taking  
15 place under the FLEX submittal reviews by the mitigating  
16 staff, the acceptance of the early venting part.  
17 Therefore, we didn't feel like we had a power action  
18 similar to that at this point, so that's why we stated  
19 there that this is statement is placed under the 12-049  
20 reviews.

21 The Generic Letter 89-16, they talked  
22 about, the industry has talked about it --

23 CHAIR SCHULTZ: I'm sorry. Just to catch  
24 you again, there are not technical issues that you feel  
25 you're not going to be able to resolve with the NEI

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1 document or the direction in which the NEI document you  
2 expect to lead the industry. It's rather that you see  
3 this as something broader than just this activity; and,  
4 therefore, there's more work ongoing and reviews are  
5 happening elsewhere, so it doesn't behoove you to  
6 address it and close it here?

7 MR. KARIPINENI: That's true.

8 CHAIR SCHULTZ: Okay, thank you.

9 MR. KARIPINENI: Right. The Generic  
10 Letter 89-16, again, there was a page-long appendix,  
11 and there is really no information that's related to  
12 the design of the hardened containment vent system.  
13 We felt like it has something more to do with their  
14 housekeeping purposes, that it is there and, to some  
15 point, that it's not there. We were not too concerned  
16 about it, and we didn't want to particularly state that,  
17 you know, we agree with everything you said here.  
18 That's the reason we are stating there it's not really  
19 the scope of the ISG requirements.

20 MR. KRAFT: If I could make a comment.  
21 Steve Kraft. Greg and I were just chatting. If the  
22 new vent that's being installed relative to EA-13-109  
23 is replacing any vent you ever had, you may use some  
24 of the components, would it make some sense to formally  
25 rescind GL 89-16 so there's no confusion, the same way

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1 you rescinded the original 12-050 order? I don't know  
2 what the implications of doing that are yet. We haven't  
3 studied it ourselves. But it just occurred to me,  
4 listening to this, well, why all this confusion in the  
5 first place? If the vent I'm going to install  
6 practically replaces the vent that I put in, maybe we  
7 just, you know, let's just make sure no future inspector  
8 gets confused or -- I'm asking the question. I don't  
9 know whether this is possible or not. Just a thought  
10 I just had.

11 MR. KARIPINENI: The GL 89-16 is sort of  
12 done under the 10 CFR 50.59 process. As the Fukushima  
13 incident has shown, there were some things about it.

14 It's not our intent to go through that GL 89-16  
15 completely again and say this is okay. For us, the vent  
16 really is this new vent that you would be using for the  
17 purposes of what GL 89-16 meant for. That's clear for  
18 us. So we don't feel that, in this Interim Staff  
19 Guidance, we need to say that we agree with what was  
20 said here.

21 MR. KRAFT: No, I'm not asking for that.  
22 I'm asking for a letter that says we hereby rescind  
23 89-16.

24 MR. KARIPINENI: Oh, that's --

25 MR. KRAFT: I think that's something maybe

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1 we have to get general counsels on either side to sort  
2 of think about that. I don't know what the implications  
3 are of doing that. I have no idea.

4 MR. AULUCK: Let me get back to you on that  
5 one.

6 CHAIR SCHULTZ: That would be a broader  
7 issue, Steve. I understand.

8 MR. KARIPINENI: The next thing is the  
9 drywell temperature issue. I think you all understood  
10 that the reason that it was even looked at now is because  
11 there is a portion of a common pipe when the wetwell  
12 vent and the drywell vent eventually converge someplace  
13 and go out as a single pipe. And that's one of the  
14 reasons why the industry felt that that common pipe  
15 temperature needs to be determined now so they can  
16 complete the wetwell vent design at this time. That  
17 was the main reason why it is even there in this document.  
18 Otherwise, it would have been plainly a Phase 2 issue.

19  
20 MEMBER SKILLMAN: Well, just let me ask a  
21 question. If a plant owner were to say I'm going to  
22 complete Phase 1 without respect to Phase 2 and I'll  
23 put in a 325-degree fahrenheit 120 psi phase-one vent  
24 and I'll put in a second pipe completely independent  
25 for higher temperature, would that --

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1 MR. KARIPINENI: Second pipe meaning --

2 MEMBER SKILLMAN: A second vent.

3 MR. KARIPINENI: Then that doesn't even  
4 need to get into this document right now. That  
5 temperature should --

6 MEMBER SKILLMAN: Okay. So this is a  
7 self-imposed temperature if I would have this medium  
8 portion temperature saturated vapor against this very  
9 high temperature capability. And it is an engineering  
10 challenge; I understand that. But there's nothing to  
11 prevent an owner, should that owner choose to have a  
12 second vent. Independent, completely independent.

13 MR. KARIPINENI: Yes, he can. The reason  
14 they are stating in here is because, at least a  
15 significant number of plants, it seemed like they were  
16 planning on how to do this.

17 MEMBER SKILLMAN: I understand that. And  
18 I'm not promoting that there should be. Steve, I'm not  
19 promoting. All I'm saying is that if an owner wanted  
20 to with a separate phase-two vent that owner could, as  
21 long as the requirements were met.

22 MR. KARIPINENI: Exactly.

23 MR. KRAFT: I appreciate your making that  
24 clarification. It actually was the other way around  
25 in that we had some feedback from some sites who said,

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1 "You know what? We want to touch this system once --"

2 MEMBER SKILLMAN: Yes, I can see that.

3 MR. KRAFT: "-- so let's get criteria now."

4 As it turns out, when we looked into it, that's a hard  
5 thing to figure out, and you can imagine based on this.

6 So at least we were able to give them part of the answer.

7 It really was the other way around. Every one will  
8 tell you to touch systems once, but it may not be possible  
9 in this sense. But also there's a Phase 2 out that says  
10 if you can do an analysis to the satisfaction of the  
11 staff that you'll never need a drywell vent.

12 MEMBER SKILLMAN: Strategy is the --

13 MR. KRAFT: Well, and I think, by knowing  
14 this number, you're sort of hedging your bet in both  
15 directions.

16 MEMBER SKILLMAN: Let me be clear I am not  
17 promoting a second vent. I just wanted to clarify if  
18 an owner wanted to that owner could.

19 MR. KRAFT: Right. And I want it  
20 understood on the record that we thank you very much  
21 for that. I don't want any manager to say to me why  
22 did you agree I have to put in a second vent? Thank  
23 you. I've been down that road before.

24 MEMBER SKILLMAN: So this 545 degrees  
25 brings up some very significant component procurement

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1 issues. That's really a difficult one in design space.

2 As my friend Erin can tell you, that's a hard one.

3 Thank you.

4 MR. KARIPINENI: The staff's concern is we  
5 believe the head gasket, drywell head gasket is the most  
6 limited component when it comes to the gross leakage  
7 potential during the severe accident. And, therefore,  
8 we believe that the drywell vent or the alternative  
9 filtration strategies should protect the drywell head  
10 gasket from failure. Failing the drywell head gasket  
11 is also containment failure.

12 So we have the vent, you know, we vented,  
13 but still the head gasket failed. We don't think that's  
14 really the right way to look at this issue. That's why  
15 all the studies we're going to be doing soon and the  
16 calculations, etcetera, for Phase 2 and MELCOR analysis  
17 from research and everything, they will do subsequent  
18 work to show what that temperature could be, what if  
19 the drywell vent is there, what if the drywell vent is  
20 not there at those locations, is there a benefit out  
21 of that, and all these things we need to think about  
22 and answer those and determine what best temperature  
23 ought to be to prevent that kind of failure. This is  
24 where the staff is coming from on that issue.

25 And, also, we have subsequent work done

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1 recently, a good amount of work from EPRI. In April  
2 2013, they had put out a document about the failures  
3 of the head gasket, how likely to fail at the two times  
4 the pressure, that it can also fail at much less than  
5 two times the pressure and, if it fails once, it won't  
6 recede back properly and would continue to fail even  
7 at lower pressures afterwards. There's information  
8 there that need to be looked at before this issue is  
9 fully confirming what should be the temperature.  
10 That's where, in a short description, that's where the  
11 issues are for staff.

12 MEMBER ARMIJO: Do you have some views  
13 right now of what the temperature would be at which these  
14 gaskets are likely to fail?

15 MR. KARIPINENI: We can only look at what  
16 the, the body of work that was done on the SECY-0157.

17 I believe there are some sequences there that took the  
18 temperature up as high as 700 degrees, 750, like that.

19 MEMBER ARMIJO: But from Fukushima, was  
20 there any --

21 MR. KARIPINENI: Fukushima. There's some  
22 information, and I'm not sure how final it is, but there  
23 is temperature raised into that range.

24 MEMBER ARMIJO: But they don't have any  
25 quantitative values that say this thing failed less than

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1 545 --

2 MR. KARIPINENI: Not to my knowledge.

3 MEMBER ARMIJO: -- greater than 545?

4 MR. DENNIG: One of the contentions is to  
5 look at the data that's available through the Fukushima  
6 portal, the raw data, to see what -- I don't know that  
7 we've gotten to that yet, but that is one of the ones  
8 of comparison for making a decision about this.

9 MR. KARIPINENI: And the second part of the  
10 paragraph there is we also realize, as we agreed with  
11 the industry during the meetings, there's a design  
12 value, there is an ultimate value. Design values are  
13 generally considerably less than the ultimate values.

14 We need to look at that also because it would be pretty  
15 hard to design this thing for that kind of temperature;  
16 we realize that. So we need to get all this information  
17 that's available out somewhere, including Fukushima,  
18 to see what is that ultimate value for this head gasket  
19 and seals are and if there is a way that that temperature  
20 can be limited by either the filtration strategies or  
21 by the drywell vent itself and make that the criteria  
22 for the temperature.

23 CHAIR SCHULTZ: So just to follow that up  
24 for a moment. Let me ask, let me ask the industry related  
25 to the diagram that you showed, pressure temperature

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1 diagram that you showed, conceptual diagram I guess I  
2 would say. And so with regard to the drywell head gasket  
3 discussion or calculations, as a function of pressure  
4 and temperature that you get a straight line that goes  
5 across the top of that curve. And I'm sure there's some  
6 slope to that line, for example.

7 The question is where are you with regard  
8 to the calculations that would support the type of  
9 refinement or understanding as to what we ought to be  
10 thinking about with regard to that correlation and that  
11 protection?

12 MR. KRUEGER: This is Greg Krueger. That  
13 was a composite of information. There exists a  
14 NUREG-4944, which looks at the elastomer seals for the  
15 head. There was also a Sandia study that was done in  
16 '87 that also looked at severe accident seal degradation  
17 under severe accidents. What we did is we took all of  
18 that, along with the structural analysis from another  
19 NUREG. This diagram actually came from the Peach Bottom  
20 Level 2 PRA analysis we did, and we took all of those  
21 studies into consideration to develop this kind of  
22 composite. This is more of a cartoon, but there's an  
23 actual curve that we drew that's a pressure/temperature  
24 curve with probabilities that go along that curve that  
25 basically estimate what the failure potential is for

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1 that given point in the curve. We do have that  
2 information, and it is based on a lot of the  
3 investigations from the 80s that went on for  
4 containment.

5 MEMBER REMPE: Hasn't there been data,  
6 though?

7 MR. KRUEGER: There is. I don't know how  
8 all that fits in there, but I'm sure there is. I'm just  
9 saying there is --

10 MEMBER REMPE: Some data from Japan that  
11 Dana talked about sometimes. And so I think it is a  
12 bit more --

13 MR. KRUEGER: Right, right. But there is  
14 a body of information already out there, and that's sort  
15 of what we used to develop that, rather than do a  
16 calculation.

17 CHAIR SCHULTZ: Right, I understand. But  
18 this is an area that was the one that I would identify  
19 as an area with at least technical controversy and yet  
20 a key need to come to agreement upon in order to move  
21 into Phase 2 and resolve it in the short time, relatively  
22 short time, when you think of all those things that need  
23 to be done, that's available. I'm glad that you brought  
24 up the information that has been assembled. How that  
25 helps get to resolution or agreement as to how to move

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1 forward with the design and implementation is still a  
2 question it sounds.

3 MR. KRUEGER: Yes, absolutely agree. It's  
4 still a question, and I think we can bring to the table  
5 a lot of that supplementary information now and have  
6 additional discussions with the NRC staff to come to  
7 some closure on where we would land on those design  
8 parameters.

9 MR. KRAFT: Although I think that we need  
10 to make sure we don't confuse design and capability.  
11 What we're trying to do here is pick a design value off  
12 of a chart or a curve of capabilities. That's confusing  
13 because they don't represent the same thing. And so  
14 if you pick this point here, you know, where these two  
15 dotted lines come together, you'll now design and the  
16 capability of that system will reach out into these other  
17 areas, and that's not real obvious on this drawing.  
18 And, you know, I think it's important to know that if  
19 you pick a 545 design and you go out and you spec your  
20 equipment, okay, so that will survive into the seven  
21 and eight hundreds kind of temperature and higher  
22 pressures and, in fact, a designer will look at that  
23 and say, well, 545, you know, my supplier can give me  
24 a valve that will give me another couple hundred, you  
25 know, maybe ten percent more, gee, I'll get that one

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1 instead. That kind of robustness is always being  
2 designed into systems. So that's why we are comfortable  
3 with this number.

4 CHAIR SCHULTZ: That's why Member Skillman  
5 brought this up because that's exactly the conversation  
6 that I'm sure you are having with the staff and it needs  
7 to be finally determined because, otherwise, things can  
8 go in a variety of different directions --

9 MR. KRAFT: Since the ISG is out for  
10 comments on this, through this now formal commenting  
11 period that we're going to resolve it, right? I mean,  
12 it's not something that we're going to keep lingering  
13 out there. At the end of October, it's resolved one  
14 way or another.

15 MR. KARIPINENI: As to what Mr. Skillman  
16 brought up about the vent, the pipe itself can take  
17 higher temperatures. That's not the issue. It's any  
18 components that may be located in the pipe.

19 MEMBER SKILLMAN: It's the valving.

20 MR. KARIPINENI: The valving.

21 MEMBER SKILLMAN: And supports and clamps.

22 MR. KARIPINENI: But those probably can be  
23 designed also, but the valving pipe, if the wetwell vent  
24 has the containment isolation valves don't end up with  
25 another -- we don't have any configurations of what this

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1 looks like yet, you know. We have some rough ideas only.

2 If that pipe in this common vent pipe doesn't have a  
3 component there, then at least that component issue is  
4 not there for this wetwell vent right now. But if the  
5 design ends up with some component that can open and  
6 close away from the containment isolation valve or  
7 another valve, that becomes an issue now with this 545.

8 Is it the right temperature? Should it be more? And  
9 we are saying we cannot endorse this number until we  
10 do all this other work.

11 MEMBER SKILLMAN: I would like to ask  
12 industry another question, and this is just a really  
13 curiosity question. You know, a lot of us around the  
14 table have worked in plant engineering for decades, and  
15 so we've been around the hardware, we've been around  
16 the gaskets, we've been around the sealants. Have you  
17 considered getting a better gasket?

18 MR. KRUEGER: For the drywell head you  
19 mean?

20 MEMBER SKILLMAN: Yes, yes.

21 MR. KRUEGER: There has been some  
22 discussion about that. Certainly, for things that are  
23 smaller, like butterfly valves, there's tricentric  
24 valves that don't have any soft seals, compared to other  
25 types of butterflies. But, certainly, those are

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1 absolutely under consideration for these higher  
2 temperatures. So there is a shift away from soft  
3 sealing surfaces. There has been some discussion with  
4 the drywell head, but there's a lot of other attributes  
5 that need to be considered relative to the containment  
6 design and some of those other, you know, non-design  
7 or design basis considerations we'd still have to step  
8 through.

9 MEMBER SKILLMAN: I was thinking like the  
10 25<sup>th</sup> with the FLEX. Paint it closed, bolt it closed.

11 If you take it off, it comes off like your head gasket  
12 on your car. Chips right off.

13 MR. KRUEGER: We'll have to get into that.

14 MEMBER SKILLMAN: It just seems to be  
15 obvious. If 545 is the gasket limit, you might say,  
16 well, is there something that is not expensive, is fully  
17 safe, that's material compatible, protection for almost  
18 no increase in finance. That's what was running through  
19 my mind.

20 MR. KRUEGER: And that goes back to the  
21 anticipatory venting. It's a pressure/temperature  
22 condition so that if the pressure stays low because you  
23 didn't anticipate an event early, the higher temperature  
24 doesn't affect the sealing surface as much because you  
25 don't have the pressure behind it. So there's that --

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1 MEMBER SKILLMAN: Thank you.

2 MR. KARIPINENI: That has brought up, the  
3 SOARCA has some information on the backup information  
4 and the SOARCA analysis was done by research about the  
5 temperature/pressure relation when it comes to the  
6 drywell head gasket failures. As you all can  
7 understand, at pretty lower pressures, you need to have  
8 such a high temperature for failure. But at the higher  
9 pressures, it can fail at a lower temperature also.  
10 That's well documented in the SOARCA.

11 This slide talks about the instrumentation  
12 reliability and the operating environment. The  
13 industry has talked about it a little bit. This is  
14 something, I believe, that will be discussed in the next  
15 meeting on Monday. These comments kind of were late  
16 breaking a little bit, and that's why they were not  
17 discussed with them in the previous meetings. But based  
18 on what I heard this morning, there is probably some  
19 way that these can be resolved.

20 And one thing I did not mention in any slide  
21 was also that the industry guidance has referenced a  
22 number of documents in both the appendices and the main  
23 document when they were talking about different methods  
24 that can be used in complying with specific areas of  
25 the order, and we did not review all those references

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1 in the full detail, not knowing, you know, which one  
2 of those methods a licensee would use. And, therefore,  
3 you know, we are withholding, in a sense, until we  
4 actually look at how the licensee is using that  
5 reference, in what ways and where. Then we'll determine  
6 if it's okay or not okay. But right now we can't tell  
7 that, and that's one of the reasons why we stated one  
8 of the exceptions, one of the clarifications in the  
9 document.

10 And then after that, I have a couple of  
11 observations that I want to mention here. As we said,  
12 we haven't seen any real schematics of the venting  
13 configurations in the NEI draft. What we have seen when  
14 the Order EA-12-050 was withdrawn, there were some  
15 licensees that have sent us some submittals on how they  
16 were meeting this 050. And so we have some idea on what  
17 is there. And our general feeling is that they were  
18 trying to create a reliable HCVS to the existing  
19 configurations, to the extent possible. And we don't  
20 have any objections to that. The only statement we  
21 would like to make here is that when we actually see  
22 it, we will consider it to be an acceptable method only  
23 if it complies with all of the requirements of EA-13-109.

24 There is some discussion about including  
25 some of the venting configurations into the NEI 13-02.

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1 I don't think we have really reached an agreement or  
2 a conclusion on that yet, and we will know a little more  
3 this Monday when talk to them.

4 The last slide, this goes to a discussion  
5 about having a drywell vent and a filter. Section three  
6 to the enclosure one of the communication on EA-13-109,  
7 there is a statement there that licensees with Mark II  
8 containments can resolve the concerns about suppression  
9 pool bypass by alternative approaches to Phase 1 and  
10 Phase 2 requirements by the installation of the  
11 containment drywell vent with an installed engineered  
12 filter. And there is a process that they need to follow  
13 if they want to do that.

14 We believe that that alternative that we  
15 discussed there, in effect, really applies to both Mark  
16 I and Mark II containments. A drywell vent with a filter  
17 can most likely cross both Phase 1 and Phase 2 parts,  
18 not necessarily completing a rulemaking because we don't  
19 know where the rulemaking is going to go. But, most  
20 likely, it might meet the rulemaking also. So if a  
21 licensee desires to take that approach, we just repeated  
22 again in our ISG this is available to you as common  
23 approaches.

24 CHAIR SCHULTZ: So the order was issued, and it's  
25 issued in Phase 1 and Phase 2. Since the order was

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1 issued, since before the order was issued and then after  
2 there's been 10 or 11 meetings with industry, out of  
3 which the NEI document was developed and the ISG has  
4 been prepared and out for public comment. And what  
5 you're saying here is you still believe that this is  
6 an acceptable way to go?

7 MR. KARIPINENI: This is an acceptable way  
8 to go. But the order itself did not contain these words.  
9 This is only a section that is not a legally-binding  
10 part, the way we were told --

11 CHAIR SCHULTZ: Yes, I understand that.

12 MR. KARIPINENI: -- contained a statement  
13 to that effect. And we continue to repeat that this  
14 is always available to you, we'll look at it and provide  
15 you the guidance or develop the guidance together again  
16 quickly if a licensee or licensees are out there that  
17 want to take this.

18 CHAIR SCHULTZ: Yes, thank you for  
19 reminding me it's in an enclosure. It's not in the  
20 order. That's what you're saying.

21 MR. KRAFT: This statement is in the body,  
22 it is in the document that has the caption on it that  
23 has the letter in it. The attachments are the technical  
24 requirements. In section three, it contains language  
25 about Mark II because, basically, for Mark II

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1 containments that have bypass issues, that, if you do  
2 this other thing, you know, you solve the problem.  
3 That's what it says.

4 It is in a section of the document that our  
5 lawyers tell us have absolutely no effect because it  
6 is above the language that says "is hereby ordered."

7 The way you know this is because it's in bold, it's  
8 in caps, and, you know, lawyers will tell you, from there  
9 on down, that's what you really got to do.

10 We persist on asking then why is it in the  
11 document at all? It doesn't belong here. This is the  
12 one issue that we have, you know, multiple arguments  
13 on because it just persists on confusing the issue  
14 because it's the rulemaking that will determine this,  
15 not this order. So I just don't understand.

16 Now, here in this ISG, it's going beyond  
17 Mark II bypass back into Mark Is, so we're making  
18 backward progress on what this was about. So this is  
19 one of the things we will deal with in our formal  
20 comments. I just don't see why this has to be -- I didn't  
21 see it in the first place, and I'm seeing it less now.

22  
23 MR. DENNIG: We're just reminding that  
24 saying you have to use a wetwell vent is, in a sense,  
25 overly prescriptive. If the boundary conditions are

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1 do something using only equipment that you already have  
2 installed or features you already have installed, do  
3 this. But that's, and that was the case back when 89-16  
4 was written. It's not the case now. The order does  
5 say install a wetwell vent. Somewhere down the road  
6 not too far, some plants that don't have that feature  
7 or could benefit from having a drywell vent with a filter  
8 that have an economic or maintenance benefit from that  
9 would find themselves locked into doing something that,  
10 from an engineering or economic standpoint, might be  
11 sub-optimal.

12 So all we've done here is to point out that,  
13 historically, this has been developed using equipment  
14 already available in the plant and that the alternatives  
15 that developed since 89-16 should be considered if you  
16 find them to your advantage.

17 MR. KRAFT: Well, but then that begs the  
18 question that let's say ABC plant shows up and says,  
19 you know what, we like that order, we like that part,  
20 we'll do that. What's the criteria? What are the  
21 temperatures? We don't have any of that. NEI 13-02  
22 didn't touch any of that, and the ISG doesn't provide  
23 any additional guidance. So it becomes, basically, a  
24 null set. Even if I want to do it, I have no idea how  
25 to do it.

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1           So I'm going to have to come into NRC staff  
2 and say here's my plan and you give --

3           MR. DENNIG: Exactly, yes.

4           MR. KRAFT: -- endorsement.

5           MR. DENNIG: Exactly, yes. Case by case.

6           MR. KRAFT: Just, to me, it's a  
7 circumvention of the order. Oh, right, thank you. The  
8 rulemaking. Because parallel with the rulemaking, we  
9 have to do guidance, right? That's part of the  
10 requirement for rulemaking. So I think, again, Bob,  
11 we said this to each other many times before, it just,  
12 to us, confuses the issue.

13           MR. DENNIG: Not reminding people that this  
14 option is available or closed as an option in the  
15 rulemaking, effectively. Nobody who has already  
16 committed his honor funds to doing things in a particular  
17 way is going to, I think, wait until the outcome of the  
18 rulemaking to decide to go a different direction. So  
19 rather than preclude an option that I think the  
20 Commission wanted to have on the table, we just reminded  
21 people that there is this option if you find it  
22 beneficial. It's less prescriptive and providing  
23 flexibility to licensees who might benefit.

24           MEMBER ARMIJO: But it doesn't provide any  
25 guidance. It just says you can, you should take this

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1 approach if you want to, but it has nothing to do with  
2 the NEI guidance.

3 MR. KARIPINENI: That is true. If they  
4 want to take that approach, they would have to take the  
5 exception. They'd have to come back to us and we will  
6 be willing to work with them.

7 MR. DENNIG: We've been through OGC, and  
8 they don't have a problem with this.

9 CHAIR SCHULTZ: Let's leave it at that  
10 then. Other comments?

11 MR. KARIPINENI: No, that's the last slide  
12 I have.

13 CHAIR SCHULTZ: So questions and  
14 discussions? Well, first I'll leave it just with regard  
15 to this presentation. We'll have the opportunity to  
16 present our comments, the Committee members will, in  
17 a few moments. But any other questions on the staff's  
18 presentation?

19 MEMBER SKILLMAN: No, not from me. Thank  
20 you.

21 CHAIR SCHULTZ: I thought I had one. The  
22 public comment period, how long is that?

23 MR. AULUCK: Thirty days.

24 CHAIR SCHULTZ: Thirty days, okay.

25 MR. AULUCK: So it's October 18th.

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1 CHAIR SCHULTZ: Thank you. Steve?

2 MR. KRAFT: My apologies. Can we go back  
3 to staff's slide 24? I have a hard time understanding  
4 this paragraph. I think there's an inherent illogic  
5 in it. Read the paragraph backwards, and it seems to  
6 suggest that in NEI 13-02 we provided some diagrams as  
7 to what might be a way you could consider lashing out  
8 the valves and whatever, by definition, to meet the  
9 requirements of NEI 13-02. And that's patently  
10 incorrect. You still have to show you meet everything  
11 else. We can come up with a set of diagrams, which  
12 apparently we're going to try to do, and you run the  
13 risk of being very wrong when you do something like that  
14 if you don't understand every planned situation.

15 It says here that if the industry were to  
16 take this approach, which is try to use what you have,  
17 to the extent possible, it would be okay, providing the  
18 requirements of the order are complied with. Well,  
19 that's true under all circumstances. It just leads me  
20 to think that there is, and I know this is right which  
21 is why I suggest there's an illogic here, that the use  
22 of any diagram you might provide in NEI 13-02 does not,  
23 by definition, tell you you've met the requirements.  
24 And I think that's what this paragraph --

25 MR. KARIPINENI: What I was trying to say

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1 is really that, in a desire to make as few changes as  
2 they can, if there is any likelihood that they violate  
3 some of these requirements, that we will go through them,  
4 critical reviews from us, and just bring that out here.

5 But it was, nowhere in the ISG we have it written  
6 anywhere. This is just a precaution that I was telling  
7 here; that's all. You would think that reading of the  
8 vent guidance and all that there may be a whole  
9 significant number of changes that might be required.

10 But based on the 050 submittal, we felt like there was  
11 not really a whole lot of changes there, other than maybe  
12 supporting the seismic a little better and all that.

13 But here you have a lot of other things --

14 MR. KRAFT: 050 does not.

15 CHAIR SCHULTZ: I think it's okay, Steve.

16 I understand, taken in the light of that comment, I  
17 think it's okay, as a precaution.

18 All right. At this point, I'd like to then  
19 open up the discussion to public comments, if there's  
20 anyone in the audience here in the room. Meanwhile,  
21 we'll open up the phone line for comments. But any  
22 members of the public in the audience who would like  
23 to provide a comment to the Committee, now would be the  
24 time. Hearing none here, I'll wait until the phone line  
25 opens. I know that it would -- the line is open. At

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1 first, now that it is open, if there are members of the  
2 public on the line, if one of you would feel free to  
3 let us know that you are out there by stating your name  
4 and letting us know that you're on the line.

5 PARTICIPANT: We can hear you.

6 CHAIR SCHULTZ: You cannot hear us?

7 PARTICIPANT: Yes, we can. I just  
8 clarified that the line was open.

9 CHAIR SCHULTZ: That's what I was looking  
10 for. Thank you very much. Would anyone on the phone  
11 line then would like to make a comment, please state  
12 your name. Hearing none, we have no comments from the  
13 public on the phone line, so we will go ahead and close  
14 the phone line. And I'll ask members of the Committee  
15 for any final comments or questions, if you have them,  
16 but final comments associated with the presentation.  
17 Joy?

18 MEMBER REMPE: Well, I found the  
19 presentations by both the staff and industry very  
20 informative, and it was a very good and useful update  
21 for me. I'm glad to see that, before starting to think  
22 about how, the issue about management and who has  
23 control, it was an interesting discussion. It's  
24 something we've discussed informally, I know, a lot,  
25 as well as at the time when we were at Peach Bottom.

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1 The need to have training and leadership and procedures,  
2 along with the vents, I think was a very important  
3 aspect, and I appreciated that discussion.

4 There was a mention about CAP and a white  
5 paper that was being prepared. Is there a schedule,  
6 or did I misunderstand that comment? I just was  
7 wondering what schedule --

8 MR. PARKER: Tom Parker. We're working to  
9 provide a document by the end of next week. I don't  
10 recall we had any specific information on CAP.

11 MEMBER REMPE: Oh, okay. I thought that  
12 there was going to be some sort of discussion about the  
13 need to think about CAP with respect to that. Maybe  
14 I misunderstood the comment.

15 MR. PARKER: We didn't have a plan to put  
16 that in the white paper. That wasn't an area for  
17 discussion, but we can consider that.

18 MEMBER REMPE: Well, I think it's something  
19 that's going to have to be considered at some point,  
20 and it will make the guidance and procedures much more  
21 complicated. I would be interested in hearing how  
22 that's going to be addressed at some point in the future.

23  
24 MR. PARKER: Very good.

25 CHAIR SCHULTZ: The Committee would be

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1 interested in hearing, to be more specific. There are  
2 members who are not here who would also be interested  
3 in hearing about it.

4 MR. KRAFT: We'll take that as an action  
5 --

6 MEMBER REMPE: That would be great. Thank  
7 you.

8 CHAIR SCHULTZ: Anything else, Joy?

9 MEMBER REMPE: No, that's it.

10 CHAIR SCHULTZ: Dennis?

11 MEMBER BLEY: Nothing further. It's a  
12 good day.

13 CHAIR SCHULTZ: Sam?

14 MEMBER ARMIJO: Very good presentations.  
15 I appreciate the effort that's gone into it from the  
16 staff and from NEI.

17 CHAIR SCHULTZ: Mike?

18 MEMBER RYAN: I was fairly impressed with  
19 the integrated actions and thinking and technical  
20 machinery and systems and all of that into kind of one  
21 coherent picture. I know you're still working on that,  
22 and that's something that you'll probably never get  
23 finished working on. But I applaud the fact that you  
24 were really thinking about getting reliability in  
25 human action aspects integrated with systems and

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1 processes and whatever that you've set for taking  
2 action.

3 I heard several times individuals say  
4 things like, well, you know, it could change from what  
5 we think now or, you know, we're prepared for this but  
6 we're also prepared to move into a different phase if  
7 we see different things come, and I encourage that  
8 thinking because I think that's probably a critical kind  
9 of organized and well thought out flexibility that's  
10 going to make any eventual event much more manageable,  
11 as you're planning. And that's coming through to me  
12 that that's the way you're thinking about it. So I'm  
13 hope I'm right, and I think that's an excellent approach  
14 and keep going. Thank you.

15 CHAIR SCHULTZ: Dick?

16 MEMBER SKILLMAN: Yes. Thorough  
17 presentations from both teams. Thank you. I commend  
18 industry for an offering that makes sense, from a  
19 practical perspective, and also the staff for agreeing  
20 to accept the industry position, as industry has rolled  
21 out a very complicated approach that fits the BWR Mark  
22 Is and IIs. So this has been a good presentation from  
23 both teams, and I thank you.

24 CHAIR SCHULTZ: I would like to echo the  
25 comments by the members regarding the quality of the

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1 presentations and the level of details that's been  
2 provided here this afternoon. The one comment I would  
3 make relates to the discussion earlier, and that is the  
4 way in which the industry guidance and the staff's  
5 endorsement of that guidance has proceeded through the  
6 public meeting process, again, both before the order  
7 was issued and then after it. And I know those meetings  
8 have not only included discussions related to this issue  
9 but because, as we talked about before, this issue is  
10 affected by an influences the other work scopes that  
11 are proceeding related to venting and containment  
12 performance and the overall process on the rulemaking  
13 associated with filter vents.

14 So that process is encouraged by this  
15 Committee because I think we've already seen how much  
16 fruit it can bear, and we look forward to it continuing.

17 I know it's been a real effort by both industry and  
18 by the staff to keep that going, but it, I believe, is  
19 the only way that we can move forward and achieve the  
20 aggressive deadlines and goal sets that have been set  
21 for both the industry and for the staff.

22 I'm very encouraged by this particular  
23 project because it is drawing together, is drawing  
24 together all of those aspects that need to be developed  
25 and focused on in order to achieve the goals of the order.

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1 So we'll be looking forward to hearing more.

2 And with that, I did want to indicate that  
3 the meeting we have with the full committee is, if I  
4 remember right, scheduled for about two hours.

5 MR. WANG: Exactly two hours, 1:30 to 3:30.  
6 3:30 to 5:30. We changed it.

7 CHAIR SCHULTZ: Okay. So there's been a  
8 slight shift to accommodate Metro schedules, I guess.

9 But we will, so we'll be looking forward to working  
10 with you on a presentation schedule that would meet up  
11 with that. But I think you certainly have the elements  
12 of the presentation that will be of most interest to  
13 the Committee.

14 Any comments by the members as to what you  
15 feel the members would like to hear in that presentation?

16  
17 MEMBER BLEY: The differences part of the  
18 staff presentation. I think that's kind of crucial.

19 CHAIR SCHULTZ: Well, and just to follow  
20 on with the comment I made, I think the public meeting  
21 schedule and activities that you have had over the last  
22 six, four or five months, as it turns out, the value  
23 has been demonstrated by the products that could come  
24 from the combined efforts of the industry and the staff  
25 and the small number of clarifications and exceptions

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1 that are in the staff guidance.

2 MEMBER BLEY: The differences, for the most  
3 part, were just things that haven't been reviewed yet.

4 CHAIR SCHULTZ: So we'll look forward to  
5 that presentation October 2nd. And any comments  
6 regarding letter writing? I think we're going to  
7 proceed, Sam. That's the feeling I get from it, and  
8 I think the Committee would like to put down our thoughts  
9 related to this subject.

10 With that, I'll close the meeting.

11 (Whereupon, the foregoing matter was  
12 concluded at 4:34 p.m.)

13

14

15

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# NEI 13-02

## Industry Guidance to Implement EA-13-109

ACRS Fukushima Subcommittee  
September 18, 2013



# General Characterization

- Cooperative effort between industry and NRC
- Numerous public meetings and technical exchanges to develop modified interim staff guidance
- Industry is working toward common design elements for implementation of the order
- Good alignment between industry and NRC on guidance document with a limited number of issues needing resolution

# Functional Requirements

- Severe accident capability
- Limit containment pressure
- Vent capability from wetwell and drywell under ELAP conditions
- Control the use of common systems within and between units
- Addresses all venting modes

# Severe accident elements of EA-13-109

- Two phased approach (wetwell and drywell)
- Design vs. capability of system components
  - Hydrogen generation from severe accident
  - Core concrete interaction
  - Temperature and radiation levels

“The HCVS shall be designed to withstand and remain functional during severe accident conditions,... The design is not required to exceed the current capability of the limiting containment components.” EA-13-109 criteria 1.2.10

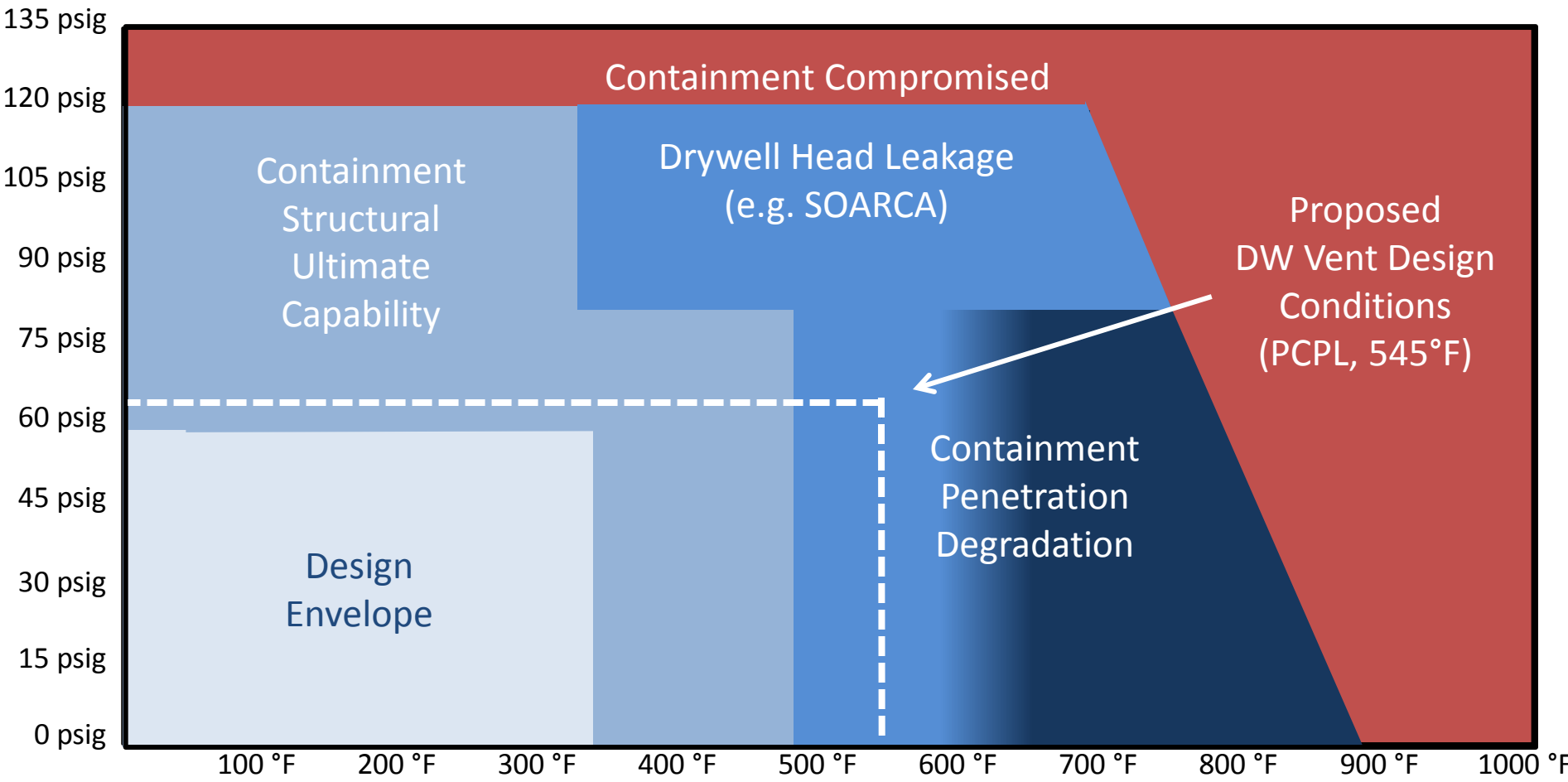
# Design Attributes

- Simplified operator actions with redundant controls
  - Prevention of inadvertent actuation
  - Habitability/accessibility under severe accident conditions
- Prevention of cross flow to buildings/systems/units
- Protection from flammable gas ignition
- Initial 24 hour operation with installed equipment
- Longer term operation to support venting function
- Wetwell design consistent with saturation conditions at containment pressure limits

# Topics for Further Alignment

- Drywell temperature design value
- Instrument qualification
- Anticipatory venting (FLEX)
- Accident management (EPG/SAG)
- Generic Letter 89-16 (Appendix E)

# HCVS DW Vent Consistent with Containment Capability



# Anticipatory BWR Venting

- Anticipatory Venting supports extended RCIC Operation for Mitigating Strategies/FLEX
- Preferred choice for Containment/Core Decay heat removal.
  - maximizes core cooling and containment function reliability
  - minimizes support systems and operator actions,
  - utilizes  $\approx 10$  times more efficient method of heat transfer
  - uses installed equipment
- Venting capability will be enhanced with EA-13-109 in BWR MK I & II



# Anticipatory BWR Venting

## New BWROG Guidance

### Allowed to Vent Containment When:

Containment Pressure > Scram Setpoint

**AND**

Required for core cooling\*/lower offsite dose

\*Maintain RCIC operation or allow low pressure injection

# Filtering Strategies Rulemaking

- Rulemaking assumes EA-13-109 modifications are in place
- Post Fukushima Lessons Learned implemented
- Dominant scenario and event tree development for rulemaking
- Performance based QHO margin screening versus ILCF and DF default values

# Mark I and Mark II BWRs Containment Venting Systems

Guidance for Order EA-13-109

Briefing to the

Advisory Committee on Reactor Safeguards Subcommittee

September 18, 2013



# Agenda

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- Overview and Schedule
- NRC staff presentation – Interim staff guidance development (JLD-ISG-13-02)
- Questions and comments



# Overview and Schedule



# Overview - SRM

- SECY-12-0157 issued November 26, 2012
- SRM issued March 19, 2013
  - Modify Order EA-12-050 to include severe accident conditions
  - Develop technical bases for filtering strategies with drywell filtration and severe accident management of containments
  - Develop proposed and final rules for filtering strategies
  - Seek Commission guidance on use of qualitative factors in regulatory decisions



# Overview – Order EA-13-109

- Order EA-13-109 issued June 6, 2013
- Included a phased approach to ensure minimal delays in implementing adequate protection provisions and cost justified safety enhancements of the Order, while allowing possible development of alternate approaches
- Also included a 2-phase implementation of Order with subsequent incorporation of requirements into rulemaking activities, which would also include broader accident management strategies





# Phase 1 - Scope

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## Mark I and II

- Wetwell Venting System
- Requirements from EA-12-050
  - Reliable, hardened containment venting system
  - Adequate protection
- Revised order added Severe Accident Capability
  - Cost Justified Safety Enhancement





# Phase 1 - Timeline

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- Implementation :
  - no later than startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first.
- Integrated Plan
  - June 30, 2014



# Phase 2 - Scope

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## Mark I and II

- Drywell Venting System
- Cost Justified Safety Enhancement

### Options:

- Installation of severe accident capable drywell vent

Or

- Develop reliable strategy that obviates need for a drywell vent



# Phase 2 - Timeline

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- Implementation :
  - no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first
- Integrated Plan
  - December 31, 2015



# Schedule - ISG

- ISG issuance endorsing NEI 13-02 – October 2013
- ACRS Full Committee – October 2, 2013
- ISG issued for public comment – September 2013
- Public and industry interactions – June to August 2013
  - 6 public meetings/webinars
  - Next public meeting – September 23, 2013



# NRC Presentation

## Draft Interim Staff Guidance

### (JLD-ISG-2013-02)



# Interim Staff Guidance For Order EA-13-109

## Severe Accident Capable vent Mark I and Mark II Containments

### – Order EA-13-109

**Objective is to assist in the removal of decay heat, vent the containment atmosphere, and control containment pressure within acceptable limits during those accident conditions (before and after core damage, including a breach of the RPV by molten core debris) for which containment venting is relied upon to preserve the capability to restore containment integrity.**

**Phase 1 – Wetwell vent**

**Phase 2 – Drywell vent or reliable venting strategies that makes it unlikely for venting from drywell. Place holders in NEI 13-02 (Section 3 and Appendix C) for inclusion of guidance at a later date for drywell vent or venting strategies.**

**Different timeline allows for consideration of the nexus between Phase 2 and rulemaking**





# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## Order EA-13-109

### – HCVS Functional Requirements

#### Performance Objectives:

**Minimize reliance on operator actions**

**Minimize plant operators exposure to occupational hazards**

**Account for radiological conditions that could impede personnel actions**

**Controls and indications shall be accessible and functional under a range of plant conditions**



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – HCVS Functional Requirements

### Key components in NEI 13-02 for meeting performance objectives:

**Environmental considerations (heat stress impact, radiological conditions)  
Use of shielding and other radiological dose control actions such that responders will not be placed in dose fields above the ERO guidance.**

**Ease of vent valve operation (from readily accessible locations without the use of jumpers, lifted leads to defeat interlocks)**

**Independent 24 hour electrical and pneumatic supplies by permanently installed equipment**

**HCVS controls located in areas where sustained operation is possible accounting for radiological conditions in the vent pipe. Control locations will not place the operators above maximum safe entry points allowed by plant safety manual/guidance.**





# Interim Staff Guidance For Order EA-13-109

## Severe Accident Capable vent Mark I and Mark II Containments

### – HCVS Functional Requirements

#### Design Features

**Vent Capacity, effluent discharge, minimizing unintended cross flow, capability to operate from main control room or remote location, minimum capability to operate 24 hours by means of permanently installed equipment, means to monitor the status of the vent system, monitor effluent discharge for radioactivity, withstand and remain functional during severe accident conditions, ensure that lower flammability of gases passing through HCVS are not reached or system designed to withstand deflagration and detonation loading, and operation, testing, inspection and maintenance.**



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – HCVS Functional Requirements

### Key design features in NEI 13-02

**Auditable calculations for vent capacity equivalent to 1% LTP.**

**Effluent discharge through plant stack or different stack (higher than nearest power block building and away from ventilation openings).**

**Minimize cross flow by use of valves, leak-tight dampers and check valves (remain closed or automatically close).**

**Prevent inadvertent actuation (key lock switches, administrative controls).**

**Minimum 24 hour operation with installed equipment**



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – HCVS Functional Requirements

### Key design features in NEI 13-02

**Operated from main control panel and alternate/local valve control locations.**

**Monitoring for vent valve position, containment pressure, effluent radiation monitor.**

**Hydrogen – nitrogen inerted, steam inerted, exclusion of oxygen, tolerate a detonation/deflagration, principles in NUREG/CR-2475. Appendix H addresses the methods.**

**Operation, inspection, and testing – performed once per operating cycle. Out of service times for HCVS addressed.**



# Interim Staff Guidance For Order EA-13-109

## Severe Accident Capable vent Mark I and Mark II Containments

- HCVS Quality Standards

- Order EA-13-109

**Containment isolation barrier (consistent with the design basis of the plant)**

**Beyond the isolation barrier (reliable and rugged performance that ensures HCVS functionality following a seismic event)**

- Key components in NEI 13-02

**Containment isolation barrier up to second isolation valve will be designed to the same requirements of the connected system**

**Components that are not required to be seismically designed by the design basis of the plant will be designed for reliable and rugged performance that ensures HCVS functionality (seismic details in ISG-JLD-2012-01 and ISG-JLD-2012-03).**

**Components external to seismic category 1 (or equivalent building or enclosure) will be designed to meet external hazards that screen in for the plant as defined in NEI 12-06 (JLD-ISG-12-01 for Order EA-12-049)**

**Auditable supporting analysis documentation**



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

- **HCVS Programmatic Requirements**

- **Order EA-13-109**

**Develop, implement and maintain procedures**

**Train appropriate personnel in the use of HCVS**

- **Key Components in NEI 13-02**

**Procedures to operate, test, and maintain HCVS will include:**

**System startup, shutdown, and off-normal conditions; standby status verification; out of service controls; system components and equipment lineups; use of portable equipment and their storage location; validated for operator accessibility with normal power and backup power; coordinated with other procedures (EOPs, SAG, FLEX); demonstrate use in drills, tabletops, or exercises with other Post Fukushima measures**

**Initial and continuing training of personnel expected to operated HCVS; training will reference specific guidance and procedures from EOPs, SAGs, FLEX); training will be refreshed on a periodic basis consistent with plant procedure control process**





# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – JLD-ISG-2013-02

Staff endorsement of the guidance in NEI 13-02 is subject to the following clarifications and exceptions:

### EPGs/SAGs/ EOPs/SAMGs

NEI 13-02 contains many references to the BWROG generic EPGs/SAGs. Staff's believes the procedural requirements to operate and make use of HCVS including whether a drywell vent is needed during severe accident conditions will depend on Phase 2 evaluations and the related rulemaking. Staff's endorsement of NEI 13-02 is not an endorsement of the BWROG generic EPGs/SAGs or plant-specific EOPs/SAMGs.

NEI 13-02 included a statement at staff's request that the requirements of Order EA-13-109 takes precedence over any design features that may be required of the HCVS to facilitate the EPGs/SAGs/EOPs/SAMGs.



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – JLD-ISG-2013-02

### Anticipatory Venting

References in NEI 13-02 for using HCVS to vent containment at lower pressure to facilitate the use of a low-pressure portable pump or to allow continued use of installed steam-driven equipment is currently being reviewed by staff as part of submittals under Order EA-12-049. Therefore, it is not addressed in this ISG.

### Appendix E – Interface with the requirements of GL 89-16

Contains no information related to the design and implementation of the HCVS. Staff did not review Appendix E, as it is not within the scope of the ISG.



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

– JLD-ISG-2013-02

Severe accident conditions – Drywell Temperature

NEI 13-02 states 545°F

Staff position:

Drywell head gasket is presumed to be the most limiting component regarding gross leakage potential during severe accident conditions and therefore, drywell vent or alternate filtration strategies should protect drywell head gasket from over temperature and over pressure failure (as occurred at Fukushima)

Ultimate integrity capability values of the drywell head gasket need to be ascertained and used, instead of specification and environmental qualification values of the head gasket for this review

Results from Phase 2 evaluations and containment analysis being performed for rule making should also be taken into account





# Interim Staff Guidance For Order EA-13-109

## Severe Accident Capable vent

### Mark I and Mark II Containments

– **JLD-ISG-2013-02**

**Instrumentation Reliability and Operating Environment**

**Effects of seismic, vibration and shock performance**

**Mounting and power requirements**

**Training, procedure development, surveillance routines for testing and calibration**

**Intrinsically safe**

**Flame proof or explosion proof features for hazardous locations**

**Habitability and accessibility**



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – Other Observations

**No schematic wetwell venting configurations included in NEI 13-02 draft.**

**Licensee submittals pursuant to Order EA-12-050 indicate a variety of vent configurations were being contemplated. The submittals for most Mark I containments appeared to be aimed at fitting the reliable hardened vent requirements to existing configurations to the extent possible. If industry takes this approach, the resulting vent systems would be acceptable provided that all the requirements of Order EA-13-109 are complied with by methods endorsed in this ISG or licensee proposed alternatives that the NRC staff finds acceptable.**



# Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

## – Other Observations

**Section III to Enclosure 1 of the communication of Order EA-13-109 stated that licensees with Mark II containments may resolve concerns about suppression pool bypass by an alternative approach to Phase 1 and Phase 2 requirements by the installation of a containment drywell vent with an installed engineered filter.**

**The ISG states that the above alternative, in effect, applies to both Mark I and Mark II containments.**



# Questions & Discussion

