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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

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WEDNESDAY

AUGUST 15, 2012

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear  
Regulatory Commission, Two White Flint North, Room  
T2B1, 11545 Rockville Pike, at 8:30 a.m., Stephen P.  
Schultz, Chairman, presiding.

SUBCOMMITTEE MEMBERS:

STEPHEN P. SCHULTZ, Chairman

J. SAM ARMIJO, Member

DENNIS C. BLEY, Member

CHARLES H. BROWN, JR. Member

MICHAEL L. CORRADINI, Member\*

HAROLD B. RAY, Member

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MICHAEL T. RYAN, Member  
WILLIAM J. SHACK, Member  
JOHN D. SIEBER, Member  
GORDON R. SKILLMAN, Member  
JOHN W. STETKAR, Member

NRC STAFF PRESENT:

ROBERT BUDNITZ, Lawrence Berkeley National  
Laboratory\*  
NILESH CHOKSHI, NRO  
RAVINDRA JOSHI, NRO\*  
ANNIE KAMMERER, RES  
STEVEN A. LAUR, NRR

\*Participating via telephone

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a Seismic Margin Assessment in Response

to the March 2012 Request for

Information Letter

by N. Chokshi

and A. Kammerer

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

(8:30 a.m.)

CHAIRMAN SCHULTZ: I'd like to call the meeting to order. Good morning. This is a meeting of the Advisory Committee on Reactor Safeguards, Fukushima Subcommittee. I'm Stephen Schultz, the Chairman of the Subcommittee.

ACRS members in attendance this morning are John Sieber -- Ja\*\*ck Sieber, Dick Skillman, Dennis Bley, Harold Ray, Sam Armijo, John Stetkar, Michael Ryan, Bill Shack and Charlie Brown.

The purpose of this meeting is review and discuss draft interim staff guidance on performing seismic margin assessment in response to the March 2012 Request for Information Letter. The Subcommittee will hear presentations and hold discussions with representatives of the NRC staff and other interested persons regarding this matter.

The Subcommittee will gather information, analyze relevant issues and facts and formulate proposed positions and actions as appropriate. The Subcommittee will report its findings in an upcoming Full Committee meeting, but at this time has not yet decided on whether to issues a letter report on this matter.

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1           The meeting this morning is open to  
2 members of the public. The rules for participation in  
3 today's meeting have been announced as part of the  
4 notice of this meeting previously published in the  
5 Federal Register. We have received no written  
6 comments or requests for time to make oral statements  
7 from members of the public regarding today's meeting,  
8 but there will be an opportunity at the end of our  
9 discussions for public comments.

10           Derek Widmayer is the Designated Federal  
11 Official for this meeting.

12           A transcript of the meeting is being kept  
13 and will be made available on the web. I understand  
14 that some of the participants in today's meeting are  
15 on the bridge line. Michael Corradini, ACRS member,  
16 is on the bridge line.

17           It is requested the speakers first  
18 identify themselves and speak with sufficient clarity  
19 and volume so they can be readily heard. Thank you.

20           We'll now proceed with the meeting and I  
21 call upon Mr. Nilesh Chokshi, Division Director of  
22 Site Safety and Environmental Analysis in the Office  
23 of New Reactors, to open the proceedings. Nilesh,  
24 thank you.

25           MR. CHOKSHI: Good morning, Dr. Schultz

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1 and thank you for an opportunity for us to come and  
2 talk to you about this draft ISG while the work is in  
3 progress. I think this time will be, you know, we can  
4 take into consideration before we have a rush to issue  
5 the position out, so I think that's good.

6 CHAIRMAN SCHULTZ: Thank you.

7 MR. CHOKSHI: With me at the table is  
8 Annie Kammerer from the Office of Research and she's  
9 been helping on the 2.1, 2.3 activities on the  
10 Fukushima. And also, by phone, Dr. Budnitz and Dr.  
11 Ravindra are participating. And I guess I'll check,  
12 Bob?

13 DR. BUDNITZ: I'm here.

14 MR. CHOKSHI: Ravi?

15 MR. JOSHI: Good morning, I'm here.

16 MR. CHOKSHI: All right, so I have my  
17 backup.

18 CHAIRMAN SCHULTZ: Thank you for being  
19 present.

20 MR. CHOKSHI: So they are here to  
21 participate in this morning's discussions. My plan is  
22 to start the presentation with a brief discussion of  
23 why we in the first place considered using the NRC-SMA  
24 for this particular application. Then, you know, in  
25 response to particularly 2.1 50.54(f) letter.

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1           Now I also want to go over a brief  
2 background of a little bit of history of the NRC-SMA  
3 in order to explain why certain announcements are  
4 needed and what really caused that ISG to come about.  
5 The need for the ISG.

6           MEMBER STETKAR: Other enhancements are  
7 not needed.

8           MR. CHOKSHI: Yes, you are right. And  
9 then most of the focus on the presentation is going to  
10 be on the technical positions. And then I'll go over  
11 most of the key technical positions and I selected  
12 three examples to discuss in more detail.

13           And then what I'd like to do is end the  
14 meeting with, tell you what the next steps are, what  
15 the schedules are. So put everything into context.  
16 So if you can go to the next slide. Oh, this is it.  
17 Okay.

18           So I think let me start with why did we  
19 include, in the first place, this option of using what  
20 we have been calling NRC Seismic Margin Analysis. And  
21 when I go over the background I think it will be a  
22 little bit clearer what this matter is about and how  
23 it has evolved.

24           But basically the 50.54(f) letter  
25 considers use of either Seismic PRA or margin method

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1 adequate for the plant evaluation. For the plants  
2 they have to conduct the evaluation because they don't  
3 pass some of the screening criteria.

4 Also the 50.54(f) letter talks about that  
5 SPRA is suitable for all conditions. And then the  
6 NRC-SMA is suitable in certain conditions. And it  
7 talks about what are those conditions.

8 MEMBER SHACK: Have you quantified those  
9 any further?

10 MR. CHOKSHI: We have, yes. And we have  
11 done more work, we had a meeting with the industry.  
12 We are actually coming together. And there is a  
13 meeting tomorrow, we're going to discuss more.

14 MEMBER SHACK: Is that going to be in the  
15 SPID or whatever we call that thing?

16 MR. CHOKSHI: Yes, it will be right here.  
17 And I think we are converging on some of the things on  
18 that.

19 MEMBER SHACK: Are you going to tell us  
20 about that today?

21 MR. CHOKSHI: I hadn't planned, but I can  
22 give you brief, you know, if you like. But it's  
23 pretty much what you have heard before. But we can go  
24 over that.

25 CHAIRMAN SCHULTZ: Niles, details that

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1 you might provide about, you mentioned that the  
2 process that has been developed by the NRC is coming  
3 together already with comments from the industry. And  
4 if you can share information that has come forward  
5 from the public meetings that you've already held  
6 prior to the public and review of this plan, that  
7 would be good.

8 MR. CHOKSHI: Yes, and the project manager  
9 is here. So what we have been doing that when we get  
10 this information, this just came yesterday, and this  
11 is a part of the SPID I was going to show you when I  
12 talk about SPID. But we are putting this in ADAMS to  
13 make it publicly available to everybody. And I think  
14 at least we can go ahead and provide the ADAMS, the  
15 number to the ACRS. So you'll see what has been  
16 discussed, all the things that, we can make sure that  
17 you have it.

18 MS. KAMMERER: And understanding it's  
19 still a very early copy. What we're doing is in  
20 preparation for each of the public meetings, we're  
21 getting the document but it's going to continue to be  
22 filled in. Basically all the topics are there but all  
23 the sections haven't been written yet and you'll see  
24 that when you look at it.

25 MR. CHOKSHI: Yes. And when I talk about

1 it, you know, that's why I put in presentation  
2 specifically discuss. I'll explain how this interacts  
3 with everything we do. And then I'll talk more about  
4 it. Some of the positions are closed for all  
5 practical purposes and in some cases we have actually  
6 endorsed some of the technical issues.

7 Other one is working the progress. At  
8 every meeting we sort of making progress in each of  
9 the --

10 CHAIRMAN SCHULTZ: So as you go through  
11 the presentation, if you could identify those  
12 categories that would be helpful.

13 MR. CHOKSHI: Yes, I'll do that.

14 CHAIRMAN SCHULTZ: Thank you.

15 MR. CHOKSHI: So coming back to this, I  
16 mentioned that we talked about in the letter that the  
17 announcement needs to be reviewed if somebody wants to  
18 use NRC-SMA. The NRC method is a fault space-based  
19 approach. And that was one of the very clear, I  
20 think, distinction made in the letter that the  
21 approach has to be fault space-based approach and  
22 specifically said that the --

23 MEMBER BLEY: Nilesh, I want to ask about  
24 that, just because --

25 MR. CHOKSHI: I expected --

1           MEMBER BLEY: Personally, if you're going  
2 to do one of these, I don't see why you don't do the  
3 PRA itself. But, having been around when both of  
4 these methods arrived, in fact being involved in one  
5 of them, I haven't seen everything that people have  
6 done with it since. But I kind of wonder what staff  
7 thinks people did to come up with their success paths.

8           Actually they had plant-specific PRA,  
9 internal events PRAs and use the fault trees and event  
10 trees in a more complete model than actually the  
11 reduced models in the other approach. So the argument  
12 seems a little fuzzy to me.

13           MR. CHOKSHI: I think part of the problem  
14 is more that if you need to extend the insight for  
15 margin to any kind of risk insights, when we were  
16 going to site specific screening process in GI-199 we  
17 found that it was extremely difficult to do any of  
18 that kind of extension. And which we would need I  
19 think in order to make the ultimate decisions about  
20 what are we going to do with this information in part  
21 of the Phase 2.

22           So I think we felt that an option is  
23 available but it should be able to then, if you need  
24 to extend to get risk insights, or for example if you  
25 want to do some more like cost/benefit or some

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1 regulatory analysis, you will have to do that. And we  
2 found that very, very troublesome to do.

3 MEMBER BLEY: Back to what Bill asked.  
4 Are you getting much from industry at this point?

5 MR. CHOKSHI: No, they actually, I think  
6 the question you asked in the last, because what is  
7 happening, because of the type that they are asking  
8 certain simplifications in the PRA process.

9 And I was going to go through them. And  
10 we are putting certain enhancements to cover the right  
11 scope for the things you have mentioned that, you  
12 know, EPRI had 72 hours. NRC whenever they went over  
13 the recent revisions didn't.

14 So we are including that now, because when  
15 NRC matter was developed and the thinking has evolved  
16 since then. So you will see that both of these  
17 approaches are coming very, very close to each other.  
18 And I think, and I'll speak from what I've heard in  
19 discussions. You know, this is not industry's formal,  
20 but at this point a lot of people are thinking SBR.

21 MEMBER BLEY: I would think so. It just  
22 doesn't make sense if you do --

23 MR. CHOKSHI: And that's how, you will see  
24 as you went on. The problem, I think, it's not really  
25 doing the SPRA RS margin. It's the availability of

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1 expertise to do the response analysis and fragility  
2 type of analysis. That's what the bottom line is.

3 MEMBER BLEY: I want to flag something for  
4 going ahead and I want to mention it. John Stetkar  
5 first triggered this in my head yesterday. When the  
6 HCLPF idea was developed, it was you picked the value  
7 low enough that you're really certain that you won't  
8 get any damage at that level, even though it's low  
9 probability. It's close to certainty I think.

10 And if you met everything with the HCLPF  
11 you were very confident. But now we're talking about  
12 taking HCLPF as an anchor point and hanging an  
13 uncertainty curve onto that. Well when you start with  
14 the median, which is what you did in the PRA, and put  
15 the uncertainty on it, the amount of conservatism in  
16 that is hard to judge but you try to pick the best  
17 uncertainty band. But it's the interplay of that  
18 curve with the hazard curve that tells what risk is  
19 and it might be lower or higher as you change that.

20 When you anchor to the HCLPF and then put  
21 the uncertainty on it, the wider the uncertainty, the  
22 lower the risk no matter what. It seems an  
23 intellectually indefensible way to approach this.

24 MR. CHOKSHI: Well in fact what you will  
25 see, that's one of the positions, which position is

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1 the user CDFM to anchor the fragility. And then what  
2 we are talking about that when you come to the end of  
3 the analysis you want to take your dominant  
4 contributors and look at it from a medium capacity  
5 point. Due to the fragility type of --

6 MEMBER BLEY: But if you haven't  
7 calculated the median, the median's and artifice of  
8 whatever uncertainty you tagged on that's artificial.

9 MR. CHOKSHI: That's why we want to  
10 separately do a separate calculation for those  
11 components.

12 MEMBER BLEY: I'm still uncomfortable. I  
13 want to hear more later, because if you take median  
14 capacities and median hazard you get no risk.

15 MR. CHOKSHI: Yes, I agree with you.

16 MEMBER BLEY: In doing it, because that's  
17 by design.

18 MR. CHOKSHI: And that's what we are  
19 talking about. That, when it come down and you have  
20 accident sequences and then you have skewed confidence  
21 when you know that those are the controlling. You  
22 want to go back to characterize those uncertainties.

23 MEMBER BLEY: Actually developing the  
24 median.

25 MR. CHOKSHI: Yes, that's what I'm talking

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1 about.

2 MEMBER BLEY: Ah, okay. Well that's a  
3 different story. But it sounds kind of --

4 MEMBER STETKAR: If you use this approach  
5 and you inappropriately characterize the median and  
6 you develop those sequences and you do any type of  
7 modification, you may have missed your dominant  
8 contributors because they were inappropriately small.  
9 So how do you define those dominant, you throw around  
10 the words dominant contributors as if it's a de facto  
11 truth. They may not appear.

12 MR. CHOKSHI: Yes, and I think one of the  
13 things, and if you look at this, that industry is  
14 doing some of the studies to support that can you make  
15 those kind of, you know, can you show that there is no  
16 change when you take the PRA and do it both ways  
17 basically. And see, they're not going to do that for  
18 everybody, but as a supporting study for the position.

19 MEMBER BLEY: The HCLPF idea was to gain  
20 some confidence that even with very, very low  
21 capacities you're okay. And now using that as an  
22 anchor point for the distribution just doesn't seem a  
23 reasonable position. We'll have to see what industry  
24 does with it but it's --

25 MR. CHOKSHI: And the reason, what drives

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1 that for them to do that, is that a lot of, you know,  
2 many people can't do the CDFM type calculations,  
3 because it's very prescribed procedure, right. And  
4 the fragilities we have seen that unless, it gets a  
5 lot more complex.

6 MEMBER BLEY: But it's probably okay for  
7 getting HCLPF, for having a high confidence, low  
8 probability. But it's just the wrong place to anchor  
9 your distribution. It might not be the one percent  
10 level, it might be something quite different.

11 MR. CHOKSHI: But Bob Kennedy has done  
12 earlier studies, you know, looking at the difference  
13 of beta values and things. And I'm shocked that as  
14 you suggested, neither beta is bad if you anchor your,  
15 in the sense that you are --

16 MEMBER BLEY: Let's see what you're going  
17 to do. If you use minimum betas then I'd be much more  
18 convinced. But you're not recommending that, you're  
19 recommending kind of a middle level uncertainties  
20 parameter.

21 MR. CHOKSHI: If you go back to taking the  
22 square, I think we're looking at 0.3/0.35 type of  
23 values.

24 MEMBER BLEY: Yes, that's just kind of a  
25 middle value.

1                   MEMBER STETKAR: That's sort of a middle  
2 level if you look at hundreds of actual fragility  
3 analyses that have been done for thousands of actual  
4 compliments. 0.35 is sort of a middle level. They  
5 range from about 0.2 to about 0.6. So it's kind of a  
6 middle level. It would be grossly optimistic for  
7 things that would have a beta-C of 0.2. It would be  
8 conservative for things that have a beta-C of 0.6.

9                   MR. CHOKSHI: Yes, well I think that's,  
10 again, this the sort of ongoing discussion with  
11 industry. We are waiting for some of the results to  
12 come back. But that's a good input.

13                   MEMBER BLEY: And you'll get more about  
14 that if it stays like this.

15                   CHAIRMAN SCHULTZ: Nilesh, if we could  
16 hold right here for just a few moments. The recorders  
17 need to make a swap out here. And so I'm going to  
18 call a recess, it may take about ten minutes.

19                   MR. CHOKSHI: Bob and Ravi, I think if you  
20 also like to address some of this, please.

21                   CHAIRMAN SCHULTZ: But think about it or  
22 prepare for it now and we'll come back into session in  
23 just a moment.

24                   (Whereupon, the meeting in the above-  
25 entitled matter went off the record at 8:48 a.m. and

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1 resumed at 8:57 a.m.)

2 CHAIRMAN SCHULTZ: I'll call the meeting  
3 back into session now, following a short recess.

4 MR. CHOKSHI: I think the last we left,  
5 Bob, do you want to add anything to the discussion  
6 about, you know, that we were having about use of CDFM  
7 and how we are looking at the SPID position.

8 DR. BUDNITZ: Well, this is Bob Budnitz.  
9 And I've been a consultant to Nilesch and Annie and the  
10 Research staff right along on belt with this. And I  
11 don't mind saying that when SMA was invented in 1984  
12 and '85 there was an expert panel that I chaired, so  
13 that was way back in the last millennium, if I must  
14 say.

15 Now the reason for allowing CDFM for the  
16 bulk of all the seismic capacities, the conviction  
17 that if we required fragility analysis method, which  
18 is the separation of variables method, done, there  
19 isn't enough talent out there in the world to do it.

20 We just, there's a lot of experience that  
21 tells that analysts, and Ravindra's on the phone and  
22 he's a premier tech. A whole lot of experience has  
23 told us that you just can't turn the fragilities  
24 analysis separation to a very large number of people  
25 without -- but we have more confidence with the

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1 ability of analysts, of a large number of analysts, to  
2 develop a HCLPF value directly using the CDFM method  
3 directly.

4 MEMBER BLEY: Bob?

5 DR. BUDNITZ: Let me go on. But the  
6 crucial point is that in most seismic PRAs, that I've  
7 seen, in fact, in all of the seismic PRAs that I've  
8 seen, there's never more than a handful of components  
9 that I would say are the leading components in, let's  
10 say the seismically weakest ones. There's never as  
11 many as ten that are the weakest ones. It's typically  
12 more like a half a dozen or sometimes even three or  
13 four.

14 And what we've said is that we want for  
15 those leading components, the weakest ones in the  
16 HCLPF space, we want some of those re-analyzed using  
17 the fragility analysis method. The separation of  
18 variables method. And then for the many, many others,  
19 stronger, stronger enough to contribute, we are  
20 comfortable with letting the CDFM method for the HCLPF  
21 stand as sufficient. Okay?

22 MEMBER BLEY: Bob?

23 DR. BUDNITZ: Yes.

24 MEMBER BLEY: This is Dennis Bley, give me  
25 a second, Ravi, and then you can come in. Our point

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1 wasn't really arguing about the HCLPF. Although I  
2 think it's not the best way I think it's perfectly  
3 adequate for what the purpose of the HCLPF is.

4 Our discomfort comes from then taking that  
5 HCLPF and hanging a distribution on it. You know, if  
6 one looks at the weakest things from the point of the  
7 HCLPF that's probably a pretty reasonable thing. But  
8 if one uses that as an anchor point, hangs a  
9 distribution that was developed to go around the  
10 median onto that kind of artificially picked HCLPF and  
11 then uses the results of an analysis that involves  
12 that with a hazard you're taking a bit of a chance.

13 DR. BUDNITZ: Let's agree. In other words  
14 if you take the HCLPF value, you put on a generic beta  
15 sequence then you do a convolution of that with a  
16 seismic hazard, you do not have a very accurate  
17 estimate of the risk per year of that unit getting in  
18 trouble.

19 MEMBER BLEY: Yes, your mean could be well  
20 off, you don't know for sure.

21 DR. BUDNITZ: Exactly correct. So you  
22 shouldn't be doing that convolution. For those ones,  
23 that I'll call the lowest lying ones, in this guidance  
24 we're going to insist -- And by the way the industry  
25 is onboard on this. Was with us 100 percent on this.

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1 And Greg Hardy too. That we want them to do the  
2 fragilities analysis method that gets to the median  
3 value and does the thing properly. And then you can  
4 take that and do the convolution with the seismic  
5 hazard.

6 MEMBER STETKAR: Bob, this is John  
7 Stetkar. When you say you'll take the lowest lying  
8 ones, is that based on HCLPF or is that based --

9 DR. BUDNITZ: Yes.

10 MEMBER STETKAR: Well that's the way I  
11 read the ISG. The ISG seems to say that you infer a  
12 median and you use that value with your seismic  
13 hazard. Run it through your scenarios and then  
14 determine what your so called dominant contributors  
15 are and then go back and re-look at those. So that's  
16 a little different. Maybe I --

17 DR. BUDNITZ: I hope that that isn't how  
18 it, I don't think that that's what we're writing. If  
19 it is either you've got an earlier version or the  
20 thing that I've got isn't, I --

21 MEMBER BLEY: Well I hope you have a newer  
22 version. That's what this one says.

23 MEMBER STETKAR: It's at least the way I  
24 interpret it. If there's a different interpretation  
25 and we can get educated this morning that would be

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1 good.

2 DR. BUDDNITZ: I think I understand.

3 MR. CHOKSHI: Yes, I think, Bob, that we  
4 are talking about two things here. What is intended  
5 for SMA and what's industry position also in  
6 conducting SPRA.

7 DR. BUDNITZ: Oh no, we're talking about  
8 SMA here. Okay.

9 MR. JOSHI: This is Ravi. Good morning.  
10 Hi.

11 CHAIRMAN SCHULTZ: We hear you, Ravi.

12 MR. JOSHI: Okay. Now, important is the  
13 CDFM calculated value as calibrated in a -- (telephone  
14 line cuts out) combo to see whether we get a different  
15 value if we do a -- (telephone line cuts out)  
16 analysis. The answer depends on the --

17 MEMBER BLEY: Excuse me, Ravi. Ravi,  
18 you're cutting out. Ravi, we can't hear you, you're  
19 cutting out. Can you get to a better phone?

20 MEMBER STETKAR: We're getting about one-  
21 third of your words in every sentence.

22 MR. CHOKSHI: Yes, you need to be on a  
23 land line, I think.

24 MR. JOSHI: I can hear you well.

25 MEMBER STETKAR: We can't hear you well.

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1 CHAIRMAN SCHULTZ: It breaks up on our  
2 end.

3 DR. BUDNITZ: Oh, by the way I think I can  
4 answer Stetkar's question while he's doing that. If  
5 you have an ordered list of HCLPFs and you put a  
6 generic beta-C on them, medians you get are ordered in  
7 the same order. That's for sure. Now you shouldn't  
8 be using them to convolute with an hazard for sure.  
9 If you do it that way the order has to be the same,  
10 because the beta-C is generic.

11 So for the purposes of trying to decide  
12 what you're ordered list is of lowest ones, one, two,  
13 three, four, five, six, seven, the HCLPFs will line  
14 up, medians will line up.

15 MR. JOSHI: This better?

16 DR. BUDNITZ: By the way but you shouldn't  
17 be convoluting that with a hazard to get what I would  
18 call CDFM.

19 MEMBER STETKAR: So we seem to be pretty  
20 well in agreement on that.

21 DR. BUDNITZ: But we're talking here about  
22 SMA, the seismic PRA is a different discussion.

23 MEMBER STETKAR: Ravi, you want to try  
24 again?

25 MR. JOSHI: Yes, can you hear me now?



1 MEMBER STETKAR: So far.

2 MR. JOSHI: The CDFM calculation that  
3 provides HCLPF value has been calibrated with using  
4 the fragility analysis. We have done a number of  
5 examples to see if similar HCLPF values whether we do  
6 this CDFM or the fragility analysis. The answer was  
7 we will, at about the HCLPF value. And that HCLPF  
8 value from a split -- point percent probability of  
9 failure.

10 So the approach is, the CDFM HCLPF value  
11 is taken as one percent probability of failure and  
12 then you can develop, using generic -- you can develop  
13 a (telephone line cuts out) curve. The anchor --

14 CHAIRMAN SCHULTZ: Ravi, you're breaking  
15 up again. I'm not sure what the solution is, but  
16 there is a technical issue here with the communication  
17 line.

18 MR. JOSHI: Can I hang up and call again?

19 CHAIRMAN SCHULTZ: Sure. Are you on a  
20 speaker phone?

21 MR. JOSHI: I'm on a speaker phone.

22 CHAIRMAN SCHULTZ: A handset might work  
23 better.

24 MR. JOSHI: Is this better?

25 CHAIRMAN SCHULTZ: No, that's not better.

1 MR. JOSHI: I'll hang up and call again,  
2 okay.

3 CHAIRMAN SCHULTZ: Okay.

4 MEMBER SHACK: Just reading in Appendix A  
5 there's a discussion that goes on here about this  
6 composite method. One disadvantage is that the  
7 assumed composite variability may give conservative  
8 estimates of seismic CDF.

9 Another instance it may lead to erroneous  
10 conclusions as to the dominant risk contributors.  
11 Then it goes on to say, for those SEC that are  
12 determined to be the dominant risk contributors,  
13 better estimates of A, M and B should be developed.

14 So it tells you you might get them wrong  
15 but then go ahead and --

16 MEMBER BLEY: But it's not just  
17 conservative, they could be the other way. They could  
18 be optimistic.

19 MEMBER STETKAR: What they don't say is  
20 they could be optimistic.

21 MEMBER SHACK: But it says it gets to  
22 erroneous conclusions and then it tells you how to use  
23 them.

24 MEMBER STETKAR: That is certainly true.

25 MR. CHOKSHI: I think, I fully agree that

1 we know in a review, people making the larger beta it  
2 may, but when you enter your fragility to HCLPF --

3 MEMBER STETKAR: That's not true. The  
4 most conservative beta to use, if you're going to use  
5 this as a screening process, would be the smallest  
6 beta that you've gotten from anybody doing real  
7 fragility analyses of SSCs for a real plant.  
8 Something on the order of maybe 0.2, 0.1, I've seen  
9 0.15s for some analyses where things are not very  
10 rugged and there's a high likelihood of failure.

11 MR. CHOKSHI: I mean most of the things  
12 I've seen are sort of 0.3 to 0.6.

13 MEMBER STETKAR: Because most of the  
14 things have been done generically by the same people  
15 who use the same generic beta-r and beta-u, that's  
16 why.

17 MR. CHOKSHI: No but I think, yes, the  
18 discussion, that just comes as taken for what we are  
19 developing with both PRA and SMA. And I was going to  
20 talk about that. And this one of the factors why  
21 these things are coming closer, because they're  
22 talking about certain things using the PRA space and  
23 also similar conceptions of margin space. So maybe if  
24 I go on we can see all of that.

25 MEMBER STETKAR: We'll probably come back

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1 to it.

2 MR. CHOKSHI: At least we'll come back  
3 here. So I think probably we are done with that  
4 slide. I cannot do it here. All right. This is how  
5 the draft ISG has been divided into these sections.  
6 Trying to follow the sort of formats we have been  
7 following for the ISG.

8 And I'm not going to go each of the  
9 sections which are in the ISG, but I want to talk  
10 about a couple of things in detail. Purpose,  
11 background and our staff position. And then I think,  
12 I'm sure you'll have questions related to other  
13 things. But I was going to focus on some of the key  
14 aspects of the ISG, but that's how it's laid out.

15 Purpose. Okay, the purpose of this ISG I  
16 think Bob Budnitz mentioned and I mentioned in my  
17 introduction. The NRC-SML has been developed in early  
18 80s. There has been a number of other things have  
19 happened since then.

20 Also for this particular specific  
21 application I think we dealt ourselves special  
22 circumstances, which of I'll explain in my  
23 presentations. So the guidance is needed for that  
24 purpose. And I will go into more details of why the  
25 guidance is needed.

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1           But the specific purpose of this guidance  
2           is to give guidance on using NRC-SMA for the purpose  
3           of developing information requested in 50.54(f)  
4           letter. And this guidance is intended to used for  
5           that purpose only at this time. Okay, because we have  
6           made, as you will see, that certain decisions are made  
7           which are not necessarily, you know, if you're  
8           literally compatible with what standard says or some  
9           other thing says. But for this applications we have  
10          created certain positions.

11           So this is, it should not have  
12          implications for other things. You know, for example,  
13          for the new reactors it is clear this should not be  
14          confused with ISG-20, you know, this is not for that  
15          application. So I think we just wanted to make sure  
16          the users of these are, you know, and this has not  
17          been misapplied, because some of the things we are  
18          bringing up, you know, these things are --

19           MEMBER SHACK: I would say anytime you  
20          have to apply that kind of codicil to guidance, it  
21          tells you you're stepping into deep doodoo.

22           MR. CHOKSHI: Well this is, I think if  
23          you're talking about this issue if you have to do 30  
24          or 40 applications at the same time and you're talking  
25          about limited resources you want to do the right

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1 things. But we're trying to find the best way but you  
2 can still get to the objective for that particular  
3 application. But I don't think really to say they  
4 should be used for everything.

5 MEMBER STETKAR: Nilesh, make sure I  
6 understand the basic rationale here, because there  
7 were a couple of places in the ISG where that second  
8 bullet is emphasized. You say that the DC/COL-ISG-020  
9 is more appropriate for new reactors. That implies  
10 it's less appropriate for existing reactors. Is it  
11 strictly the resource associated with fragility  
12 analyses? That's the only issue?

13 MR. CHOKSHI: To me that's the biggest  
14 issue. I mean, they in fact, in very initial  
15 discussion we were talking about using ISG-20 for this  
16 also. But in that case there is no option. ISG-20 is  
17 an option when you don't have a hazard information,  
18 basically. Here you have a hazard information. So to  
19 say that ISG-020 is an option to me doesn't make  
20 sense. And the next step is to go on, in regard to  
21 your answers.

22 So I think for this one we thought for  
23 some of the low seismic hazard site this is why a bold  
24 approach, but it has to be fault-based. Okay, let me  
25 go now, above here on the slide on the background on

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1 NRC-SMA, I'm sorry I haven't been announcing where I  
2 am, so you and Ravi can both follow. So I'm on the  
3 background slide.

4 Let me just repeat, because ACRS has a lot  
5 to do with SMA in some sense. I think it is like, as  
6 all of you know, in the late '70s and early 80's the  
7 NRC undertook a very systematic, comprehensive program  
8 to look at the sort of seismic safety in its totality.

9 There were a lot of issues, particularly  
10 in when in '60s and mid '70s the seismic design  
11 processes became involved. There were controversies  
12 about positions in SRP. Some of the people were  
13 saying some of the things are very conservative. And  
14 there were issues that it was not conservative.

15 So the SSMRP looked at very  
16 comprehensively at the question of the conservatism,  
17 the various steps and also the level of the seismic  
18 risk analysis matter. You know, a lot of that the  
19 people involved also developed the industry side and  
20 were the same people, Bob Kennedy and a number of  
21 people were starting, Ravi also was part of that.

22 So the SSMRP had a very comprehensive look  
23 at that. And while that was ongoing, there was a  
24 discussion about -- and particularly Professor  
25 Oakland, I think, and the ACRS was concerned with

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1 that: is there sort of a cliff? We haven't really  
2 answered the question beyond design-basis margin. Can  
3 we quantify and can we answer.

4 So in response to that ACRS concern the  
5 NRC found an expert panel, which was chaired by Bob  
6 Budnitz, and so Bob is much better to talk about this  
7 but I'll continue with my discussion. And so they  
8 found the question, how do we define, come up with  
9 this, what is the actual seismic margin of the plant,  
10 beyond design-basis.

11 The deliberations, the panel included Bob  
12 Kennedy, Alan Cornell, Shinozuka and lot of those  
13 experts at that time. And we had talked both in terms  
14 of the probabilistic and had work with, particularly  
15 in the structural area with reliability type of  
16 concepts.

17 And so this panel then got together and  
18 they basically said that an easier way to address this  
19 question is not come up with **the** margin that you can  
20 answer that question, but it's to add sort of a define  
21 an earthquake level which is higher than the design-  
22 basis, and then measure your plant against that.

23 And so then, I think, as those two sub-  
24 bullets show, find the plant capacity to resist that  
25 -- high confidence, low probability of failure to

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1 resist that level of earthquake. And so they defined  
2 this HCLPF: high confidence, low probability of  
3 failure. So that's been the two major approaches.  
4 You know the key concepts came out of that  
5 deliberation.

6 And that's how the method of analysis is  
7 structured around those two basic ideas. That you  
8 define a DB-level earthquake or seismic margin  
9 earthquake, which is higher than the, you know, and  
10 you'll see about that in the applications that concept  
11 has your, part of that in terms of you talk about  
12 screening, it's an important step. So that's why we  
13 --

14 MEMBER STETKAR: Are you going to talk a  
15 little bit more in detail about that screening or this  
16 --

17 MR. CHOKSHI: Yes, I'm going to talk in a  
18 lot of detail about that.

19 MEMBER STETKAR: Okay, thank you.

20 MR. CHOKSHI: So that, to me, it's a key  
21 step on this whole, you know. So the NRC-SMA, as  
22 opposed to the EPRI and things, was basically the  
23 panel used the insights from the PRAs, which were  
24 available then and I think that I can rattle off some  
25 names, Zion and Indian Point and Limerick, Mill Stone,

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1 all of those things which were available at that time.

2 MEMBER STETKAR: And that was all of them,  
3 there were about five.

4 MR. CHOKSHI: I think you exhausted my,  
5 right. And then they also basically retained the  
6 false based approach. They focused on selected  
7 functions and the thought was that if you look at  
8 dysfunctions you will capture most of the structure  
9 systems and components you want to look at whenever.  
10 But you've covered most of the front line and support  
11 systems, which allowed to simplify the logic structure  
12 quite a bit.

13 And I think, Dennis, you talked about when  
14 safe shutdown and was the old approach with NRC, that  
15 was right. So I'll talk about more on that. And  
16 another thing I think at the same time was this  
17 screening tables based on the available test data  
18 calculations done for the fragilities.

19 Earthquake experience played a big part on  
20 that. That you could look at certain, and because we  
21 are defining a specific level of earthquake, you could  
22 use that experience, coupled with the level of  
23 earthquake, to eliminate certain components, eliminate  
24 certain conditions. Okay, so that was allowed to use  
25 the scope of the analysis, so they were both.

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1           And then I think the last bullet is that  
2 we have been talking about the Min-Max approach. When  
3 you do the HCLPF how you quantify sequence level HCLPF  
4 and ultimately your plant level HCLPF. And I'll talk  
5 more about that. There is also somewhat an evolution,  
6 little bit about that as well.

7           The matter was published in the Expert  
8 Panel Report, 4334 ('85), followed by some detailed  
9 guidelines on how to apply that. And then also there  
10 is more system insights, in particularly the BWR in  
11 5076.

12           And this was actually applied in the Maine  
13 Yankee. Maine Yankee had actually a licensing issue.  
14 Their design-basis there was a question about because  
15 of the -- if I remember right, GAAP and earthquake,  
16 the people knew about them after the plant was  
17 licensed and whether they should have been considered  
18 in the design basis.

19           So the Maine Yankee volunteered to have a  
20 trial application for the NRC-SMA, because at that  
21 same time they can also answer the question, is design  
22 basis what the plant built on. So that's why that was  
23 applied. Just really a trial plant, and I was  
24 involved quite a bit and, in fact, wound up writing an  
25 SER for addressing that licensing issue.

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1           So that was the application and the other  
2 applications of NRC-SMA, when industry did Hatch for  
3 their success path approach, NRC did the system  
4 review. And some of the insights came out from that  
5 also. So that is my, the guidance of the NRC-SMA is  
6 sort of scattered in some number of documents. If you  
7 want to systematically understand how to apply today  
8 you'll have to go to a number of documents. And  
9 that's -- Bob, I'm going to the Slide, Reasons for  
10 Enhancements.

11           DR. BUDNITZ: Yes, I'm watching it, I  
12 think out here we've got it. I think Ravi probably  
13 does too.

14           MR. CHOKSHI: So that is one of the  
15 reasons for why for why we want to have ISG to try to  
16 bring in all these different things, help, and just  
17 historically in one place. So the people understand  
18 that.

19           And second, the other big reason is the  
20 scope of the analysis to respond to a 50.54(f) letter  
21 has to be bigger than what was in the original, you  
22 know, the Group A function zone. And I think one of  
23 the things is that we need to extend the time to look  
24 at more, going down to the stable shutdown.

25           Also the references. You know, the things

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1 we talk about, the fragility analysis and the basic  
2 principles that have not changed, but there has been  
3 some advance made on particular aspects of those  
4 matters. So we want to capture that people use that  
5 and don't rely on what's referenced on the old  
6 documents. Because then it's also bringing, and then  
7 also you want to, as I have been mentioning, these  
8 industry positions we are working on, which, its  
9 primary driver has been talked about in context of  
10 SPRA but a lot of those are applicable here. So we  
11 want to make it consistent.

12 So that's the reason for, and that's why  
13 this ISG is bigger. I initially thought that we'll  
14 only talk about enhancement. But as the things have  
15 progressed, it has become clear that we need to put it  
16 in one place. And so we have tried to cover all of  
17 the major elements of the matters.

18 MEMBER SHACK: I found it difficult even  
19 to track down those old NUREGs. I've never found the  
20 BWR one, I've got the PWR one.

21 MR. CHOKSHI: Yes we actually, I think  
22 between Bob, me and going back to original authors we  
23 have been able to scrounge up all.

24 MS. KAMMERER: We're having everything  
25 that's referenced, we're finding, getting scanned and

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1 getting put into ADAMS.

2 MEMBER SHACK: Oh good.

3 DR. BUDNITZ: Anybody that wants 5076 now  
4 I'll email it to you.

5 MEMBER SHACK: Can you do that, Bob?

6 MS. KAMMERER: We found that at least one  
7 shares a NUREG number with another document as well.

8 DR. BUDNITZ: Who wants it?

9 MEMBER STETKAR: Send it to Derek.

10 DR. BUDNITZ: I'll send it right now. I  
11 found a copy in my basement and scanned my personal  
12 copy.

13 CHAIRMAN SCHULTZ: Thank you, Bob.

14 DR. BUDNITZ: Don't laugh, it may be the  
15 only one around.

16 MR. CHOKSHI: Okay, so we're going to move  
17 on to the next slide. And then we're going to start  
18 talking about the staff positions on technical issues.  
19 And basically the technical issues we have divided  
20 into the five categories, as shown here.

21 And I'm not going to read the slide, but  
22 the way the ISG is structured that those five areas  
23 are the scope of the SMA. Things related to the  
24 ground motion and the responses of structures and  
25 systems and confidence. How do you add those, you

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1 know, the system analysis part, the fragility and  
2 capacity parts which includes fragility method, CDFM  
3 method.

4 And then finally integration. And then  
5 documentation and peer reviews are in a separate  
6 section. Sections 5 and 6. So that's sort of each  
7 element that we have grouped together.

8 And my presentation is not going to  
9 necessarily going to follow, you know, follow this  
10 because what I've done is tried to pick up sort of key  
11 positions are make them clear, because I think  
12 otherwise I would have to restructure my presentation  
13 very drastically and I have the slides available. But  
14 I think it can raise the, you know.

15 But before I do that we'll be talking  
16 about the SPID approach and I sort of want to describe  
17 what it is. The SPID approach is when we, as a part  
18 of the 2.1 letter, if you look in the letter it  
19 specifically says that the staff and industry will  
20 work together to develop implementation guidance by  
21 November of this year.

22 And that process, that is twofold  
23 approach. Industry will develop certain industry  
24 positions, working with the staff, and they will  
25 submit to the staff and the staff will endorse it.

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1 The second part is that where there are specific  
2 things which staff would like to see to be applied or  
3 there is a need for staff interim positions, staff  
4 will issue an interim staff guidance.

5 So in the seismic area there's a mixture  
6 of both. The only ISG actually is this one. And the  
7 rest of the things we are going to work for the  
8 Screening, Prioritization and Implementation Details  
9 Guide. So that's what the approach is to address the  
10 guidance issue.

11 MS. KAMMERER: Just to make one point, is  
12 that the topics, I think the next slide is the 11  
13 topics that are being discussed, those are topics that  
14 were actually identified by industry as those that  
15 they felt that they needed additional guidance on.

16 And so that was the source, so they're not  
17 a comprehensive set of guidance, they're a little bit  
18 patchy. But it was something that they really felt  
19 had an opportunity to either go awry or that they  
20 wanted input so that we could get a more consistent  
21 response.

22 MR. CHOKSHI: Yes, and I think, I'm going  
23 to go to that list of issues.

24 MEMBER STETKAR: Before you get to  
25 specific issues, are we going to see that document?

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1 MR. CHOKSHI: That document is actually,  
2 versions of them are already available in public. We  
3 can make sure that you have, it's an evolving  
4 document.

5 MEMBER STETKAR: No, but I mean if it's  
6 going to be published in November they tend to be in  
7 a state of flux until they're published. So we've had  
8 that experience seeing things --

9 MR. CHOKSHI: It is. Every meeting,  
10 before the meeting they give us the new version.

11 MS. KAMMERER: Right. So when we started  
12 out back in April the very first thing that they did  
13 was actually just come in with a set of items. And so  
14 we've gone through a process up until the last public  
15 meeting, which we've been doing about one a month,  
16 where we were just working from a series of position  
17 statements and working through those positions  
18 statements.

19 As of the last meeting we managed to  
20 resolve, come to agreement, on a number of them to the  
21 point where they felt like they could actually then  
22 put together the first draft of the document, which is  
23 what we will have available for you. Understanding  
24 there's still sections which are empty.

25 MR. CHOKSHI: Yes, and you will see the

1 example, you know, I have a specific example of how we  
2 started, initiated, this process and where we are.

3 MS. KAMMERER: But we can also provide you  
4 information from the public meetings, because there  
5 will be some gaps in the SPID document on some of the  
6 positions because it hasn't been written yet.

7 MEMBER STETKAR: I understand the state of  
8 flux. What I was asking is will the ACRS Subcommittee  
9 have the opportunity to give you comments on that  
10 document when it develops some sort of stability and  
11 before it's published? I draw the analogy to the FAQ  
12 process that went on during the fire analysis, where  
13 it just seems very similar to that.

14 And in many cases, you know, fairly  
15 substantive technical issues are resolved in that  
16 forum. And I think it would be useful for us to see  
17 that document, when it becomes more stable, because  
18 it's not useful to see something that will change at  
19 the next meeting. But in some sort of timely fashion  
20 before it's published.

21 MR. CHOKSHI: Yes, I think we'll take that  
22 back, then we'll schedule it and get back, when it  
23 looks like fairly stable and then we can come.

24 MEMBER STETKAR: I mean that sounds like  
25 October, which is only three months away.

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1 MR. CHOKSHI: Now I'll tell there are a  
2 couple of things which have, and let me come to that,  
3 we already endorsed because of the timing. But I'll  
4 talk about each of those, one of the things. Because  
5 that will have a big impact on certain things.

6 Okay so now let's specifically talk about  
7 the 11 issues. And the issues came about sort of a  
8 joint discussion. Because if you look at like Number  
9 2, Hazards. Okay, use of existing site conditions.  
10 In doing the hazard analysis the local site response  
11 analysis is a key step. And how do you get some of  
12 the data in an existing site you can build, you know,  
13 do the bootings under the plant and stuff.

14 So we had extensive dialogue and industry  
15 did supporting studies and gave us a lot of, there was  
16 extensive interaction. They developed the process, we  
17 reviewed, we give them feedback and modified it. But  
18 at this point it's essential integrating for  
19 performing hazard analysis so we settled that first.

20 So the industry came back one or two weeks  
21 back on that, based on our discussions, they finalized  
22 their approach and then we reviewed that final one and  
23 then endorsed it. Now the rest of the other things,  
24 you know, risk analysis, screening, again we are  
25 making progress on a number of things.

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1           Some of them are pretty close to coming to  
2 a closure and some of the things are proceeding. So  
3 as you will see there are a number of elements which  
4 are also discussed in this ISG.

5           MEMBER CORRADINI: So can I ask a  
6 question?

7           MR. CHOKSHI: Yes.

8           MEMBER CORRADINI: So this is Mike  
9 Corradini. The first thing, the reference on the use  
10 of the updated EPRI attenuation models. And EPRI, has  
11 that been reviewed by the NRC or is that still being  
12 developed. I guess I didn't understand.

13          MR. CHOKSHI: No, that one is still being  
14 developed.

15          MEMBER CORRADINI: Because it was my  
16 understanding there's still some inconsistencies or  
17 things that need to be looked at there.

18          MR. CHOKSHI: Yes, here is how whole thing  
19 is working, okay. The hazard one, I mean, is that in  
20 fact the industry is meeting today, in their own  
21 meeting, to decide whether they want to proceed with  
22 this option based on some preliminary analysis they  
23 have done. And what they have indicated to us that  
24 based on that they will let us know whether they are  
25 going to proceed with this option.

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1           In order for them to use this in a timely  
2 fashion they need to have an analysis approval, in a  
3 sense, by February of '13. But the idea is that if  
4 this does not look feasible then they will use the  
5 current attenuation models.

6           MEMBER CORRADINI: So maybe this is a step  
7 back. And again I'm not as, John and Dennis are much  
8 more in tune to all of this, but if I could take one  
9 step back. The source model for all of this is the  
10 new USGS for Central and Eastern?

11           MR. CHOKSHI: Yes.

12           MS. KAMMERER: It's not USGS, it's NRC,  
13 DOE and EPRI.

14           MEMBER CORRADINI: Okay. But isn't the  
15 basis of that the USGS?

16           MS. KAMMERER: No, no. It was a brand  
17 new, they participated as consultants to us, but it  
18 was not based on the USGS. It was a brand new,  
19 starting from scratch, shock level 3 study.

20           MEMBER CORRADINI: All right, so I  
21 apologize, I didn't realize that. I thought it was  
22 directly linked to the USGS.

23           MS. KAMMERER: No, although they're going  
24 to incorporate a lot of the elements.

25           MEMBER CORRADINI: Okay. And so that's

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1 the source that's going into that, that's the basis?

2 MS. KAMMERER: Correct. Well that's, yes,  
3 that's the source model. Then this is talking about  
4 the attenuation. And so what this is is a Level 2  
5 Shock Level 2 update to the previous model to address  
6 some enhancements that may be needed. And then it  
7 will still be replaced by the ongoing NGA East Shock  
8 Level 3 Project which is also starting from scratch.  
9 Which is a much larger more comprehensive study.

10 MR. CHOKSHI: And which will come later,  
11 right?

12 MS. KAMMERER: And which will come later,  
13 right.

14 CHAIRMAN SCHULTZ: What is later, roughly?

15 MR. CHOKSHI: 2014/'15.

16 CHAIRMAN SCHULTZ: 2014, okay, thank you.

17 MR. CHOKSHI: So I mean I wouldn't be  
18 surprised if it even goes further out.

19 MEMBER CORRADINI: So the question, it's  
20 a little bit off topic, but I guess I want a link to.  
21 So as you corrected me that this is really a  
22 combination of NRC, DOE and EPRI, which has USGS as  
23 part of it. So is the results of the source model  
24 that was done here different in the sense of larger  
25 magnitude sources than what other civilian

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1 infrastructures are going to have to deal with? I'm  
2 lost somewhere.

3 MS. KAMMERER: So you look at the  
4 magnitude distribution relationship, so the  
5 probability of different magnitudes. So we're not  
6 designing to a magnitude, we design to a ground  
7 motion. So really the magnitudes are tied to the  
8 likelihood of their occurrence over any particular  
9 time.

10 Civilian infrastructure, for example the  
11 USGS National Hazard maps, which we use a lot of the  
12 elements, are based on a either 500 year or 2,500 year  
13 ground motion. So the ground motions will be smaller  
14 because they're looking at more likely events.

15 MEMBER CORRADINI: Okay. So can I just  
16 say it back to you so I get it right?

17 MS. KAMMERER: Yes.

18 MEMBER CORRADINI: So you're looking at  
19 longer return periods, therefore, you're going to come  
20 up with more severe sources than the rest of the  
21 civilian infrastructure in the vicinity of the plant?

22 MS. KAMMERER: Right, more severe ground  
23 motions. The sources are the same. They just were  
24 looking at the rarer event from the sources. So the  
25 ground motions will be higher.

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1 MEMBER CORRADINI: I'm sorry. Sources  
2 meaning the locations might be the same but because  
3 we're looking at a longer return period --

4 MS. KAMMERER: Right, bigger earthquakes.

5 MEMBER CORRADINI: -- you're going to see  
6 potentially higher magnitudes or different spectrum or  
7 some combination?

8 MS. KAMMERER: Yes.

9 MR. CHOKSHI: Exactly.

10 MEMBER CORRADINI: Okay. So the reason  
11 I'm asking the question like this is, that would mean  
12 if Plant X, which is in the Region A, is going to have  
13 to deal with this sort of ground motion that means the  
14 surrounding area is going to get devastated at the  
15 same level. So I'm kind of jumping from the source  
16 all the way to the end.

17 Is the anticipation is the plant has to  
18 handle this all by itself? This plant is going to  
19 have this handle this all by itself or it's going to  
20 have to look into Region A for some resources for the  
21 safety of Plant X. Because if the extreme and the  
22 source is that large there may not be much left in  
23 Region A.

24 MR. CHOKSHI: I think the question you're  
25 asking is about EP, Emergency Planning. And I think

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1 how the seismic is considered, I don't think I can  
2 give you very comprehensive answer. But --

3 MEMBER CORRADINI: Well you don't have to  
4 give a comprehensive answer. I guess I'm looking for  
5 some set of consistency so that the source the plant  
6 has to deal with, if it really is going to think about  
7 it from the standpoint of really having to really deal  
8 with it, then does it mean that the region itself is  
9 devastated to the point there's no point of getting  
10 extra help from the region. Or they're having to deal  
11 with it all isolated by themselves. That's kind of  
12 where I'm getting --

13 MR. CHOKSHI: That's a good question. But  
14 if you look at the Fukushima recommendations, we're  
15 talking about 2.1 basically. But if you look at the  
16 full spectrum of recommendations, that addresses, I  
17 think, your question. There's a 9.3 and some of the  
18 EP and then FLEX equipment. What do you do  
19 considering the conditions, you know, the hazard  
20 related conditions not only at the site but outside of  
21 the site. How do you bring in the equipment.

22 So the whole Fukushima thing to me  
23 addresses parts of your question.

24 MEMBER RAY: Mike, this is Harold. I  
25 think this word you use, consistency, we need to talk

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1 about it separately. What we're trying to do is  
2 withstand a very remote event.

3 MR. CHOKSHI: Right, I understand that,  
4 Harold. And I know I'm a bit off topic, I just wanted  
5 to be sure that I understood the sequencing. But I  
6 appreciate the clarification. I'll be quiet.

7 MEMBER STETKAR: Annie, something, it's  
8 been awhile since I've looked at the USGS 2008 Hazard  
9 Maps and I want to make sure I understand something  
10 you said. USGS actually projects their hazards out to  
11 something on the order of  $10^{-7}$  frequency. If you look  
12 at their Hazard --

13 MS. KAMMERER: They don't, we have. We  
14 have.

15 MEMBER STETKAR: No, I'm sorry, if you  
16 look at the USGS Hazard maps they actually have peak  
17 ground accelerations at things on the order of about  
18  $10^{-6}$  to  $10^{-7}$  per year, out to about 2G.

19 MS. KAMMERER: The USGS doesn't produce  
20 those. Now they have an algorithm that will pull  
21 information out of their model but the model was never  
22 intended for that purpose.

23 MEMBER STETKAR: The Hazard maps that I  
24 have a very large file for, indexed by latitude and  
25 longitude, with many data points typically have, I've

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1 forgotten how many data points they have at each  
2 coordinate, they tend to I think it's 11 or something  
3 like that, they run out to about 2G peak ground  
4 acceleration. And the frequencies are on the order of  
5  $10^{-6}$  to  $10^{-7}$  per year.

6 MS. KAMMERER: Okay, so one of his  
7 questions was --

8 MEMBER STETKAR: Published by USGS.

9 MS. KAMMERER: Okay so there's two  
10 different things. Well it is but it's not intended  
11 for that purpose. The purpose of the National Hazard  
12 maps is to support the building codes.

13 MEMBER STETKAR: I understand that. But  
14 if they're publishing those hazards out to that level  
15 and using a model then how they extrapolate is part of  
16 their business, how you extrapolate is part of your  
17 business. I think you were mischaracterizing what's  
18 available from USGS.

19 MS. KAMMERER: Well I think the USGS would  
20 be the first one to tell you you shouldn't be using  
21 them to that extrapolation.

22 MEMBER STETKAR: I've talked to the USGS  
23 and indeed they say there's very high uncertainties  
24 out at the low frequencies and that they do not  
25 explicitly quantify uncertainty. They do not disown

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1 those numbers, they just say there's high  
2 uncertainties associated with them.

3 MS. KAMMERER: Well they don't disown  
4 them, they wouldn't be using them for a nuclear plant.  
5 And, in fact, that's why they supported us in updating  
6 their model specifically for our purposes when we were  
7 doing GI-190. So I mean I think the update of their  
8 model for those long return periods was in  
9 coordination with us.

10 And so we've actually, we needed them and  
11 so we did some development. Now let me just clarify  
12 though, in response to his question, because he was  
13 asking about the civilian infrastructure and that is  
14 on the building code, which is that two-thirds of the  
15 2,500-year ground motion.

16 MEMBER STETKAR: That's right, that's  
17 certainly more where they're oriented.

18 MS. KAMMERER: Right, so that's really  
19 where they're targeting.

20 MEMBER STETKAR: That's true.

21 MS. KAMMERER: You know, the shock process  
22 requires that you bring in all scientifically viable  
23 alternate hypothesis. The way that the USGS  
24 approaches it, because they're having to produce maps,  
25 so they're having to get value for a massive number of

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1 data points, whereas we have 63 sites. And so they  
2 haven't needed, before, computational efficiency in  
3 the way that they run their model. So they really try  
4 and pick their best estimate versus the whole suite of  
5 approaches.

6 The USGS approach certainty is one of the  
7 parts of the logic tree of the new model. And we  
8 worked together to really update the earthquake  
9 database.

10 MR. CHOKSHI: I think there are two  
11 important elements get sometimes lost in this  
12 conversation. The one is that we require each plant  
13 to do a very detailed investigation of a number of  
14 things. So EPRI expect them each, there is need to  
15 update the sources at the time that they are doing  
16 investigation.

17 Second thing is the local site response.  
18 The parameters used, it's a lot more complex. There  
19 are detailed descriptions of the ground motion and  
20 stuff and the back-end of the analysis of local site  
21 response was a lot of attention being paid into that  
22 site. So it's used those things that are differences.

23 So as you see there are elements here, the  
24 point I want to make here that a number of these  
25 elements also apply when you think about analysis and

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1 I'll bring that to Dan, the practical elements which  
2 are applicable.

3 So as Annie was mentioning, this is  
4 evolving work. For example, here is the -- I picked  
5 the position 2, because it's a closed position. But  
6 this is how it started out, the use of existing  
7 information. And then so they investigate the issue  
8 about how do we go about using the site information to  
9 do the local site response analysis. And how do we do  
10 the site response.

11 So it is outline its position then  
12 justification and also define what they will do to  
13 justification a basis for their position. And so very  
14 early in the process that defined the study we had a  
15 dialogue, where everybody said yes, we are on the  
16 right or we think there is some fundamental issue  
17 here. Do we agree with the studies you are doing. Do  
18 we want you to include some different to modify. And  
19 we had a dialogue of that nature.

20 And on this one, this particular issue is  
21 closed and in the latest one now it's pulling the  
22 report from, but then this is describing the studies  
23 that were done to support that. So we listed the  
24 forces, that's how each of these issues are working.

25 And so I'd like to give you sort of, when

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1 we talk about ISG, SPID and why we're incorporating  
2 some of them at this time, though it's in draft form,  
3 is so the people can understand what the position is.  
4 It will evolve but it will give you a very good  
5 indication of what it's going to look like.

6 So that's what the SPID is about. So I'm  
7 going to walk through some of the key positions. And  
8 I started with one of the first basic parameter you  
9 need, review level earthquake.

10 For this application, and that's one of  
11 the reasons why this is limited to this application,  
12 because I'm not sure that the review level, you may  
13 want to use a different review level for a different  
14 application so that's one thing. This is not a DRLE,  
15 it does not answer question forever.

16 So the RLE: to use this we have defined in  
17 50.54 is the envelope of the SSE and the ground motion  
18 response spectra. We want to make sure that you  
19 capture at least HCLPF, if it's above that, it gives  
20 us certain information. If it's below, it gives us  
21 certain information. So I think idea is to, you want  
22 to at least see if the margin is up to here.

23 So that's the review level. The  
24 initiating events, I think this is very similar to  
25 what was basically, this is the one that I think Bob

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1 may want to elaborate. If you read 4334 you will not,  
2 to me it will not clearly come to the conclusions,  
3 it's only asking for transient LOCAs. But if you look  
4 at the application and other things, it's mostly  
5 transient and small LOCAs and some medium LOCAs  
6 particularly for BWRs.

7 DR. BUDNITZ: Well, the best thing to say  
8 is that the original NRC -- this is Bob Budnitz. The  
9 original NRC-SMA method only stopped analysis with  
10 early injection, that was back in 1985. And that's  
11 what supports this before and guidance in 5076 for  
12 BWRs that Paul Amigo wrote.

13 But we're extending this all the way out.  
14 We're interested in the full response including NERF.  
15 Full response means switch over to -- BWR switch over  
16 to suppression-cooled cooling. All the systems and so  
17 on that go along with that. So all the systems that  
18 cope with the other things anyway.

19 MR. CHOKSHI: And so I think the --

20 MEMBER STETKAR: Nilesh and Bob, either  
21 one of you. In the ISG it says kind of well, look at  
22 transients and small LOCAs and oh, look at transients  
23 that look at relief valves. Why are we taking pot  
24 shots at this thing? Why don't we experience from  
25 risk assessments?

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1 DR. BUDNITZ: That comes from it.

2 MEMBER STETKAR: That's one thing to look  
3 at. For example, why do we know that unrecoverable  
4 loss of offsite power is something that we ought to  
5 assume with this?

6 DR. BUDNITZ: Oh, that's from experience  
7 with earthquakes not related to nuclear power plants,  
8 just earthquakes that damage the grid.

9 MEMBER STETKAR: Let's look at the  
10 earthquake that hit Japan. And indeed Fukushima lost  
11 all offsite power. The other nearby site almost lost  
12 all offsite power but they didn't lose all offsite  
13 power, they still had some offsite power. Now, if I  
14 try to think in risk assessment space and I try to  
15 think about reactor coolant pump seal LOCAs, which  
16 tend to be important for some PWRs, and I try to think  
17 about new PWRs with new seals.

18 Or old PWRs who have replaced their seals  
19 who claim that as long as the pump is stationary they  
20 don't get any seal LOCA, then indeed unrecoverable  
21 loss of offsite power is optimistic for those plants.  
22 So how do we know that unrecoverable loss of offsite  
23 power is universally conservative? How do we know  
24 that?

25 DR. BUDNITZ: Say it again, how do we know

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1 that it's --

2 MEMBER STETKAR: How do we know --

3 DR. BUDNITZ: Conservative meaning the  
4 plant would be better off if it lost it than if it  
5 kept it?

6 MEMBER STETKAR: Yes. Reactor coolant, if  
7 you think of risk space, reactor coolant pump seal  
8 LOCAs tend to be very important types of scenarios.  
9 For pressurized water reactors, at certain plants.  
10 New plants, and some old plants that have updated  
11 their reactor coolant pump seals, claim that as long  
12 as the pump is stationary, i.e., not rotating, they  
13 will get minuscule leakage from their seals even if  
14 they've lost all cooling.

15 If my plant happens to be one of those  
16 plants and I assume, according to the guidance, that  
17 I have loss of offsite power I don't get any seal  
18 LOCA, if power is still available and my pump is still  
19 running I might have a seal LOCA if I lose those  
20 cooling systems. So therefore, please explain to me  
21 why loss of offsite power is universally conservative  
22 for every single plant.

23 DR. BUDNITZ: Well you would have to  
24 assume, I mean, let's just back up. Let's suppose  
25 that the power was there. Do they have procedures to

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1 --

2 MEMBER STETKAR: I'm not doing a PRA, Bob.  
3 I'm questioning your universal assumption that this is  
4 conservative. If you want to do a PRA let's do a PRA  
5 where I account for the procedures and I account for  
6 the timing and I account for the human performance and  
7 I account for the seismic failures of all the other  
8 systems that effect cooling. I'm only challenging  
9 this universally presumed conservative assumption.

10 DR. BUDNITZ: I understand that.

11 MR. CHOKSHI: But, Bob --

12 DR. BUDNITZ: No, let me say, at such a  
13 plant if the offsite power was there, do they have  
14 procedures to cut those pumps? I don't think so.  
15 Hence, they can't take credit for that. Right? I  
16 don't know a plant like the one you know, that you've  
17 mentioned, I know two or three like that. But I don't  
18 think they have procedures to say to the operator, you  
19 know, because of seal LOCA you should kill those  
20 pumps.

21 MEMBER STETKAR: No, they don't. That's  
22 my whole point.

23 MEMBER BLEY: This is getting a little  
24 confused, I don't think you need to pursue it. But in  
25 fact they do, if you loose cooling the procedure is

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1 cut the pumps.

2 MEMBER STETKAR: If you loose coolant.

3 MEMBER BLEY: But John's just making the  
4 point that the assumption that that's conservative  
5 might not always be true. Especially when --

6 MR. CHOKSHI: But genesis, I remember, and  
7 Bob can correct me, but the idea was with two things.  
8 One starts with the transients, they've lost the  
9 offsite. And the second one starts with the condition  
10 small LOCA.

11 MEMBER STETKAR: But both with no power.

12 MR. CHOKSHI: Without power. And the  
13 small LOCA the assumption was not, the reason was you  
14 can walk down the many parts of the plants but you  
15 cannot walk down a lot of small tubings and things.  
16 And so that under seismic there was no business not to  
17 assume small LOCA without pinpointing to that  
18 particular source of small LOCA. So that was the idea  
19 that then so that you would construct the tree, how  
20 you're going to respond to that small LOCA situation.

21 And that was the whole idea was  
22 simplifying that for the trees are simple in the  
23 margin methods. Because you're starting with that,  
24 and I think Bob and Ravi that 4434 specifically talks  
25 about that, that why we need to retain, how we came

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1 about with small LOCA, it was because the inability to  
2 say, I can walk down the plant, do the calculations  
3 and rule it out.

4 DR. BUDNITZ: Yes. By the way, going back  
5 to John's comment. If you don't mind my saying, going  
6 back to that. If somebody wants to try to take credit  
7 for that they had better do a site PRA, okay. In  
8 other words the SMA is not going to be universally  
9 conservative in that regard, I agree.

10 MS. KAMMERER: Can I make one comment,  
11 just as not somebody who is an SMA or a PRA expert by  
12 any means but someone who has done a lot of post-  
13 earthquake reconnaissance. Is the idea, whether or  
14 not it's conservative, the reality in the vast  
15 majority of earthquakes you do lose offsite power.  
16 You do lose power, I think you can't necessarily look  
17 at a Japanese grid in its robustness and compare it to  
18 the U.S. Because if it goes for more than a second or  
19 two, like then it's extremely common.

20 So for me it's just more realistic. I  
21 would question whether or not someone had that because  
22 that's just typically what happens.

23 MEMBER STETKAR: It depends on the site,  
24 it depends on a lot of things. The only point I was  
25 raising here is that the experience of people who have

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1 limited experience, you know, looking at PRAs and  
2 looking at different sites, may not be most  
3 appropriate for every single site in the country.

4 For example, even in design-basis accident  
5 analysis, Chapter 15 analyses these days, we ask  
6 people to look at loss of offsite power and we look at  
7 non-loss of offsite power and say take the more  
8 conservative of those two for your design basis  
9 accident analysis. In some cases loss of offsite  
10 power indeed is more conservative. In some cases they  
11 find that the non-loss of offsite power is more  
12 conservative so that --

13 MR. CHOKSHI: Yes, I think like 1150  
14 that's how sort of we developed the hierarchy that  
15 assume transients with power, transient with loss of  
16 power.

17 MEMBER STETKAR: Yes, that's right.

18 MR. CHOKSHI: I think here, to me, I think  
19 that was that started with a margin question, this  
20 whole approach. An idea was that am I capturing all  
21 the components and then the system structures if I use  
22 this, you know, it's not necessarily based in optimal  
23 use of the, you know, but to me that was driving the  
24 assumption, some of these assumptions.

25 MEMBER STETKAR: And with a presumed small

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1 LOCA you might be. You might be.

2 MR. CHOKSHI: Yes. Because one of the  
3 things, as Bob was mentioning, that we looked at,  
4 compared after Hatch, EPRI, SSELS and NRC through your  
5 system approach, it looks pretty similar. In fact,  
6 with the NRC approach you could bring in some of the  
7 other options which are hard to bring in in the EPRI  
8 options.

9 So that was one of the check. And I that  
10 by recapturing all the elements we know which control  
11 the sort of seismic risk. And a part was by this  
12 simplification you will be able to capture most of  
13 those components. Which you might want to look at  
14 from the capacity point of. So that was the thought.

15 But I think you are right, because I often  
16 wondered about that question about seal myself,  
17 because the seals, you know, the old PWRs was that one  
18 of the sequence once you got a loss of component  
19 cooling or something and you loose the seal. So late  
20 failure of containment. I'm not sure it's worried  
21 anymore with the new seals or have anybody looked at  
22 it.

23 MS. KAMMERER: So is there something that  
24 we can do before the guidance?

25 MEMBER STETKAR: Well, I'm not going to

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1 presume. I think it's something you ought to think  
2 about.

3 DR. BUDNITZ: John, it's not a small  
4 point.

5 MEMBER STETKAR: Oh I know.

6 DR. BUDNITZ: In fact, for anything like  
7 this, if a plant wants to take credit for something  
8 like this they can take exception. Okay?

9 MEMBER STETKAR: Well that would be good  
10 if the ISG kind of reminds them that something in  
11 there might be optimistic.

12 DR. BUDNITZ: That's a good point.

13 MS. KAMMERER: Yes.

14 MR. CHOKSHI: And this is one of the  
15 things why, you know, some of the time we need to  
16 revisit some of these questions.

17 DR. BUDNITZ: By the way, this Bob  
18 Budnitz, I've got to tell you something and I hope  
19 this goes down as best it can. I chaired the panel  
20 that invented SMA for a different purpose in 1985. It  
21 was for Eastern seismicity. Now if I had my druthers,  
22 the number of plants that will use SMA response time  
23 would be zero. I think it's crazy, right?

24 I just thought I'd say that. Any plant  
25 wouldn't do a seismic PRA. On the other hand I'm not

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1 the plants and I'm not the staff. That's just  
2 speaking per se.

3 MR. CHOKSHI: The rest of the stuff I  
4 think Bob already covered when he was talking about  
5 extending mission time and --

6 MEMBER STETKAR: Well, a couple of  
7 questions I had on the mission time, Niles, and this  
8 is only to help me. It was kind of mission time and  
9 what is stable shutdown. If I read the ISG in one  
10 place I'm kind of led to believe that you need to go  
11 to cold shutdown, and it's in Section 4.2.1 that I  
12 found those words. It's clear you want to extend it  
13 out into recirculation, which I think is eminently  
14 reasonable.

15 But I found the words cold shutdown and  
16 that got me a little bit confused about what is stable  
17 safe shutdown, whether I can actually terminate the  
18 thing at hot shutdown conditions, which I don't know  
19 what the answer to that is.

20 MR. CHOKSHI: All right.

21 MEMBER STETKAR: And then the second  
22 question that I had was where you discuss the 72  
23 hours. The statement, and this is in 4.4.2, says,  
24 "for each potential accident sequence, the mission  
25 time for the safety systems and functions that the SMA

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1 analysis evaluates should extend to either 72 hour or  
2 to the time required to achieve a stable state,  
3 whichever is longer."

4 What do you mean by "achieve a stable  
5 state?" For example, if I presume that offsite power  
6 is lost and unrecoverable, my emergency onsite power  
7 supplies need to run for some period of time. Is that  
8 72 hours, is it 76 hours? Is it 68 hours? Is it  
9 forever? Forever is longer than 72 hours. So what do  
10 I mean about "achieve stable states?"

11 For example, if I need a makeup source to  
12 replenish a water supply and I need electric power for  
13 my makeup source and I've got enough in my tank for 76  
14 hours, does that mean my diesels have to run for 76  
15 hours? Or I've got a week's worth of water, does that  
16 mean they have to run for a week?

17 Because, the reason I raise this is, if  
18 you're going to use some sort of numerical importance  
19 measures to start screening the results from these  
20 scenarios, if I start running diesel generators for  
21 things like four, five, six, eight, ten days, you may  
22 get a very different skewed impression of what the  
23 important contributors are compared to a different  
24 mission time, in particular for diesel generators.  
25 But for any piece of equipment that has to run for a

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1 long period of time. Could be turbine driven pumps  
2 for example is another attended piece of equipment  
3 that has a fairly high running failure rate.

4 So I think, I don't know, has the industry  
5 kind of questioned you about what that means? The  
6 whichever is longer is what's bothering me.

7 MR. CHOKSHI: Yes, I say it's a good idea.

8 DR. BUDNITZ: Let me try, this is Bob  
9 Budnitz again. The reason for the extra words are  
10 that stopping at 72 hours didn't make sense as an  
11 arbitrary thing. That's what the old things said, it  
12 said 72 hours, stop. And you know, by the way, when  
13 we went to Fukushima they were still on RCIC until  
14 almost 72 hours, never minding getting to the, you  
15 know, that next phase.

16 So 72 seemed arbitrary for sure. So the  
17 point was that you wanted -- But if you got on to  
18 recirculation in 39 hours we still wanted you to run  
19 out to 72.

20 MEMBER STETKAR: That I got. The question  
21 is what is a stable shutdown state and how long do you  
22 need to --

23 DR. BUDNITZ: We were going to let  
24 analysts tell us in a plant by plant.

25 MEMBER STETKAR: Okay.

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1 DR. BUDNITZ: There may be a plant that  
2 says, gee, we're going to be better staying at hot  
3 shutdown for a week. If the analyst says that's  
4 better, for a certain reason, okay we can accept that  
5 if that's better. Put out a week then other help.

6 MEMBER STETKAR: That's all right, I  
7 raised the cold shutdown because the only place I  
8 found it was in that introductory area. And I thought  
9 that the intent was to allow people to maintain stable  
10 hot shutdown, because that tends to be what people are  
11 doing these days is defining what safe shutdown is.

12 MEMBER BLEY: And I guess some thought on  
13 even what that means is important. Does that mean  
14 you're living on one diesel generator? Or what does  
15 it mean to be stable?

16 MEMBER STETKAR: Yes.

17 CHAIRMAN SCHULTZ: That's why they need to  
18 provide additional guidance as to what --

19 MEMBER STETKAR: Achieve and maintain, if  
20 it's achieve and maintained how long do I have to  
21 maintain that?

22 DR. BUDNITZ: Okay. So let me just push  
23 this one step further. Are you suggesting that in  
24 this guidance the NRC provide some specifics about  
25 that? Or alternatively, what I think is here now is

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1 that the analyst who's close to the analysis gets to  
2 decide and explain it.

3 MEMBER STETKAR: I think it's important to  
4 clarify what you mean by achieve stable shutdown.

5 DR. BUDNITZ: Helpful.

6 MEMBER STETKAR: Because getting to  
7 something that you say I'm stable here for X number of  
8 hours might be someone's interpretation of what that  
9 means. Maintaining that condition for X or Y or Z  
10 number of hours after that point may be someone else's  
11 interpretation of what stable shutdown means.

12 So you may get, I'm thinking about the  
13 responses you'll get to this. You may get a different  
14 set of responses from different licensees depending on  
15 their own interpretations of what those words mean.

16 With those responses may come then  
17 different lists of relative importance of pieces of  
18 equipment. Or different cutsets or scenarios or  
19 sequences or whatever you want to call them depending  
20 on what assumptions they've made about that timing.

21 DR. BUDNITZ: That's correct. So I guess  
22 we'll take the advice to try to provide more here  
23 without being I'd say prescriptive it would be  
24 appropriate.

25 MR. CHOKSHI: Yes, I think, Bob, what I

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1 got from this I think that we need to explain what we  
2 mean by this so when the licensee responds, as you  
3 said, they can explain but they know what they're  
4 explaining.

5 MEMBER STETKAR: And so you know what  
6 they're doing pretty clearly, because if you do have  
7 those discrepancies you can at least have the same --

8 MR. CHOKSHI: I think that's good because  
9 I was thinking more in terms of the recirculation  
10 phase, more than anything else.

11 MEMBER STETKAR: Understand, I'm thinking  
12 transients with makeup water and things like that.

13 MR. CHOKSHI: Yes, I was thinking like you  
14 know, you would have to go to an alternate source.

15 CHAIRMAN SCHULTZ: So there's two parts  
16 here. One is to ensure that there's a consistent  
17 understanding of what is the end state that's  
18 expected. And the other is to be very clear that if  
19 the process is going to allow the analyst to describe  
20 what that is for their particular plant that the level  
21 of detail that you would expect in order to review  
22 that appropriately over the range of analysts that  
23 will come in with different explanations that you set  
24 your expectations regarding that explanation.

25 DR. BUDNITZ: Yes, that's fair. So we're

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1 not going to have an acceptance criterion on the  
2 configuration or anything. But an acceptance  
3 criterion on the level of detail of the expected  
4 documentation of what their decision was?

5 CHAIRMAN SCHULTZ: That's correct. I  
6 would recommend that highly.

7 MEMBER RAY: Well, let me just add one  
8 thing here. I mean as John knows, he used an example  
9 that I love to use, it's exactly right. And I don't  
10 think this is at all unimportant. There's too much  
11 incentive to make other decisions than the ones that  
12 you would be making if you had to explain them.

13 DR. BUDNITZ: Yes, but you see but there's  
14 also the plant variability in the following. For some  
15 plants they have really high confidence they can get  
16 help by the fifth or sixth day. And maybe some other  
17 plants say, you know, we've got to stand alone here  
18 for ten or 15 days. Remember this is a huge  
19 earthquake that damages infrastructure, bridges,  
20 hospitals, ambulances, police. And how long they  
21 think they can, or need to, stand alone will differ.

22 CHAIRMAN SCHULTZ: Now you're hearing Mike  
23 Corradini's comment that he made earlier.

24 MEMBER CORRADINI: Thank you very much.  
25 That's what I was starting to worry about earlier.

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1 DR. BUDNITZ: But that's the plant  
2 specific argument that the analysts can bring in if  
3 they have what they know.

4 MEMBER RAY: Well wait a minute, that's  
5 not your comment I don't think, Mike. You were using  
6 the word consistency as if the plant would be designed  
7 to the same thing as the surrounding region would be.

8 MEMBER CORRADINI: No, that was part of  
9 it, Harold. My comment was, first I wanted to  
10 understand the source and the difference in the source  
11 used. So that part I was incorrect and that was  
12 clarified.

13 My point is now, I've putting on the plant  
14 a higher source and then I have to cope with it. Now  
15 if I do that I'm looking for weak links beyond the  
16 design-base. Now I'm going to have to ask the plant  
17 to decide how they're going to cope with it.

18 And if they're going to cope with it, and  
19 they need outside sources, the outside sources could  
20 be affected by the same event. So they have to  
21 decide, you know, is it realistic that I'm going to  
22 have offsite sourced help.

23 MEMBER RAY: Okay, that's fine.

24 MR. CHOKSHI: But I think I just again  
25 want to remind that that question of the entity of

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1 recommendation deals with all the different timeframe  
2 and outside help and stuff. So this 2.1 activity is  
3 strictly looking at the new design-basis and effects  
4 and the things we want to do associated with the  
5 changing design of the plant.

6 MEMBER CORRADINI: Okay, but let me just  
7 say it once more and then I'm going to stop. What  
8 worries me about all these recommendations is they're  
9 a little bit here a little bit there. But yet, the  
10 worry is I have a seismic event that's beyond the safe  
11 shutdown earthquake. I want to understand the weak  
12 link so I fix them, or at least identify them and  
13 decide how to fix them.

14 Once fixed if I, god forbid, have anything  
15 that's above the safe shutdown earthquake I have to  
16 plan for it. And that has to be consistent across the  
17 board. It can't just be what's on the plant site,  
18 it's got to be how I expect help from the outside and  
19 what time I expect the help.

20 Because if it really is that large of a  
21 natural disaster people are scurrying about on a whole  
22 other set of issues that have nothing to do with the  
23 plant. And so you can't count on outside help  
24 necessarily.

25 MR. CHOKSHI: Yes, and I think like the

1 4.2 and others address those points. Based on my  
2 understanding. That this is, as a part of looking at  
3 the total, they are looking those type of things. And  
4 under what conditions, and outside help needed and how  
5 do you, given the situation, is it able to provide  
6 that help.

7 MEMBER BLEY: I guess this is a point  
8 we've talked about in previous letters. I know one  
9 has to parse this whole thing apart into pieces to  
10 address them. On the other hand, the real world  
11 exercises it all at once and somehow after we're all  
12 done it has to be reintegrated. We have a lot of  
13 things living right now in regulations that are this  
14 piece and this piece and they just don't work to well.

15 MR. CHOKSHI: And one of the things  
16 probably is not clear is that we worked with other  
17 project things, which are dealing with other things  
18 like ISG on the 4.2. We have been talking about what  
19 we're doing. So people are aware of that similar type  
20 of question. But, yes, it's very hard and then you  
21 have to put everything together.

22 CHAIRMAN SCHULTZ: And here, just to  
23 reemphasize, where you're talking mission time as the  
24 example. It's not enough to assume that there is  
25 going to be a link between Parts A that someone else

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1 is doing and the project is being done here. At least  
2 we need to say, at this point one must consider what  
3 is happening with regard to the region. And so assure  
4 that the analyst is not thinking in a box but is  
5 thinking about the entire scenario.

6 MR. CHOKSHI: Yes. I think that was, we  
7 will go and definitely expand on this discussion. All  
8 right, I'm going to go to the next slide. And this  
9 talks about non-seismic failures, human actions.

10 And I think in the past, SMA, particularly  
11 in the success path approach there is the general  
12 reliability number that you must have your argument or  
13 human actions. You need to make sure that they meet  
14 certain reliability requirement. But other than that  
15 this no longer appears in the analysis.

16 And I think it's here it's important,  
17 particularly you know, switch order phases and things  
18 that are the human actions and random failures have  
19 shown up in combination with seismic failures so I  
20 think in order to get a full picture we need to  
21 include them on the explicit limit risk.

22 Now the screening of SSCs, that's, you  
23 know, that is a evolution in some sense. The user  
24 screenings table are still being used in both NRC  
25 document and EPRI document. But what we learned from

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1 IPEEE that if you, you know, if you can come up with  
2 many situations where either you are not able to make  
3 a statement about the plant HCLPF capacity because  
4 your reading level is so low, and you are screening  
5 out component, because the component capacity are  
6 higher. Or that thing you assumed is very high  
7 capacity is showing up as a dominant contributor.

8           So that's sort of a anomalous result. And  
9 so that has, there's been a lot of discussion about  
10 what kind of guidance we can give. Reserving the  
11 separate screening, but we know there are inherently  
12 strong components, we want to maintain that. But we  
13 also want to get it right inside. And I'll discuss  
14 that in a lot more detail.

15           This has a direct connection to the scope  
16 of work you have to do. How many components you have  
17 to do specific calculations versus you can rely on  
18 some generic characterization. So that has been a lot  
19 of discussion.

20           I think, what we've got coming out, I  
21 think it seems to me that first a much more reasonable  
22 position than has been experienced in the past. So  
23 I'll talk more about that more, later.

24           Plant walkdown. I think EPRI is probably  
25 one of the best piece of guidance in terms of how to

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1 conduct walkdown and how to record in the EPRI  
2 document. So I think that's what we are referring to  
3 that. And that's what we also did at IPEEE, that  
4 anybody using any method, PRA, safe shutdown or the  
5 NRC, all plant work done all that comply with the EPRI  
6 guidelines.

7 MEMBER STETKAR: By the way, Derek, can we  
8 get a copy of these? This is not one of the EPRI  
9 reports that I could find publicly available. I  
10 couldn't find it anywhere in ADAMS either.

11 MS. KAMMERER: It is publicly available,  
12 I'm positive.

13 MEMBER STETKAR: It is?

14 MS. KAMMERER: Yes, on the EPRI site, but  
15 we can get you a hard copy.

16 MEMBER STETKAR: An electronic copy.

17 MS. KAMMERER: Oh, yes. That's what I  
18 mean. A digital file. It seems like I have it with  
19 me.

20 MEMBER STETKAR: Okay, thanks.

21 MR. CHOKSHI: So the plant walkdown I  
22 think is straightforward and I don't think there is  
23 anybody, everybody expects to do according to the  
24 EPRI.

25 The responses, now a lot of things, a

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1 couple of long, in how to generate structural  
2 responses. Do you have to use new models, do you have  
3 to use existing models. How do I scale my, you know,  
4 that. All of those things are kept sort of in  
5 responses.

6 And again I'm going to discuss that in  
7 more detail. This is the element which cuts across  
8 both PRA and SMA. How do I decide when I use my  
9 existing models, when I can scale, you know, and what  
10 conditions I cannot.

11 And we talk about seismic margins, how to  
12 compute the HCLPF, and I think we had a discussion  
13 about CDFM and generator also. I think, I'm going to  
14 go back and sort of revisit that to make sure that the  
15 caution, and you will see that there is a caution that  
16 they expressed in that. But I look at that our  
17 process will capture that provisional conservatism.

18 MEMBER SHACK: Just coming back to this  
19 for a second. When you picked your review level  
20 earthquake, I mean that's probably as low as you could  
21 pick your review level earthquake. I mean it's really  
22 going to be, the nominal design-basis. And so you're  
23 not getting any picture of margin.

24 MR. CHOKSHI: The reason I think we picked  
25 that, you know, if you look at the new GMRS is about

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1 roughly  $10^{-4}$ , it's between  $10^{-4}$  and  $10^{-5}$ . And if you  
2 got an HCLPF at that level, at about 0.1 percent  
3 probability of failure on the composite, so 95 percent  
4 confidence, you have a pretty good chance that the  
5 core damage is  $10^{-5}$  or below.

6 MEMBER SHACK: Okay, you're looking at  
7 HCLPF level.

8 MR. CHOKSHI: So that was sort of the  
9 idea. I want to make sure that the HCLPF is, and  
10 that's why when I come to screening, you will see  
11 that. It will be nice to know what that value is.  
12 Rather than simply saying I'm higher than the, you  
13 know, in some cases it may happen. But the thought is  
14 if you want to capture, so when it comes to the  
15 screening we are trying to do that. We don't want to  
16 screen people at that level.

17 MS. KAMMERER: And he'll show you some  
18 details in a minute.

19 MR. CHOKSHI: So on the whole issue of  
20 high frequency component has been around for a long  
21 time. I think the 1407, we dealt with what we called  
22 bad actor relays were knew based on some of the test  
23 programs, the relays which had the problems. And that  
24 was basically they were replaced.

25 I think at this time, I think for me, I

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1 think the industry is doing the right approach and  
2 we've sort have been encouraging them to do is to  
3 undertake a comprehensive test for that.

4 You know, of the high frequency sensitive  
5 components. Basically the things that change of the  
6 state type, you know, the contactors and relays. And  
7 so I'll describe that in more detail, because I  
8 thought this was would an interesting topic for, you  
9 know, so they have already initiated the Phase 1 of  
10 test program. And again it could be completed in --  
11 Do you have a timeframe complete?

12 MS. KAMMERER: The first phase will be  
13 completed by November and some of the initial lessons  
14 learned will be incorporated into the SPID. The  
15 second phase, which will be heavily informed by the  
16 results of the first one, will be completed next  
17 November, so 18 months, basically.

18 MEMBER STETKAR: You have another slide?

19 MR. CHOKSHI: Yes, I have a slide on that.  
20 I was going to talk in a little bit more detail,  
21 because that's, to me, I think personally I'm very  
22 pleased with that kind of effort because we have been  
23 always talking about some of the ad hoc, and this is  
24 a more systematic look at the issue.

25 Soil failure modes are very applicable,



1 the guidance is out there. And I think basically what  
2 we are saying that, you know, you have to look at for  
3 the sites which what they have potential for leak  
4 detection and things of that nature. How to come up  
5 with a sequencing plan with HCLPF. I think again  
6 there's a convolution approach particularly when you  
7 have non-seismic and human actions.

8 And then the use of Min-Max, again Min-Max  
9 with justification, because under some situation it  
10 could be not necessarily a minimum HCLPF and it could  
11 be also very, very extraordinarily conservative. I  
12 think Min-Max approach, then people need to think  
13 through.

14 And documentation. They tried to use a  
15 lot of the typical things we expect from PRA plus  
16 things we need from 50.54(f) letter. So I don't think  
17 that's too much different that what you might expect.  
18 But my anticipation is that we'll get a comment on  
19 that also from the industry, because they might think  
20 that we're asking a little bit too much.

21 Peer review definitely will get a lot of  
22 comments. What we are trying to do here is not to  
23 impose ASME standard type of thing, because first of  
24 all the resources and the timing will not help us. We  
25 don't want the review to occur at the late stage where

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1 the things are sort of cast in concrete and the people  
2 can't go back and take into account.

3 This is sort of maybe a bias from my IPEEE  
4 experience. Because a lot of the peer review didn't  
5 really help the process because they were not dealt  
6 with. Here we want them to see that they address  
7 them, they're documented and we understand what the  
8 peer review process is.

9 MEMBER STETKAR: I had a couple questions  
10 about the peer review, because have you talked to the  
11 folks who are doing the NFPA 805 transitions about  
12 peer reviews? As I read through the ISG it said you  
13 encourage participatory peer reviews, you just  
14 mentioned it. You also say that you expect a peer  
15 review of the final report, which to me implies some  
16 sort of ongoing peer review and then a final  
17 determination about how issues that were raised were  
18 finally resolved.

19 MR. CHOKSHI: That's it, exactly.

20 MEMBER STETKAR: We've already established  
21 the fact that there aren't too many people in this  
22 world who have the technical capabilities to do these  
23 types of peer reviews and many of them are aging and  
24 are not all that interested in doing it anymore.

25 The same problem has been faced by the

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1 NFPA 805 folks. In particular there are many people  
2 who have early peer reviews that raised a lot of  
3 issues that essentially were raised because they were  
4 done prematurely. And not enough time and not enough  
5 manpower was available to do another peer review at  
6 the end to come to some sort of conclusion about  
7 whether the issues were resolved.

8 In other words, it was a one-stop peer  
9 review. A number of issues were raised, the  
10 individual licensees developed their responses, but  
11 the peer review group never came back and said yes  
12 indeed we think this acceptable. Because of timing  
13 and personnel. So I'd encourage you to think a bit  
14 about this. It sounds good, but if you only have  
15 three people in the world that can do these for 60-  
16 some odd sites you're in trouble.

17 MR. CHOKSHI: Yes, and I anticipate that  
18 one of the things it says, and I've been thinking  
19 about that, you know, we say that at least one  
20 offsite. And there are things in that I'm going to  
21 get comments back, you know, are they going to be  
22 practical or not. And this is useful, because I think  
23 we'll talk to NFPA people and --

24 MEMBER STETKAR: Talk to NFPA because  
25 there's a lot of parallelism here in terms of evolving

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1 science and limited number of people with expertise.

2 MR. CHOKSHI: And what we have here, idea  
3 is that really the same thing for the flooding. So I  
4 want to be consistent. So I think you're going to  
5 like it. And so more peddle to the fire, again, NFPA  
6 is a good talk.

7 MEMBER BLEY: That seemed to cause quite  
8 a bit of problems then.

9 MR. CHOKSHI: And that was probably one of  
10 the lesser satisfying part of the IPEEE process,  
11 because the idea was to rely on that and it didn't  
12 happen that way.

13 MS. KAMMERER: Can I ask a question?  
14 Because I'm not clear on what exactly happened with  
15 NFPA 805, was it that the people who were supposed to  
16 be coming, they ran out of time? Or the people that  
17 who were supposed to be coming back and doing that  
18 close out peer review were just too busy with another  
19 project?

20 MEMBER STETKAR: All of the above I think.  
21 And talk to the NFPA 805 folks, they have really good  
22 stories about problems that, you know, individual  
23 licensees scheduled a peer review because they thought  
24 that they were going to be further along in the  
25 process than they were. But they had the slot for

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1 that limited number of peer reviewers.

2 The peer reviewers came and in many cases,  
3 we heard one example where the peer review team said,  
4 there's nothing here for us to review and left. But  
5 they already then had slots for their peer reviews  
6 because of the schedule. So it's a real --

7 MR. CHOKSHI: I think Steve has very good  
8 experience with this. He probably can give insights.

9 MEMBER STETKAR: Please state your name.

10 MR. LAUR: Yes, this is Steve Laur, NRC  
11 Staff. I was involved a little bit in the NFPA 805  
12 early on. There was a couple of issues, one is  
13 resources. But when a peer review team comes to  
14 review a PRA, according with the ASME-ANF standard,  
15 the PRA is supposed to be essentially complete.

16 Now, that was not the case for the NFPA  
17 805 for several reasons and we won't go into those.  
18 But what we ended up doing was accepting peer reviews  
19 that were done on a modeling progress for a to be  
20 built plant as opposed to an as built plant. Or a to  
21 be modified plant.

22 I guess the other thing I heard that is  
23 not exactly correct. One thing of the peer review  
24 process is that even if it's a complete model, a peer  
25 review team comes in and writes a report. They never

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1 come back to validate that the correction of the  
2 finding or the facts and observations were performed.

3 That's left to the licensee and we used to  
4 review that as part of the --

5 MEMBER STETKAR: That's correct, but in  
6 this particular ISG the expectation is that there  
7 would be another peer review of the final report.

8 MR. CHOKSHI: Right, that's how it's laid  
9 out, yes.

10 MEMBER STETKAR: Which implies that  
11 iteration phase.

12 MS. KAMMERER: And in fact in the --

13 MEMBER STETKAR: That is different here.

14 MS. KAMMERER: Yes. In the documentation  
15 section I think there's quite a few where it's  
16 specifically called out where they have to document  
17 how they close out peer review.

18 MEMBER STETKAR: That's always the case,  
19 though, for any peer review.

20 MR. CHOKSHI: But I think one of the  
21 important points, I think, that in that space on the  
22 SPID position, particularly with the industry like on  
23 the use of existing structural models, that's an  
24 important element of that review by an experienced  
25 structural engineer to make sure that models are

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1 existing. So there are some elements where it's  
2 specifically integrated into the excerpt positions.

3 MEMBER STETKAR: That's fine, but it's one  
4 of the things I stumbled over though.

5 MR. CHOKSHI: No this is always a  
6 difficult issue.

7 MEMBER STETKAR: In Section 6 it  
8 explicitly says peer review should include review of  
9 the final report, which implies that iteration.

10 MR. CHOKSHI: Yes, and I'm sure that we're  
11 going to have both comments on this one internally and  
12 externally. And I think we'll coordinate with NFPA.

13 CHAIRMAN SCHULTZ: Niles, before we go  
14 forward, we had the general presentation here of the  
15 key positions and we've gone into some level of detail  
16 and I understand from the slides coming up that we're  
17 going to go into more detail. So I would suggest that  
18 we have a short break.

19 MR. CHOKSHI: Yes, this is a good time to  
20 do that.

21 CHAIRMAN SCHULTZ: With an opportunity to  
22 reassemble at 10:45.

23 DR. BUDNITZ: Steve?

24 CHAIRMAN SCHULTZ: Yes.

25 DR. BUDNITZ: Can you give a clue as to

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1 when this thing might end? The hour maybe?

2 CHAIRMAN SCHULTZ: We could figure an  
3 hour, it will be before noon. I would expect that it  
4 would be an hour past 10:45, or 11:45. Around 11:45  
5 until noon, in that timeframe.

6 MEMBER BLEY: We're only halfway through  
7 the slides.

8 (Whereupon, the meeting in the above-  
9 entitled matter went off the record at 10:27 a.m. and  
10 resumed at 10:45 a.m.)

11 CHAIRMAN SCHULTZ: I'll bring the meeting  
12 back into session. And Nilesh, turn the presentation  
13 back to you with regard to moving forward with the  
14 slides. Thank you.

15 MR. CHOKSHI: Okay.

16 CHAIRMAN SCHULTZ: Thank you.

17 MR. CHOKSHI: So I think we went over most  
18 of the key positions you know, and then what I like to  
19 do is talk about a couple of things in more detail.  
20 So the first issue I'd like to talk about is about the  
21 High Frequency Components.

22 DR. BUDNITZ: And Nilesh, can I say one  
23 ten second thing?

24 MR. CHOKSHI: Sure.

25 DR. BUDNITZ: I think we can put a clause

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1 in that will recognize the analyst may wish to assume  
2 that offsite power wasn't permanently us and then  
3 justify why for that particular scenario and so.  
4 That's easy to put in.

5 MEMBER STETKAR: You guys can work on  
6 that.

7 MR. CHOKSHI: Yes, I think Bob, let's  
8 discuss that. I think that's you know, yes. But I  
9 think you're right, we got the comments, so okay. So  
10 I'm going to go, we are back on the record and I'm  
11 going to move to the High Frequency Components slide,  
12 okay.

13 MS. KAMMERER: Oh you know, there's  
14 something --

15 MR. CHOKSHI: On no, yes I'm sorry, I'm  
16 wrong. We going to, Screening is the first list. So  
17 I'm going to start the slide, which has the diagram of  
18 the screening of, that is the guidance of that EPRI  
19 NP-6041 and other recent reference EPRI is a bit of  
20 some guidance. And very specifically we have  
21 addressed this issue within this screen and next SPID.

22 And this was again, this is the concept  
23 which applies to the both PRA as well as margin. In  
24 looking from the seismic capacity for inter fuel that  
25 it could meant at least you know that you have

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1 selected, that's been dividing into three categories.

2 One, I'll start from the top. One SSCs  
3 Inherently Rugged Structure Systems and Components.  
4 And for the part of the model analyst you can assume  
5 the structures are general considered, has a lot more  
6 capacity and normally you do not include them in the  
7 model. There are some of the MOE and some other  
8 components.

9 The second category is the High Seismic  
10 Capacity where you know partly of the because of the  
11 review level you're looking at a fixed leveled  
12 earthquake, that compared to that level the certain  
13 components and structures system error.

14 High capacity for one, provided to meet  
15 certain conditions. And those are what are outlining  
16 the screening tables into the EPRI NP document and  
17 matters.

18 And then how you deal with those you know,  
19 basically the principle lesson learned, I think from  
20 my belief was that you do not want to lose this, not  
21 only from my particular belief. We like to read in  
22 those components at least into the accident sequences,  
23 so you don't lose them.

24 But now the questions is, do I need to do  
25 specific calculations for them? Because I know high

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1 capacity, but I can assign some components capacity  
2 without doing calculations. And so I can reach in the  
3 model and then depending on the outcome of the  
4 reasons, I may have to go back and look at it, what do  
5 I do with components?

6 The remaining components are, you want to  
7 make sure that are in your analysis and you would do  
8 a specific evaluation by using either you know, both  
9 CDFM matter or separation of variables. But you  
10 retain them and do specific calculations.

11 Now so this is sort of how, looking at  
12 this from a seismic capacity point of view.

13 So now how do you, you know, apply this  
14 and what should be the level that should be applied?  
15 So the first thing the position, key position is that  
16 when high capacity issued to be assigned, capacity  
17 equal to the screening level, okay.

18 Because you ascertain, from that screening  
19 level you can do a lot. So that's considered already  
20 that your capacities high, but let's keep them on the  
21 model. So they'll show up in the cutsets and in other  
22 places.

23 And the screening level now, this is the  
24 one which was the problem and it's still involving.  
25 The number here are the industries doing analysis to

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1 support some of these numbers.

2 We have seen partial results and so  
3 confirmed that you know, are these the appropriate  
4 numbers to use or do we want to define a process were  
5 we come up with an appropriate number. But the  
6 concept is that it has to be a significant higher than  
7 the RLE.

8 So for this purpose based on the  
9 information earlier, when you take two and a half  
10 times the RLE, okay.

11 MEMBER STETKAR: And that's just and  
12 arbitrary selection at the moment?

13 MR. CHOKSHI: It's basically, it's not  
14 that arbitrarily but looking at some of the core  
15 damage frequency, calibrating to that you know.

16 MEMBER STETKAR: I understand the  
17 rationality between, behind the second bullet there.

18 MR. CHOKSHI: Right.

19 MEMBER STETKAR: That essential says, if  
20 everything fails I have an HCLPF for  $5 \times 10^{-7}/y$

21 MR. CHOKSHI: Yes.

22 MEMBER STETKAR: Fine, I can understand  
23 that rational. You can argue with what the number  
24 ought to be but I understand the rational. I  
25 absolutely, I don't understand the background. I

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1 haven't seen any of the discussion, but for the life  
2 of me I cant figure out why a HCLPF capacity 2.5 times  
3 the RLE has any basis --

4 MR. CHOKSHI: I think we're just going  
5 back to this, because your RLE is  $10^{-4}$  minimum.

6 MEMBER STETKAR: I understand.

7 MR. CHOKSHI: Okay? So now if I take a  
8 2.5 and that's not one percent probability of failure,  
9 I can do some kind of computations, again, assigning  
10 generic beta and stuff, and what that means in terms  
11 of core damage. This is very broad, you know, but --

12 MEMBER STETKAR: God, if you can do that  
13 you're really good. I can't.

14 MR. CHOKSHI: Well, in a sense, if I divide  
15 HCLPF capacity by 2.5 and have a fixed beta, how does  
16 that affect my, you know, it has to do with the  
17 hazard.

18 CHAIRMAN SCHULTZ: So there is some  
19 evidence that would suggest that these are relatively  
20 equivalent?

21 MR. CHOKSHI: I mean you know, that other  
22 kind of study has been ongoing, but to me that's what  
23 you want to wind up with the safety value here.

24 CHAIRMAN SCHULTZ: Yes I understand that's  
25 what you want, but I'm just wondering what evidence

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1 there is that --

2 MR. CHOKSHI: Yes, no it's --

3 MEMBER STETKAR: I would certainly hope  
4 they're somehow equivalent.

5 CHAIRMAN SCHULTZ: Yes.

6 MR. CHOKSHI: Yes, sure --

7 MEMBER STETKAR: Otherwise, you know.

8 MEMBER BLEY: And that's their report that  
9 deals with that --

10 MR. CHOKSHI: They are preparing, yes.

11 MS. KAMMERER: Preparing.

12 MR. CHOKSHI: The industry is preparing  
13 it, yes.

14 MS. KAMMERER: At their last public  
15 meeting they presented the first phase of research and  
16 so we can provide that for you, but it's basically the  
17 minutes of the last public meeting and they will be  
18 writing it up in, although it's a little bit confusing  
19 how it was presented if you do look at this.

20 MR. CHOKSHI: Yes, if you looking at the  
21 slide it won't be --

22 MS. KAMMERER: It's challenging.

23 MEMBER STETKAR: Well that's why earlier  
24 I think we said that, if this is part of SPID --

25 MR. CHOKSHI: Yes.

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1 MS. KAMMERER: Yes.

2 MEMBER STETKAR: -- we'd kind of like to  
3 see it for --

4 MR. CHOKSHI: Yes, and then like --

5 MEMBER STETKAR: -- get more stable.

6 MR. CHOKSHI: And as I mentioned this is  
7 a critical item you know.

8 MEMBER STETKAR: Yes.

9 MR. CHOKSHI: Because this is what effects  
10 a whole lot of things.

11 MEMBER SHACK: I mean, I assume it's the  
12 same hand waiving argument that you got to in 1.208,  
13 which was your performance base. That's how you came  
14 up with the  $10^{-4}$  is acceptable because when you sort  
15 of did the back calculation you came up with the --

16 MR. CHOKSHI: Yes, well I think that's a  
17 good --

18 MEMBER STETKAR: Well but I mean this is  
19 a little bit different, this is screening.

20 MR. CHOKSHI: Screening.

21 MEMBER STETKAR: It says, that if, yes  
22 second bullet --

23 MEMBER SHACK: It think he does the same  
24 sort of calculation --

25 MEMBER STETKAR: But the second bullet

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1 says, using a mean point estimate. That says that, I  
2 take it HCLPF, I derive a mean, I run it through and  
3 analysis and I get to a frequency of failure of  
4  $5 \times 10^{-7}$ . If everything fails, that's a large early  
5 release frequency, so I can sort of understand how  
6 that is done.

7 I don't understand how that, without  
8 knowing the hazard curves and without knowing what  
9 assumptions you've made about betas and things like  
10 that, I don't know how the 2.5 times the review level  
11 earthquake relates to that same sort of thinking.  
12 That's what I was sort of challenging.

13 MS. KAMMERER: But one other thing that  
14 sort of --

15 MEMBER STETKAR: I think that's a little  
16 different than 1208.

17 MS. KAMMERER: -- helped me to understand  
18 it to is remember this is just for, this is for the  
19 first pass of the screening of the model. They still  
20 have to go back and do the check to look and see, did  
21 any of the components that were screened show up as  
22 were significant, in which case they have to go back  
23 and they have to redo the actual capacity.

24 So they can, regardless of what we put  
25 there they can follow the guidance or not, using a

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1 different criteria. Industry is looking at between  
2 two and three those are very high, but they have to  
3 still go back and do those checks.

4 MR. CHOKSHI: Well, one thing may not be  
5 clear from this, I realize that. The second phase  
6 applies to the component probability of failure. So  
7 to me we can evaluate the second part first. I can  
8 come out with what I need to be on the first bullet.

9 So I can start correlating. I think the  
10 question you were asking.

11 MEMBER STETKAR: Yes but if you do the  
12 second part first why would you need to?

13 MR. CHOKSHI: From the study point of  
14 view. Because you know, we have a hazard  
15 corroborative of the site because coming out from 2.1.  
16 I sort of back calculate, again I pre-assume some  
17 genetic beta and what the emission capacities. And  
18 then I will see where I am. So I think that stack has  
19 not been done to demonstrate that it's not equivalent.

20 MEMBER STETKAR: Then I guess I'm not as  
21 far along as you are. The second bullet suffers from  
22 that thing we talked about earlier. You want a screen  
23 to be, to come circuit. You don't want to miss  
24 anything when you do the screen. And the beta that  
25 you pick to come up with mean point estimate with

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1 HCLPF anchored curve really ought to be a pretty low  
2 one.

3 MR. CHOKSHI: Yes it is. And the industry  
4 study is looking at that also.

5 MEMBER STETKAR: I assume they are ready  
6 a basis document with it or something?

7 MR. CHOKSHI: Yes, exactly, right. I  
8 think that you're correct but we haven't reached that  
9 point. But I think the source for in order to at  
10 least have something for people can react to 2.5.

11 MS. KAMMERER: I want to ask this.

12 CHAIRMAN SCHULTZ: For the folks that are  
13 on the bridge line, can you make sure your phones are  
14 on mute. We can hear papers rattling in the  
15 background. Thank you.

16 MR. CHOKSHI: I think Annie just pointed  
17 out that also you wanted to keep the screening level  
18 high. So 2.5 times, for application you need to  
19 actually come up with a non level. And keep it high  
20 that all the caveats are addressed and also that your  
21 not using or listing out some important things.

22 And so then I think the total relating  
23 first of all to anything we're talking about is that  
24 in the end, again we want to make sure that we all  
25 depart from the check. Everything else in the plan

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1 when we start the analysis your perception of what is  
2 required to get any conclusions and what was high  
3 seismic capacity. So the question about it, then you  
4 need to go back and look at it.

5 MEMBER ARMIJO: A quick question. The  
6 screening level of 2.5 or  $5 \times 10^{-7}$  year do these have a  
7 history or are they traditional. What's the basis for  
8 those?

9 MR. CHOKSHI: The history, people have  
10 always recognized that the screening level needs to be  
11 not necessarily unilaterally. You need to challenge  
12 the components. Otherwise you be able to spin out.  
13 And that was, I like it quite a bit in that particular  
14 application.

15 So when the ASME and ANS standard, it  
16 specifically talks about caution in that select. It  
17 does not specify specific levels. This is the first  
18 time we are specifying the levels.

19 MEMBER ARMIJO: So it was just a judgment  
20 call on the basis.

21 MR. CHOKSHI: Yes judgment call and then  
22 what the industry has done is get, and then say I have  
23 information on this. Now I went back and applied this  
24 criteria to this study.

25 They then take certain components and as

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1 you generate based on my screening level. And that's  
2 basically that's starting with the second bullet  
3 first.

4 If I assume seven year probability of  
5 failure how much incremental changes in the risk.  
6 What insights I am losing and so on. So they're  
7 testing those different limits.

8 MEMBER STETKAR: You just said the  
9 industry has taken ATRA meaning all of this stuff  
10 generically for every plant in the country is being  
11 derived from an evaluation of one plant.

12 MR. CHOKSHI: We could look at more but so  
13 far what we've --

14 MEMBER STETKAR: Could, but have they?

15 MR. CHOKSHI: No their plan is to look at  
16 more. But so far this is all work in progress. What  
17 we are assuming is from one study. We are going to do  
18 a number of things. They are going to look at a  
19 number of different hazard. They are also going to  
20 look at different criteria and they're going to look  
21 at some more fragilities.

22 MS. KAMMERER: That's right.

23 MEMBER STETKAR: Are they doing all that  
24 by the November?

25 MS. KAMMERER: Yes they are.

1 MR. CHOKSHI: Oh yes. In order to them I  
2 would say within the next month.

3 MS. KAMMERER: Yes they're supposed to  
4 have the rest of, the remainder. I'm sure they are  
5 putting out results tomorrow. And they have to have  
6 it all written out within a couple of months.

7 MEMBER STETKAR: Okay.

8 MS. KAMMERER: So they've already done the  
9 looking through, they've already gone through the  
10 different frequencies of failures. They've already  
11 done some of the work on the input motions.

12 MR. CHOKSHI: Still there's a lot.

13 MS. KAMMERER: A lot to do.

14 MR. CHOKSHI: A lot to do and then  
15 systematically sit down and analyze the data. But to  
16 me I think this a, I essentially like the having the  
17 industry initiative on this. Because this is a big  
18 gap like high frequency. And I think we are all first  
19 time ordering.

20 I can see this now, Bill, going back to  
21 your question about some parts of this application and  
22 we come up with ISG. And then go forward in some  
23 other, and come out with a much better equation on  
24 this that should be captured in the standard. So both  
25 sides, you know.

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1           We look now at structural. This is  
2 another big issue. I've got this going, and we've  
3 talked about all of the expertise and Bob and Armijo  
4 are on the response line.

5           DR. BUDNITZ: I'm here.

6           MR. CHOKSHI: So okay. One of the big  
7 question if you listen to the PRA and it has stamps  
8 from the changing nature of ground motion. As we  
9 know, I think if we look at the original earlier PRAs  
10 were based on a spectra shape based on a Reg Guide  
11 160, primarily Western type of ground motions.

12           As we learn more about the Eastern, the  
13 spectra look differently. And the screening was very  
14 attractive in the past because of all the design  
15 spectra and the spectra shape we used in the PRA were  
16 comparable. You could use the results of existing  
17 analysis to scale to increasing levels.

18           The second thing is that structural  
19 modeling and things you have also. In the past, in  
20 many of the IPEEE analysis, people have relied on the  
21 design models.

22           Although at some point they did additional  
23 models but we have used one we call a lumped mass  
24 model. From my perspective that lumped mass model and  
25 type of things we are trying to do for the PRA

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1 standard, none of that is adequate but it requires  
2 careful talk and what you are doing is adequate for  
3 the purpose.

4           And how do you account for changes in the  
5 spectra shift. When do you decide I want to do a new  
6 model. Or my model is adequate for the purposes of  
7 what I'm doing here in this analysis. So industry has  
8 given a number of ideas for better positions. We have  
9 had quite a bit of internal discussions and  
10 supplemented that position. And what you see in the  
11 ISG again this is ongoing but reflection of that  
12 process.

13           And industry is doing another study, two  
14 studies. One study is related to the effect of  
15 spectra issue. And that's to me probably the biggest  
16 issue that could alter your insights from earlier  
17 results. You know, if your responses are shifting  
18 that's typical like most of the structures are listed  
19 in 10 hertz. And the earlier design spectra, the new  
20 spectra are a much higher.

21           So now what you are estimating capacity of  
22 the structure in the rule. It's different now, you  
23 probably will estimate high capacity. So on the high  
24 frequency component you do the risk. So at some point  
25 in time your reasons will no longer become valued or

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1 applicable.

2 So I won't read all of these but the next  
3 this is trying to address that issue. And this is  
4 only a part of the position. There are three  
5 elements.

6 MS. KAMMERER: Actually they are all on  
7 the slide. Let me go ahead and, if you don't mind,  
8 just go ahead and summarize.

9 So industry came in with three positions  
10 with the hope that to the extent possible the existing  
11 models could be used. Obviously some of them have  
12 more complexity than others.

13 So we generally agreed that for the  
14 purposes of the 5054F letter a lot of the existing  
15 models could be used but not all of them. And so they  
16 had three positions.

17 The first one, what is the criteria that  
18 says when a model is sufficiently accurate and complex  
19 or not. The second thing is when can in structure  
20 response spectra be scaled. And that is what speaks  
21 to what Nilesh was just talking about.

22 And the third thing is, when can the  
23 existing models, or the original definition of rock  
24 was 3,500 feet per second. Now we consider that a  
25 soft rock and you would normally do a SSI analysis

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1 now.

2 But they wanted to go ahead because many  
3 of the models have been developed that way with fixed  
4 base could they still do it.

5 And so on the first topic we have now  
6 worked with them to develop a list of criteria, I  
7 believe it's the writing in Appendix A.

8 More specifically the elements that they  
9 have to look at to see whether or not --

10 MEMBER STETKAR: Is this applicable both  
11 to the SMA and the PRA.

12 MS. KAMMERER: Yes it is.

13 MR. CHOKSHI: Actually the origin of this  
14 issue in context with SPID.

15 MS. KAMMERER: That's probably where we  
16 can expect to see more of those. So that's in  
17 Appendix A. And they provided some, we supplemented  
18 it.

19 One of the things that's clear that in all  
20 three of these elements however they get to those  
21 ultimate in-structure response factor it has to peer  
22 reviewed. It needs to be assessed through an  
23 experienced structural engineer.

24 So that's consistent through and we expect  
25 in the documentation for them to then provide all of

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1 the information for the justification at that time.

2 So on those three particular issues the  
3 in-structure response spectra is a little more  
4 challenging speaking to some of the issues that Nilesh  
5 raised.

6 But those three structural elements are  
7 tied together and they are all covered in the SPID.  
8 So why the first point says either go to the standard  
9 or use the criteria that's laid out in the SPID.

10 MR. CHOKSHI: And I think as I pointed out  
11 earlier that is unknown. Because these are critical  
12 decisions. And you don't want to be at the end of the  
13 analyses if you question these.

14 There is just no time to go back and  
15 that's why we, specifically on this one if someone  
16 looks at it independently and comes to the same  
17 conclusion I think it's safe.

18 MS. KAMMERER: One other thing I should  
19 mention is there was as Nilesh mentioned now we have  
20 a lot more understanding of the high frequency  
21 content.

22 A big difference between this and the new  
23 reactors is how the high frequency content is being  
24 developed. Because as was mentioned, there's that  
25 testing program to look at the high frequency

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1 response. And so those two portions of the review are  
2 handled separately.

3 So these models are not going to capture  
4 accurately that high frequency response. We know that  
5 and so that's why we're addressing it in a different  
6 way. So I just wanted to make that clear.

7 MR. CHOKSHI: I think a little bit I have  
8 more. But here I think the initial discussion on the,  
9 particularly on the scaling. And I just said, the  
10 only mention of that particular one being the shape of  
11 the previous input response factor and the shape of  
12 the new shift to any structural frequencies used in  
13 response and things which would alter the --  
14 basically, the response of the event.

15 And I think we talked about a lot of these  
16 so I'm not going to talk about them more. It is the  
17 high frequency. And I think as Annie told you a good  
18 segue that you're looking at high frequency issue  
19 differently.

20 Because remember that even for the blinds  
21 which we are going to screen out these known hazard  
22 beyond 10 hertz. And saying if you exceed the new  
23 hazard beyond 10 hertz the thing you'd have to do is  
24 to address the high frequency issues. But we don't  
25 have a good estimate. That is throughout that high

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1 frequency issue is being dealt with by the space  
2 program.

3 MEMBER BLEY: Is anything sensitive to  
4 high frequencies other than contact chatter and  
5 electrical equipment?

6 MR. CHOKSHI: What we are looking at, I  
7 can tell you some of the categories you are looking  
8 at. One is electro-mechanical relays, control. Sub-  
9 control switches. Process switches and sensors.

10 MEMBER BLEY: That's circuit breakers,  
11 it's still the contact.

12 MR. CHOKSHI: Yes correct, contact.  
13 Electro-mechanical contacts, auxiliary contacts,  
14 transfer switches. And in a limited sense, solid  
15 state but very limited, you know. It's sort of  
16 lumping.

17 MEMBER BLEY: Those are, the natural  
18 frequencies on those as I recall, range like from 20  
19 to 25 hertz, something like that, right?

20 MR. CHOKSHI: Yes. And then let me talk  
21 a little bit about this program, okay? And I think  
22 that this program is in two phases. The phase one is  
23 to sort of iron out the details of this program.

24 And before they start on an actual program  
25 they're going to, and this is already work underway.

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1 We had two meetings on this issue. They have given a  
2 plan, we give comments back.

3 Particularly we give them comments back on  
4 the list of components they are testing and then their  
5 latest they are addressing why they are not including  
6 some of their components.

7 MEMBER BLEY: SQRSTS did some testing  
8 years ago. Are these things they didn't test, or  
9 better tests than they've done before?

10 MR. CHOKSHI: High frequency.

11 MEMBER BLEY: They didn't do the high  
12 frequency?

13 MR. CHOKSHI: Because at the time they  
14 were done, we really didn't know that much about high  
15 frequency. So if you go back to Lawrence Livermore  
16 test, Brookhaven test and SQRSTS test, they do not  
17 answer the question of high frequency.

18 MEMBER BLEY: So more than 10 hertz.

19 MR. CHOKSHI: We know that typically if  
20 you look at Reg Guide spectra there some amplification  
21 of the 33 hertz but you start dropping fast.

22 MS. KAMMERER: In that report EPRI-1015109  
23 which was published in October 2007 as a response to  
24 some of what happened about that time. It has a  
25 discussion in details the list of equipment narrows it

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1 down to about ten classes.

2 So this is the sets of classes of  
3 equipment that the program is focused around. It's  
4 discussed in there so the initial phase which has now  
5 been, as you heard, just last week they gave us the  
6 final test program for Phase 1.

7 That covers the range of those and we're  
8 also looking, they're also looking at a range of  
9 loading levels. So times three, I can't remember,  
10 pulse of a random. Things like that which will help  
11 to inform it.

12 Also that information, any lessons learned  
13 will make their way into this bid. But it's really,  
14 it's detailed in there and there's a few other  
15 components that we're asking them to justify why they  
16 have taken out, not only the program but 109.

17 So I think we're pretty happy I think with  
18 what's been proposed. We participated in the work  
19 shop to develop it.

20 MR. CHOKSHI: Yes, the motion issue, 16 to  
21 64 hertz, to specifically answer that, because that's  
22 the frequency range where a lot of issues are.

23 MEMBER STETKAR: You mentioned a number of  
24 electro-mechanical type devises that have contacts  
25 that I can look at. You said very quickly a limited

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1 look at, I think you said, digital INC.

2 And I'll differentiate now between digital  
3 INC which generally means software related things and  
4 solid state which generally means printed circuit  
5 cards stuck in slots on cabinets.

6 Sometimes micro switches mounted on the  
7 circuit boards. Are they looking at solid state type  
8 installations? Because and awful lot of plants now  
9 have those. Regardless of whether they've gone to  
10 software controls.

11 MR. CHOKSHI: And I think that's what  
12 exactly they are looking at, like mounting.

13 MEMBER STETKAR: Mounting, they are?  
14 Okay, good thank you.

15 MEMBER BROWN: Can I amplify just a smart  
16 chip?

17 MEMBER STETKAR: I wasn't going to ask  
18 because I knew you would want to.

19 MEMBER BROWN: I just wanted to clarify a  
20 little bit this solid state. Software based systems  
21 also are on printed circuit cards. So it's not  
22 printed circuit cards and mounting.

23 It's the isolation of the circuits and the  
24 analog for the solid state world within that circuit  
25 card that can create a problem. So I'm just trying to

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1 clarify a little bit so you don't, all printed  
2 circuit.

3 Well they're all printed circuit cards,  
4 they all go in slots. Whether they're software based  
5 or otherwise. That's the only clarification I wanted  
6 to throw in there.

7 MR. CHOKSHI: I don't know enough to know.  
8 I think that's good.

9 MS. KAMMERER: It seems to me it would be  
10 really useful to come back when we have the results of  
11 the Phase 1. Because the Phase 1 is like really  
12 happening right now. If we have that because then we  
13 have a little bit more time to develop this much  
14 larger program.

15 MR. CHOKSHI: Yes, and that's the next  
16 slide is talk about electros too.

17 MEMBER BLEY: Let me ask you a question  
18 about how that's going to be implemented. One thing  
19 happened back in the '80, was all the people involved  
20 in getting this test set up were mechanical and  
21 structural engineers and no electrical.

22 And they were astounded by some of the  
23 things they saw. Where if they'd had an electrical  
24 engineer they wouldn't have been so astounded.

25 I wonder if we have some engineers for

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1 electronics equipment involved in these tests to be  
2 thinking about things that might not come to mind to  
3 the folks that are usually working on this and I hope  
4 so.

5 MR. CHOKSHI: Yes. I think that is a good  
6 question. To find people who have that expertise  
7 hard, people that think that way.

8 MEMBER BLEY: Find people who study  
9 seismic, who have that experience is hard. But I  
10 think if you get people with that experience they  
11 could think up the idea of assertion being the  
12 problem.

13 MR. CHOKSHI: I think we could find the  
14 coordinate to set up with this electrical group.

15 MS. KAMMERER: The work shop that occurred  
16 was very large. There was about 15 people there, all  
17 different groups of people. The testing is being done  
18 in facilities that would typically do qualification  
19 testing for nuclear equipment. And there was a lot of  
20 discussion in different mounting orientations and  
21 things like that.

22 MR. CHOKSHI: But selection of the  
23 components I think the industry went through that  
24 process. They talked to the systems people and the  
25 staff group.

1                   MEMBER BLEY: I thought that was going on  
2 way back when some of the other work was done, and  
3 like I say there were things done that had to be  
4 redone. And great surprises because you didn't have  
5 people who understood the whole electrical circuit  
6 involved in the setup.

7                   MR. CHOKSHI: That's a good question, I'll  
8 raise that again with them and see who is being.

9                   MS. KAMMERER: Yes, I'll ask that.

10                  MEMBER BLEY: Before we go, when you go  
11 back to Phase 1 slide. I just want to look at that  
12 last bullet. Annie, you indicated that there's a lot  
13 that is going on and that last bullet really has three  
14 or four different components in it.

15                  So if you could be more clear with respect  
16 to the schedule for this, the test program, the  
17 feedback, the validation of the plan and the pilot  
18 test plan I understood was going to be completed by  
19 November this year.

20                  MR. CHOKSHI: Next year.

21                  MS. KAMMERER: No, not the plan but the  
22 testing is going to be completed.

23                  MEMBER BLEY: Yes I understand that, so  
24 just for the Phase 1 what is going to be accomplished  
25 and is being accomplished very rapidly over the next

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1 couple of months here?

2 MS. KAMMERER: Okay. So we've already had  
3 a work shop, we've developed a Phase 1, we weren't in  
4 the meeting at the time.

5 We've got the final write-up to make sure  
6 it's consistent with what we all agreed in the work  
7 shop last week. And we can provide that and it really  
8 spells it out in much greater detail.

9 And so that testing, in order to get into  
10 these facilities, of course because the squad people  
11 had it after, the testing is going on, it's happening  
12 in two different phases, within Phase 1.

13 So there's testing ongoing right now for  
14 some of the components. And what they're going to do  
15 then is look at the various loading types of loading  
16 and to gain some insight.

17 And then the second set of testing on  
18 table I think is going to happen, help me out here,  
19 you were at the workshop, in about a month.

20 And we'll have an opportunity once this  
21 data been developed, we're all going to sit together  
22 in a room and look at it and try to make sense of it  
23 because it's an enormous amount of data.

24 MEMBER BLEY: About a month?

25 MS. KAMMERER: In about a month. And then

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1 the second program happens and then we get the report  
2 on Phase 1 draft and insights that would go into this  
3 bid, all that's completed by October in order to get  
4 into the SPID.

5 About that time then and looking at the  
6 draft report and everything we learned at that point  
7 the broader program will be developed and scope out  
8 and that will be October/November and that will be  
9 completed over the following year.

10 CHAIRMAN SCHULTZ: It's in those two  
11 phases based upon the discussion we just had about  
12 what personnel ought to be involved with evaluating  
13 the pilot test and planning the test for next year.

14 The electronics experts in addition to  
15 those that are probably more mechanical in terms of  
16 mounting and so forth. That's where you want to be  
17 sure, or we all want to be sure that they're engaged  
18 and involved.

19 MS. KAMMERER: And that will be a very  
20 large undertaking.

21 MEMBER STETKAR: The analogy, again, to a  
22 lot of the fire testing that was done if you talk to  
23 the fire folks, like Henry Salley, for example. The  
24 amount of involvement that they needed to have from  
25 electrical engineers when they designed their fire

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1 tests, such that they understood what indeed was being  
2 tested and they got the right information. It came  
3 from the electrical folks, it didn't come from fire  
4 fighters.

5 MR. CHOKSHI: In fact when the least of  
6 the equipment, I did, we did involve here, electrical  
7 engineers to look at also. And here also the people  
8 were looking at the new reactors the people with  
9 qualification background.

10 I think to sort of summarize there are,  
11 for me, there are four big elements of this whole  
12 process. One is to the selection of right equipment.  
13 The second thing make sure that the testing motions  
14 you are using is going to answer all the questions,  
15 which is not just, that's why they are looking at  
16 different things, you know, the sine beta, the sine  
17 sweep and the random input. Because in order to  
18 answer questions you have to look at all of those  
19 carefully.

20 The thing is you are going to do many  
21 tests once you get it because different cities,  
22 different models. That's why the pilot test. Make  
23 sure that once you start on the production type of  
24 testing, you'll be running a lot of, putting many  
25 specimen on the one table and stuff, looking at the

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1 different states energized. You want to make sure that  
2 everything works before you go into that process.

3 And the fourth step which is in the Phase  
4 2 is to now how do I result applying the plant  
5 evaluation. That one not in November, okay? How I  
6 will get this information and if I want to put it in  
7 my models, for example I want to characterize  
8 something by a fragility, how I am going to do this.  
9 What I'm going to deal with in a different context.  
10 So that step has to occur after the testing is  
11 complete.

12 So this is being all the issue of high  
13 frequency is sort of being dealt separately but I  
14 think to me in the right way. So I sort of went over  
15 my Phase 2, but in Phase 2 there is this survey to  
16 gather information on types of potentially -- make  
17 sure that at that point we know all the right  
18 expertise. Another challenges is that a lot of this  
19 has to come from the existing plants because we don't  
20 develop it off site.

21 So I think that they are doing good job of  
22 that from what I hear about their specimens they have  
23 collected.

24 MEMBER STETKAR: Do you see this process  
25 jeopardizing the response schedule?

1 MR. CHOKSHI: No because --

2 MEMBER STETKAR: There's enough margin?

3 MR. CHOKSHI: Enough time because they  
4 know this is going to be right, yes.

5 MEMBER STETKAR: Because I heard this  
6 stuff tends to take a life of it's own.

7 MR. CHOKSHI: I think because we talk  
8 about two to five years.

9 MS. KAMMERER: The way that the  
10 information is coming in, so the Phase 1 information  
11 going into this bid, they are going to put out as much  
12 information related to what we need immediately which  
13 is screening, things that are related to screening.  
14 And approaches and hazard. The longer term program  
15 will be providing a lot more of the fragility data.

16 And that's something that they don't  
17 necessarily need within this bid or immediately.  
18 They're going to need that once they start to  
19 undertake their analyses. So we're really looking at  
20 getting the information in three phases.

21 First anything that is going to be helpful  
22 in screening phases and input. The second is guidance  
23 on how one would use this information within the high  
24 frequency elements. Either for understanding or for  
25 inputting the SRAs and PRAs, and then ultimately the

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1 fragility information.

2 MEMBER STETKAR: I certainly hope the  
3 industry is on board with that schedule.

4 MS. KAMMERER: Yes.

5 MEMBER STETKAR: Because again, finding  
6 analogy on a lot of the fire stuff, you know the  
7 industry has constantly said we need to do more tests  
8 and because we need to do more tests we have a delay.  
9 As long as they're taking ownership of this within the  
10 context of this schedule.

11 MS. KAMMERER: Yes.

12 MR. CHOKSHI: And this has been -- I think  
13 at least in the seismic column that you have talked  
14 about for a while, that in order to address this  
15 issue, we need a test program. You can't analyze all  
16 of these things.

17 MS. KAMMERER: I think one interesting  
18 thing to note is that this program was actually  
19 already forming in peoples minds and had been  
20 discussed under the EPRI NRC research MOU. We had  
21 identified several areas that came out of the ANNUS  
22 Pilot study that was done of areas of future  
23 collaboration and working on this.

24 So there had already been a lot thought as  
25 to how something like this might happen. And so this

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1 particular program in fact is still occurring under  
2 the NRC EPRI MOU as part of the overall research  
3 program. It's just on a much more accelerated  
4 schedule than we'd ever really anticipated previously.

5 MR. CHOKSHI: So I think as far as the,  
6 all of the sort of technical discussions and on the  
7 policies I am finished but I wanted to bring back to  
8 the overall how does this now relates to the ERA.

9 And to me that is important perspective,  
10 I want to be about this. So as you talked about the  
11 SPID positions and our history of the six which  
12 affects both the SPRA and the SMA. They need to be  
13 applied first of all consistently echoes both matters.

14 And by doing that and also then now  
15 including increasing the scope of NRC-SMA this  
16 operation phase and containment functions.

17 And at the same time we're using the not  
18 necessarily requiring fragility analysis for all the  
19 components in and other things those two approaches  
20 are coming together.

21 That's two differences and I think, John,  
22 I think you really brought out that margin we are  
23 trying, the force is to here to identify components  
24 and the why do you want to look at capacity. It does  
25 not answer the questions that the sort of the

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1 phenomena that do you log it as LOCA because of the  
2 seal or are we starting with that assumption.

3 That differences still remain but in terms  
4 of doing the analysis and the resources those  
5 differences are I think for me are coming together.

6 MEMBER BLEY: As I read an early page in  
7 your report you talked about preferring fragility  
8 analysis and then a full scope SMA. How did you get  
9 there? It's hard to tell the difference.

10 MR. CHOKSHI: The difference to me you may  
11 be able to use analysis, individual screening is also  
12 not limited, but you just may have it with pure  
13 calculations. And you're looking at a smaller number  
14 of less complicated trees. And then small initiators.  
15 But the other thing is that hazard is always going to  
16 be available so to me that question is now, in the  
17 past that was an important question.

18 MEMBER BLEY: If I think out loud  
19 somewhere in here you said, I forget the percentage,  
20 but well over half of the people had done EPRI SMAs  
21 only two I think you said did NRC. And the remainder  
22 did PRAs, I don't know how many that is.

23 MR. CHOKSHI: Thirty-six.

24 MEMBER BLEY: That many? If you had an  
25 EPRI SMA and you have an updated internal events PRA

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1 I can't imagine why you'd go to the trouble to build  
2 a reduced model.

3 MR. CHOKSHI: I think that's --

4 MEMBER BLEY: Are you hearing from people  
5 what they're going to do?

6 MR. CHOKSHI: Yes, one of the feedback we  
7 are getting from the people is they might as well do  
8 SBA.

9 MS. KAMMERER: Yes really, most of the  
10 discussions the industry is coming in with is us is  
11 really about the screening. About just doing  
12 something, whether it's an SMA or PRA that's not  
13 really what, it's can they use their existing models.  
14 Can they use things to get screened out.

15 MR. CHOKSHI: What we hear, all of the  
16 technical people basically says you do the PRA,  
17 there's not that much. Now whether the decision  
18 makers will go along with that we don't know.

19 MEMBER STETKAR: And I think, Annie, what  
20 you said about the screening and what the industries  
21 kind of keep that on the screening. How much of that  
22 can they use, and what kind of guidance can be  
23 provided for that screening.

24 That's, I think, where you've heard a  
25 little feedback from us about if they're going to use

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1 the screening approach there should be some confidence  
2 that that screening is appropriately conservative. So  
3 indeed it does identify the things that you might want  
4 to sharpen your pencil on.

5 MS. KAMMERER: I'm sorry, I was really  
6 unclear. What I meant was the overall screening. In  
7 other words did they even have to do, not within a  
8 period.

9 MEMBER STETKAR: Oh, I see, I'm sorry.

10 MS. KAMMERER: And I meant the structural  
11 model. So I realize I just completely said something  
12 very confusing. So they're really looking at what are  
13 the levels at which they have to do something versus  
14 which they're done, you know.

15 And can they use their existing structural  
16 model? That's really where a lot of the discussion  
17 is.

18 MEMBER STETKAR: A different level than  
19 what we're discussing.

20 MS. KAMMERER: Yes, but it's not PRA  
21 versus us.

22 DR. BUDNITZ: Wait, this is Bob Budnitz,  
23 there's an important distinction here. In the systems  
24 model, we're going to allow them to do something that  
25 everybody has always done. And that is if something

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1 is very very rugged like a manual valve, you know, one  
2 of those big looks like a steering wheel on it. We  
3 just let them screen it out. No problem.

4 MEMBER BLEY: But you've done that in  
5 PRAs.

6 DR. BUDNITZ: Of course, but we do that  
7 with PRA too. But if we screen what we call a strong  
8 component it stays in the model if a conservative  
9 HCLPF or conservative fragility.

10 MS. KAMMERER: Right.

11 DR. BUDNITZ: So it's not screened out,  
12 it's just in the model with a conservative HCLPF.  
13 That's an important point. And then later if we find  
14 out that that conservative thing dominates something  
15 then we insist they go back and do it right.

16 MS. KAMMERER: Sorry, I was confusing  
17 getting us back on the topic.

18 DR. BUDNITZ: So we don't lose anything.

19 MS. KAMMERER: We got it. We got it.  
20 Should we go to the next slide?

21 MR. CHOKSHI: Yes. I think this is my  
22 last slide. Our goal is to, you know, we're working  
23 to an issue that is for public comments by the end of  
24 August. We think we heard some comments today, we're  
25 trying to see what, and also we're getting some

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1 internal comments.

2 My plan is to reflect those comments to  
3 the extent we, some of the things we may not have  
4 properly addressed. But the process for going out for  
5 public comments my part is to stick with the schedule  
6 because we don't get a lot of comments.

7 And we are going to ask them for 30 days.  
8 And then after that, we get the comments, there will  
9 be a comment response. What I'd like to do is maybe  
10 come back to the committee after that and have they  
11 look over the responses so we get your feedback while  
12 still we are preparing the finalized sheet.

13 CHAIRMAN SCHULTZ: And to be a little more  
14 specific then, so we can also schedule that off-line.

15 But just for me to repeat back what I  
16 heard you say. What will go out at the end of August  
17 for public comment will be the document that we have  
18 seen.

19 And then there will be some changes  
20 reflecting comments that you've received from internal  
21 staff review. The discussions that we've had today.  
22 There's another meeting happening with industry  
23 tomorrow.

24 MR. CHOKSHI: But this one we are not,  
25 this is not the reason, we had a meeting on this a

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1 couple of weeks back.

2 CHAIRMAN SCHULTZ: Okay. And so those are  
3 the types of changes you're going to implement before  
4 the end August, and then put for comment.

5 MR. CHOKSHI: Right.

6 CHAIRMAN SCHULTZ: And by the end of  
7 September you'll have the feedback from the public  
8 comment review period.

9 MR. CHOKSHI: Yes, and my plan is to I  
10 want have the fragility by end of October.

11 MS. KAMMERER: There would be some  
12 efficiency also because that's when we'd have the SPID  
13 as well.

14 CHAIRMAN SCHULTZ: That was my next  
15 question.

16 MS. KAMMERER: I think it makes a lot of  
17 sense to have you guys look at those documents  
18 together.

19 CHAIRMAN SCHULTZ: Where the SPID would be  
20 in the form that John was hoping for, stable.

21 MR. CHOKSHI: Yes so then maybe in that  
22 group right after we take all this and what we think  
23 is a sort of final just wanting all the comments to  
24 come back to you. In the end of October beginning of  
25 November, and that gives us another three weeks to

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1 address any other comment.

2 CHAIRMAN SCHULTZ: We'll consider that,  
3 they sent it back to you on the schedule for that. It  
4 will be difficult to schedule that because of other  
5 things are already on the plate.

6 MR. CHOKSHI: Yes. I think if nothing  
7 else we can forward you the documents I think for what  
8 is.

9 CHAIRMAN SCHULTZ: We'll see what we can  
10 do. We'll discuss that off-line.

11 MR. CHOKSHI: So I think that is the end  
12 of my presentation.

13 MEMBER ARMIJO: I had a question going  
14 that I didn't hear discussed and it's in the SPID  
15 Guide, I guess it's that table on Page 10 of your  
16 slides. The issue of the approach for spent pool fuel  
17 evaluations. That wasn't discussed but now is that an  
18 industry position, that column?

19 MR. CHOKSHI: That's a very good question,  
20 because industry has taken different ways at different  
21 times.

22 MEMBER ARMIJO: Let me finish my question.  
23 My question was, what is the position and does the  
24 staff agree or disagree or is that contention there  
25 not --

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1 MS. KAMMERER: They have not yet provided  
2 us a stable position. It changes.

3 MR. CHOKSHI: Yesterday I read that, but  
4 yesterday it looks like they have included something.  
5 So this would be a discussion tomorrow. They have  
6 gone through several.

7 MEMBER ARMIJO: You could just give us a  
8 hint to where they've been wandering about.

9 MR. CHOKSHI: Yes, so at one point they  
10 said they don't want to address spent fuel pool we can  
11 do it later. Now they come back that we don't want to  
12 go into structural evaluation but we will look at make  
13 up capacity and some draw down.

14 But they were still, that was one, and  
15 they were going back to that steering committee and I  
16 haven't looked at it in detail but apparently in this  
17 there is some discussion of spent fuel pool. So we  
18 can know now what they are deciding.

19 MEMBER ARMIJO: Okay. So that's a big  
20 open?

21 MR. CHOKSHI: Open issue.

22 MS. KAMMERER: Yes and just so you know,  
23 whatever's in there, and actually I haven't read that  
24 section yet, it's not at all been reviewed by NRC  
25 staff. We haven't even had an opportunity to speak as

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1 a group.

2 MR. CHOKSHI: This is a log of, so far we  
3 must have at least 25 meetings. We won't have anymore  
4 to do without bouncing that back to project manager  
5 who handles the logistics.

6 MS. KAMMERER: Yes.

7 CHAIRMAN SCHULTZ: Well, the committee  
8 would like to congratulate the staff on the level of  
9 effort as well as the type of interaction that you've  
10 had regarding this topic over the last few months  
11 really.

12 It's proving it's worth with what you've  
13 presented today and what you envision to be developed  
14 over the next few months.

15 Are there other comments or questions by  
16 members of the committee before I open it to public  
17 comment?

18 MEMBER SKILLMAN: I would like to offer  
19 that I think the discussion about mission time in the  
20 72 hours and the stable shutdown state needing  
21 definition is good counsel for your team. I believe  
22 that will be a lightning rod as this goes out into  
23 industry.

24 MR. CHOKSHI: Yes.

25 MEMBER SKILLMAN: I thank you for your

1 presentation.

2 MR. CHOKSHI: Thanks.

3 CHAIRMAN SCHULTZ: Thank you. Other  
4 comments?

5 DR. BUDNITZ: No.

6 CHAIRMAN SCHULTZ: With that I would like  
7 to open to the room an opportunity for comment,  
8 members in the public or individuals in the room who  
9 would like to make any comment. Hearing none.

10 Members of the public or participants on  
11 the phone lines? Any addition comments that would  
12 like to be entered into the record? Hearing none,  
13 I'll move to adjourn the meeting, thank you.

14 (Whereupon, the meeting in the above-  
15 entitled matter was concluded at 11:37 a.m.)

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# **Draft Interim Staff Guidance on NRC SMA for Use in Recommendation 2.1 Evaluations**

**August 15, 2012**

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# Reasons for Including NRC-SMA

- **Recommendation 2.1 50.54(f) letter considers use of either Seismic PRA (SPRA) or NRC Seismic Margin Analysis (SMA) appropriate for plant evaluations if hazard screening criteria are not met**
- **NRC-SMA outlined in the 50.54(f) is an enhanced approach from the original NRC-SMA**
- **NRC-SMA is a fault-space based approach using PRA system logic but limiting analysis to two seismic initiators; transient and small LOCA**
- **Approach is capable of providing risk insights and suitable for sites with lower seismic hazard. SMA is not suitable for high hazard sites**
- **Because of the fault-space based model, the NRC-SMA approach can be easily extended to more detailed PRA type of analysis, if needed**

# Outline of the Draft Interim Staff Guidance (ISG)

- Purpose
- Basic Terms and Concepts
- Background, Overview and Issues Related to Seismic Margin Methods
- Staff Position on Individual Technical Issues
- Documentation
- Peer Review Attributes, Activities, and Documentation

# Purpose and Applicability

- Supplemental guidance to nuclear power reactor licensees on an acceptable method for performing a Seismic Margin Assessment (SMA) as referred to in the March 12, 2012 NRC letter
- This guidance, at this time, is only intended to be used for an SMA conducted in response to the 50.54(f) letter, and not for other purposes. NRC Interim Staff Guidance (ISG) NRC ISG DC/COL-ISG-020 remains the NRC's current guidance for application to new reactors. The contents of this ISG have no implications for NRC ISG DC/COL-ISG-020, the ASME/ANS PRA standard, or any other document

# Background on NRC-SMA

- Seismic Safety Margin Research Program (SSMRP) in late 1970s and early 1980s
- As the SSMRP was wrapping up, ACRS raised the question of actual seismic margin beyond design basis
- NRC formed an expert panel to address the question of seismic margin (early 1980s)
- NRC expert panel addressed easier task and defined the following analysis approaches:
  - review the plant against a specific earthquake level (i.e., SME) and determine whether plant has a high confidence of low probability of failure for SME (this earthquake level is called review level earthquake (RLE) in this ISG)
  - if less than SME, then calculate the plant “high-confidence low probability of failure (HCLPF)” capacity of individual SSCs and ultimately of the plant-as-a-whole



# Background on NRC-SMA

- The expert panel used insights from the then available SPRAs as follows:
  - Retained fault-space based approach
  - Only focused on selected functions, simplifying logic structure significantly
  - Introduced screening tables for use in conjunction with the specified RLE
  - Developed min-max approach to calculate sequence/plant HCLPF
- NRC Method published in NUREG/CR-4334 (1985) followed by NUREG/CR-4882 and NUREG/CR-5076
- Maine Yankee trial application, NUREG/CR-4826

# Reasons for Enhancements

Reasons for the NRC enhancements for this ISG are as follows:

- To define the scope of analysis needed for information requested in 50.54(f) letter
- To provide staff positions on the major elements of SMA
- To update references to allow use of the recent advances in methods and guidance
- To incorporate references to applicable provisions of the ASME/ANS standard and positions of industry (SPID) endorsed by the NRC

# Staff Positions on Technical Issues

## SMA Scope 4.2

- Addition of certain containment functions and systems to assess LERF
- HCLPF capacities for core-damage and large early release sequences
- Separate analysis of HCLPF capacities of sequences with and sequences without non-seismic failures and human errors
- Chatter analysis and treatment of high-frequency response of certain SSCs

## Ground Motion and In-Structure Response 4.3

- Selection of the Review Level Earthquake
- Soil failures
- Development of in-structure response spectra
- Median seismic responses of systems and components

## Systems Analysis 4.4

- Enhancements to the PRA-type systems SMA model beyond those in the original guidance
- “Mission time” for the accident analysis
- Selection of the Seismic Equipment List

## Fragility and Capacity 4.5

- Plant walkdown methodology
- Screening approach and level for of SSCs
- Fragility analysis method for evaluation of the HCLPF capacity of an SSC
- CDFM method for evaluation of the HCLPF capacity of an SSC

## SMA Integration 4.6

- Plant margin evaluation using the Convolution Method for sequence-level and plant-level HCLPF capacity
- Guidance on using the “Min-Max” method for sequence-level and plant-level HCLPF capacity

# SPID Approach

- **Screening, Prioritization, and Implementation Details (SPID) Guide**
  - Being developed by industry with NRC input
  - Objective is to be endorsed by NRC and published by November
- **Some elements of SPID are applicable to the draft ISG and are incorporated and referenced in staff positions**

**Screening, Prioritization and Implementation Details  
 (SPID) Guide for the Primary Approach – Fukushima**  
**NTTF 2.1:**

Category	Reference Number	Position	Figure 1 Flow Chart Reference
Hazard	1	Use of updated EPRI attenuation model	1
Hazard	2	Use of existing site conditions	1
Risk Analysis	3	Use of existing structural models	6a, 6b
Risk Analysis	4	Scaling of responses to develop ISRS	6a, 6b
Risk Analysis	5	Screening criteria for SSCs	6a, 6b
Screening	6	Use of IPEEE HCLPF to compare GMRS for screening	3, 5
Screening	7	Treatment of HF	3, 6a, 6b
Risk Analysis	8	Use of CDFM and separation of variables methods	6a
Risk Analysis	9	Approach for SFP evaluations	7a, 7b
Risk Analysis	10	Overall approach relative to RG 1.200 and ANS/ASME EE standard	ALL
Risk Analysis	11	Consideration of rock founded structures for developing ISRS	6a, 6b



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# An Example of SPID Approach

## **Position #2 / Figure #1 Step 1 Bullet 4:** Use of Existing Site Information

### **Position:**

- The industry will use available soil/site characteristic information. Utilities have the option to gather further information should they choose.
- Subsurface site response models will go deep enough to characterize the lowest frequency of interest to the structure. (0.3 Hz is industry proposal)
- 30 convolution analyses will be used to define the mean and standard deviation of the site response
- The GMRS to SSE comparison will be performed at control point(s) defined in the FSAR. If no control point is defined in the FSAR, the comparison will be conducted at the highest competent layer.

### **Justification:**

- For the purpose of meeting the requirements of 2.1, the existing soil/site characteristic information will provide sufficient accuracy.
- Subsurface site response models are not needed down to depths that would be necessary to capture responses below frequencies of interest to nuclear facilities.
- Statistical analyses have been done to demonstrate that 30 convolution analyses are sufficient to define the mean and standard deviation of the site response. The technical basis for this is contained in the February 22, 2010 Duke Power letter on the Lee Plant FIRS to the Document Control Desk of the NRC (Docket 05200018, Duke Power letter WLG2010.02-01, ADAMS ML100550350)

### **Follow-up studies under consideration for incorporation into the SPID:**

- Guidance on development of the site amplification factors will be included in the SPID.
- Industry to develop guidance for selecting the control point elevation for screening (GMRS vs. IPEEE HCLPF Spectrum) and for soil/rock modeling for SSI (in layer, outcrop, etc.) for future risk assessments. This will ensure proper identification of required hazard data and locations. Two workshops will be conducted involving several industry experts to formulate a consensus on the appropriate control point and soil/rock strata characterization for screening and for SSI.

# Key Positions Under Consideration

- RLE:** The RLE to be used in the SMA is the envelope of the SSE and the Ground Motion Response Spectra (GMRS) over the entire frequency range.
- Initiating events:** Transient and small LOCA with unrecoverable loss of offsite power
- Mission time:** Extended to 72 hrs. or stable shutdown state, whichever is longer
- Scope of functions:** Group A functions (Shutdown chain reaction plus injection-phase early core cooling)  
+ emergency core cooling late involving recirculation and switchover phase  
+ containment heat removal  
+ containment over-pressure protection (early)  
+ containment integrity (penetration and isolation).
- Containment structural failure modes:** Need not be included

# Key Positions Under Consideration

- Non-seismic failures: To be included explicitly
- Human actions: To be included explicitly
- Screening of SSCs: EPRI-NP-6041-SL Rev.1, other recent refs. SPID position (described in detail later)*
- Plant walkdown: EPRI NP-6041- SL Rev.1, ASME/ANS Part 10, HLR-SM-D
- Responses: ASME/ANS Part 10, SM-C1 to SM-C4 and SPID (described in detail later)*
- Seismic margin (SSCs): Fragility method: Section 5-2.2 of Part 5 of the ASME/ANS Part PRA Standard, also SPID provision of using CDFM with generic  $\beta$   
CDFM method: Section 10-2 of ASME/ANS Part 10, EPRI Guidance

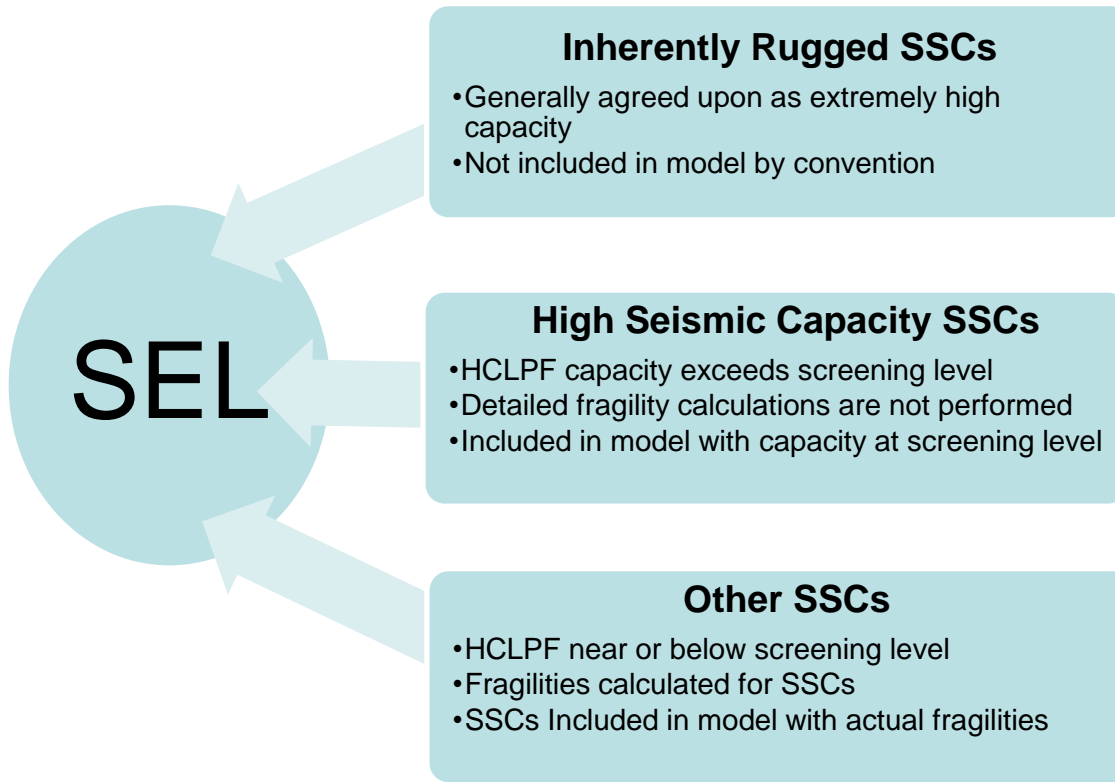


# Key Positions Under Consideration

<i>High-frequency components :</i>	<i>Treated through test program (described in detail later)</i>
Soil failure modes:	To be included as applicable
Sequence/Plant HCLPF:	Convolution approach Min-Max method acceptable with justification
Documentation:	As per ISG-20 and position of SPID on sequences before screening of components HCLPFs for leading sequences separately for core damage and large release HCLPFs for sequences separately with and without non-seismic failures
Peer review:	Participatory review

# Key Positions Under Consideration - Screening

Screening of SSCs: EPRI NP-6041- SL Rev.1, other recent refs. SPID position



# Key Positions Under Consideration

## Screening of SSCs –Draft Staff Position

- The components identified as “high capacity” SSCs should be assigned capacities equal to the screening level and retained in the system model
- The screening level may be set as either:
  - A screening level consistent with a HCLPF capacity that is 2.5 times the RLE, or
  - A screening level equivalent to the HCLPF that leads to a frequency of failure on the order of  $5 \times 10^{-7}/\text{yr}$  using a mean point estimate.
- Once the SMA analysis has been performed, a check must be conducted to assure that none of the following conditions exist:
  - A “high seismic capacity” SSC (which has been assigned a conservative HCLPF equal to the screening level) is identified as a dominant contributor to HCLPF of core damage
  - A high seismic capacity SSC is identified as a dominant contributor to HCLPF of large early release

# Key Positions Under Consideration - Response

## Summary of Draft Staff Position:

- Realistic ISRS should be calculated using ASME/ANS PRA Standard Part 10 or the guidance on the use of existing information and models provided in the SPID
- If an existing structural model is used, its attributes should be compared to the criteria in the SPID and its applicability documented and justified
- If scaling of in-structure response spectra (ISRS ) is used, its use should be consistent with current accepted practice or the SPID guidance on the use of scaling. The use of scaling should be documented and justified
- Fixed base models may be used for structures founded on rock with a shear wave velocity greater than 3,500 feet/second
- The use of any existing models or data should be reviewed by an experienced structural engineer, and should be subject to peer review

# Key Positions Under Consideration - Response

From Appendix A of Draft ISG:

- The acceptability of scaling of responses will be based on:
  - previously developed ISRS
  - shapes of the previous input response spectrum/review level earthquake (RLE)
  - shapes of the new RLE, and structural natural frequencies, mode shapes and participation factors
- Licensee will need to demonstrate/document that scaling of the ISRS is appropriate for the site in their submission to the NRC. Any potential structural issues with the use of scaling should be addressed and justified in the documentation. The use of scaling and the documentation should be subject to peer review, which will also be documented
- Scaling of rock or soil sites where the shape of the new hazard spectrum is not highly similar to the previous spectrum is not recommended without justification that demonstrates the validity of the scaling approach

# Key Positions Under Consideration – High Frequency SSCs

- Staff position – utilize industry test results after endorsement
- Industry has undertaken a test program involving two phases

## Phase 1:

- Developed a project plan and roadmap incorporating past studies on high frequency effects
- Conducted a workshop to review draft project plan and roadmap
- Conducted workshop to develop and review a test plan
- Will initiate pilot test program to collect feedback and validate project and test plan.

# Key Positions Under Consideration – High Frequency SSCs

## Phase 2:

- Upon completion of Phase 1, the broader test program will be initiated (Phase 2), including:
- Survey to gather information on types of potentially high frequency sensitive equipment (type, manufacturer #, model, etc.)
- Utilize results from survey and pilot test program to finalize test plan (workshop to review)
- Conduct test program
- Utilize results from test program to confirm adequacy of high frequency input motions for plants that otherwise screen out and for plants that are undertaking further risk evaluations

# SPRA for Recommendation 2.1

- The following six SPID positions proposed by industry in conjunction with the use of SPRA apply to the SMA also
  - Use of existing structural models
  - Scaling of in-structure response spectra
  - Use of fixed-based models for soft rock sites
  - Use of the CDFM and Separation of Variables methods for fragility curve development
  - High frequency test program
  - Screening of component
- With the enhancements in the NRC-SMA method and use of the above positions the differences between SMA & SPRA are narrowing
- The challenge with the available resources is related to whether there are enough response and fragility analysts



# Next Steps and Summary

- Issue draft ISG for public comments by the end of August
- Receive public comments after 30 days
- Issue final ISG by November
- Enhanced NRC-SMA is provided as a fault-space based option to SPRA for low hazard sites
- Enhanced NRC-SMA can more easily be extended to obtain risk insights