

# Official Transcript of Proceedings

## NUCLEAR REGULATORY COMMISSION

# ACRST-2099

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441st Meeting

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

MAY 2, 1997

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards on MAY 2, 1997, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

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

1 UNITED STATES OF AMERICA  
2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 441st MEETING

5 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

6 + + + + +

7 FRIDAY, MAY 2, 1997

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9 ROCKVILLE, MARYLAND

10  
11 The Advisory Committee met at the Nuclear  
12 Regulatory Commission, Two White Flint North, Room T2B3,  
13 11545 Rockville Pike, at 1:00 p.m., Robert L. Seale,  
14 Chairman, presiding.

15  
16 COMMITTEE MEMBERS:

17	ROBERT L. SEALE	CHAIRMAN
18	DANA A. POWERS	VICE CHAIRMAN
19	GEORGE E. APOSTOLAKIS	MEMBER
20	JOHN J. BARTON	MEMBER
21	MARIO H. FONTANA	MEMBER
22	THOMAS S. KRESS	MEMBER
23	DON W. MILLER	MEMBER
24	WILLIAM J. SHACK	MEMBER

25  
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## 1 ACRS STAFF PRESENT:

2 JOHN T. LARKINS Exec. Director  
3 MICHELE KELTON Tech. Secretary  
4 ROXANNE SUMMERS Tech. Secretary  
5 SAM DURAISWAMY  
6 CAROL A. HARRIS  
7 RICHARD P. SAVIO  
8 PAUL BOEHNERT  
9 NOEL DUDLEY  
10 MEDHAT M. EL-ZEFLAWY  
11 MICHAEL MARKLEY  
12 AMARJIT SINGH

13  
14 ALSO PRESENT:

15 RICHARD P. CORREIA  
16 THOMAS A. BERGMAN  
17 SUZANNE BLACK  
18 MARK CUNNINGHAM  
19 PETE WILSON

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

(1:05 p.m.)

CHAIRMAN SEALE: The meeting will now come to order. Since we didn't have the transcriber this morning I thought I'd read this piece of paper. This is the second day of the 441st meeting of the Advisory Committee on Reactor Safeguards. During today's meeting the committee will:

- (1) Continue discussions on SRM -- pardon me, the DSI 22 on Research;
- (2) Implementation of the Maintenance Rule;
- (3) Future ACRS Activities;
- (4) Reconciliation of Comments; and
- (5) Proposed ACRS Reports.

We've already met with the Commissioners to discuss items of mutual interest.

This meeting is being conducted in accordance with the provisions of the Federal Atomic Energy Act.

Mr. Sam Duraiswamy is the designated federal official for the initial portion of this meeting.

We have received no written statements or requests for time to make oral statements from members of the public regarding today's sessions.

A transcript of portions of the meeting is being kept. It is requested that the speakers use one of

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1 the microphones, identify themselves and speak with  
2 sufficient clarity and volume so that they can be readily  
3 heard.

4 This afternoon we're going to hear about the  
5 implementation of the maintenance rule; something that  
6 we've all been very interested in. And Dr. Kress, that's  
7 your subcommittee so I'll turn it over to you.

8 MEMBER KRESS: Thank you, Mr. Chairman. The  
9 purpose of this session is to have a briefing. It's a  
10 presentation by the NRC staff about the results and the  
11 lessons learned from their implementation and initial  
12 baseline inspections related to the maintenance rule,  
13 which like you said, we all are very interested in.

14 Partly because it's been touted as a risk-  
15 informed, performance-based regulation, but in reality it  
16 was crafted in the early '90s before the word risk-  
17 informed became in-vogue. But because of the inherent  
18 nature of nuclear regulations, it is risk-informed to some  
19 extent. But the actual rule I think, has been in effect  
20 now for --

21 MR. CORREIA: About nine months.

22 MEMBER KRESS: Nine months? And the NRC has  
23 conducted pilot assessment programs for about three years  
24 along with this. So today I guess we'll just hear a  
25 briefing and see what lessons they've learned, and I'll

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1 turn it over to you with that short introduction.

2 MR. CORREIA: Thank you. My name is Rich  
3 Correia. I'm a section chief in NRR responsible for  
4 maintenance rule programs. I've been in that position  
5 since shortly after the rule was issued in 1991. I'll be  
6 giving part of the presentation today on the background of  
7 the rule and an overview of the rule.

8 Tom Bergman, who is in my section, will give  
9 the presentation on the baseline inspection results and  
10 clarifications we've recently made to our Regulatory Guide  
11 for the maintenance rule. And then I'll finish off with  
12 some lessons learned and insights we've learned from the  
13 initial implementation of the rule.

14 The rule was written and issued in July of  
15 1991 for a number of reasons. The Commission -- one of  
16 the most largest concerns the Commission had in the '80s  
17 were the number of transients and scrams caused by  
18 failures of balance of plant equipment due to ineffective  
19 maintenance. And most of these systems weren't covered by  
20 existing regulations. And still today, based on the  
21 latest AEOD data it shows that many transients and scrams  
22 are still initiated by failures in balance of plant  
23 equipment.

24 Another reason the Commission was interested  
25 in establishing a maintenance rule was the results from

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1 the maintenance team inspections that were conducted in  
2 the late 1980s. And there were three findings that  
3 resulted from these inspections that the Commission  
4 thought was significant and increased their concern with  
5 having a maintenance rule.

6 One had to do with, there were no -- licensees  
7 weren't trained in equipment performance. Another reason  
8 was that risk wasn't being necessarily considered during  
9 the planning and scheduling of preventive maintenance  
10 activities. And another reason was, poor root cause  
11 determinations and corrective actions that ultimately  
12 resulted in additional failures of the same kind.

13 So those two issues I think, were the most  
14 significant of the concerns the Commission had at the time  
15 and they went forward and issued the maintenance rule.

16 As Dr. Kress just said, initially it wasn't  
17 called a risk-informed, performance-based rule. I think  
18 it was called a results-oriented performance-based rule.  
19 Because the rule focused on the results of licensee's  
20 preventive maintenance activities and not on the processes  
21 and procedures that they used to implement those programs.

22 But the rule does encourage, through the  
23 statements of consideration, the use of risk insights.  
24 It's not a requirement but encourages the use of PRA  
25 insights. For example, once a licensee determines which

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1 structures, systems, and components in their plant are in  
2 the scope of the rule, they can use risk insights to  
3 categorize these SSCs into high or low, safety-significant  
4 categories.

5           It's not that they're changing or reducing the  
6 regulation based on these categorizations, it's just a  
7 better way to manage the program, to pay most attention to  
8 the high, safety-significant SSCs, and somewhat less for  
9 the lower categorizations.

10           Licensees can also use risk insights to  
11 establish goals required by (a)(1) of the rule, or  
12 performance criteria that licensees use to demonstrate  
13 compliance with (a)(2) of the rule. And certainly we've  
14 seen in many cases, the (a)(3) safety assessments that are  
15 recommended to be done before licensees perform preventive  
16 maintenance.

17           Risk insights are used in combinations of  
18 other deterministic information to evaluate the overall  
19 plant safety before taking equipment out of service for  
20 maintenance.

21           The rule gives licensees a lot of flexibility  
22 on how to establish programs or how to implement them.  
23 The goals and performance criteria that are used can be  
24 modified/changed, based on actual system performance,  
25 risk-insights. The rule even allows that goals not have

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1 to be established or monitored if they demonstrate  
2 effective preventive maintenance under paragraph (a)(2).

3 Initial results from the baseline inspections  
4 have led us to believe that the rule can be inspected and  
5 enforced consistently. We've spent a lot of effort in  
6 training our inspectors, Headquarter's oversight of the  
7 program. Each and every baseline inspection has someone  
8 from my section on a team. We maintain constant contact  
9 with the teams during the inspections and afterwards.

10 In fact, the first inspection, I was the team  
11 leader, we had every team leader from the region on that  
12 team as well as everyone from my section on that team.  
13 And also, in the enforcement arena, in concert with the  
14 office of enforcement and the regions, we developed  
15 enforcement guidance specifically for the maintenance  
16 rule, and a panel that reviews every potential enforcement  
17 action for the maintenance rule to ensure consistency.

18 But the flexibility that the rule gives  
19 licensees does give us some challenges in that they can  
20 establish their programs specific to their facilities, of  
21 course; each plant has different design features, system  
22 boundaries; they can scope the structures, systems,  
23 components in the rule either by system-specific  
24 categorizations or they can do it by functions. We found  
25 either case is acceptable.

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1           So information that a particular inspector  
2 learns about one site doesn't necessarily translate to the  
3 next site; it's almost like starting all over again. So  
4 it's quite a challenge, but we think with the  
5 communications we've had with the industry, with our  
6 regional people, amongst ourselves, the constant oversight  
7 during the baseline inspections, we feel that we are being  
8 consistent in the way that these inspections are being  
9 conducted.

10           MEMBER APOSTOLAKIS: I have a question here.  
11 I'm a little bit perplexed. Judging from what you've just  
12 said, I would say this is indeed a performance-based rule,  
13 and I don't know if you've seen it but there are four  
14 points or four definitions to this -- four points that  
15 constitute the definition of a performance-based  
16 regulation: define your measurable quantities, grant  
17 flexibility, and so on.

18           So I would say this is a performance-based  
19 rule. And then I remember what I read in the special  
20 evaluation report by the Office of Inspector General.  
21 And, "Representatives of the industry told us that if,  
22 under the maintenance rule they could still get Appendix B  
23 violations even though they were meeting their performance  
24 goals, then the rule was not truly performance-based. NRC  
25 staff generally do not see the maintenance rule as a

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1 vehicle for regulatory relief. Many staff members pointed  
2 out that the current enforcement guidance for the rule  
3 states that the rule does not supersede other  
4 requirements, specifically referring to Appendix B."

5           So it seems to me that we have here a rule  
6 that has certain performance requirements, but still the  
7 licensee has to comply with everything that led the  
8 licensee to meet the requirements. Is that correct?  
9 Because you said they have flexibility and yet it says  
10 here that that does not provide relief. You know, you can  
11 meet the criteria, but still you have to do everything  
12 else.

13           MR. CORREIA: That's true. The maintenance  
14 rule is an additional regulation. Licensees still have to  
15 meet Appendix B requirements as well as maintenance rule  
16 requirements.

17           MEMBER APOSTOLAKIS: So the statement that  
18 it's a performance-based rule is really very -- it's true  
19 I think, in a sense, but it's very limited. The rule  
20 itself is performance-based, but we have other regulations  
21 that don't make it performance based in the broader sense.  
22 And I'm wondering why that is the case. Why don't you  
23 trust them? I mean, if they meet the performance goals,  
24 what's the problem?

25           MR. CORREIA: Well, we'll get into that -- I

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1 might as well talk about that now. Right now, our  
2 baseline inspections are very programmatic. To give us  
3 the confidence that licensees have a program in place that  
4 will give us reasonable assurance that in the future, when  
5 we walk away from programmatic inspections and only look  
6 at performance, they'll be doing it right consistently.

7           And this is a concern of the industry also.  
8 But they understand this is really the first -- one of the  
9 first performance-based inspections, but we need to assure  
10 ourselves, and they need to assure themselves, that  
11 they're doing it right. Have a stable program in place to  
12 allow them to go and implement the rule. And once we're  
13 doing with the baselines, fully expect to only look at the  
14 results of their implementation and not the program.

15           MEMBER APOSTOLAKIS: So is it then correct to  
16 understand from this that we are in a transition period,  
17 that you establish this rule, you don't want to grant  
18 relief anywhere else until you and the licensees are  
19 convinced that the rule works? I mean, that's the only  
20 way I can see this. And then of course the question is,  
21 how long is this transition period?

22           MR. CORREIA: The baselines are scheduled  
23 currently to be completed by mid-1998, next year. When  
24 you say grant relief, I think the maintenance rule, in  
25 itself, won't grant relief to anything, but it could form

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1 a basis for relief in other areas, if licensees take  
2 credit for what they're doing under the maintenance rule.  
3 I believe that's a possibility.

4 I think where licensees will see relief is,  
5 how many inspectors they see and how often, and what  
6 they're looking at.

7 MEMBER APOSTOLAKIS: Especially the latter.

8 MR. CORREIA: Yes. Yes.

9 CHAIRMAN SEALE: A potentially related  
10 question. We're aware of the fact that there have been  
11 some industry initiatives, things we've called the pilot  
12 studies, and two of those -- in-service inspection and in-  
13 service --

14 MEMBER BARTON: Testing.

15 CHAIRMAN SEALE: -- testing, should -- not  
16 just could, but should -- impinge rather specifically on  
17 certain aspects of the maintenance program. Have you done  
18 any forward-thinking about how that kind of proposal, if  
19 it's granted, would impact upon your maintenance rule  
20 enforcements?

21 And now you've brought up another issue and  
22 that is, now you may have three piles or four piles of  
23 regulation, none of which is precisely consistent with  
24 each other. And I can understand how the Utilities begin  
25 to believe that they're just getting bandaids on bandaids

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1 but no real relief. The blood just flows.

2 MR. CORREIA: Personally, I don't have much  
3 knowledge of what they're doing in the ISI/IST area since  
4 we are totally consumed by maintenance rule inspections,  
5 but I would imagine that if a licensee crafted their  
6 ISI/IST program such that it could be used as a way to  
7 implement the rule and meet ISI/IST requirements, they  
8 could just eliminate some redundant requirements.

9 CHAIRMAN SEALE: Yes. It's essentially  
10 bringing the risk-informed element into the detail of the  
11 maintenance process. But we still haven't figured out how  
12 to resolve this multiple jurisdiction program.

13 MEMBER APOSTOLAKIS: Yes, and again, you know,  
14 whether reinforcing this impression out there that the  
15 Agency is not serious about performance-based and risk-  
16 informed regulations. And if we have a rule that is  
17 performance-based, I just don't know why we don't treat it  
18 as such. I mean, maybe that's not your job, but somebody  
19 in the Agency has to think about it.

20 Here we have a rule, we advertise it as a  
21 performance-based rule, we give licensees flexibility, but  
22 then we have to realize that the rule does -- the NRC does  
23 not.

24 MEMBER BARTON: Right.

25 MEMBER APOSTOLAKIS: Okay. And I don't know

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1 if the rest of you feel that's a reasonable thing to do.  
2 I'm a little bit -- actually more than a little bit  
3 perplexed.

4 MR. SHACK: Do you find it so unreasonable  
5 that they have a baseline inspection to check that the  
6 program is in place? I mean, you want to wait until you  
7 see the results? You know, you think it's unreasonable to  
8 ask for a baseline inspection of the program?

9 MEMBER APOSTOLAKIS: No, no. But I don't see  
10 this as a problem. This is just an additional regulation.

11 MEMBER BARTON: That's right. The maintenance  
12 rule is an additional rule above and beyond all the other  
13 rules and regulations.

14 MEMBER APOSTOLAKIS: Yes. And that's what I  
15 find unacceptable.

16 MR. SHACK: Oh, but that was true in '91. I  
17 mean, it was never advertised as anything but an  
18 additional rule.

19 MEMBER APOSTOLAKIS: But if I look at this  
20 slide, knowing nothing else, I would say we're making  
21 tremendous strides towards risk-informed and performance-  
22 based regulations. And it turns out that we're not. In  
23 fact, we're undermining the process.

24 VICE CHAIRMAN POWERS: Well George, the only  
25 way you -- I mean, you cannot go after Appendix B without

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1 going after Appendix B. I mean, you cannot use some other  
2 rule to say I get out of Appendix B.

3 MEMBER APOSTOLAKIS: Who, in this Agency, is  
4 thinking at that level? You know, I understand that --

5 VICE CHAIRMAN POWERS: You and I.

6 MEMBER APOSTOLAKIS: I'm trying to do that,  
7 but I think my colleagues --

8 VICE CHAIRMAN POWERS: We just disagree.

9 MEMBER APOSTOLAKIS: Pardon?

10 MEMBER BARTON: We're not disagreeing with  
11 you.

12 MEMBER APOSTOLAKIS: No, I think Bill is.

13 MR. SHACK: Well, I mean, if the rule was set  
14 up to increase the inspection of balance of plant  
15 components, that's a new rule. Now, when you have a new  
16 rule to do that you could do it with a new prescriptive  
17 rule or you could do it with a new performance-based rule.

18 It's a new rule, there's no getting away from  
19 that. They did choose to make the new rule a performance-  
20 based rule. So I mean, you could argue that there was no  
21 new rule needed, which --

22 MEMBER APOSTOLAKIS: No, I'm not talking that  
23 --

24 MR. SHACK: -- industry certainly did for  
25 quite some time. But given the fact that you're going to

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1 have a new rule, you have a performance-based rule.

2 MEMBER APOSTOLAKIS: But isn't this a very  
3 limited view of this? I mean, we are not talking -- I  
4 mean the individual rule, yes, is performance-based, but  
5 the idea is not really to have individual rules that are  
6 performance-based, to have regulations that are  
7 performance-based.

8 VICE CHAIRMAN POWERS: George, all you're  
9 doing is railing against the fact that it takes time to  
10 change all the rules.

11 MR. SHACK: This wasn't meant to overhaul the  
12 whole regulatory system.

13 MEMBER APOSTOLAKIS: I know Rich is not. But  
14 I think the record should reflect this and -- are we  
15 writing a letter on this anytime soon?

16 MEMBER KRESS: Not unless you want to.

17 VICE CHAIRMAN POWERS: You can write a letter  
18 on it anytime you want to.

19 MEMBER KRESS: This was just a briefing to let  
20 us know what the progress has been, the lessons learned,  
21 and if you've got some overriding points you want to make,  
22 we can write a letter.

23 MEMBER APOSTOLAKIS: But you're willing to be  
24 convinced?

25 MS. BLACK: If I may say something -- Susie

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1 Black, branch chief. I have QA also, and NEI came in and  
2 met with us -- I think it was towards the end of February  
3 -- with a proposal that building on this monitoring  
4 program to change QA requirements, and we are meeting with  
5 them again -- I believe May 22nd is the date I've heard --  
6 to discuss their proposals for using this monitoring.

7 And in fact, in all of the performance-based,  
8 risk-informed reg guides, we are giving the licensees the  
9 option of using their maintenance rule program to satisfy  
10 the monitoring requirements.

11 MEMBER APOSTOLAKIS: Yes, I mean, clearly you  
12 cannot divorce this from Reg. Guide -- I think it's 1064?

13 MS. BLACK: Yes.

14 MEMBER APOSTOLAKIS: Yes. So if this is  
15 happening then all I can see is that I'm very pleased to  
16 hear it. Yes.

17 MR. CORREIA: I believe many licensees want to  
18 use their maintenance rule programs as a foundation for  
19 many of these other pilot programs. I see they're all  
20 using performance or condition monitoring, they want to  
21 use the same process throughout, at least to be consistent  
22 in the way they implement these programs.

23 CHAIRMAN SEALE: George, if we decide we would  
24 like to write up something that would perhaps, anticipate  
25 tying all of these things together and identifying some of

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1 the options that might be available to in fact, modify  
2 things, then that's something we might want to do as an  
3 initiative.

4 MEMBER APOSTOLAKIS: Yes, and I think that  
5 before we do that, though, I think we should hear from Ms.  
6 Black and her colleagues about these new activities,  
7 because it's a whole package. But that's something we'll  
8 come back to, I'm sure.

9 MR. CUNNINGHAM: If I might --

10 MEMBER APOSTOLAKIS: Excuse me -- Mark  
11 Cunningham.

12 MR. CUNNINGHAM: Mark Cunningham from the  
13 staff. I believe we're coming back in June to discuss the  
14 PRA implementation plan with the full committee -- the  
15 middle of June or something -- and that might be a time  
16 when we start to tie how the burden reduction regulatory  
17 guide efforts depend, or rely, or make use of maintenance  
18 rule work.

19 Kind of look at it that way as opposed to  
20 maintenance rule going the other way. It's an  
21 underpinning of a lot of things in the risk-informed ISI  
22 or some things like that. That might be a better forum  
23 for that.

24 MEMBER APOSTOLAKIS: That's fine with me.  
25 June is soon enough.

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1 MR. CORREIA: Thank you.

2 MEMBER MILLER: Excuse me. Didn't the  
3 industry originally want to tie the maintenance rule to  
4 the graded quality assurance program?

5 MS. BLACK: Yes, that was part of their  
6 proposal, but --

7 MEMBER MILLER: That was back --

8 MS. BLACK: Back -- way back in 1993 or '94.  
9 But their monitoring program which they proposed in their  
10 first guidance document, we didn't find acceptable.  
11 Because as I stated, I think, in one of the more recent  
12 ACRS meetings, their monitoring program for low, safety-  
13 significant SSCs, is at the train level, where you wait  
14 till you have two scrams or two safety system actuations,  
15 and we didn't think that was a fine enough monitoring  
16 system for finding whether QA was breaking down.

17 Then we stopped our negotiations on that  
18 altogether, and they wanted to go ahead with just the  
19 risk-informed part. But the more we got into it we  
20 realized you do need some sort of monitoring program to  
21 see what the effectiveness of QA is, but not --

22 MEMBER MILLER: So we're back to now, trying  
23 to tie them again, together, is that what it is?

24 MS. BLACK: That's the most recent proposal by  
25 -- the maintenance rule has these high-level monitoring

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1 programs, but they also rely on more detailed monitoring  
2 programs that are already in place.

3 And so the latest proposal, NEI I think, is  
4 going to come in with his taking advantage of these  
5 underpinning monitoring programs that don't necessary show  
6 up in the maintenance rule results but they are the basis  
7 of it.

8 MR. CORREIA: In a way of background, briefly,  
9 the rule was issued as you know, in July of 1991, with a  
10 5-year implementation period. The first two years the  
11 Commission directed the staff to develop regulatory  
12 guidance; the last three years were for licensees to  
13 implement that guidance.

14 During the first two years -- almost  
15 immediately after the rule was issued -- NUMARC at the  
16 time, now NEI, came to the staff and proposed -- they  
17 developed in parallel with our regulatory guide, an  
18 industry consensus standard for implementing the rule.  
19 Long story short, by May of 1993 they completed work on  
20 NUMARC 93-01, which we turned around and endorsed through  
21 the first version of Reg. Guide 1.160.

22 And 1.160 was revised slightly in, I think,  
23 1995, to reflect a relatively minor rule change where we  
24 changed the periodic assessments from annual to once for  
25 refueling cycle. And we'll talk shortly about Revision 2.

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1           Late in December of 1993 we developed our  
2 first version of the inspection procedure for the  
3 maintenance rule, 62706. We put it out for public  
4 comment, we had a workshop, we had nine pilot inspections  
5 at nine volunteer sites.

6           We had another public workshop to explain to  
7 the industry and the public what the inspection procedure  
8 was all about, how we would conduct these baseline  
9 inspections, and then we issued the procedure final  
10 shortly thereafter, in August of '95.

11           We also wrote a new procedures for our  
12 resident inspectors -- or their code program, 62707 --  
13 that incorporates some of the more programmatic  
14 inspections that they were currently doing, looking at  
15 maintenance, process, and control, and we also brought in  
16 maintenance rule requirements.

17           So on a routine basis, since the rule went  
18 into effect, our resident inspectors are looking at a more  
19 limited part of licensee's implementation of the  
20 maintenance rule, but much more from a performance-based  
21 perspective than a program.

22           They're actually looking at work in the field,  
23 what preventive maintenance activities are going on, what  
24 equipment has failed, and then following through with the  
25 requirements of the rule to see how the licensee has or

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1 has not implemented the rule.

2 And eventually over time this will be the  
3 maintenance rule inspection that will be conducted  
4 routinely once the baselines are done.

5 With that, I'd like to turn it over to Tom  
6 Bergman. Tom's been in our section for quite a few years  
7 now. He's written I think, four of the most recent SECY  
8 papers on the status of the maintenance rule and was the  
9 primary author of Revision 2 to Reg. Guide 1.160. And  
10 he'll talk about the baseline inspection results and the  
11 changes to the Reg. Guide.

12 MR. BERGMAN: To date, we've completed 24  
13 inspections. As Rich mentioned earlier each inspection is  
14 unique, largely because of the flexibility we gave  
15 licensees.

16 VICE CHAIRMAN POWERS: Are the inspections --  
17 when you say 24, is that 24 units or is that 24 sites?

18 MR. BERGMAN: Well, it depends. For example,  
19 Nine Mile -- there's two units at the site but we only did  
20 one inspection. It depends if they have separate  
21 maintenance rule programs or not, so I guess I'd  
22 characterize it as 24 maintenance rule programs have been  
23 inspected.

24 VICE CHAIRMAN POWERS: So you have something  
25 like 80 to do?

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1 MR. CORREIA: Yes.

2 MR. BERGMAN: Yes, 80 to 83, I think.

3 VICE CHAIRMAN POWERS: Eighty-three total.

4 MR. BERGMAN: We're approximately on our  
5 planned schedule.

6 MR. SHACK: Now again, each inspection is  
7 unique. I assume they're all using the NUMARC guidance,  
8 though --

9 MR. BERGMAN: They all use --

10 MR. SHACK: -- but even with that it's still -  
11 -

12 MR. BERGMAN: Right, what the guidance does  
13 is, it gives them similar approach to (a)(1) and (a)(2),  
14 there's common terminology, maintenance preventable  
15 functional failures, what performance criteria are, what  
16 goals are. But even when you go to two very similar units  
17 -- I was at inspections at both Nine Mile 1 and Oyster  
18 Creek, which are both BWR IIs -- very different ways to  
19 implement the rule.

20 They have different organizations, who's  
21 responsible for what aspect is different. Nine Mile did  
22 the scoping by systems so they had in the range of 150  
23 systems. Oyster Creek took what we call this functional  
24 approach; they had over 360 sort of subsystems.

25 So you can't say, well I was at Nine Mile 1,

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1 how did they do it? Oyster Creek should look the same.  
2 You really have to start over with each licensee's program  
3 and say, is this a reasonable approach for meeting the  
4 rule? But there are some commonalities.

5 VICE CHAIRMAN POWERS: Do you have a simple,  
6 easy -- like 2- or 3-page comparison, one-on-one --  
7 illustrative of these differences that you see?

8 MR. BERGMAN: We didn't provide it here at the  
9 Commission briefing. We provided for, I think, 13 sites  
10 at the time. Yes, we do periodically do a small table  
11 that shows like number of systems, number of systems in  
12 scope, number in (a)(1) versus (a)(2).

13 CHAIRMAN SEALE: Could we get a copy of that,  
14 which would take care of us?

15 MR. CORREIA: You should have it. SECY-97-502  
16 --

17 MR. BERGMAN: Well, it's in the slides,  
18 though. It wasn't part of the paper.

19 Overall, we feel that licensees are adequately  
20 implementing the rule. We have seen problems. We've  
21 issued a fair number of violations, but the violations are  
22 to specific aspects of a requirement. We're not saying  
23 this licensee is flat-out not meeting any of the rule.

24 For example, high safety-significant SSCs are  
25 expected to monitor both reliability and availability.

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1 We've frequently seen where licensees are not monitoring  
2 one or the other. That's a violation, but the rest of  
3 their program could be perfectly fine and meet the rules.  
4 So a number of violations shouldn't be characterized as,  
5 nobody's meeting the rule, period.

6           Where we've seen more than isolated problems  
7 it's usually been because some licensees have implemented  
8 the rule late, despite the implementation period of,  
9 really three years since the guidance was out. Some  
10 licensees, either because of organizational changes or not  
11 understanding the complexity of complying with this rule,  
12 really didn't implement it early enough, and we get there  
13 and the program is still being developed when we get on-  
14 site. Those have been the more significant findings.

15           The two most common findings we've had have  
16 been what we call inadequate reliability performance  
17 criteria or goals. Normally this is because licensees  
18 simply are counting the number of maintenance-preventable,  
19 functional failures, but they have no technical  
20 justification for that number.

21           They don't have any understanding of how that  
22 number of failures relates to the number of demands on the  
23 system during a certain time period; they can't  
24 demonstrate any relationship to values assumed in the PRA,  
25 if that's the method they choose; and they have no

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1 demonstration that the values of failures was commensurate  
2 with safety as required by the rule.

3 MEMBER APOSTOLAKIS: Let me understand that.  
4 If my calculation of reliability or unreliability or  
5 unavailability is number of failures over number of  
6 demands or trials, you're saying they're focusing on the  
7 numerator but they're not doing anything about the  
8 denominator?

9 MR. BERGMAN: They don't know what the  
10 denominator is.

11 MEMBER APOSTOLAKIS: Well, that doesn't make  
12 sense.

13 MR. BERGMAN: Well, it doesn't and that's why  
14 they get violations.

15 MEMBER APOSTOLAKIS: But that's the first  
16 thing I would derive if I were a licensee.

17 MR. BERGMAN: They're being pushed in that  
18 direction.

19 MEMBER KRESS: But only if that were one of  
20 your performance goals.

21 MR. CORREIA: That is true.

22 MEMBER KRESS: That wasn't the performance  
23 goal, was it?

24 MR. BERGMAN: No, it is. They do call it  
25 reliability --

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1 MEMBER KRESS: In that case it's clear.

2 MEMBER APOSTOLAKIS: It doesn't make sense.

3 MR. BERGMAN: And we found cases where the  
4 allowed number of failures per cycle was more than the  
5 number of demands they would normally expect to see --  
6 they would see like one surveillance per cycle --

7 MEMBER APOSTOLAKIS: There is such a thing as  
8 a principle of conservation of failures. It's right up  
9 there with electric charge and mass.

10 MR. BERGMAN: So we're not debating if it  
11 should be 90 or 95 percent; we don't want to give you that  
12 impression.

13 MEMBER APOSTOLAKIS: I understand.

14 MR. BERGMAN: We're demanding, are you doing  
15 it, period.

16 MEMBER APOSTOLAKIS: Now, the second question.  
17 Are you reasonably satisfied that the reliability or  
18 availability or whatever, that will be produced from these  
19 calculations, is the reliability that applies really, to  
20 an actual demand?

21 MR. BERGMAN: Pete, do you want -- I think the  
22 question was, are the surveillance-type demands the same  
23 as a real demand?

24 MEMBER APOSTOLAKIS: Yes.

25 MR. WILSON: My name is Pete Wilson. I'm a

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1 senior reactor analyst with the PRA Branch at NRR. We  
2 currently do not look at that during the inspection.  
3 Basically is, check to see if they're preserving the  
4 assumptions in the PRA but not go into seeing if the  
5 surveillance demands really test -- the system would  
6 respond the same way in an actual demand.

7 MEMBER APOSTOLAKIS: Well, you said something  
8 very interesting. That whether they observed the  
9 assumptions of the PRA, you said?

10 MR. WILSON: Yes.

11 MEMBER APOSTOLAKIS: What does the PRA have to  
12 do with this?

13 MR. WILSON: If the licensee has used a PRA  
14 for risk ranking, then we expect them to have performance  
15 criteria that preserves that risk ranking.

16 MEMBER APOSTOLAKIS: Okay. Okay. Very  
17 interesting.

18 MR. BERGMAN: I think every licensee we've  
19 been to has sort of -- I don't want to say, based their  
20 program on PRA, but certainly used PRA in the development  
21 of their performance criteria and risk ranking.

22 The second issue was for high safety-  
23 significant SSCs. At a minimum, we expect the  
24 demonstration of effective preventive maintenance to  
25 include both reliability and --

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1 MEMBER APOSTOLAKIS: I thought you were going  
2 to the second sub-bullet. It's just amazing. I had  
3 another opportunity to see how some people in the industry  
4 confuse these concepts, the site obscure books.

5 I find it incredible that people don't know  
6 the distinction between reliability and availability but  
7 vidently -- see, the problem is I think, that before PRA  
8 came in full force, people were using the word reliability  
9 as a general English term for, you know, the thing working  
10 for a period of time, being available when you want it,  
11 and so on.

12 But now there is a strict mathematical  
13 definition which has to do with successful performance  
14 over a period of time. Whether it starts or not is the  
15 availability question, but evidently that's very hard to  
16 change.

17 And I had opportunities just last week to see,  
18 you know, the reliabilities point too, and then I don't  
19 know whether it's going to work for a period of time; I  
20 was scratching my head. And then I realized what was  
21 happening. So I don't know. Maybe that should be part of  
22 your courses, Mark.

23 MR. CUNNINGHAM: I believe we do, in those  
24 courses, try to stress -- the courses that we have for the  
25 staff -- distinction and define both reliability and

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1 availability. If you go back to the PRA working group  
2 days, that's one of the things that was of trouble then  
3 and we continue to work on.

4 MEMBER APOSTOLAKIS: Does the NUMARC document  
5 define clearly, these concepts?

6 MR. BERGMAN: It provides a definition of both  
7 reliability and availability.

8 MEMBER APOSTOLAKIS: Oh, okay, so there's no  
9 excuse, then.

10 MR. CORREIA: We agree. And they cite them.  
11 It's puzzling.

12 MR. BERGMAN: The next issue -- we have issued  
13 a number of violations on scoping but most of these have  
14 been on relatively low, safety-significant SSCs, with the  
15 most common problem relating to the scoping criteria for  
16 including those non-safety-related SSCs that are relied  
17 upon to mitigate accidents, and transients are used in the  
18 EOPs. And we've had debate -- they're in the marginal --  
19 so they're violations but they're not major violations.

20 Reluctance to identify MPFFs. This one has  
21 sort of mystified us. We're not sure why licensees are  
22 reluctant to call failures MPFFs. From the standpoint of  
23 us regulating the rule, the fact that you have an MPFF  
24 isn't an issue; all it does is initiate a process to  
25 identify the causes and corrective actions for the

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1 failure.

2 To the contrary, the failure of a licensee to  
3 identify an MPFF that was, is a violation of the rule, and  
4 so we do sometimes issues violations because we find  
5 failures were MPFFs that the licensee did not call them  
6 for one reason or the other.

7 On structural monitoring, before the rule even  
8 went into effect we realized that the structural  
9 monitoring guidance in the NUMARC 93-01 wasn't really  
10 adequate for what they needed to do. Structures are  
11 different. You can't really use reliability or  
12 availability in general; that you need to do condition  
13 monitoring.

14 Industry has developed a guideline document  
15 that has not yet been endorsed by the staff. We felt  
16 enough time had gone by that we put some guidance in Rev 2  
17 of the Reg. Guide to clarify it, and basically this change  
18 just described to licensees when to move a structure from  
19 (a) (2) to (a) (1) based on the condition of the structure.

20 The last sort of result is on the (a) (3)  
21 safety assessments which are not a requirement. That's a  
22 "should" in the rule. All licensees have done something.  
23 There's a couple of basic approaches: what we call the  
24 matrix approach -- which outlines accepted or prohibited  
25 configurations of equipment -- and some licensees also use

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1 a risk monitor-type approach.

2 And typically, if they enter a configuration  
3 that's outside of the matrix they will contact a risk  
4 group to get involved as to whether or not that new  
5 configuration is acceptable.

6 MR. SHACK: What is structural monitoring? I  
7 mean, is it a walkdown of the system?

8 MR. BERGMAN: That's how you monitor --

9 MR. SHACK: Right.

10 MR. BERGMAN: -- but from a maintenance rule  
11 standpoint what we expect them to see is that they will do  
12 a periodic evaluation of the condition of the structure to  
13 conclude that it is in an acceptable condition and can  
14 meet its design basis and will continue to do so till the  
15 next inspection. But they rely on their existing  
16 structural monitoring programs.

17 Weaknesses in these (a) (3) safety assessments  
18 have generally been related to the treatment of the non-  
19 frontline safety systems. Most licensees seem to have a  
20 good understanding of the importance of those systems.  
21 It's systems just beyond that level that become increased  
22 risk when something else is out of service that we cannot  
23 completely address in the matrix.

24 MEMBER APOSTOLAKIS: I thought you meant that  
25 they don't treat the support systems well. What you just

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1 said is different. That if something is out of service  
2 then the configuration is different, and the risk  
3 importance changes. Is that what you meant?

4 MR. BERGMAN: Right, yes. Things that  
5 previously may not have been as --

6 MEMBER APOSTOLAKIS: Ah, okay.

7 MR. BERGMAN: -- but it isn't clear that they  
8 always catch that.

9 MEMBER APOSTOLAKIS: So they should have then,  
10 least of importance measures under different  
11 configurations. Assuming that certain components are  
12 down, then they have a new set of risk importance  
13 measures, so I may have a new ranking of the operating  
14 components --

15 MR. BERGMAN: They might but -- that's one of  
16 the, I guess you'd call it, a problem with the matrix  
17 approach. You can only put so many configurations before  
18 it just becomes unwieldy.

19 MEMBER APOSTOLAKIS: Right.

20 MR. BERGMAN: But they do -- we like to see  
21 them have at least all the systems they've called risk  
22 significant, on the matrix. Sometimes they don't, though.

23 This next slide has a few errors on it. We  
24 have completed enforcement now on 18 inspections: three  
25 of which had no maintenance rule violations; one had the

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1 severity level III with no CP; and 14 had one or more  
2 multiple severity level IV.

3 The remaining six inspections, the results are  
4 still under review by the staff. And two of those six  
5 have had escalated enforcement meetings, but a decision  
6 has not been reached by the staff.

7 MEMBER APOSTOLAKIS: Do we have the document -  
8 - JIT describes the severity levels and all that?

9 MR. BERGMAN: The EGM?

10 MEMBER APOSTOLAKIS: Would you give me a copy?

11 MR. BERGMAN: Sure.

12 MEMBER APOSTOLAKIS: Thank you.

13 MR. BERGMAN: Now, I didn't plan to go over  
14 all the clarifications; I have two slides of  
15 clarifications. This first slide are the four we thought  
16 were most important. I'll go over them and then I'll put  
17 up the other slide, and if you want me to address them I'm  
18 happy to do so -- or just all of them.

19 The first sort of big area of clarification  
20 was on scoping, which is section 1.1 of the Reg. Guide.  
21 There were four clarifications on scoping. We clarified  
22 when, due to redundancy or installed spares, SSCs that  
23 could cause a scram, could be excluded from scope.

24 We know that the SSCs whose use is implied to  
25 mitigate accidents and transients, are used in EOPs, and

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1 that provides significant fraction of the mitigating  
2 function are included in scope. And this specific  
3 clarification came out of really, communications and  
4 emergency lighting.

5 We found a number of licensees were excluding  
6 those from scope. We didn't feel that you could respond  
7 to accidents and transients unless you could communicate  
8 and see. So even though they weren't called out  
9 explicitly, they were very important from an accident  
10 mitigation standpoint.

11 The third clarification just says that you can  
12 do scoping on a functional basis instead of a system  
13 basis. And last in scoping was that you could exclude  
14 those portions of a system that didn't have a maintenance  
15 rule function even where the overall system function was  
16 in scope.

17 So if there's a test loop aspect that doesn't,  
18 on its own would not have a -- be in scope or the rule,  
19 you can leave that portion of the system out, but they  
20 have to look at that specifically.

21 The second clarification was MPFFs as a  
22 reliability indicator, which is section 1.4. You can use  
23 MPFFs, the number of MPFFs as reliability indicator,  
24 provided that there's a technical understanding of how  
25 that number relates to the reliability of the system.

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1 Monitoring structures, as I discussed earlier,  
2 we've added guidance on structures; that's section 1.5,  
3 and section 1.7 pertains to normally-operating SSCs of low  
4 safety-significance.

5 For high safety-significant and standby, low  
6 safety-significant SSCs you have to monitor at the system  
7 or train level. It's only for the normally-operating, low  
8 safety-significant systems that we allow monitoring at the  
9 plant level, so they group all their systems together and  
10 have plant level criteria. Typically that's scram, safety  
11 system actuations, and unplanned capability loss factor.

12 We added three clarifications on this. First,  
13 if they break one of those plant-level performance  
14 criteria they must do a cause determination including  
15 corrective actions, and consider moving the SSC that  
16 caused them to break the performance criteria from (a)(2)  
17 to (a)(1).

18 Second, we believe they must use unplanned  
19 manual scrams as well as automatic. Some licensees were  
20 not. From a performance indicator standpoint, the way you  
21 trip the plant doesn't tell you anything about whether or  
22 not you had a maintenance problem causing the trip. And  
23 the maintenance rule focuses on the maintenance problems,  
24 so we've said you have to look at both manual and  
25 automatic scrams.

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1 And the third is, in some cases you may need  
2 to establish system or train-specific criteria for these  
3 so-called plant-level systems. And the reason is, not all  
4 these low safety-significant, normally-operating systems  
5 are measured by scrams and safety system actuations or  
6 unplanned capability and loss factors, such as spent fuel  
7 pull.

8 It can't cause you -- it isn't measured by any  
9 of those criteria so you need to come up with a criteria  
10 that does measure its performance.

11 If you like, I can go over any of these or  
12 I'll turn it back over to Rich for insights.

13 MEMBER APOSTOLAKIS: How would you describe  
14 your safety-significance categorization process --

15 MR. BERGMAN: The --

16 MEMBER APOSTOLAKIS: -- is --

17 MR. BERGMAN: Oh, I'm sorry.

18 MEMBER APOSTOLAKIS: Is it timid or brave?

19 MR. BERGMAN: I think it encompasses a fair --  
20 well, we'll only divide it --

21 MEMBER APOSTOLAKIS: Daring.

22 MR. BERGMAN: It only divides it into two  
23 categories: high and low safety-significant. And I think  
24 the systems that are brought into the so-called high  
25 safety-significant -- it's a pretty large group of

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1 systems. But this clarification that's mentioned here, we  
2 note in the Reg. Guide that the process described in 93-01  
3 is endorsed only for the maintenance rule, not for any  
4 other application like graded QA or ISI/IST.

5 MEMBER APOSTOLAKIS: And we have that, too?

6 MR. BERGMAN: Which one?

7 MEMBER APOSTOLAKIS: I'd like to read all that  
8 -- safety-significance categorization process. Is there a  
9 document that describes how you do that?

10 MR. CORREIA: That is in NUMARC 93-01.

11 MR. BERGMAN: A summary of it -- we issued a  
12 SECY paper, 95-265, that describes that process in detail,  
13 you know, how it's limited to the maintenance rule.

14 MEMBER APOSTOLAKIS: Good.

15 MR. CORREIA: Again, as Tom said, it's a  
16 fairly simple process for maintenance rule purposes,  
17 because we just put things in two different categories and  
18 it's combined with deterministic inputs that an expert  
19 panel sits down and reviews.

20 MEMBER APOSTOLAKIS: Good.

21 VICE CHAIRMAN POWERS: Do you forecast in the  
22 future -- and I'm not sure how far the future has to go  
23 out -- that instead of having two categories you could  
24 envision having a continuum? Or more closely to a  
25 continuum?

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1 MR. CORREIA: I would imagine if a licensee  
2 has the sophisticated tools to do that it could. I don't  
3 know. Pete, has any licensee ever mentioned that?

4 MR. WILSON: No.

5 MR. CORREIA: No, I don't think so.

6 VICE CHAIRMAN POWERS: I think in answer to  
7 your question, I think we would like to go through this  
8 viewgraph.

9 MR. BERGMAN: Oh, okay. As we already  
10 discussed, the safety-significance categorization process  
11 of 93-01 is limited to the maintenance rule. We changed -  
12 - in the Reg. Guide we know that there have been two  
13 changes to the maintenance rule since Revision 1 of the  
14 Reg. Guide was issued.

15 A change was made in August of '96 to make it  
16 -- explicitly make it applicable to decommissioned plants.  
17 And in December '96 the definition of safety-related was  
18 changed in the maintenance rule to be consistent with  
19 other rules. That was part of the seismic rulemaking.

20 The definition --

21 MEMBER BARTON: So the maintenance rule has to  
22 be applied to the plant like Fermi 1?

23 MR. CORREIA: If the change was specific to  
24 plants and decommissioning status, I think is the term  
25 that they used, and it's basically just for the safe

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1 storage control and maintenance of spent fuel. Only those  
2 systems apply.

3 MR. BERGMAN: Yes, it's very limited.

4 MR. CORREIA: It's very limited.

5 MR. BERGMAN: The definition of maintenance.  
6 NUMARC 93-01 has always referenced the Commission's final  
7 policy statement on maintenance. We just re-emphasized  
8 that that is the definition of maintenance we expect to be  
9 used for the maintenance rule. And it really includes  
10 everything from planning and scheduling of maintenance  
11 through tag out and tag bag in. It's not just turning the  
12 wrenches on the equipment.

13 Timeliness. Some licensees wanted us to  
14 provide a specific time period to complete the activities  
15 in the maintenance rule, like 30 days to do a cause  
16 determination. We felt that was counter to the flexible  
17 approach taken in the rule and we've just said, you should  
18 accomplish activities commensurate with the safety  
19 significance and complexity of the issue.

20 The definition of standby. The definition of  
21 standby is those systems where they could have a failure  
22 where it won't be immediately apparent. We had a problem  
23 with some licensees calling what we consider a standby  
24 system as normally operating, so we ran into some  
25 performance criteria problems.

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1 MPFFs related to design deficiencies. What we  
2 said is, if you choose to live with a poor design for  
3 economic reasons that's acceptable, but you have to modify  
4 your preventive maintenance program to prevent occurrences  
5 of the failures anyway. You can't just say it's craft  
6 design or just --

7 VICE CHAIRMAN POWERS: Let the thing fall  
8 apart --

9 CHAIRMAN SEALE: Reality rears its ugly head.

10 VICE CHAIRMAN POWERS: Didn't like it; hope it  
11 falls apart.

12 MR. BERGMAN: And the last clarification was  
13 the number of SSCs in (a)(1). We just said that we don't  
14 use that as a performance indicator. You can have two  
15 plants with identical performance, but different numbers  
16 of systems in (a)(1) just because they set difference  
17 performance criteria. So it's not a true indicator of  
18 performance.

19 So I'm done. Rich will cover the lessons  
20 learned.

21 MR. CORREIA: In the short time that the rule  
22 has been in place we have learned an awful lot about so  
23 far, about performance-based regulations and even all the  
24 efforts that we spent in the last, nearly six years,  
25 getting to this point.

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1                   Communications by far, has been extremely  
2 important. Given this, again, flexibility and limited  
3 verbiage in the rule itself, having mutual understanding  
4 of what these words mean, and what licensees ought to do,  
5 what our inspectors ought to do, and having everyone  
6 understand that, has been very important.

7                   MEMBER APOSTOLAKIS: So -- excuse me. You  
8 refer to communication between the staff and the licensee  
9 primarily?

10                  MR. CORREIA: Both within the staff --

11                  MEMBER APOSTOLAKIS: And within the staff.

12                  MR. CORREIA: -- and with industry.

13 Absolutely.

14                  MEMBER APOSTOLAKIS: Not communication as an  
15 organizational factor?

16                  MR. CORREIA: No.

17                  MEMBER APOSTOLAKIS: That is important.

18                  MR. CORREIA: We saw a lot of value in a pilot  
19 program before the rule went into effect. We were able to  
20 go out to a licensee's plant that volunteered for us to  
21 come out. It gave us an opportunity to test our  
22 inspection procedure and give them feedback on what they  
23 had done so far, without it being in an enforcement  
24 environment.

25                  We've seen that developing guidance, both for

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1 licensees and for our inspectors, was accomplished through  
2 an iterative process. We developed drafts, we tested  
3 them, we worked with them, we took lessons learned from  
4 all of these applications and revised them, and I see that  
5 continuing.

6 Training. We've spent enormous amounts of  
7 time training our inspectors and its staff, technical  
8 staff and managers in the Agency. I think to-date we've  
9 trained close to 1,000 people in various ways: simple, 1-  
10 hour presentations all the way to 3-day workshop  
11 activities for the baseline inspectors. And we'll  
12 continue to do that.

13 Something we talked about earlier is the need  
14 for a programmatic, baseline inspection program. We  
15 thought it was important for the maintenance rule since  
16 it's one of the first performance-based, risk-informed  
17 regulations, that we need to have confidence that  
18 licensees will develop and implement a program that would  
19 give them sustained, adequate implementation.

20 We found that such a rule can be inspected and  
21 enforce consistently. It takes a lot of work and effort  
22 to achieve that, and we acknowledge that up-front and  
23 we're doing it. Again, training, guidance,  
24 communications, are all essential to achieving that. But  
25 all of these require an awful lot of resources.

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1 MEMBER APOSTOLAKIS: Is it because you're  
2 doing it for the first time?

3 MR. CORREIA: Probably that has a lot to do  
4 with it, yes.

5 MEMBER APOSTOLAKIS: Yes.

6 MR. CORREIA: Because we've just never been  
7 down this path before, and hopefully, the other programs  
8 that are following us can learn from what we've done and  
9 maybe not duplicate the same effort -- or have to  
10 duplicate --

11 VICE CHAIRMAN POWERS: Are you going to  
12 prepare a lessons learned document of a generic nature,  
13 like this?

14 MR. CORREIA: We produced one after we did the  
15 pilot program, NUREG-1526. I fully expect -- what I'd  
16 like to do is, halfway through the process probably have  
17 another public workshop and lessons learned guidance  
18 document.

19 VICE CHAIRMAN POWERS: And if you did that,  
20 would you try to communicate that in fora other than the  
21 workshop? I'm thinking of ANS meetings or similar types  
22 of meetings?

23 MR. CORREIA: I don't think there's been a  
24 year that has gone by where somebody from our branch,  
25 Susie, hasn't been at an ANS conference, ASME conference,

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1 international conferences -- we're scheduled to be at the  
2 IEEE human factors conference this year and ANS. So that,  
3 I believe, will continue.

4 VICE CHAIRMAN POWERS: I'm thinking more in  
5 terms of just the lessons learned of a generic nature.

6 MR. CORREIA: Okay.

7 VICE CHAIRMAN POWERS: I think you're right;  
8 that there are many, many lessons that have come out of  
9 this that would be of broad use. I mean, I can't imagine  
10 that communications won't be important to every single  
11 program, and the anecdotal accounts you can present on  
12 communications drive that home.

13 I can't imagine some of these innovative  
14 programs we're talking about not benefitting from a pilot  
15 program. Anecdotal accounts that you provide, again,  
16 drive that home. I think you have things to offer the  
17 larger community, not only within this and the building  
18 next door, but the larger community, et al., and I think  
19 it would be useful to share that with them and get  
20 feedback from them. They may have different views on what  
21 the lessons learned are that you can learn from.

22 CHAIRMAN SEALE: But the fact that it's doable  
23 is also something that people need to know.

24 VICE CHAIRMAN POWERS: It's a success story  
25 that needs to be advertised as well.

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1 MR. BERGMAN: We did write up the lessons  
2 learned and insights as part of our most recent Commission  
3 paper.

4 MR. CORREIA: And we've issued an information  
5 notice on early implementation --

6 VICE CHAIRMAN POWERS: Now, I don't know that  
7 we have that information notice.

8 MR. CORREIA: That was just issued, I think --

9 MS. BLACK: April 14th.

10 MR. CORREIA: -- April 14th. Information  
11 notice 9718. We can get that for you.

12 VICE CHAIRMAN POWERS: I think it would be  
13 useful to see that.

14 MR. CORREIA: Yes. Thank you for that  
15 suggestion. And one issue that we're dealing with right  
16 now is, as Tom mentioned earlier, the very last part of  
17 paragraph (a)(3) of the rule says that licensees should  
18 perform safety assessments before they take equipment out  
19 of service for maintenance.

20 And our lawyers tell us, by virtue of the fact  
21 the word "should" is in there, you can't enforce it.

22 MEMBER KRESS: I found that to be very  
23 interesting.

24 MEMBER BARTON: You can --

25 MR. CORREIA: Cannot.

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1 MEMBER KRESS: Cannot. They should have had  
2 the word "shall". Shall would be a better word.

3 MR. CORREIA: Shall. The Commission has asked  
4 us to advise them on that very subject so we're working on  
5 that right now.

6 VICE CHAIRMAN POWERS: And what are you going  
7 to advise them, or is it --

8 MR. CORREIA: I can give you my personal  
9 opinion.

10 VICE CHAIRMAN POWERS: I'll welcome your  
11 personal opinion.

12 MEMBER APOSTOLAKIS: The committee's opinion,  
13 really.

14 MR. CORREIA: Should we change to a shell?  
15 Absolutely. And all licensees that do it --

16 MEMBER KRESS: And the NRC should avoid using  
17 the word "should".

18 MR. CORREIA: Yes, in all cases. Regulations  
19 should not have -- what's the term, hortatory --  
20 provisions.

21 That concludes our presentation. I'll take  
22 any questions.

23 MEMBER BARTON: Overall you feel that the  
24 program's been successful?

25 MR. CORREIA: We believe it has. Some --

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1 MEMBER BARTON: Sounds like it.

2 MR. CORREIA: -- licensees disagree.

3 MEMBER BARTON: Those are ones that have the  
4 most violations, probably.

5 MR. CORREIA: Probably.

6 VICE CHAIRMAN POWERS: But I mean, you're  
7 happy and it looks good to you. Do you have a  
8 quantitative endorsement of that feeling, or is it too  
9 soon? It's probably too soon to have a --

10 MEMBER APOSTOLAKIS: A what, endorsement?

11 VICE CHAIRMAN POWERS: A quantitative. I  
12 mean, it's --

13 MEMBER KRESS: Reliability of equipment is --

14 VICE CHAIRMAN POWERS: You've only had nine  
15 months of official operating experience, so it may be too  
16 soon to have a quantitative measure.

17 MR. CORREIA: That's another question the  
18 Commission has asked us to address. How can we measure  
19 success of this rule?

20 VICE CHAIRMAN POWERS: And what's your  
21 thinking?

22 MR. CORREIA: I believe it's very difficult  
23 because of the variables that go into measuring successive  
24 maintenance.

25 MEMBER APOSTOLAKIS: I don't understand what

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1 success means here. Unless the whole system becomes  
2 performance-based, I --

3 MR. CORREIA: Perhaps through data --

4 MEMBER APOSTOLAKIS: This is not very relevant  
5 --

6 MR. CORREIA: If there's a reliability data  
7 rule --

8 MEMBER BARTON: Why wouldn't the data the  
9 plants are collecting that you're inspecting to give you  
10 some indication whether it's --

11 MR. BERGMAN: In terms of availability and  
12 reliability of equipment?

13 MEMBER BARTON: Yes.

14 MR. BERGMAN: We could.

15 MR. CORREIA: It could.

16 MR. BERGMAN: But again, especially with  
17 reliability that would take an extremely long period of  
18 time --

19 MEMBER BARTON: Oh, sure it would.

20 MR. BERGMAN: -- to give you good information.  
21 Subjective -- we expect that it will be primarily through  
22 subjective measures: inspections, SALP process. But even  
23 then it will take a fair number of years to get a feel for  
24 how it's doing.

25 CHAIRMAN SEALE: I realize this may require

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1 concurrence by other offices or something like that, but  
2 you have a performance-based rule. Have you thought about  
3 what the appropriate subsidiary now -- I'll use that  
4 terminology -- performance indicators might be on meeting  
5 the requirements of this rule? It seems to me that would  
6 be a reasonable first hack at your metrication of success.

7 VICE CHAIRMAN POWERS: Metrication?

8 CHAIRMAN SEALE: Measuring.

9 MR. CORREIA: I believe AEOD will continue to  
10 monitor overall plant performance. Certainly they look at  
11 transient scrams, they look at where they're initiated  
12 from, and they have a pretty good idea of what's causing  
13 them: human performance, maintenance issues, operations.

14 CHAIRMAN SEALE: Yes, but there are things in  
15 your inspection process that you know, and that's why I  
16 called them subsidiary performance indicators.

17 MR. CORREIA: Right. Yes.

18 MEMBER APOSTOLAKIS: Well, you've already  
19 mentioned two: the number of failures and the number of  
20 demands. Right? These are indicators. Then you do a  
21 simple calculation and -- the other problem that you  
22 mentioned, that risk importance or significance may change  
23 given different configurations.

24 Now, there you might want to figure out a way  
25 to have an indicator that the plant is indeed, doing that

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1 in a reasonable way. It seems to me that in all these  
2 rules, it's unavoidable that you will have to have some  
3 indicators that are organizational indicators. You can't  
4 just have number of failures, number of demands. So  
5 you're going to have to get into that sooner or later.

6 And then speaking of AEOD, are your results  
7 being fed into AEOD programs?

8 MR. BERGMAN: No, we don't collect data during  
9 the inspections. The licensees don't have to submit any  
10 data for the maintenance rule.

11 MEMBER APOSTOLAKIS: Okay.

12 MEMBER BARTON: That's why, talking about  
13 reliability data rule.

14 MEMBER APOSTOLAKIS: Yes. No, but still  
15 though, I mean, they are trying to develop -- I think  
16 they're in the process of developing performance  
17 indicators.

18 CHAIRMAN SEALE: Yes, there is a large --

19 MEMBER APOSTOLAKIS: You might be able to help  
20 them with that process, and you know, from your own  
21 experience.

22 MR. BERGMAN: We interact with them on the  
23 reliability data rule and on the maintenance performance  
24 indicator.

25 MEMBER APOSTOLAKIS: When is that rule coming

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1 before the committee? Who is the chairman of the  
2 subcommittee -- the --

3 MEMBER KRESS: I don't even know which  
4 subcommittee --

5 CHAIRMAN SEALE: I have heard a rumor that  
6 there may in fact, be a disposition of that.

7 MR. CUNNINGHAM: The Commission paper, the  
8 recommendation on how to proceed with the data rules, is  
9 in, I believe in the EDO's office now. So I expect it  
10 will get to the Commission pretty soon.

11 MEMBER APOSTOLAKIS: Is it John's subcommittee  
12 that's going to look at it?

13 MEMBER KRESS: Probably.

14 MEMBER BARTON: I haven't been told that  
15 officially yet, George.

16 VICE CHAIRMAN POWERS: I wouldn't think so.

17 CHAIRMAN SEALE: No.

18 MEMBER APOSTOLAKIS: Do we have a reliability  
19 rule subcommittee?

20 MEMBER KRESS: Yes. PRA.

21 VICE CHAIRMAN POWERS: It's called PRA.

22 MEMBER APOSTOLAKIS: Oh, it's under PRA?

23 VICE CHAIRMAN POWERS: Yes.

24 MEMBER APOSTOLAKIS: I would be very happy to  
25 see that.

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1 VICE CHAIRMAN POWERS: George, we're always  
2 trying to find some basis to firm the foundation of this  
3 PRA business.

4 MEMBER BARTON: Ah, Dana is one step -- I  
5 think an application of PRA.

6 VICE CHAIRMAN POWERS: I think this was a --  
7 my opinion it was an extraordinarily good briefing.

8 MR. CORREIA: Thank you very much.

9 MEMBER KRESS: We thank you very much for your  
10 briefing.

11 VICE CHAIRMAN POWERS: I personally hope that  
12 they will come back to us in, say one year, and give us  
13 another update, and if you do produce papers on lessons  
14 learned of a generic -- or a specific nature -- sending a  
15 copy down here would probably be very welcome.

16 MEMBER KRESS: Would you put that date on your  
17 calendar? One year?

18 MR. CORREIA: Thank you.

19 MEMBER KRESS: Thank you very much. Mr.  
20 Chairman.

21 CHAIRMAN SEALE: I understand there's no  
22 industry people here to talk or comment. They were  
23 invited. Maybe this is the day when they announce bonuses  
24 or something. But I do hope that in the future we can get  
25 some industry input for this.

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1           Okay. We are now going to go back and let, or  
2 ask, Dana to complete his discussion of DSI-22 on  
3 Research. We're understand there are going to be some  
4 people here from staff, is that correct?

5           Were there going to be some staff people here?

6           VICE CHAIRMAN POWERS: It mattereth not a  
7 whit.

8           CHAIRMAN SEALE: I understand that but  
9 somebody -- Sam told me that we were --

10          MR. BOEHNERT: Yes, there were supposed to be  
11 and I just let him know about this. I haven't talked to  
12 them; I can't get them on the phone; I left them an E-  
13 mail.

14          CHAIRMAN SEALE: They may be announcing their  
15 bonuses, too.

16          VICE CHAIRMAN POWERS: Okay, right now we are  
17 --

18          MR. EL-ZEFTAWY: Dana has another handout  
19 that's coming to you regarding the same topic.

20          VICE CHAIRMAN POWERS: Yes, these are the  
21 details of the elements of the current research program  
22 which we'll delve into in the second half of this talk.

23          MR. SHACK: Before you start, Dana, they were  
24 talking about they had their criteria for picking --

25          VICE CHAIRMAN POWERS: We will go into those

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1 criteria.

2 MR. SHACK: These are theirs, though?

3 VICE CHAIRMAN POWERS: These are theirs.  
4 Those are they.

5 MR. SHACK: Them's the one.

6 VICE CHAIRMAN POWERS: Yesterday I went  
7 through the mechanical parts of DSI-22, delineated the  
8 options and discussed some of the options that have been  
9 selected by the Commission. In particular, I noted that  
10 the Commission had selected option 5, along with 4. And  
11 in option 5 they are to establish and maintain core  
12 research capabilities.

13 Today in our meeting with the Commission, the  
14 Chairman asked if we had looked at what they were doing to  
15 define what the core research capabilities ought to be.  
16 If you will turn to slide 7 I will show you the criteria  
17 that apparently had been selected for defining what a core  
18 program is.

19 And what I cannot tell you is that there is  
20 any importance in the top to bottom listings of these  
21 items. It is my impression that they are all factors to  
22 consider in defining whether an area should be labeled a  
23 core program or not.

24 First on the list of course, is that a high  
25 risk, large uncertainty area, does it involve an emerging

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1 issue or an emerging technology? Quite frankly, I don't  
2 understand why that should be part of a core program  
3 rather than just a research needs issue.

4 Is expertise or the facility involved in this  
5 kind of research, unique? And I think they use unique  
6 precisely here. Is it precisely a one-of-a-kind or  
7 difficult to reproduce facility?

8 Can NRC gain access in a timely manner to  
9 either that expertise in facility or some alternate  
10 expertise in facility?

11 Can NRC gain access to independent expertise  
12 on a topic, or should it have its own in-house expertise?

13 How frequently does NRC need expertise or the  
14 facility?

15 What impact will there be on the NRC if  
16 expertise or the facility and the capability they  
17 represent is lost?

18 What cost would be associated with  
19 reassembling expertise that had been abandoned for some  
20 interim time, and subsequently, a new issue had emerged?  
21 And clearly that is to be compared against, what is the  
22 cost of maintaining some current expertise?

23 And finally, how important is expertise or  
24 capability to ongoing cooperative agreements? I remind  
25 you that in the SRM, the Commission encouraged the NRC to

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1 continue to be involved in these cooperative research  
2 agreements internationally, and to solicit joint research  
3 programs -- the Department of Energy and other  
4 institutions -- including the industry.

5 Now, those tend to be tit-for-tat kinds of  
6 arrangements where research done in one area is swapped  
7 for research in another, and when you do that you've got  
8 to have something to swap. And I think Dr. Fontana  
9 pointed out to us, we're losing our ability to swap  
10 because we ain't got nothing to swap. And clearly that is  
11 in their thinking on this research.

12 MEMBER KRESS: Are they going to put scores  
13 aside each of these and add them up and have a -- if a  
14 score exceeds a certain --

15 MR. SHACK: They've apparently done that.

16 VICE CHAIRMAN POWERS: It is my impression  
17 that they have done that and they have arrived at a  
18 priority ranking. How the things were done is beyond me.

19 MR. SHACK: They have 39 core areas, I think.

20 VICE CHAIRMAN POWERS: Could be. And --

21 MEMBER KRESS: There's not that many in the  
22 whole world.

23 VICE CHAIRMAN POWERS: Oh, trust me Tom.  
24 You've been away from the National Laboratories too long.

25 MEMBER KRESS: We had 39 just in my section.

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1 VICE CHAIRMAN POWERS: Yes. Absolutely,  
2 that's the way it is.

3 MEMBER KRESS: Who made this list up?

4 VICE CHAIRMAN POWERS: I believe this list  
5 comes from Research itself.

6 MEMBER KRESS: Morrison?

7 VICE CHAIRMAN POWERS: I assume that Morrison  
8 and his staff -- or someone on the Research staff came up  
9 with this.

10 MEMBER APOSTOLAKIS: Can you tell me real  
11 quick, what a core program is?

12 MEMBER KRESS: That's a good question.

13 VICE CHAIRMAN POWERS: Well, a core program  
14 George, is one that apparently involves a high risk or  
15 large uncertainty research area that may or may not be an  
16 emerging issue or technology. It's an expertise that is  
17 unique; that NRC has difficulty gaining access to.

18 MEMBER APOSTOLAKIS: I was under the  
19 impression, which evidently is the wrong impression, that  
20 you know, as budgets go down and so on, the Office of  
21 Research has to decide, like there are certain  
22 disciplines, certain kinds of expertise that are core.

23 Like when we give the general exam at MIT for  
24 Ph.D. candidates, there is a morning there that's called  
25 core. That means, everyone in this department should

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1 understand transport phenomena, should understand nuclear  
2 physics.

3 VICE CHAIRMAN POWERS: This is different,  
4 George.

5 MEMBER APOSTOLAKIS: So this isn't the same  
6 use of the word "core"?

7 VICE CHAIRMAN POWERS: No, this is core  
8 capabilities and it is a buzz word within the industry. I  
9 would guess it really hit a peak about three or four years  
10 ago when it really became fashionable to divide your  
11 efforts up into what your core capabilities are.

12 It is one of the quality gurus who ran around  
13 the country that had this as one of his central theses,  
14 and you will find many, many technological-based  
15 companies, and I suspect all of the national laboratories  
16 have what they call their core competencies or core  
17 capability groups.

18 MR. MARKLEY: Or core line of business.

19 VICE CHAIRMAN POWERS: Yes, that's another  
20 term.

21 MEMBER APOSTOLAKIS: But I think that's --

22 VICE CHAIRMAN POWERS: And the way it's used,  
23 George, is these are things that you preserve for the  
24 long-haul, that you're always in this business, you always  
25 need it, and that you are the very best that you can

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1 possibly be.

2 Now, most companies say we're world-class or  
3 things like that, but let's be realistic; the best you can  
4 possibly be is what they really mean, in these areas. For  
5 instance, in the National Laboratories you find yourself  
6 in much better stead if you can solicit programs that you  
7 can argue, contribute to the core competencies.

8 MEMBER APOSTOLAKIS: Okay, I understand that.  
9 But maybe we should question then, whether that's the way  
10 we should interpret it, and I would go back to the exam  
11 again.

12 It seems to me if you want to call yourself a  
13 Ph.D. nuclear engineer, regardless of whether you do work  
14 on radiation science or PRA or materials, you have to have  
15 some nuclear physics, you have to have transporter -- so  
16 if you want to have an Office of Research in a nuclear  
17 regulatory agency, what are these basic --

18 VICE CHAIRMAN POWERS: Well, I think the best  
19 way to do that, George --

20 MEMBER APOSTOLAKIS: No, no -- well, I don't  
21 know about that. I think there are slight differences.

22 MEMBER FONTANA: The differences is in the  
23 definition of the word "core". This was a management fad  
24 like he was saying. If you change that to essential, I  
25 think it would be more understandable --

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1 MEMBER APOSTOLAKIS: But I don't understand  
2 why --

3 MEMBER FONTANA: What you have to have for  
4 what you're going to do now --

5 MEMBER APOSTOLAKIS: But why is there not  
6 uncertainty areas --

7 MEMBER FONTANA: -- and --

8 MEMBER APOSTOLAKIS: -- that's a research  
9 project that you may establish.

10 MR. SHACK: No, I think what it means is, it's  
11 an area where we need more information. We still have --  
12 it contributes to risk and we still have uncertainties; we  
13 don't know a lot about it.

14 MEMBER APOSTOLAKIS: But that's not a core by  
15 any interpretation of the word.

16 MEMBER FONTANA: It could be essential.

17 MEMBER APOSTOLAKIS: It is essential, but  
18 whether it's core --

19 MR. SHACK: It's only one of nine factors.

20 MEMBER APOSTOLAKIS: Yes, but what I'm saying  
21 --

22 MR. SHACK: Even if it was important George --  
23 but if you knew everything about it, it wouldn't be part  
24 of your research program.

25 MEMBER APOSTOLAKIS: No, but that's my point.

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1 Oh, you mean you wouldn't put it in the Office of  
2 Research?

3 MR. SHACK: No. It might be an essential  
4 discipline for the Nuclear Regulatory Commission, but you  
5 might not need to do any more research on it. You know,  
6 sometimes research actually ends. Not often, but  
7 sometimes. Never on pressure vessel, steam generators, or  
8 materials problems.

9 MEMBER MILLER: He needs to find the core --  
10 his core.

11 MEMBER APOSTOLAKIS: Why is the word "core"  
12 used here? What is the message the word core is sending?

13 MEMBER FONTANA: Because everybody uses it  
14 nowadays.

15 MR. SHACK: I think when the budget shrinks,  
16 these are the things we've got to keep going.

17 MEMBER APOSTOLAKIS: I think you do these even  
18 if the budget doesn't shrink.

19 MR. SHACK: Well, you prioritize, these are  
20 the things --

21 CHAIRMAN SEALE: The trauma is when it does  
22 shrink.

23 VICE CHAIRMAN POWERS: When these things  
24 disappear when the last man in Research walks out and  
25 turns out the light. And these they will preserve at the

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1 expense of other things.

2 MEMBER MILLER: Will the core always be the  
3 same, or will it change slowly?

4 VICE CHAIRMAN POWERS: I think, oh, there's a  
5 certain permanence attached to the core but the truth is,  
6 when there is a change -- the time scale for change is  
7 long compared to other things.

8 MEMBER MILLER: For example, in engineering --  
9 I think a better analogy rather than using the Ph.D. exam  
10 would be the core disciplines in engineering. You know,  
11 like mechanical, electrical and that. They're always  
12 going to be there. Nuclear may not be there tomorrow but  
13 that's --

14 MEMBER FONTANA: Well, the elastic guys are  
15 using a different -- they're training people who are  
16 supposed to be good for the next 50 years.

17 MEMBER MILLER: What I'm trying to do is  
18 identify the fact that the core in Research --

19 MEMBER APOSTOLAKIS: Yes, core means something  
20 else.

21 MEMBER MILLER: -- this field is probably  
22 going to be changing.

23 VICE CHAIRMAN POWERS: I think that's true and  
24 it evolves and whatnot. I don't know that spending  
25 enormous amount of time discussing core gets to my core

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1 problem here. Let me go on and go beyond what's in the  
2 DSI and reveal to you some of the intelligence I've  
3 gathered about the Research program.

4 And I have passed out for you the current core  
5 research programs and some of the detailed program  
6 elements that are in each of those, and some indication of  
7 how long they go on. I have on the next couple of slides,  
8 tried to encapsulate some of that and offer some thoughts  
9 on the Research programs.

10 Let's see, if I could have the next slide?  
11 There are altogether, six or seven items on this list that  
12 they have gone through with some effort to prioritize. I  
13 could fit on this slide three of those: aging research,  
14 reactor structural performance, and PRA. I expected  
15 members from each wing of the table to stand up and salute  
16 at this, but they didn't respond.

17 MEMBER MILLER: You haven't gotten to my area  
18 yet.

19 VICE CHAIRMAN POWERS: We'll get to your  
20 particular fanaticism in a second.

21 MEMBER MILLER: Was FRA by the way, a core ten  
22 years ago?

23 VICE CHAIRMAN POWERS: Yes, it was.

24 MEMBER APOSTOLAKIS: Thirty years ago it was  
25 not.

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1 VICE CHAIRMAN POWERS: You'd have to go back -

2 -

3 MEMBER MILLER: Twenty years ago, probably.

4 VICE CHAIRMAN POWERS: -- probably into '79

5 before you would see PRA merely as one of these

6 indulgences.

7 MEMBER MILLER: So today it's a core, but now

8 it's been pushed into the --

9 MEMBER KRESS: What is this slide, Dana?

10 These are --

11 MR. SHACK: Dana's acerbic comments on the --

12 VICE CHAIRMAN POWERS: There are my collective

13 acerbic comments on things that you have the details

14 about.

15 MEMBER KRESS: Okay, these are Research

16 programs that they have now --

17 MR. SHACK: Right, reactor aging programs --

18 VICE CHAIRMAN POWERS: That's right.

19 MEMBER KRESS: Okay, and these are your

20 acerbic comments. Okay, now I've got you.

21 VICE CHAIRMAN POWERS: My acerbic comments.

22 Let me give you overall, the acerbic comment that, there

23 is no element of the research planning that I would say

24 shows a tight coordination with what I would call, the

25 mission needs of the Agency.

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1           There is not a tradition that parallels that  
2 formalism that is common in the Department of Defense and  
3 aspired to within the Department of Energy, to identify  
4 mission needs, and from that, identify research needs.  
5 Except that most of this research is done in response to a  
6 user need --

7           MEMBER KRESS: Yes, and NRC's mission is very  
8 clear and simple.

9           VICE CHAIRMAN POWERS: The Agency's mission  
10 may be very clear. The Agency's mission needs may not be  
11 so clear.

12          MEMBER KRESS: Oh, I'm sure of that.

13          VICE CHAIRMAN POWERS: So when I see a large  
14 program on aging research, my immediate thought when I saw  
15 it was gee, I thought the aging rule had eliminated most  
16 of the need for this.

17                 In fact, I think when you look at the program  
18 elements you may come to the conclusion that well, these  
19 are things that have been undertaken and now they're just  
20 wrapping them up, and that we may be seeing a vestige --  
21 vestigial activities here and fair enough, it's not  
22 closely planned but it would be irrational just to stop  
23 things abruptly and not reap the harvest that you've  
24 started.

25                 Reactor structural performance is a research

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1 area that seems to be more tightly coupled to user needs.  
2 And I note that there are cooperative agreements with  
3 Japan that continue through fiscal year '99, and there  
4 seems to be a healthy amount of testing and development of  
5 tools that you could anticipate the staff would need for  
6 siting.

7           Unfortunately, it's a little difficult to get  
8 too excited because we don't anticipate a whole lot of  
9 applications for plants that would demand using tools for  
10 evaluating siting.

11           PRA research --

12           MEMBER FONTANA: Wait, back up just a second.  
13 Does this include things like steam generator tube --

14           VICE CHAIRMAN POWERS: Yes, it does.

15           MEMBER BARTON: -- diagnostics and stuff like  
16 that?

17           VICE CHAIRMAN POWERS: No, no, that's --

18           MR. SHACK: That's under the aging research.

19           MEMBER FONTANA: It is?

20           MR. SHACK: Yes.

21           CHAIRMAN SEALE: I think their problem here is  
22 that the aging research is a broader topic than the  
23 remaining elements of the program would suggest.

24           VICE CHAIRMAN POWERS: It depends on how you  
25 cut it. If you cut it based on costs, then it's classic

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1 aging research. If you cut it based on program elements,  
2 then you're right. And you will have to look at the  
3 details in my other handout to see what all the program  
4 elements are.

5 MR. EL-ZEFTAWY: They have this -- if you look  
6 at the elements.

7 MEMBER FONTANA: Oh, I hadn't looked at it.

8 MR. SHACK: Partly you call it whatever it  
9 takes to get it funded. If aging is hot this year, it's  
10 aging. If it's --

11 VICE CHAIRMAN POWERS: I mean, that's one of  
12 the problems, is that there is very much a persuasion  
13 component in the way research is organized. That is, if  
14 I'm an articulate, persuasive salesman, it is easier for  
15 me to keep my research programs well-funded than if I'm  
16 fairly inarticulate. That that again comes back to,  
17 there's not a close tie to mission need.

18 CHAIRMAN SEALE: Yes, but I have to suggest  
19 also that the ability to express disdain for old programs  
20 is a management tool for putting pressure on research  
21 programs to see whether or not they can stand up to the  
22 gaff.

23 VICE CHAIRMAN POWERS: Well, I think that  
24 there is a tendency in all research organizations that  
25 have not carefully planned their work, to argue something

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1 like this: we've worked on this issue for a number of  
2 years; it must surely be done, whether it's done or not.

3 CHAIRMAN SEALE: Yes.

4 VICE CHAIRMAN POWERS: I think that often  
5 happens. And that's one of the things that you can try to  
6 avoid when you -- if you tie planning of a research  
7 program closely to mission need with agreed-upon  
8 requirements and functions for that research.

9 MEMBER APOSTOLAKIS: Dana, under PRA,  
10 shouldn't they have some research activity in the area of  
11 risk management/decision-making?

12 VICE CHAIRMAN POWERS: I believe that that is  
13 a topic that they -- certainly the management, and perhaps  
14 even the Commission -- have said that accident management  
15 is really a program that belongs to the licensees. And  
16 that is, they have attempted then, not to intrude upon  
17 that as much as possible.

18 MEMBER APOSTOLAKIS: No, but I don't mean  
19 accident management; I mean risk management. Like this  
20 morning, all these questions about how do you handle  
21 uncertainty, how do you make decisions in the light of  
22 these uncertainties?

23 This Agency has shied away from doing work on  
24 decision-making or risk management, or risk-informed  
25 decision making, and perhaps it's time for them to get

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1 into this a little bit more and understand better what the  
2 elements of decision-making that are relative to their  
3 problems are.

4 VICE CHAIRMAN POWERS: I'm, certainly I think,  
5 supportive of your point of view, and I suspect in every  
6 one of these research topics we can identify things that  
7 ought to be done, and we can go on and divine many, many  
8 more research topics than what I've been able to put on  
9 two viewgraphs.

10 MEMBER APOSTOLAKIS: Well, the reason why I'm  
11 saying is --

12 VICE CHAIRMAN POWERS: And I think we're going  
13 to be asked to do that.

14 MEMBER APOSTOLAKIS: Yes. You say no shut  
15 down, low power, so I thought you were soliciting -- I  
16 mean, this just happened to come to your mind?

17 VICE CHAIRMAN POWERS: These are my own  
18 personal acerbic comments.

19 MEMBER APOSTOLAKIS: I thought you were  
20 soliciting input to put --

21 CHAIRMAN SEALE: If you have an ox you want to  
22 gore, why you write it down.

23 VICE CHAIRMAN POWERS: George, the intention  
24 of this entire discussion is simply to sensitize you to  
25 the question of the research program and to say yes, I

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1 think we're going to have to get more aggressively  
2 involved in this.

3 The queen of sciences is of course --

4 MEMBER FONTANA: PRA.

5 VICE CHAIRMAN POWERS: Not this one yet, Med -  
6 - "RES Program, Cont'd", do you have that?

7 CHAIRMAN SEALE: Number 9.

8 VICE CHAIRMAN POWERS: The queen of the  
9 sciences of course, is an element of the research program,  
10 and I think this is one that we're fairly familiar with.  
11 And it has --

12 MR. SHACK: Simplified the fuel work under  
13 there for some strange reason.

14 VICE CHAIRMAN POWERS: They do indeed. They  
15 have a small component of a small program.

16 MEMBER KRESS: They could put a model on the  
17 end.

18 VICE CHAIRMAN POWERS: Everything up to the  
19 big bang and including the big bang, was thermal  
20 hydraulics. We've been informed that many times before.

21 I read all this thermal hydraulics stuff and I  
22 just said, gee, if you're in the position of having to be  
23 very, very strict in your definition of what research  
24 ongoing is, do you have that much programmatic need  
25 forecast in the future for such an expansive program in

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1 thermal hydraulics? And I only pose the question; I did  
2 not pose the answer to it.

3 The kind of the sciences, I&C, is of course  
4 listed here, unfortunately second. That was my  
5 prerogative and not others.

6 MEMBER MILLER: Second on this page.

7 VICE CHAIRMAN POWERS: On this page, that's  
8 all.

9 MEMBER MILLER: Fifth on your list, at least.

10 VICE CHAIRMAN POWERS: We all know that it  
11 should figure very high since it is an element of physics,  
12 one of the better ones.

13 CHAIRMAN SEALE: I thought it was the strong,  
14 right arm.

15 VICE CHAIRMAN POWERS: Here's the one that  
16 just flabbergasts me. We have I&C and human factors.

17 MEMBER KRESS: Why is "from" separated from  
18 "separated"?

19 VICE CHAIRMAN POWERS: Because the word  
20 processing engineer that did this worked on two different  
21 kinds of printers.

22 MEMBER MILLER: Why is your question that I&C  
23 and human factors not be together? Why wouldn't you  
24 expect it to be together?

25 VICE CHAIRMAN POWERS: The two of them seem as

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1 unrelated as any two I can think of.

2 MEMBER MILLER: No, but if you look at it from  
3 a systems' viewpoint, you draw a block diagram of a power  
4 plant control system, you've got the human in the loop who  
5 has to read the control room, and that's fed by the  
6 instrumentation.

7 VICE CHAIRMAN POWERS: I won't argue with you.

8 MR. SHACK: Certainly that's where human  
9 factors grew out of in most engineering curriculums.

10 MEMBER MILLER: Electrically has the largest  
11 human factors group I think, in engineering.

12 VICE CHAIRMAN POWERS: The question I  
13 actually, explicitly posed is, why is human factors  
14 separated from human reliability analysis?

15 MEMBER MILLER: That's a good point.

16 VICE CHAIRMAN POWERS: And I'm now told that  
17 they're no longer separated; that they are now closely  
18 tied together.

19 MEMBER MILLER: They're now put together, yes.  
20 They must have seen you do this overhead.

21 VICE CHAIRMAN POWERS: It is indicated that  
22 there is some assessment of the adequacy of industrial  
23 standards that is to be a component of this overall  
24 research program, but I'll be darned if I can find a task  
25 that actually addressed that kind of a question.

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1           The final issue here is severe accidents.  
2   There are a variety of components involved in the severe  
3   accident program. Nearly all of them are code-associated.  
4   There is a very limited amount of experimental work going  
5   on. I think most of the experimental work going on in  
6   this country is associated with the lower head integrity  
7   issue, and my understanding is that research is wrapping  
8   up.

9           The rest of it is code work, and experimental  
10   work that is coming from the cooperative agreements -- and  
11   there are a variety of them connected with source term,  
12   fuel coolant interactions, hydrogen combustion.

13           Now, it is my understanding that the severe  
14   accidents program and this prioritization that Bill Shack  
15   mentioned, has come in last on this, and it consequently  
16   is on the chopping block.

17           MEMBER KRESS: A little strange to me.

18           VICE CHAIRMAN POWERS: It is a peculiarity.

19           CHAIRMAN SEALE: Now, let me ask you a  
20   question. You mean that in its full scope, the program is  
21   on the chopping block, not --

22           VICE CHAIRMAN POWERS: That's exactly right.  
23   It's my understanding -- and I have to admit, I'm very  
24   sympathetic with this point of view of management -- and  
25   this is strictly hearsay, by the way --

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1 CHAIRMAN SEALE: Let me finish my question,  
2 though. It seems to me that it would be appropriate to  
3 judge the elements of that program independently and  
4 decide whether FCI is on the chopping block, or hydrogen  
5 combustion, or whatever. Because I can fully anticipate  
6 there may be other topical areas and other centers, if you  
7 will, or other focus areas, which may individually be on  
8 the chopping block, before perhaps, some of the things  
9 here are on the chopping block.

10 MEMBER FONTANA: That's a good point.

11 CHAIRMAN SEALE: I think you're making the  
12 go/no-go decision at a level higher than is appropriate.

13 VICE CHAIRMAN POWERS: Understand, I'm making  
14 no no-go decisions at all --

15 CHAIRMAN SEALE: But -- I know, but if they  
16 are indeed, making it in a way you suggest --

17 VICE CHAIRMAN POWERS: Let me explain what --

18 MEMBER FONTANA: I talked to Morrison  
19 yesterday a little while afterwards here and he said well,  
20 he says if I let go of severe accidents what do I lose,  
21 compared if I let to something else what do I lose? And  
22 so on. He says, I already know enough about severe  
23 accidents to tide me over. His position.

24 But you're right, Bob. If you want a line  
25 item veto rather than the whole page.

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1 VICE CHAIRMAN POWERS: I believe the rationale  
2 went this way. That they had done the research budget  
3 cutting in the past, much like you described, Bob. He had  
4 reached the point now, there were no longer any overly  
5 ripe elements to pluck out. He had a large nut to crack  
6 and he did the voting a lot like Mario said. Is, what do  
7 I lose? If I take anything else out of that list versus  
8 what do I lose here?

9 Now, I don't know that these are carved in  
10 stone. In fact, it looks to me like a lot of it's a game  
11 of chicken here. Or it's like -- I characterize it as  
12 cancelling the football program when you have to cut the  
13 high school budget. You know that a lot of people are  
14 going to squawk.

15 Again, my personal difficulty --

16 MEMBER KRESS: When you really ought to cancel  
17 the band from the --

18 VICE CHAIRMAN POWERS: Well, you don't want to  
19 cancel the girl's field hockey team anymore.

20 CHAIRMAN SEALE: Or the cheerleaders.

21 VICE CHAIRMAN POWERS: You end up in court.

22 MEMBER KRESS: How did this degenerate so  
23 quickly? Go ahead.

24 VICE CHAIRMAN POWERS: If I could have my last  
25 slide of really acerbic comments.

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1 MEMBER KRESS: How come I don't have that  
2 slide?

3 VICE CHAIRMAN POWERS: Because I didn't pass  
4 it out. When I get very acerbic I don't want to leave  
5 evidence.

6 This just says, some of my initial thoughts in  
7 looking at the intelligence I've gathered on this subject  
8 is, the basis of prioritization of the current research  
9 activities is just not at all obvious to me -- and I list  
10 some things here.

11 We have no applications for license extension  
12 but lots of applications for high burnup fuel;  
13 consequently, we have a large research program in plant  
14 aging and just a small component of a small program to  
15 look at high burnup fuel.

16 MEMBER KRESS: This makes logical sense.

17 VICE CHAIRMAN POWERS: Makes no sense to me --

18 MR. SHACK: I'd point out that steam  
19 generators don't wait until you ask for license extension  
20 to degenerate, nor do vessels wait for you to ask for a  
21 license extension before they embrittle.

22 VICE CHAIRMAN POWERS: I will also remind you  
23 that steam generators are part of the maintenance rule and  
24 not part of the aging rule.

25 We have an Agency-wide effort to go into risk-

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1 informed, performance-based regulation, but we don't have  
2 any research to develop risk information in things like  
3 shutdown, and George has mentioned some others -- or to  
4 extend this research concept into materials in the medical  
5 use area.

6 And again, the planning that we have seen in  
7 some of these research areas -- and the human performance  
8 program plan is the one that comes most to mind -- they  
9 tend to be much more listings of program --

10 MEMBER KRESS: Does that mean they're turning  
11 over on their side and sinking?

12 VICE CHAIRMAN POWERS: No, that means that  
13 there are enumerations. They seem to be enumerations of  
14 programs that lack a focus on, and any tie to, what the  
15 ultimate goals of the Agency are -- the mission needs,  
16 again, and what the requirements are.

17 And I think that as we go into this examining  
18 the Research program, I certainly would like to see us  
19 encouraging the Agency to go to a more disciplined  
20 practice in planning its research so that it is following  
21 more of a DOD kind of principle than this -- gee, it seems  
22 like a good idea to look into this -- type of principle.

23 That's what I have to say, Bob.

24 CHAIRMAN SEALE: Thank you very much, Dana. I  
25 think you've done us all a real service here, and I think

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1 you've set us all up for this planning effort. I would  
2 urge everyone to take the time to go over the more  
3 specific information on each of these programs so that we  
4 can get ourselves up to speed to work more effectively on  
5 the research program.

6 MEMBER MILLER: Are we going to -- Dana has  
7 made kind of a recommendation. Are we going to discuss  
8 further how we might be involved in that recommendation,  
9 or are we going to --

10 CHAIRMAN SEALE: Well, I think you have some  
11 things planned for the near future to discuss elements of  
12 the Research program. In the meantime, as you go along  
13 and you find -- well, growing out of the I&C process  
14 you're in right now, if there are research elements that  
15 ought to be argued out, you should identify them for us  
16 and perhaps write some things down on them so we'll have  
17 something specific to talk about. And similarly, in other  
18 areas.

19 MEMBER MILLER: My question is, should we as  
20 individuals -- like I as Chair of this I&C committee --  
21 talk one-on-one with the I&C Research group ad hoc, or  
22 should we not do that?

23 CHAIRMAN SEALE: Well, I think that would be  
24 fine.

25 VICE CHAIRMAN POWERS: I think I'd encourage

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1 that. I think at some point we as an institution are  
2 going to have to decide and formulate a strategy on what  
3 it is we want to do with respect to the Research program.

4 Are we going to let it come to us as it's  
5 delivered, or are we going to get involved in the process  
6 and say, what is it that the Agency really needs in the  
7 area of research, and how can that research be organized  
8 to meet those needs?

9 MEMBER FONTANA: Are we free to go talk to the  
10 guys on the staff? I know I got a little dinged a little  
11 bit for asking for something, and turned out it was  
12 embargoed, or what the heck ever it was, and I should have  
13 gone through --

14 CHAIRMAN SEALE: You weren't dinged; you were  
15 told it was embargoed and it wasn't available to you at  
16 this time, and that can happen.

17 MEMBER FONTANA: Yes, but I can --

18 CHAIRMAN SEALE: But it's not as if you had  
19 gone in there and mugged somebody or kissed the secretary  
20 or anything like that. That's on a personal, one-on-one  
21 basis, Mario.

22 MEMBER APOSTOLAKIS: You guys remember we're  
23 on record, here. Because I forgot earlier myself, so  
24 that's why I shut up.

25 CHAIRMAN SEALE: No, you can talk to

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1 individuals, you should ask the cognizant staff engineer  
2 to work with you on that.

3 MEMBER FONTANA: There's no area there --

4 CHAIRMAN SEALE: No, no.

5 MEMBER MILLER: So there's reason to be  
6 somewhat proactive in all this.

7 CHAIRMAN SEALE: Yes.

8 MEMBER FONTANA: Okay, thank you.

9 CHAIRMAN SEALE: You didn't violate a  
10 fundamental principle when you went to talk to someone.  
11 When you found out it was embargoed, then that's a  
12 constraint they have to live with and you have to honor  
13 that. But you didn't do anything fundamentally wrong to  
14 approach them in the first place.

15 Okay. Now, I think before we quit, I should  
16 mention that after we had our meeting with the  
17 Commissioners, Commissioner McGaffigan asked me if we were  
18 going to be looking at any of the other DSIs. And I had  
19 the distinct impression that they would appreciate if we  
20 would go through those and try to identify specific  
21 components, or indeed the whole issue, that we would like  
22 to make comments on.

23 So I thought I would try to get together with  
24 John and go through the DSIs and perhaps dole them out  
25 appropriately and see if we could take a quick reading by

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1 the individual involved and then maybe at the next meeting  
2 we'll take the time to see if there are things in the DSIs  
3 that we should try to do some more in-depth work on,  
4 similar to what Dana has done here on 22.

5 MEMBER MILLER: Would it be reasonable to dole  
6 them out the way we doled them out before?

7 CHAIRMAN SEALE: Well, I think there have been  
8 some changes and some personnel changes -- moving of  
9 responsibilities --

10 MEMBER MILLER: Well, I agree --

11 CHAIRMAN SEALE: -- and so I'd like to  
12 doublecheck that.

13 John? I think I would do my committee a favor  
14 if I allowed them to take about a 10-minute break. We're  
15 going to check on -- this 10-minute break will be a more  
16 religiously observed philosophy.

17 DIRECTOR LARKINS: I'd just mention, everybody  
18 did get the DSIs -- the individual Commissioner's comments  
19 on many of them.

20 CHAIRMAN SEALE: Yes, right. Okay, we'll be  
21 back.

22 (Whereupon, the foregoing matter went off the  
23 record at 2:46 p.m.)

24  
25

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C E R T I F I C A T E

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

Name of Proceeding: 441<sup>ST</sup> ACRS

Docket Number: N/A

Place of Proceeding: ROCKVILLE, MARYLAND

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



CORBETT RINER

Official Reporter

Neal R. Gross and Co., Inc.

INTRODUCTORY STATEMENT BY THE ACRS CHAIRMAN  
441ST ACRS MEETING, MARCH 1-3, 1997

THE MEETING WILL NOW COME TO ORDER. THIS IS THE SECOND DAY OF THE 441ST MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS. DURING TODAY'S MEETING, THE COMMITTEE WILL CONSIDER THE FOLLOWING:

- (1) STAFF REQUIREMENTS MEMORANDUM (SRM) ON DIRECTION SETTING ISSUE 22, RESEARCH
- (2) IMPLEMENTATION OF THE MAINTENANCE RULE
- (3) FUTURE ACRS ACTIVITIES
- (4) RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS
- (5) PROPOSED ACRS REPORTS

IN ADDITION, THE COMMITTEE WILL MEET WITH THE NRC COMMISSIONERS BETWEEN 9:00 - 10:30 A.M. IN THE COMMISSIONERS' CONFERENCE ROOM TO DISCUSS ITEMS OF MUTUAL INTEREST.

THIS MEETING IS BEING CONDUCTED IN ACCORDANCE WITH THE PROVISIONS OF THE FEDERAL ADVISORY COMMITTEE ACT.

MR. SAM DURAISWAMY IS THE DESIGNATED FEDERAL OFFICIAL FOR THE INITIAL PORTION OF THE MEETING.

WE HAVE RECEIVED NO WRITTEN STATEMENTS OR REQUESTS FOR TIME TO MAKE ORAL STATEMENTS FROM MEMBERS OF THE PUBLIC REGARDING TODAY'S SESSIONS. A TRANSCRIPT OF PORTIONS OF THE MEETING IS BEING KEPT, AND IT IS REQUESTED THAT THE SPEAKERS USE ONE OF THE MICROPHONES, IDENTIFY THEMSELVES AND SPEAK WITH SUFFICIENT CLARITY AND VOLUME SO THAT THEY CAN BE READILY HEARD.

# **STATUS OF THE MAINTENANCE RULE**

**Richard P. Correia**

**Thomas A. Bergman**

**Contact: Rich Correia**

**Phone: 415-1009**

**May 2, 1997**

# **AGENDA**

- **Maintenance Rule Background**
- **Baseline Inspection Program Results**
- **Clarifications in Regulatory Guide (RG) 1.160, Revision 2**
- **Lessons Learned and Insights**

# OVERVIEW

- **Need for a Rule**
  - Number of Transients and Scrums
  - Maintenance Team Inspections
- **Developed Risk-Informed, Performance-Based Rule**
- **Give Licensees Flexibility**
- **Can Inspect and Enforce**
- **Challenges**
  - Variation Between Licensees
  - NRC Resources Required are High

# **BACKGROUND**

- **Rule Issued 7/10/91, In Effect 7/10/96**
- **Industry Guideline Document NUMARC 93-01**
- **RG 1.160**
- **Inspection Procedure (IP) 62706**
- **IP 62707**

# **BASELINE INSPECTION RESULTS**

- **24 Inspections**
- **Each Inspection Unique**
- **Overall Licensees Adequately Implementing the Rule**
- **Some Licensees Implemented Late**



# **BASELINE INSPECTION RESULTS - CONTINUED**

- **Two Common Findings**
  - Inadequate Reliability Performance Criteria/Goals
  - Failure to Monitor Both Reliability and Availability
- **Scoping**
- **Reluctance to Identify Maintenance Preventable Functional Failures (MPFFs)**
- **Structural Monitoring**
- **(a)(3) Safety Assessments**

# **BASELINE INSPECTION RESULTS - CONTINUED**

- **Enforcement Complete on 13 Inspections**
  - **Two Had No Maintenance Rule Violations**
  - **One Had One Severity Level III But No Civil Penalty**
  - **Ten Had One or Multiple Severity Level IV**
  - **Remaining Inspection Findings Under Staff Evaluation**

# **CLARIFICATIONS IN RG 1.160, REVISION 2**

- **Scoping**
- **MPFFs as Reliability Indicator**
- **Monitoring Structures**
- **Normally Operating SSCs of Low Safety Significance**

# **CLARIFICATIONS IN RG, CONTINUED**

- **Safety-Significance Categorization Process**
- **Reflect Changes to Rule Since Revision 1**
- **Definition of Maintenance**
- **Timeliness**
- **Definition of Standby**
- **MPFFs Related to Design Deficiencies**
- **Number of SSCs in Category (a)(1)**

# ● LESSONS LEARNED AND INSIGHTS

- Importance of Communication
- Value of the Pilot Program
- Guidance Developed Through Iterative Process
- Importance of Training
- May need Programmatic Baseline Inspection Program
- Can Consistently Inspect and Enforce
- Resource Requirements High
- Rules Must Only Contain Requirements

## RESEARCH OPTIONS

### OPTION 1

*QUIT DOING RESEARCH*

### OPTION 2

*CONFIRMATORY RESEARCH ONLY*

### OPTION 3

*EXPLORATORY RESEARCH ONLY*

### OPTION 4

*CONFIRMATORY & EXPLORATORY  
RESEARCH*

### OPTION 5

*ESTABLISH & MAINTAIN CORE  
RESEARCH CAPABILITIES*

### OPTION 6

*USE UNIVERSITIES MORE*

### OPTION 7

*PARTICIPATE IN INTERNATIONAL  
SAFETY PROGRAMS*

## **SELECTED OPTIONS**

### **○ OPTION 4**

#### **EXPLORATORY & CONFIRMATORY RESEARCH**

(BUSINESS AS USUAL ?)

### **○ OPTION 5**

#### **ESTABLISH & MAINTAIN CORE RESEARCH CAPABILITIES**

- RES IS TO DEFINE THESE CORE CAPABILITIES
- CAN ACRS HELP ?

### **○ COMMISSION SUPPORTS A BIGGER FRACTION OF THE RESEARCH GOING TO UNIVERSITIES**

- WANTS NEW APPROACHES TO  
GRANTING MONEY

### **○ CONTINUE ACTIVE PARTICIPATION IN INTERNATIONAL RESEARCH PROGRAMS**

## OTHER POINTS

- EXPLORE COOPERATIVE RESEARCH WITH  
INDUSTRY & THE DOE

*- DOE BUDGET FOR NUCLEAR ENERGY  
IS UNDER EXTREME PRESSURE  
\$0 TO \$40 MILLION FOR FY'98*

- MOVE RULEMAKING OUT OF RES
- ESTABLISH RESEARCH EFFECTIVENESS  
REVIEW BOARD
- IDENTIFY RESEARCH NEEDS FOR NRC  
OVERSIGHT OF DOE NUCLEAR FACILITIES
- CONTINUE TO THINK ABOUT ITEMS ON  
PAGES 13, 14 AND 18 OF THE DSI



## PAGES 13 & 14

### ○ ORGANIZATIONAL ISSUES

*- FOCUS NOW ON CONDUCT OF RESEARCH  
EFFECTIVELY & EFFICIENTLY*

### ○ ROGERS' PAPER

*- NRC IS A KNOWLEDGE BASED INSTITUTION  
- REQUIRES MAINTENANCE & EXTENSION  
OF THE KNOWLEDGE BASE  
- QUALIFIED STAFF ESSENTIAL*

### ○ RELATIONSHIP BETWEEN RES & PROGRAM OFFICES IS KEY TO EFFECTIVE & EFFICIENT CONDUCT OF RESEARCH

*- SPECIALIZED EXPERTISE IN PROGRAM  
OFFICES OR JUST IN RES ?*

*- CAN NRC STILL ATTRACT TOP TALENT?*

*- SHOULD THERE BE A BROADER  
EXPLORATORY RESEARCH COMPONENT ?*

*- IS AN INDEPENDENT OFFICE OF RESEARCH  
ESSENTIAL ?*

- WHAT CORE CAPABILITIES ARE TO BE MAINTAINED & WHAT SHOULD BE ALLOWED TO WITHER AS NEED DISAPPEARS ?
- MAINTENANCE OF CAPABILITIES BY
  - *IN HOUSE STAFF*
  - *CONTRACTORS*
  - *COMBINATION*
- SHOULD MORE ANALYTIC ACTIVITIES BE DONE IN HOUSE ?
- HOW DO YOU DECIDE TO DROP A RESEARCH ACTIVITY ?
  - *HOW DO YOU RE-INITIATE IF A SPECIFIC NEED ARISES LATER ?*
- DEPTH OF STAFF EXPERTISE NEEDED

## **CRITERIA FOR A CORE PROGRAM**

- 1. High risk, large uncertainty area; does it involve emerging issue or technology ?**
- 2. Is expertise or facility unique ?**
- 3. Can NRC gain access in a timely manner ?**
- 4. Can NRC gain access to independent expertise ?**
- 5. How frequently will expertise or facility be used ?**
- 6. What impact on NRC if capability is lost ?**
- 7. What is cost of reassembling expertise ?**
- 8. What is cost of maintaining expertise ?**
- 9. How important is expertise or capability to ongoing cooperative agreements ?**

## **RES PROGRAM**

### **○ AGING RESEARCH**

- CONTINUES THROUGH FY'99**
- I THOUGHT AGING RULE ELIMINATED MOST OF THE NEED FOR THIS**

### **○ REACTOR STRUCTURAL PERFORMANCE**

- COOPERATIVE AGREEMENT WITH JAPAN CONTINUES THROUGH FY'99**
- TESTING & DEVELOPMENT OF SEISMIC ANALYSIS TOOLS**

### **○ PRA**

- PRIMARILY IPE & IPEEE**
- SOME METHODS DEVELOPMENT**
  - HRA**
  - ORGANIZATIONAL PERFORMANCE**
  - FIRE RISK**
  - PLANT AGING**
  - DIGITAL I&C**
  - CONSEQUENCE UNCERTAINTY**
- NO SHUTDOWN/LOW-POWER COMPONENT**

## **RES PROGRAM, CONT'D**

### **○ THERMAL HYDRAULICS**

- CODE UPDATE**
- IS THERE REALLY THAT MUCH NEED ?**
- INCLUDES FUEL BEHAVIOR CODE UPDATE FOR HIGH BURNUP FUELS**
- SOME WORK AT HALDEN**

### **○ I&C AND HUMAN FACTORS**

- WHY IS HUMAN FACTORS SEPARATED FROM HRA ?**
- INCLUDES TESTING OF SMOKE ON DIGITAL CIRCUITS**
- SAYS ASSESSMENT OF THE ADEQUACY OF INDUSTRIAL STANDARDS IS A COMPONENT BUT THERE IS NO TASK FOR THIS**

### **○ SEVERE ACCIDENTS**

- COMPONENTS INCLUDE**
  - FCI**
  - HYDROGEN COMBUSTION**
  - LOWER HEAD INTEGRITY**
  - SOURCE TERM**
  - SEVERE ACCIDENT CODES**
- ORIENTED TOWARD COOPERATIVE PRGMS**

# REACTOR AGING PROGRAM

- GOALS

- Provide data and analysis tools necessary to identify (anticipate), quantify (inspect, validate), manage (mitigate effects and establish margins), and regulate effects of aging in nuclear power plants for current license periods and license renewal
- Maintain essential competence for NRC through highly qualified technical staff and a few analytical and experimental contractors
- Stimulate, provide leadership, and collaborate in international research projects

- COMPONENTS

- Embrittlement of the reactor pressure vessel (RPV)
- Thermal annealing of the RPV
- RPV fracture analysis methods
- Environmentally assisted cracking of safety-critical systems and components
- Nondestructive evaluation techniques
- Integrity of steam generator tubes
- Aging of electrical cables
- Mechanical components - inspection, surveillance, testing and maintenance.

# REACTOR AGING PROGRAM

## Major Deliverables

- Validate Annealing Rule & R. G.
  - Engineering Demonstrations 1997
  - Recovery and Rembrittlement Trends 1999
- Revise PTS Regulatory Guide 1999
- Implement improved fracture mechanics methods into ASME Code and validate 1998
- Evaluate and quantify material property variability 1997
- Validated models for SG tube severe accident analyses to support NRR rulemaking 1997
- Validated correlations for inspection, leak rate, failure pressure and failure mode 1999
- Complete LOCA testing and evaluation of cable condition monitoring and provide guidelines to NRR on EQ 1999
- Provide review criteria for evaluating licensee IST programs for pumps and valves 1997

## International Collaborators

- Second International Piping Integrity Research Group (IPIRG-2) - 14 foreign collaborators
- Working Group of the Joint Coordination Committee on Civilian Nuclear Reactor Safety on Pressure Vessel Integrity (WG-3) -- Russia, Ukraine
- Working Group of the Joint Coordinating Committee on Civilian Nuclear Safety on Nuclear Plant Aging and Life Extension (WG-12) --Russia, Ukraine
- International Group on Radiation Damage Mechanisms for RPVs - 11 foreign contributors
- International Cooperative Group on Environmentally Assisted Cracking - 18 foreign collaborators
- CSNI, Principal Working Group - 3, Subgroup on the Integrity of Metal Components - The European Community, East European countries, and 2 other foreign contributors

## Key Contractors

- University of California at Santa Barbara
- Brookhaven National Laboratory (BNL)
- Argonne National Laboratory (ANL)
- Pacific Northwest National Laboratory (PNNL)
- Battelle Columbus Laboratory (BCL)
- Oak Ridge National Laboratory (ORNL)
- Idaho National Engineering Laboratory (INEL)



# REACTOR STRUCTURAL PERFORMANCE

- GOALS

- Provide information needed to develop regulatory acceptance criteria for judging site suitability considering seismological, geological, and geotechnical factors and other natural hazards
- Assess and validate analytical methods for structural performance
- Determine adequacy of margins of existing facilities through inspection procedures and evaluation of effects of degradation

- COMPONENTS

- Inspection and evaluation of aged/degraded structures and components
- Confirmation and assessment of design and operational capacity of nuclear power plant structures, systems, and components
- Assessment of the capacity and margins of reactor containments
- Earth science investigations
- Assistance for evaluation of siting and structural aspects of non-reactor facilities such as gaseous diffusion plants and independent fuel storage facilities



# REACTOR STRUCTURAL PERFORMANCE PROGRAM

## **Major Deliverables**

- Trial implementation of NRC, DOE and EPRI guidance on conducting probabilistic seismic analyses 1997
- Revise Reg. Guides 1.60, 1.61, 1.92, etc. 1998
- Seismic data from large-scale main steam and feedwater system 1997
- Data from large scale concrete containment pressure tests 1999
- Evaluation of methods to assess margins of degraded containments 1998
- Assessment of grease leakage from prestressing tendons on strengths of concrete containments 1997
- Data from seismic proving tests of concrete containments 1998

## **International Collaborators**

- Hualien Soil-structure Interaction Experiment -- France, Japan, Korea and Taiwan
- Main Steam & FeedWater Seismic Proving Tests at Tadotsu Shake Table -- Japan
- Strong Ground Motion Propagation Through Shallow Soil Columns -- Japan, France
- Containment Structural Integrity Model Test at SNL - Japan
- CSNI, Principal Working Group 3, Subgroups on Seismic Behavior of Structures and Behavior of Degraded Containments -- EC, Eastern European Countries, Japan, Korea
- Seismic Proving Tests for Concrete Containments - Reinforced and Prestressed at Tadotsu Shake Table --- Japan

## **Key Contractors**

- Lawrence Livermore National Laboratory (LLNL)
- Brookhaven National Laboratory (BNL)
- Oak Ridge National Laboratory (ORNL)
- Sandia National Laboratory (SNL)
- United States Geologic Survey (USGS)
- City College of New York (CCNY)
- University of California at Santa Barbara
- Energy Technology Engineering Center (ETEC)
- Corps of Engineers/Waterway Experiment Station

# PROBABILISTIC RISK ASSESSMENT PROGRAM

- GOALS

- Support risk-informed regulation by developing guidance and methods for PRA
- Develop insights on the application of PRA through reviews of IPEs and IPEEEs

- COMPONENTS

- Development of Regulatory Guides on use of PRA in risk-informed regulatory activities
- Develop and demonstrate methods:
  - ASP model
  - Human reliability analysis
  - Organizational performance influences on risk
  - Fire risk analysis
  - Reliability and data analysis
  - Digital I&C influences on risk
  - Consequence uncertainty analysis
- Regulatory Reviews:
  - IPEs & IPEEEs
  - Insights from set of submittals

# PROBABILISTIC RISK ASSESSMENT PROGRAM

## Major Deliverables

- Finalize Reg. Guides in the area of overall PRA, ISI, IST, QA, and Tech. Specs. 1997
- Initiate any needed rule changes for risk-informed regulation 1998
- Initiate changes to 10 CFR 52 regarding COL-PRA 1998
- Completion of methods developments or improvements:
  - Human reliability analysis 1997
  - Organizational performance 1998
  - Fire risk 1999
  - Plant aging 1998
  - Digital I&C 1999
  - Consequence uncertainty 1997
- Issue draft IPE Insights report for Public Comment Complete
- Complete final IPE insights report 1997
- Complete IPEEE SERs 1998
- Complete IPEEE Insights Report 1998

## International Collaborators

- Bilateral agreement on PRA methods - Spain
- Bilateral agreement on PRA methods - Switzerland
- Bilateral agreement on PRA methods - Canada
- CSNI, Principal Working Group 5. -- E.C., US, Eastern European Countries, Japan, Korea
- PRA technology transfer and VVER-1000 PRA - Russia (GAN)
- Research contract - Russian Academy of Sciences
- PRA technology transfer and VVER - 440 PRA - Ukraine
- Proposed international cooperative program on PRA

## Key Contractors

- Brookhaven National Laboratory
- Sandia National Laboratory
- Idaho National Engineering Laboratory
- Los Alamos National Laboratory
- Energy Research, Inc.

# THERMAL HYDRAULICS PROGRAM

- GOALS

- Develop and maintain experimental capability and analytical tools for the independent assessment of applicant/licensee submittals through highly qualified technical staff and a few support contractors
- Analyze and evaluate operating events and safety issues to assure an appropriate basis for regulation
- Stimulate and collaborate in international research in thermal hydraulics and fuels
- Train future engineers through focused research at universities

- COMPONENTS

- Plant transient analysis
- Plant transient code improvements
- Thermal hydraulic testing
- Fuel behavior and reactor physics

# THERMAL-HYDRAULICS PROGRAM

## **Major Deliverables**

- Complete incorporation and correction of currently identified deficiencies in thermal-hydraulics codes 1997
- Initiate development of an improved state-of-the-art code to replace the existing T/H codes 1997
- Complete AP-600 related experiments 1997
- Initiate testing in support of future code development 1997
- Complete update of FRAPCON 1997
- Complete update of FRAP-T6 1998
- Initiate clad test program 1998

## **International Collaborators**

- The Code Assessment and Maintenance Program (CAMP) involves 25 countries. They provide cash contribution, assessment of the NRC thermal hydraulic codes (RELAP5, TRAC-B and TRAC-P). East European countries' contributions are provided by AID.
- We are collaborating with CEA, France, RRC, Russia and JAERI, Japan in the thermal hydraulic and high burnup fuel testing:
  - CABRI
  - NSRR
  - Halden
- Actively participating in CSNI PWG-2; hosted and participated in several ISPs, workshop and specialists meeting

## **Key Contractors**

- Los Alamos National Laboratory
- Brookhaven National Laboratory
- Scientech, Inc
- Penn State University
- Purdue University
- University of Maryland
- Oregon State University
- Argonne National Laboratory

# CONTROL, INSTRUMENTATION, AND HUMAN FACTORS

## • GOALS

- Develop a credible basis of understanding of the performance characteristics of digital I&C systems, including software reliability and man-machine interface, to provide guidance to regulatory decision making
- Develop methods for assessing human and organizational performance for use in regulatory applications

## • COMPONENTS

- Hybrid control rooms
- Root cause investigations
- Human performance
- Environmental qualification of digital I&C hardware
- Programming languages and CASE tools
- Adequacy of industry standards
- Guidelines for evaluation of the human-system interface
- Total system reliability and acceptability



# CONTROL INSTRUMENTATION AND HUMAN FACTORS

## **Major Deliverables**

- Complete development of a technical basis and guidance on hybrid control room 1997
- Complete technical basis report for advanced control rooms 1997
- Complete technical basis report for a performance based method to determine staffing levels for operating plants 1997
- Revise Reg. Guide 1.8 1997
- Reg. Guide 1.164, Time response criteria for safety-related operator actions 1997
- Complete revision to HPIP 1998
- In the area of Task Network Models
  - Complete first model on medical device 1997
  - Complete first model on reactor related human performance model 1997
- Issue Reg. Guide on EMI/RFI 1997
- Complete smoke testing program 1997
- Report effects of smoke on digital I&C 1998

## **International Collaborators**

- OECD Halden Reactor Project - Norway, Belgium, Denmark, Finland, France Germany Italy, Japan, Korea, Spain, Sweden, Switzerland, UK, Czech Republic, Hungary, Netherlands, Russia
- Technical Exchange & Cooperation on Human Factors - Switzerland (FOE)
- Technical Exchange & Cooperation on Human Factors - Spain (CSN)
- Exploring cooperative effort with ISPN on software quality - France

## **Key Contractors**

- Brookhaven National Laboratory
- Institutt for Energiteknikk (Halden)
- Army Research Laboratory (ARL)
- Pacific Northwest National Laboratory
- Oak Ridge National Laboratory
- Sandia National Laboratory
- National Institute of Science & Technology (NIST)
- Sohar, Inc
- Lawrence Livermore National Laboratory

# SEVERE ACCIDENTS PROGRAM

- GOALS

- Develop and maintain tools for analysis of severe accidents
- Expand experimental base through international collaboration to understand and quantify phenomena and potential challenges to reactor and containment integrity

- COMPONENTS

- Fuel-coolant interactions
- Hydrogen combustion
- Lower head integrity/debris coolability
- Source term
- Severe accident codes



# SEVERE ACCIDENTS PROGRAM

## Major Deliverables

- Complete FCI experiments on chemical augmentation of energetics 1998
- Complete high temperature hydrogen combustion experiments 1997
- Complete RASPLAV program 1999
- Complete lower head failure experiments 1998
- Provide pretest support and conduct tests FTP-2 and FTP-4 1998
- Complete updated code releases of MELCOR, SCDAP, and CONTAIN 1997
- Complete peer reviews of VICTORIA & FCI codes 1997
- Complete analyses and development in support of AP-600 review 1997
- Complete in-vessel cooling experiments 1998

## International Collaborators

- CSARP (Cooperative Severe Accident Research Program) - Belgium, Bulgaria, Canada, Czech Rep., Finland, France, Germany, Hungary, Italy, Japan, Korea, Lithuania, Netherlands, Slovak Rep. Spain, Sweden, Switzerland, Taiwan, UK
- PHEBUS Fission Product Program - France, European Union, Japan, Canada
- FARO Program - Belgium, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland, UK
- OECD RASPLAV Project - Russia, Belgium, Canada, Finland, France, Germany, Italy, Japan, Korea, Netherlands, Spain, Sweden, Switzerland, UK
- MELCOR Cooperative Assessment Program - Belgium, Canada, Czech Rep., Finland, France, Germany, Hungary, Italy, Japan, Korea, Netherlands, Spain
- SCDAP/RELAP5 Cooperative Assessment Program - Czech Rep., Finland, Germany, Hungary, Korea, Netherlands, Spain
- MACE - EPRI, Belgium, Canada, Finland, France, Germany, Hungary, Italy, Japan, Mexico, Netherlands, Spain, Sweden, Taiwan, UK
- Hydrogen Combustion - France, Germany, Japan, Russia
- In-Vessel Cooling Experiments - EPRI, France, Japan
- GASFLOW Code - Germany

## Key Contractors

- University of Wisconsin
- Argonne National Laboratory
- JRCISPA (ISPRA)
- Russian Research Center
- California Institute of Technology (Cal Tech)
- Sandia National Laboratory
- Penn State University
- Commissariat L'ENERGIE Atomique (CEA)
- Brookhaven National Laboratory
- Idaho National Engineering Laboratory
- Oak Ridge National Laboratory
- Los Alamos National Laboratory
- Energy Research Inc