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

FEBRUARY 7, 1997

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards on February 7, 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.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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438TH MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

+ + + + +

FRIDAY

FEBRUARY 7, 1997

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Advisory Committee met at the Nuclear
Regulatory Commission, Two White Flint North, Room T2B3,
11545 Rockville Pike, at 8:30 a.m., Robert L. Seale,
Chairman, presiding.

COMMITTEE MEMBERS:

ROBERT L. SEALE, Chairman

DANA A. POWERS, Vice Chairman

GEORGE E. APOSTOLAKIS

JOHN J. BARTON

IVAN CATTON

MARIO H. FONTANA

THOMAS S. KRESS

DON W. MILLER

WILLIAM J. SHACK

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1 ACRS STAFF PRESENT:

2 JOHN T. LARKINS, Executive Director
3 ROXANNE SUMMERS, Technical Secretary
4 SAM DURAISWAMY
5 CAROL A. HARRIS
6 RICHARD P. SAVIO
7 PAUL BOEHNERT
8 NOEL DUDLEY
9 MADHAT M. EL-ZEFTAWY
10 MICHAEL MARKLEY
11 AMARJIT SINGH

12 ALSO PRESENT:

13 TOM KING
14 GARY HOLAHAN
15 MARK CUNNINGHAM
16 WAYNE HODGES
17 GARETH PARRY
18 BOB JONES
19 JOE MURPHY
20 TONY PIETRANGELO
21 JOSE IBARRA
22 JACK ROSENTHAL
23 ERNIE ROSSI
24 BILL JONES
25 HAL ORNSTEIN

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A-G-E-N-D-A

	<u>Agenda Item</u>	<u>Page</u>
1		
2		
3	8) <u>Opening Remarks by the ACRS Chairman</u>	111
4	9) <u>Risk-Informed, Performance-Based Regulation and</u>	113
5	<u>Related Matters</u>	
6	9.2) Briefing by and discussions with	113
7	representatives of the NRC staff	
8	10) <u>AEOD Spent Fuel Pool Study</u>	204
9	10.1) Remarks by the Subcommittee Chairman	204
10	10.2) Briefing by and discussions with	205
11	representatives of the Office for	
12	Analysis and Evaluation of Operation Data	
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

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

(8:34 a.m.)

8) OPENING REMARKS BY THE ACRS CHAIRMAN

CHAIRMAN SEALE: Well, it looks like we're mostly here, and it's the witching hour. The meeting will come to order. This is the second day of the 438th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following: Risk-informed, performance-based regulation and related matters; results of the study performed by AEOD on the consequences of an extended loss of spent fuel pool cooling; and proposed ACRS reports.

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 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, and it is requested that speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can readily be heard.

Today we again have a series of interviews of potential candidates for Committee membership in the area

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1 of thermal hydraulics. You have a schedule along with
2 some resumés at your desk. And I'd ask you to be very
3 careful to not let one of those sessions get by you.

4 There's also another matter that I'd like to
5 bring to your attention. There's an announcement that I
6 should have made yesterday. It's on this yellow mustard,
7 I guess, or somewhere in that general spectral range page.
8 And it has to do with the appointment of Anthony J.
9 Galanti as Chief Information Officer.

10 You'll recall that in the recent restructuring
11 of the Commission, the position of Chief Information
12 Officer was established. And that officer will act, along
13 with the Executive Director for Operations and the Chief
14 Financial Officer, on the Executive Council for the
15 agency.

16 Mr. Galanti comes from the outside. He was
17 with Mobil's information systems and has done work in
18 exploration, producing, refining, and marketing on the
19 international arena.

20 Were there any other announcements or special
21 items that anyone would like to bring to anyone's
22 attention at this time?

23 (No response.)

24 CHAIRMAN SEALE: If not, we'll proceed with
25 the meeting. The first topic this morning is a

1 presentation from the staff on risk-informed,
2 performance-based regulation and related matters.

3 I understand that we've also had a request
4 from the NEI people to make a short statement at the end
5 of that time. I thought we had anyway. So we'll have
6 that as well.

7 We're scheduled to go until 10:30. Tom, are
8 you it?

9 MR. KING: The gang of four.

10 CHAIRMAN SEALE: The gang of four. Okay.

11 (Slide)

12 9) RISK-INFORMED, PERFORMANCE-BASED REGULATION AND

13 RELATED MATTERS

14 9.2) BRIEFING BY AND DISCUSSIONS WITH

15 REPRESENTATIVES OF THE NRC STAFF

16 MR. KING: My name is Tom King. I'm with the
17 Office of Research. And I think you know everybody at the
18 table: Gary Holahan and Bob Jones and Mark Cunningham.

19 What we wanted to do today, at the request of
20 the WRA Subcommittee, was give a short overview of where
21 we stand on developing the regulatory guides and standard
22 review plans for risk-informed regulation. And then we
23 had also gotten some specific issues that they wanted
24 addressed at the full Committee meeting today.

25 So the presentation is going to quickly

1 summarize the status, the activities that are going on,
2 the approach, and the changes that have been made in the
3 general reg guide and SRP since we last met and then
4 specifically address six questions that we got from the
5 Subcommittee back on January 28th.

6 (Slide)

7 MR. KING: By way of background and to refresh
8 everyone's memory, the Commission issued a policy
9 statement back in August of '95, encouraged the use of
10 risk information in all regulatory matters. And they felt
11 that by doing this, it would lead to better
12 decision-making, more effective use of NRC resources, and
13 could lead to burden reduction for licensees.

14 A number of activities are underway as a
15 result of that. And they're documented in what's called a
16 PRA implementation plan, which we update quarterly. One
17 of the major activities in that PRA implementation plan is
18 development of some reg guides and standard review plans
19 that are addressed toward providing guidance to licensees
20 and the staff and how you would make plant-specific
21 changes to a plant's current licensing basis.

22 Now, these are directed toward reactors only
23 at this point. And the idea is that by developing these
24 reg guides and SRPs would help encourage submittals from
25 licensees that utilize risk information and provide some

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1 consistency for the process by which one information has
2 to be in the submittals as well as how the staff reviews
3 those.

4 T. objectives of these reg guides and SRPs
5 are: to describe the overall approach, expectations, and
6 process of requesting changes to a CLB; to provide the
7 principles and some guidance on how we would do the
8 deterministic and probablistic analysis and integrated
9 decision making; to describe what we call a
10 performance-based implementation strategy, which we think
11 is important in this whole process; and to provide
12 guidance on what information does a licensee have to
13 submit in requesting these changes. We'll talk a little
14 bit more about each of these as we get into this.

15 This whole process because it's generated or
16 stems from a policy statement is voluntary on licensees.
17 Now, we would expect certainly that when the staff
18 receives applications for changes to a CLB if they utilize
19 risk information, they will get higher priority in ones
20 that come in and don't utilize risk information. But
21 clearly if it's a safety issue, it's going to get high
22 priority anyway, whether they use risk or not. But things
23 for burden reduction, we will give higher priority to
24 those that utilize risk information.

25 (Slide)

1 MR. KING: Just to remind everyone what the
2 scope of these reg guides and SRPs that we're currently
3 working on includes, we've got what we call some general
4 guidance, which is right now contained in a Draft Guide
5 1061 and a related companion SRP. And then we've got
6 application-specific regulatory guides and some SRPs to
7 cover specific areas that are underway.

8 And we have some pilot applications in from
9 licensees in these areas. And those are: in-service
10 testing, technical specifications, graded QA, and
11 in-service inspection.

12 The in-service inspection part is on a later
13 schedule than the others. And we won't be talking today
14 or over the next couple of months on in-service
15 inspection, but we will be covering the other areas.

16 We also developed a draft NUREG-1602. It
17 provides information on the scope and quality of PRA
18 analysis. Now, it's not a guideline. It's not a
19 standard. And it's not a requirement, but it's more an
20 example of: When we talk about a quality PRA, what do we
21 mean?

22 MEMBER APOSTOLAKIS: Tom, we haven't really
23 discussed in detail the applications, have we? I mean,
24 these are ongoing now. You're --

25 MR. KING: Are you talking about the

1 application-specific reg guides?

2 MEMBER APOSTOLAKIS: Yes.

3 MR. KING: No. No, we haven't. But,
4 remember, we have a subcommittee meeting scheduled the
5 20th and 21st.

6 MEMBER APOSTOLAKIS: So we will do it then?

7 MR. KING: Yes.

8 MEMBER APOSTOLAKIS: And you will tell us
9 what's going on and what information you're asking from
10 the licensees, what they are submitting, I mean, not just
11 a description of them.

12 MR. KING: No. You would like to get into the
13 pilot programs I understand.

14 MEMBER APOSTOLAKIS: Yes, in detail. Okay.

15 MR. KING: Yes.

16 MEMBER APOSTOLAKIS: Sure.

17 (Slide)

18 MR. KING: We developed various drafts of all
19 of these guides and SRPs starting back around September.
20 The Committee has received copies of earlier drafts. We
21 in the December-January time frame had spent some more
22 time doing internal management review. We've now received
23 a staff requirements memorandum from the Commission on
24 four policy issues that we had sent up previously.

25 And, as a result, back in mid January we sent

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1 to the Committee an updated reg guide and SRP on the
2 general framework. We expect today to provide updated
3 drafts on the application-specific reg guides and SRPs
4 except for in-service inspection, which will come at a
5 later date.

6 As I mentioned, we had a meeting with the
7 subcommittee on January 28th on the general. And we have
8 a meeting scheduled on February 20th-21st with the
9 subcommittee on the application-specific activities except
10 for ISI. As I had mentioned, we had gotten an SRM from
11 the Commission. We'll talk about that in a little more
12 detail later.

13 The purpose of today's presentation is to
14 update you on the changes that have been made on the
15 general reg guide and SRP. I'll briefly summarize the
16 approach that's being taken to respond to specific
17 questions raised at the subcommittee meeting and solicit
18 feedback from members.

19 We're not asking for a letter at this point in
20 time, but we are going to ask for a letter after the March
21 full Committee meeting.

22 (Slide)

23 MR. KING: The schedule we're on now is to
24 provide a package to the Commission by the end of March,
25 which means we do need something after the March full

1 Committee meeting, the Committee's views in a letter
2 addressing the general reg guide and the
3 application-specific ones except for ISI.

4 (Slide)

5 MR. KING: I had mentioned we had gotten some
6 feedback from the Commission in the form of a staff
7 requirements memorandum on January 22nd. It gave feedback
8 on four policy issues that we had sent up back in October,
9 I believe. Those four policy issues were:
10 performance-based regulation, use of safety goals for
11 plant-specific application; risk-neutral versus risk
12 increase; and how to deal with, a recommended way to deal
13 with, changes in the ISI under the current regulations.

14 In general the guidance we got back from the
15 Commission did not change the direction that we had been
16 heading in putting the drafts together. The guidance did
17 not result in any major changes to what we had been doing,
18 did ask for some additional things to be done and
19 additional information to be provided to the Commission.

20 Just quickly, on performance-based regulation,
21 we had recommended to the Commission that we use
22 performance-based approaches wherever possible in
23 implementing these risk-informed changes.

24 The Commission endorsed that. They also asked
25 for a more comprehensive plan that would take a look at

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1 implementing performance-based initiatives outside this
2 risk-informed area. So the staff was asked to put
3 together a separate plan I believe by August of '97 for
4 that.

5 The Commission also asked for a summary of how
6 performance monitoring is being addressed in the pilot
7 programs. And we owe them a separate response on that.

8 Use of safety goals for plant-specific
9 application. We recommended that be done. The Commission
10 tentatively approved using the safety goals in that
11 fashion but also requested OGC, the legal arm of the
12 agency, to put together a legal analysis on the use of
13 numerical guidelines in plant-specific decisions,
14 addressing things like the potential for litigation and
15 what if the PRA changes later on. Do you have to come
16 back and change your decisions that you made previously?
17 So they are on the hook to put together an analysis and
18 provide it to the Commission.

19 Risk-neutral versus risk increase. What we
20 recommended was that in this process, changes to a CLB
21 should be allowed to result in small increases in risk
22 under certain conditions. The Commission endorsed that
23 and said: Please tell us what "small" means and what
24 "under certain conditions" means. I think the reg guide,
25 the draft reg guide, and SRP do that. And we'll talk

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1 about that.

2 And then, finally, the last one was more of a
3 process issue, not a technical issue. But the Commission
4 endorsed the staff's recommendation that the current rules
5 allow implementation of ISI changes under what they call
6 an acceptable alternatives provision. So no rulemaking is
7 needed.

8 (Slide)

9 MR. KING: The major changes that we made in
10 the general reg guide and SRP since the version that you
11 had seen back in November were that: first, we have added
12 some emphasis on what we call the overall expectation of
13 improved safety.

14 There was a concern that the earlier drafts
15 were worded -- someone described them as a road map for
16 how to increase risk. And, clearly, as a safety agency,
17 we didn't want to send that message.

18 We think that by using risk insights in the
19 long term, it is going to result in safety and that when
20 licensees are putting together their applications, they
21 ought to be looking at the total picture, both where risk
22 tells them they ought to improve safety and where risk
23 tells them there's unnecessary burden as well as look at
24 the cumulative impact in changes. So we put that
25 emphasis, more of that emphasis, in the regulatory guide.

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1 And you'll see that right up front in the package.

2 We have now used the safety goal subsidiary
3 objectives to define what we call insignificant risk. And
4 we have used those in the description of what changes in
5 risk are allowed to define what the Commission asked for
6 in terms of the word "small."

7 Basically what we have done is we have removed
8 the figures that were in the reg guide that had core
9 damage frequency and LERF versus delta CDF and LERF. And
10 we have defined basically three regions in risk space
11 where reviewing changes to a CLB would either be
12 acceptable or unacceptable and require certain levels of
13 review.

14 Basically we have said is if a plant's
15 baseline core damage frequency is greater than 10^{-4} or its
16 large early release frequency is greater than 10^{-5} , we
17 would expect changes to CLBs would be in a direction to
18 decrease risk.

19 We have also said that if changes are very
20 small and the plant's core damage frequency is less than
21 10^{-5} or its large early release frequency is less than 10^{-6} ,
22 changes in CDF, small changes in CDF, or LERF down in that
23 region would likely be acceptable and probably in some
24 cases would not require the rigorous sensitivity analysis,
25 uncertainty analysis, and so forth that may be necessary

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1 to get closer to the benchmark values.

2 Then there's the middle in the region. The
3 region is about a factor of ten below the benchmark CDF
4 and LERF values. And the regulatory guide says we're
5 going to look very closely at plants that are in this
6 region and are requesting changes that increase calculated
7 risk.

8 That may require some additional analysis on
9 the licensees' part and will certainly trigger some
10 additional review on the staff's part, including
11 additional management review. And there are a number of
12 factors in the reg guide that are examples of the kinds of
13 things we would be looking at.

14 We have expanded the discussion on
15 uncertainties. And we're updating the appendices to the
16 general reg guide and SRP, which will be in the package
17 that you'll get today.

18 MEMBER APOSTOLAKIS: I have a comment. Your
19 second bullet seems to use the word "insignificant" and
20 "small risk" interchangeably. I would not do that. I
21 think insignificant is different from small.
22 Insignificant is something that I don't care about. Small
23 is something that's higher than insignificant but I
24 declare it as small.

25 I don't think it would be a good idea to use

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1 the words the way they are used there, that we have
2 defined what is insignificant and anything below that is
3 small.

4 It's just semantics, but sometimes these
5 things make a difference.

6 MR. KING: All right. We'll take a look at
7 that.

8 (Slide)

9 MR. KING: Just quickly, the overall approach
10 in the reg guide and SRP, you'll recall the November
11 version had a four-step process. The current version
12 still has a four-step process. The four steps are:
13 define the change, do the engineering analysis, define
14 your implementation and monitoring strategy, and then
15 submit the documentation that's requested.

16 Basically under the engineering analysis, we
17 have five what we call fundamental safety principles.
18 Those are: must meet the regulations or propose a change
19 or an exemption, must maintain defense-in-depth, maintain
20 sufficient safety margin, have no significant increases in
21 risk to public health and safety, and implement the change
22 utilized performance-based monitoring and feedback
23 strategies wherever possible.

24 The reg guide expands on each of those as to
25 what is meant and provides some subelements and some

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1 examples of what we mean in each of those principles.
2 Now, we're going to come back a little later and talk more
3 in detail about the defense-in-depth and sufficient safety
4 margin.

5 It also has what we call expectations on
6 implementation. Those are sort of subelements under the
7 principles. And they basically emphasize the factors of:
8 We expect the licensee to assess all safety impacts in
9 looking at the proposed change. We expect the scope of
10 the analysis supporting the change would cover all
11 systems; structures; components; operating modes;
12 initiators affected by the change; and should reflect the
13 as-built, as-operated plant.

14 (Slide)

15 MR. KING: We've defined what we call some
16 benchmark risk levels for decision-making. There are two
17 of them: one for core damage frequency of 10^{-4} per reactor
18 year. That's the value endorsed back by the Commission in
19 1990 as a benchmark for accident prevention. And then
20 we've defined for large early release frequency a 10^{-5} per
21 reactor year, which is consistent with the quantitative
22 health objectives. And it's also consistent with the 10^{-4}
23 and the Commission's endorsed value of .1 conditional
24 containment failure probability.

25 We have said that proposed changes to the CLB

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1 should be made in small increments. And we have defined
2 what those are, which are basically less than ten percent
3 of the benchmark CDF and LERF values.

4 And, as I mentioned, when you get close to the
5 benchmark CDF and LERF values, there will be additional
6 management review. And we think between the benchmark
7 values and limiting the CLB changes to small increments,
8 that those two things together ensure no significant
9 increases in risk. And I think we'll revisit the words to
10 make that clear.

11 We expect a licensee to perform uncertainty
12 and sensitivity analysis appropriate for the proposed
13 change. Now, we've left a lot of flexibility in the reg
14 guide and SRP for the licensee to decide the extent of
15 that analysis that needs to be done, but the general
16 thought is the closer you get to the benchmark values, the
17 more rigor we would expect in that area.

18 We have put the expectation in that we expect
19 quality analysis and talked about some ways to achieve
20 that. Clearly, whatever they do we expect would be
21 available for public review. Then there's the performance
22 monitoring and the documentation that's part of the
23 overall approach.

24 At the end of the January 28th subcommittee
25 meeting, we jotted down six items that the subcommittee

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1 wanted to talk in more detail about today. And those are
2 listed on this page.

3 What I've got, the remaining part of the
4 presentation, is a page on each of those.

5 (Slide)

6 MR. KING: So starting with defense-in-depth
7 on Page 10, we have an overall defense-in-depth principle
8 that says maintain defense-in-depth. Now, the reg guide
9 also has six subelements that try and explain what that
10 means. Those six subelements are listed here on Page 10.

11 The question that came up in the subcommittee
12 meeting was: What's the role of PRA in evaluating these
13 six subelements? And there was a concern that, as stated,
14 these basically said: Let's do the traditional
15 application of defense-in-depth. And we can't change from
16 that, even though we have a PRA in our hands.

17 George proposed some words to try and clarify
18 that. And I think that we have agreed that's a good idea
19 to try and clarify that because we do believe PRA has a
20 role to play in how you look at these various subelements.

21 (Slide)

22 MR. KING: So we're going to propose some
23 clarification that goes into the reg guide in this area.
24 And basically that clarification is shown in two bullets
25 on Page 11.

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1 MEMBER APOSTOLAKIS: I agree on Page 11, you
2 are really beginning to talk about guidelines. On 10, is
3 there another word to substitute for "guidelines"? I
4 mean, these are not really principles, are they?

5 MR. KING: No.

6 MEMBER APOSTOLAKIS: But this is the idea of
7 defense-in-depth.

8 MR. KING: The principle is maintain
9 defense-in-depth.

10 MEMBER APOSTOLAKIS: Okay.

11 MR. KING: How do you do that?

12 MEMBER APOSTOLAKIS: Yes.

13 MR. KING: These are some ideas as to: What
14 do you look at when you're trying to meet that principle?

15 MEMBER APOSTOLAKIS: I think the guidelines
16 really are what you're going to talk about in a moment.
17 When you're here -- I mean, for example, it would be
18 desirable to maintain defenses against human errors. I
19 mean, that's really the spirit of this, isn't it?

20 I mean, it's semantics again, but I think
21 these are things that are important. For me guidelines
22 means you're telling people how to do things. And this is
23 more like --

24 MEMBER CATTON: Definition.

25 MEMBER APOSTOLAKIS: -- definition or --

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1 CHAIRMAN SEALE: To the elements of defense.

2 MEMBER APOSTOLAKIS: To the elements of
3 defense-in-depth. I don't want to call them "principles,"
4 but, I mean, it's --

5 CHAIRMAN SEALE: "Elements" is good, "elements
6 of defense-in-depth."

7 MEMBER APOSTOLAKIS: Do you want to call it
8 that?

9 MR. KING: Okay. I have no problem with the
10 word "elements."

11 MR. HOLAHAN: I think it's guidance in the
12 sense that these are things that we expect licensees to
13 think about and inform us.

14 MEMBER APOSTOLAKIS: Right, right.

15 CHAIRMAN SEALE: Yes, right.

16 MR. KING: Things we would expect them to
17 address in their submittal.

18 MEMBER APOSTOLAKIS: But they are not absolute
19 criteria.

20 MR. KING: No.

21 MEMBER APOSTOLAKIS: I mean, there may be some
22 degradation of the independence of barriers, but you
23 should evaluate that in the context of a proposal change;
24 right?

25 MR. KING: Yes.

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1 MEMBER APOSTOLAKIS: So it would be desirable
2 to maintain that, but you are not absolute. We are not
3 saying, "Gee, you degraded it. That's it." I think
4 that's the spirit of this.

5 MR. KING: Yes.

6 MEMBER CATTON: Maybe it's characteristics.

7 MEMBER APOSTOLAKIS: Yes, elements,
8 characteristics, or some other thing.

9 MR. KING: Yes. But I think these are the
10 kinds of things we would expect a licensee to come in and
11 address in the submittal, --

12 MEMBER APOSTOLAKIS: Exactly, yes.

13 MR. KING: -- "What do I do in each of these
14 areas."

15 MEMBER APOSTOLAKIS: So we need another word,
16 I think.

17 MR. KING: What we're proposing to add to the
18 reg guide are some words that basically accomplish the
19 following. I call it guidelines for application of the
20 defense-in-depth principle. But whatever we call it,
21 we're basically going to say where you have items that are
22 not addressed by the PRA, for whatever reason, or you have
23 high uncertainty coming out of your PRA, we would expect
24 basically the traditional engineering judgment is used in
25 applying defense-in-depth.

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1 For areas where you do have a good risk
2 analysis, we would expect people to look at what that risk
3 analysis says and help guide the application of
4 defense-in-depth and to use as a basis for demonstrating
5 that those six elements are met or the change that's being
6 proposed on any of those elements is appropriate.

7 Again, you haven't seen the exact paragraph,
8 but that's basically the context of what we're trying to
9 say.

10 MEMBER APOSTOLAKIS: In other words, what
11 you're saying in the second bullet is the PRA quantifies
12 certain things. So I have a contributor that has a
13 certain frequency distribution.

14 What defense-in-depth is telling me is that
15 it's not just the frequency and the distribution itself.
16 I want to look into it and try to understand where these
17 elements are coming from. That's really what it's saying.

18 MR. HOLAHAN: Yes.

19 MR. KING: Yes. For example, you have an
20 outlier in risk. You may say, "What's going on here? Do
21 I have defense-in-depth the way I really thought I had
22 it?"

23 MEMBER APOSTOLAKIS: Now, some of it is
24 already built into the distribution because if you don't
25 have defense-in-depth in the sense of redundancy and all

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1 of that and diversity, then the numbers presumably will be
2 high.

3 So some of it is already in the numbers, but
4 we go beyond that. And I think that's reasonable. That's
5 reasonable.

6 (Slide)

7 MR. KING: The second issue had to do with
8 safety margins. And the principle basically says maintain
9 sufficient safety margins. And there was a question as
10 to: How do you judge what's sufficient?

11 The two guidelines or elements that we have in
12 the reg guide under that principle are shown here on this
13 slide as the first two bullets that you meet codes and
14 standards that are approved for use. And if you've got
15 certain safety analysis acceptance criteria, a lot of that
16 is deterministic criteria, like Part 100 dose guidelines
17 and so forth, that still have to be set as part of the
18 change.

19 Now, we are not proposing any additional words
20 into the regulatory guide or SRP in this particular area.
21 We felt that between the existing deterministic criteria
22 and between having a risk assessment, that you really can
23 take a look at your safety margins and what's changed from
24 the original versus the proposed change and make a
25 judgment on whether it's still adequate.

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1 Clearly if you're still meeting the
2 deterministic requirements, it should still be adequate,
3 even though maybe your Part 100 dose calculation is a
4 little higher than it used to be. As long as it's still
5 meeting the Part 100 criteria, it should still be
6 adequate.

7 So we're not proposing any change to what's in
8 there at this point.

9 MEMBER APOSTOLAKIS: I guess I'm a bit
10 confused about this. Proposed provisions provide
11 sufficient margin to account for analysis and data
12 uncertainty. Now, that analysis is a PRA analysis or
13 could be a PRA analysis?

14 MR. KING: Could be, could be.

15 MR. HOLAHAN: In the deterministic side,
16 there's usually a conservative methodology that's used.

17 MEMBER APOSTOLAKIS: But if you have
18 sufficient margin, perhaps you will not have analysis
19 uncertainty. I mean, that's what I'm trying to
20 understand. I mean, if you have sufficient margin, then
21 the probabilities you are going to get will show that,
22 will reflect that, won't they? And then you will say,
23 "Now, go back and make sure that" --

24 MR. BOB JONES: Let me try where this comes
25 from.

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1 MEMBER APOSTOLAKIS: Okay. Okay.

2 MR. BOB JONES: In the regulatory standards,
3 for example, in GDC for fuel design, which are at a
4 general level, a licensee has in its licensing basis today
5 a defined safety standard. It's a DNB limit of whatever
6 from some method, 2,200 degrees, certain calculations,
7 whatever it is.

8 If they propose to change what the staff has
9 already accepted as an acceptable criteria and change that
10 margin, then at that point they need to come in with the
11 supporting analysis and data and why that still meets the
12 appropriate regulatory standard. And when they do that,
13 they need to look at the data uncertainty and any analysis
14 uncertainty that may be associated with it.

15 So what we're saying is the standards that are
16 currently out there that are acceptable to us can be
17 changed. But the burden when you do that is you have to
18 still demonstrate that you're meeting the underlying
19 regulatory requirement and that you're accounting for data
20 analysis uncertainties and the impacts of those safety
21 margins.

22 So it's part of the principle of maintaining
23 consistency with regulations and also where if a
24 regulation hasn't gotten that specific you would have to
25 come in with appropriate analysis to support it.

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1 Let's go look at this in the area, for
2 example, of if you wanted to have different repair
3 criteria for a steam generator you want to change the
4 repair criteria, you want to meet certain structural
5 margins. You have to demonstrate with appropriate data
6 how you detect it, why it's good enough, how it meets the
7 underlying safety margins to ensure tube integrity.

8 MEMBER CATTON: What if you find there's no
9 underlying regulatory requirement? In other words, you
10 have a regulation. But you try to do this, and you find,
11 gee, there's really no basis. Does that mean you can
12 ignore it? What do you do?

13 MR. KING: I don't think you ignore it. You
14 can --

15 MEMBER CATTON: I can give you some examples
16 in the fire arena where this is the case. But what do you
17 do?

18 MEMBER APOSTOLAKIS: Can you give one?

19 MEMBER CATTON: The golden rules and magic
20 numbers. It's in the papers. There's whole series of
21 them: Height of things, where you put this, that, and the
22 other.

23 MEMBER APOSTOLAKIS: Do they all know what
24 that is?

25 MEMBER CATTON: I don't know. Do you know the

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1 paper golden rules and magic numbers? I can get it for
2 you?

3 MEMBER APOSTOLAKIS: Well, let me again tell
4 you what I don't understand.

5 MR. HOLAHAN: Can I go back and change
6 something from one of the previous answers?

7 MEMBER APOSTOLAKIS: Yes.

8 MR. HOLAHAN: I think if you read this bullet
9 carefully and see it in the context of the document, I
10 don't think it really, not normally -- it doesn't normally
11 apply to the PRA analysis.

12 I think it's really for -- because it's
13 related to FSAR and licensing basis, I think it's the
14 engineering and licensing basis analyses currently on the
15 plant, which might have a little piece of PRA in it
16 somewhere. But generally this is for the traditional
17 engineering analysis.

18 MEMBER APOSTOLAKIS: Now, what if I do a PRA
19 and in a certain situation I have a given margin and now I
20 reduce it? Okay?

21 MR. HOLAHAN: I think these words don't apply
22 very well to a PRA.

23 MEMBER APOSTOLAKIS: They don't.

24 MR. HOLAHAN: In a PRA you're doing best
25 estimate analysis and assessing them, the uncertainties

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1 and margins. You're not putting them in there.

2 MEMBER APOSTOLAKIS: Right. But I may do
3 something that presumably reduces the margin. And then I
4 argue probablistically that that is reasonable. So the
5 criterion there will be: Is delta CDF within the range
6 that Tom showed us and this and this and that or, in
7 addition to that, somebody might say, "Gee, but I really
8 don't like the fact that you're reducing the margin"?

9 It's really the same conceptual problem that I
10 had with defense-in-depth. You have to have some guidance
11 how you implement these principles.

12 MR. HOLAHAN: In some sense, I don't think you
13 need this principle for the PRA analysis because the
14 margins and the uncertainties are taken care of.

15 MEMBER APOSTOLAKIS: Yes.

16 MR. HOLAHAN: It's only in the engineering
17 analysis that you want some assurance that the pipe
18 doesn't break or the pump really starts.

19 MEMBER APOSTOLAKIS: So the last line, then,
20 perhaps doesn't belong there?

21 MR. HOLAHAN: Or it doesn't apply to PRA
22 analysis. It applies very much to engineering
23 calculations.

24 MEMBER APOSTOLAKIS: Yes, yes. So that will
25 be clear in the text.

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1 MR. KING: But in theory let's use the Part
2 100 dose guideline as an example. You have a 25-rem whole
3 body limit now. A plant, say, currently has a 20-rem
4 calculation and they want to do something. It will raise
5 that to 25. It clearly would meet the current
6 regulations, but you may want to look at that from a risk
7 perspective and see: From a risk standpoint, what does
8 that change do?

9 So I guess I think the safety margin is
10 involved in looking at the PRA as well as looking at the
11 deterministic stuff. I guess I tend to agree these words
12 don't meld the two together very well.

13 MEMBER APOSTOLAKIS: But if I look at the PRA,
14 then I will apply the earlier criteria.

15 MR. HOLAHAN: Right, right. We have another
16 principle that I think captures our guidelines for PRA.
17 That's why I don't think it needs to be captured here.

18 MEMBER APOSTOLAKIS: Okay.

19 MR. HOLAHAN: Also I think safety margins I
20 think tend to go to individual component design more than
21 it does to overall plant risk. So what I see as the
22 bigger picture questions of "Are the risk changes small
23 enough and acceptable?" I think are covered by the PRA
24 guidelines that we just talked about.

25 And this tends to make sure that, even though

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1 the risk numbers are low, you didn't design a pipe that's
2 likely to fail and then prove to yourself that, well,
3 failure of the pipe is okay because the mitigation systems
4 are very reliable. So it's that good engineering margins
5 should be in all engineered systems.

6 MEMBER APOSTOLAKIS: Isn't that against some
7 formal defense-in-depth?

8 MR. HOLAHAN: Yes, it is. Sure.

9 MEMBER CATTON: It's the safety factors you
10 put into the system. You could substitute. For "safety
11 margin," you could put "safety factor." In the definition
12 that he's giving us, he could.

13 When you start talking about safety margin, I
14 think it implies something that you don't know. It's very
15 difficult to determine what your real safety margin is.
16 But you know the safety factor that you plan to have into
17 a particular piece of equipment.

18 MEMBER APOSTOLAKIS: Would it be too radical
19 to combine safety margins with defense-in-depth and say
20 there is one thing that we really want to spread the
21 contributions to risk?

22 MR. HOLAHAN: Yes, I think that would be too
23 radical.

24 MEMBER APOSTOLAKIS: Why is that?

25 MR. HOLAHAN: Well, I think the concepts --

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1 maybe they could be combined, but it seems to me that it's
2 clearer in this sense because safety margins are something
3 built into most engineering analyses. And you can define,
4 whether it's safety factors or margin to burst or
5 something like that.

6 Defense-in-depth is not a numerical value.
7 You don't calculate, you know, this system has two and a
8 half layers of defense-in-depth. It's more of a
9 philosophical view of seeing that the design looks like it
10 has appropriate levels of prevention and mitigation,
11 rather than a numerical analysis.

12 MEMBER APOSTOLAKIS: So there is, then, less
13 need for this principle because something that's
14 quantifiable would be a part of the PRA?

15 CHAIRMAN SEALE: May I offer --

16 MR. HOLAHAN: But I think it's normally not
17 part of the PRA. The PRA doesn't get to the level of
18 engineering detail that's covered here, I think.

19 MEMBER APOSTOLAKIS: Unless we involve this
20 other principle on Page 8, "Perform uncertainty and
21 sensitivity analysis appropriate for the proposed change."
22 If it's appropriate, they may have to go down there to do
23 the details.

24 See, PRA is not just a systems approach. You
25 go as far down as you need to to support your position.

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1 CHAIRMAN SEALE: Well, isn't it true that when
2 you're talking about the current licensing basis, you're
3 generally talking about a bounding condition and a margin
4 of safety that is inherently defined by the conservatisms
5 that are built into that bounding condition?

6 What happens when you go to a basis which
7 includes a best estimate assessment of system performance
8 with allowances or with considerations given to
9 uncertainties and a margin, then, that comes out of that,
10 out of your understanding of how good the best estimate
11 is?

12 Now, when you've done that, you've put the
13 performance estimate on the table. You've gone from a
14 bounding to a best estimate evaluation of system
15 performance. And that frees up, at least intellectually,
16 what the margin should be because now your margin is with
17 respect to a different point. It's the best estimate now,
18 not the bounding analysis.

19 What this says is that when you make that
20 transition, you've still got to do the margin assessment,
21 but it's with respect to the uncertainties that are
22 inherent now in this best estimate methodology you're
23 using, rather than in the old bounding methodologies.

24 MEMBER APOSTOLAKIS: This is all within the
25 deterministic framework, isn't it?

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1 MEMBER CATTON: No.

2 CHAIRMAN SEALE: Well, it's not limited to
3 that.

4 MEMBER CATTON: You do the best estimate. You
5 have to roll it in uncertainty, and it becomes risk. It
6 becomes a PRA-type. It doesn't have to be risk, but --

7 MEMBER APOSTOLAKIS: No. Probabilistic, I
8 mean, but --

9 CHAIRMAN SEALE: It's a best estimate.
10 Actually.

11 MEMBER CATTON: -- the uncertainty associated
12 with a particular device doing what it's supposed to.
13 It's not a fixed point.

14 CHAIRMAN SEALE: It's negotiable. And this is
15 the basis for the negotiation.

16 MEMBER APOSTOLAKIS: Yes. I mean, I don't
17 understand in a PRA context what's a best estimate. There
18 isn't such a thing. You've got a whole distribution. I
19 mean, you can determine a mean value or a this and that,
20 but the best estimate is --

21 MEMBER CATTON: Then it's a mix.

22 MEMBER APOSTOLAKIS: It's a traditional --

23 MEMBER CATTON: The heat transfer coefficient
24 is ten plus or minus.

25 MEMBER APOSTOLAKIS: In the seismic analysis,

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1 isn't there such a thing as a margins approach that --

2 MR. HOLAHAN: Yes, yes.

3 MEMBER APOSTOLAKIS: -- has probabilities of
4 the HCLPF and all that?

5 MR. HOLAHAN: Yes.

6 MEMBER APOSTOLAKIS: So that's all
7 probablistic there.

8 MR. HOLAHAN: Well, that's true. And I think
9 the way the reg guide is structured, in addition to saying
10 that there's this principle related to safety margins, it
11 suggests that you can address it either through a
12 traditional engineering analysis or through PRA insights.
13 And I think the seismic margins analysis is a way of
14 showing margin through a probablistic approach.

15 I have to say but in most cases I expect
16 safety margins will probably be shown through engineering
17 analysis than probablistically. But I think the reg guide
18 leaves that open for the licensee to develop an argument
19 one way or the other.

20 MEMBER APOSTOLAKIS: All right.

21 MR. HOLAHAN: What we have now, for example,
22 is this 3 times margin to burst and 1.4 times margin to
23 burst under steam line break conditions. And so those are
24 these kind of traditional engineering safety margins.

25 But conceptually in the steam generator world,

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1 we're also trying to show margins of safety with respect
2 to core damage, large early release, and things like that.

3 MEMBER SHACK: But then you go back to
4 probability of burst. You can evaluate it that way also,
5 probablistic alternative.

6 MR. HOLAHAN: Yes, yes. In effect, I think
7 the voltage-based criteria are that sort of thing. Yes.

8 MR. KING: Move on?

9 CHAIRMAN SEALE: The Chairman is out, but
10 that's all right.

11 MEMBER CATTON: You're the Chairman.

12 (Slide)

13 MR. KING: The third issue we call
14 plant-specific LERF. And, as I remember, this sort of had
15 a couple of sub-elements. One was we're proposing on
16 value for the large early release frequency that would be
17 universally applied and would be a constant.

18 There was a question as to: Why not let that
19 be different either based upon site characteristics of a
20 plant or maybe be different by plant type: BWRs versus
21 PWRs, for example?

22 We're not proposing a change in what was in
23 the regulatory guide, which, as I said, was a single
24 value. We recommended 10^{-5} per reactor year along with the
25 region of increased management attention when you're close

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1 to that.

2 We feel that that is a reasonable number.
3 It's based upon providing reasonable that the safety goal
4 QHOs are met without being de facto new goal.

5 We think it's consistent with work we did
6 several years ago when we looked at what was called the
7 10^{-6} large release guideline that the Commission asked us
8 to investigate and we found out if it was applied would
9 essentially be a de facto new goal because it was much
10 more conservative than the QHOs.

11 We also think it's consistent with the 10^{-4} CDF
12 and the .1 conditional containment failure probability
13 safety goal subsidiary objectives that the Commission
14 endorsed back in 1990.

15 We also think that sticking with a single
16 value has some other advantages that allows licensees to
17 just use Level 1 and Level 2 PRA only. It avoids the
18 uncertainty associated with Level 3 analysis which right
19 now the only method we have or the only uncertainty we
20 look at in Level 3 is the uncertainty associated with wind
21 rose, but we know there are a lot of other uncertainties
22 in Level 3 analysis.

23 We think it's consistent with decoupling
24 siting from plant design, which the Commission told us to
25 do about five or six years ago.

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1 VICE CHAIRMAN POWERS: Are you saying that you
2 think the uncertainty in Level 3 is overwhelming in
3 comparison to 1 and 2?

4 MR. KING: No, I'm not saying it's
5 overwhelming. I'm saying we don't know what it is. I'm
6 not sure how we would deal with it.

7 VICE CHAIRMAN POWERS: You haven't adequately
8 quantified it?

9 MR. KING: Right. And we think providing
10 simple uniform, consistent guidelines to all plants is
11 reasonable. We think that the 10^{-5} does provide some
12 flexibility for BWRs versus PWRs, for example, to adjust
13 core damage frequency versus containment performance in
14 meeting that.

15 So we don't really see a need to have more
16 than one single value. Therefore, we're not recommending
17 anything different than what's been in there all along.

18 MEMBER KRESS: Tom, what is your basis for
19 that first sub-bullet that provides reasonable assurance
20 that the safety goal QHOs are met?

21 MR. KING: We've gone back and looked at
22 NUREG-1150 and LaSalle PRA and looked at: If you want to
23 meet the QHOs, what kind of LERF do you need based upon
24 the early containment failure numbers that were in those
25 PRAs and based upon the Level 3 PRA information that was

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1 in there, similar to what Rick Sherry presented? -- I
2 think it was at the subcommittee meeting -- and then
3 looked at the fact that most of that analysis was looking
4 at full power only and putting some margin in to account
5 for low power and shutdown, external events and so forth.

6 We think 10^{-5} is a reasonable number that would
7 assure you meet the early fatality QHO, which is the
8 controlling one.

9 MEMBER KRESS: I agree that that's the
10 controlling one. How can you assure yourself that such a
11 value encompasses all of the sites? This will be
12 site-dependent.

13 MR. KING: It will be site-dependent. The
14 plants that NUREG-1150 and LaSalle looked at covered all
15 the containment types, and they covered high population
16 and low population sites. And I guess one of the
17 assumptions at this point is that that's a reasonable set
18 of --

19 MEMBER KRESS: Reasonable plant --

20 MR. KING: -- plants to look at.

21 MEMBER KRESS: Reasonable bounding set for all
22 the sites.

23 MR. KING: Yes, and then the containment
24 types. Now, we don't have Level 3 information from the
25 IPEs. A few submitted it but not many. So we don't

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1 really have a big database to go back to beyond that and
2 look at.

3 MEMBER APOSTOLAKIS: Could someone derive
4 another LERF guideline for their plant based on where they
5 are or is that --

6 MR. KING: Based upon their site and their --

7 MEMBER APOSTOLAKIS: Yes. Let's say 5 times
8 10^{-5} .

9 MR. HOLAHAN: I think if you think of it in
10 the context of a reg guide, what we're saying is this is
11 the purpose of a reg guide is to define a set of analyses
12 and guidance that the staff would find acceptable, which
13 says not that if a licensee proposed something different
14 it would necessarily be rejected.

15 But the licensees ought to understand if they
16 send in something in conformance with these guidelines,
17 they ought to expect it to be approved. So it's sort of a
18 one-sided test.

19 What we're saying is this 10^{-5} appears to be
20 sort of a conservative bound of at least the range of
21 plants that we've looked at. So we would accept it. If a
22 licensee wants us to accept something different, I think
23 there's a lot of additional burden of proof for them to
24 justify why this makes sense for their circumstances.

25 MR. KING: There's nothing in the reg guide

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1 that says they can't make that proposal. They could come
2 in and propose it, but --

3 MEMBER APOSTOLAKIS: I thought we were
4 treating the CDF subsidiary goal and the LERF subsidiary
5 goal differently in the sense that in the CDF case, you
6 really can't do what you just said. I mean, they cannot
7 come and argue that the CDF could be 5 times 10^{-4} because
8 at least this Committee has recommended that we elevate
9 that to the same level as the QHOs.

10 However, LERF appears to be more flexible. So
11 one could derive the site-specific goal for LERF. Now,
12 again, you don't want it to be --

13 MR. HOLAHAN: In the legal context of granting
14 license amendments, neither the QHOs nor any of these
15 guidance documents are actually in the regulations. Okay?

16 So I think even though we put a higher
17 importance on a QHO and a Commission safety goal and a
18 formal adoption of that, in the legal licensing process,
19 that really doesn't have any stricter role than any of the
20 other guidance documents.

21 So in a legal sense, the CDF and the LERF
22 guidance values really play the same role. They are
23 indications of what the staff would find acceptable. And
24 in theory, a licensee could come in with a proposed CDF,
25 baseline or change, that's different from what we

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1 suggested here.

2 But I think anyone who reads the record and
3 sees how serious the staff and the ACRS and others are
4 about treating these things shouldn't realistically expect
5 too receptive an audience.

6 MEMBER APOSTOLAKIS: I don't remember now, but
7 is it made clear in 1061 that there is a difference in the
8 way the staff is looking at CDF and LERF?

9 MR. HOLAHAN: No, no.

10 MR. KING: No.

11 MEMBER APOSTOLAKIS: Should there be something
12 there to make it clear?

13 MR. HOLAHAN: I don't think it's necessary.

14 MR. KING: Yes. I don't either.

15 MR. HOLAHAN: Legally they're the same. The
16 fact that I think we -- well, in fact, with a LERF value
17 as high as 10^{-5} , I think exceeding it is pretty serious,
18 too. When we used to talk about the 10^{-6} , I think a lot of
19 us felt that, well, maybe there's a good deal of margin
20 here.

21 But I'm not sure I feel any more generous
22 about a 10^{-5} LERF than I feel about a 10^{-4} CDF.

23 MEMBER APOSTOLAKIS: Well, I guess what I am
24 questioning is we have a QHO, and that's what the
25 Commission gave us. Then we're establishing CDF goals,

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1 LERF goals.

2 MR. HOLAHAN: Yes.

3 MEMBER APOSTOLAKIS: Presumably we're trying
4 to be consistent, to have a self-consistent system.

5 MR. HOLAHAN: Yes.

6 MEMBER APOSTOLAKIS: But now it seems that the
7 site is really out of the picture, isn't it?

8 MR. HOLAHAN: Except that you will recall that
9 as part of the range that we have been talking about, this
10 middle range with additional management attention, siting
11 is one of the additional factors that the staff ought to
12 take into consideration when it's making sort of one of
13 the more difficult judgments.

14 MEMBER KRESS: That means in reality, if they
15 could stand a bigger LERF or CFP and still meet the QHO,
16 within that, if they were close to the margins, you would
17 give that more consideration?

18 MR. HOLAHAN: We would give it more
19 consideration.

20 CHAIRMAN SEALE: But you might need a full
21 scope, including all operating --

22 MEMBER KRESS: To show that, right.

23 CHAIRMAN SEALE: -- ranges, PRA Level 3 in
24 order to make that point.

25 MEMBER KRESS: To make that case.

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1 MR. HOLAHAN: That's right. And if you look
2 at the other considerations in that area, it calls for
3 additional analysis and treatment of uncertainties and
4 that kind of thing.

5 CHAIRMAN SEALE: What if I came in and I had a
6 full-scope Level 3 PRA with all the bells and whistles and
7 I made a proposal to you and I only based it on the QHO, I
8 didn't say anything about CDF or LERF? Would you consider
9 that to be a viable proposal?

10 MR. HOLAHAN: I guess I'd have to look at it.
11 Okay? I'm a bit skeptical, but, look, if the guidance
12 document that we're writing says yes, you know, we would
13 look at that.

14 CHAIRMAN SEALE: Okay.

15 MR. HOLAHAN: But I don't expect to see a lot
16 of --

17 MEMBER KRESS: I don't either.

18 CHAIRMAN SEALE: That would be pretty
19 hypothetical.

20 MEMBER KRESS: Along that, a similar, related
21 question.

22 CHAIRMAN SEALE: Yes.

23 MEMBER KRESS: It seems to me that the 10^{-4} and
24 .1 have been accepting you guys as a reasonable balance in
25 terms of defense-in-depth. Do you have a real reason for

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1 that or is that just consensus that's been around a while
2 and it looks like that's what people have been using so
3 long that now it's become ingrained in our thinking or is
4 there a reason for saying that's a reasonable balance?

5 MR. HOLAHAN: I'm not sure that there's any
6 philosophical basis for it.

7 MEMBER KRESS: It's a judgment call?

8 MR. HOLAHAN: Well, in addition to a judgment
9 call, in some ways it's a matter of facing reality. I
10 mean, it is --

11 MEMBER KRESS: You're right.

12 MR. HOLAHAN: It reflects the way many of the
13 designs are out there. Now, you could argue that as a
14 matter of principle, even though you would like balance in
15 the design, you certainly don't want a 50/50 balance which
16 says -- I mean, there is --

17 MEMBER KRESS: This is arbitrary.

18 MR. HOLAHAN: Well, no because I don't think
19 they're equally valuable. I think preventing accidents is
20 more valuable than mitigating them.

21 MEMBER KRESS: So you would expect to see this
22 --

23 MR. HOLAHAN: I would expect to see my CDF
24 expectations to be different from my containment
25 performance. And whether it's --

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1 MEMBER KRESS: In several orders of magnitude,
2 that's --

3 MR. HOLAHAN: -- and whether it's 10^{-3} , 10^{-2} , or
4 10^{-4} , 10^{-1} . But I wouldn't expect it to be 10^{-2} , 10^{-2} , I
5 think. That's not a good -- well, that's perfect balance,
6 but it's not a good idea.

7 MEMBER KRESS: There's really no way to arrive
8 at that number except by judgment on the --

9 MR. HOLAHAN: I think it's a matter of
10 judgment. Now, I think you could say: When the value
11 gets above .1, if you wanted to pick a value of .5, that
12 really says you don't have much confidence in that
13 barrier. And I think you've gone beyond the concept of
14 defense-in-depth.

15 So in some sense you might argue .1 is a
16 balance point at which you say I have some confidence in
17 defense-in-depth, but I haven't put too much of my
18 protection --

19 MEMBER KRESS: In that basket.

20 MR. HOLAHAN: -- in that basket because you
21 want most of your eggs in a prevention basket. That's
22 where it does the most good.

23 MEMBER KRESS: The way this question relates
24 to Bob's is I think that's the kind of thing you would
25 think about if somebody really came in with just a QHO

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1 kind of --

2 MR. HOLAHAN: Yes, absolutely. If they came
3 in with a QHO that said, "Core melt is likely, but we have
4 a fantastic containment," that doesn't sound too good.

5 If they said, "We have a fantastic system that
6 prevents core melts, but our containment isn't so good,"
7 well, I'm a little more receptive to that. But, frankly,
8 the way we'd really like to see it is what the reg guide
9 says.

10 So the burden of explanation I think is on the
11 licensee's part.

12 MR. KING: You said you recall that 10^{-4} and a
13 .1 were recommended by the staff back in the late '80s. I
14 think they were also endorsed by this Committee back then
15 as well.

16 MEMBER K'LOS: Yes. This Committee endorsed
17 those numbers.

18 MR. KING: And we can dig out those old papers
19 and see what they say, but that's where it came from.

20 MR. CUNNINGHAM: And they were aired with the
21 Commission, and the Commission went along with them
22 basically as well.

23 MEMBER APOSTOLAKIS: You said, Gary, that the
24 QHOs and subsidiary goals have no legal standing.

25 MR. HOLAHAN: Yes.

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1 MEMBER APOSTOLAKIS: Now, you also said --
2 well, Tom said earlier that the Commission has asked the
3 Office of General Counsel to give them a position paper as
4 to how all of these things fit in the system.

5 MR. HOLAHAN: Yes.

6 MEMBER APOSTOLAKIS: Do you think that a year
7 from now, two years from now these will have legal
8 standing?

9 MR. HOLAHAN: No. That's not our current
10 plant. To give them legal standing, it seems to me
11 there's only one way to do that. And that is to take the
12 Commission's policy statement and write it into the
13 regulations. So you would have a safety goal regulation
14 of some sort. And that would give it legal standing.

15 And if you were to do such a thing, you could
16 put QHOS or CDF or LERF or whatever level you wanted to
17 put in there or you could just put in there the
18 qualitative safety goals. I mean, it has a number of
19 choices. But whatever you put in there has legal
20 standing. Whatever you don't is guidance.

21 The one other difference it makes to me is
22 when I get guidance from the Commission and even if the
23 staff thought that we had an extraordinary argument from a
24 licensee that something different from that guidance would
25 be acceptable, it seems to me the staff wouldn't accept

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1 that. Probably because it's a Commission policy, we would
2 have to go back to the Commission and have the Commission
3 approve such a thing.

4 So the only thing that a Commission policy
5 seems to do is set the Commission's expectations so that
6 if the staff wanted to do something different, it probably
7 needs the Commission's approval to do so.

8 MEMBER APOSTOLAKIS: But if you are making
9 decisions using these numbers, what difference would it
10 make if they acquired legal standing? I mean, as a
11 practical matter, it doesn't make a difference.

12 MR. KING: Well, you recall what the
13 Commission said when they asked OGC to do their review was
14 they used the words "legal implications." I agree with
15 Gary. They don't have legal standing. But the fact that
16 the staff is now considering this information in making
17 its decisions could potentially have legal implications
18 for these numbers in a PRA. And that's what the
19 Commission is asking.

20 MEMBER APOSTOLAKIS: What does legal standing
21 do to you? I mean, if you are to use them, I don't
22 understand what the difference would be. You are using
23 them.

24 MR. BOB JONES: Well, in the sense of if you
25 said that 10⁻⁴ CDF was an absolute, there is no way we

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1 could ever grant a license amendment without a complete
2 demonstrate that it met the 10^{-4} CDF.

3 And it may need to meet -- all modes may have
4 to have been fully analyzed. I mean, there are
5 implications associated with it that at times the
6 discussion we've had with the subcommittee about "Is that
7 a bright line or a soft line?"; it becomes a bright line,
8 period.

9 MEMBER KRESS: Can't you structure the rule in
10 such a way that it doesn't, though?

11 MR. HOLAHAN: Yes.

12 MR. BOB JONES: Well, you could do it, but I'm
13 just saying if you took it as the rule says, X, then
14 violation of the rule now has other legal hurdles you
15 would have to clearly jump over.

16 I mean, there are exemption processes. For
17 example, you could still deal with it. But it becomes --
18 the hurdle I think gets larger. You go from the low to
19 the higher by doing that.

20 MEMBER APOSTOLAKIS: You would lose
21 flexibility, then. That's what you're saying?

22 MR. HOLAHAN: Normally when there's a rule
23 involved, you lose some flexibility because there are
24 additional standards to getting exemptions. If there were
25 a rule, one thing is I think it would be another difficult

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1 and time-consuming process to have such a rule.

2 It might clarify some of the potential
3 arguments about backfits. To what extent is the staff's
4 insistence on using these guidelines versus some other
5 numbers a matter of a backfit? I think it would clarify
6 that role.

7 I think the path we are on which does not
8 involve a rule but involves using guidelines in the
9 decision-making, I think this is a viable approach that
10 we're on. We haven't run into any insurmountable problems
11 yet. I don't see anything that says that we need a rule
12 in order to implement risk-informed, performance-based
13 regulation.

14 MEMBER APOSTOLAKIS: I got my answer. Let's
15 go on.

16 (Slide)

17 MR. KING: Fourth issue raised was the
18 Committee noted that the general reg guide and SRP did not
19 have any guidelines on temporary changes in risk. What's
20 in there, the CDF and the LERF values expressed, are
21 expressed in terms of annual average CDF per reactor year,
22 for example.

23 We do in the technical specification reg guide
24 and SRP address temporary conditions because a lot of
25 those changes will deal with assessing changes to

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1 allowable outage times, which by the very nature are
2 temporary conditions.

3 You haven't seen the latest version of that
4 reg guide and SRP. You should be getting it today. But
5 basically what it has in there are two limits that are
6 expressed in terms of core damage probability and large
7 early release probability.

8 Those are really for the period you're in the
9 allowable outage time times the risk value caused by that
10 condition. Multiply those two together and come up with a
11 probability. And there are limits expressed. We're going
12 to discuss the basis for those at the February
13 subcommittee meeting.

14 Those limits on temporary risk are also
15 applied in addition to the annual average CDF and LERF
16 values in the general reg guide. Just as an example, if
17 you were to apply the core damage probability limit, it
18 would correspond to a CDF of 10^{-3} per reactor year for a
19 5-hour period when you're in that AOT. In other words,
20 for the 5 hours you're in that AOT, if you were in that
21 for the full year, it would correspond to a 10^{-3} CDF. So
22 just to give you a feel when you look at it on an annual
23 number, that's the magnitude of CDF that we're talking
24 about that these numbers represent.

25 And we are going to solicit in the Federal

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1 Register notice that goes out with this package for
2 comment comment on temporary changes in risk. Do we need
3 more than what's in there today. Should we put something
4 in the general reg guide that deals with this?

5 As I said, we'll talk the specifics of how we
6 deal with AOTs when we get to the February subcommittee
7 meeting.

8 CHAIRMAN SEALE: So 10^{-3} for a half an hour
9 would also be acceptable?

10 MR. KING: Under this limit, yes. But when
11 you start going beyond five hours, for example --

12 CHAIRMAN SEALE: 10^{-2} for a half an hour.

13 MR. KING: Oh, yes, yes.

14 MEMBER APOSTOLAKIS: That 10^{-3} per reactor year
15 means if you were in that configuration for the full year.

16 MR. KING: For a full year, right.

17 CHAIRMAN SEALE: Exactly.

18 MEMBER APOSTOLAKIS: I'll have to think about
19 that.

20 MEMBER KRESS: Tom, on this temporary change
21 in risk, it seems to me that the quantitative health
22 objective, say, on early fatalities doesn't have any time
23 that's built into it. The one year is a convenience.

24 What we're really dealing with is a right at
25 which accidents happen. And we multiply that right by a

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1 year. We end up with a total, a number of deaths that are
2 due to accidental means over a year. We use that, .1
3 percent of that, as our QHO. So what we're dealing with
4 is a rate.

5 Why can't that rate be used for any length of
6 time and derive a -- instead of 5 times 10^{-7} , you end up
7 with the fraction of the time assuming the rate were
8 constant over a year and end up with the same QHO and
9 apply it on any time increment that you wish to? It seems
10 to me like it would be perfectly compatible with the QHO
11 and be consistent and --

12 MR. KING: Whether express it in terms of per
13 year or per hour, as long as it's based upon the same
14 fundamental QHO number, what difference does it make? I
15 guess my question is: What would it buy you by doing
16 that?

17 MR. HOLAHAN: No. If I understood how you
18 constructed that, I think you probably can't live with it
19 because what you were saying is you would be applying to a
20 situation in which you knew it wouldn't last the same
21 standard that you would apply to situations that you think
22 persist most all the time.

23 I don't think we want to apply, for example,
24 to allowable outage times a standard that says, "While
25 you're in the allowable outage time, you're meeting the

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1 QHO to the same extent as when you're not in the allowable
2 outage time."

3 MEMBER KRESS: I don't understand why not.

4 MR. HOLAHAN: Because you know that your
5 exposure to that situation isn't going to last. So why
6 should I act as though it will?

7 MEMBER KRESS: Take, for example --

8 MR. HOLAHAN: It's an integral effect.

9 MEMBER KRESS: Let's look, for example, at
10 shutdown. And let's say that you know that the
11 containment is going to be open for some fraction of that
12 shutdown period. That seems reasonable to me there to say
13 that, "I know my conditional containment failure
14 probability there is one for that time period that the
15 containment is open."

16 MR. HOLAHAN: We're encouraging licensees to
17 be able to close it. So maybe it's only --

18 MEMBER KRESS: Maybe it's only .9 then or
19 something. But, anyway, a reasonable approach there might
20 be to decide what core damage frequency I could live with
21 --

22 MR. HOLAHAN: Yes.

23 MEMBER KRESS: -- and still meet the QHO with
24 a conditional containment failure criteria of one, where
25 the QHO now is for that time period only, and require that

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1 whatever they do maintains that core damage frequency.

2 MR. HOLAHAN: But the fact that you knew that,
3 let's say, the situation would only persist for five
4 percent of the time, would you consider that in the
5 calculation?

6 MEMBER KRESS: Yes.

7 MR. HOLAHAN: So, in effect, you're averaging
8 the effect?

9 MEMBER KRESS: Yes.

10 MR. HOLAHAN: Okay. Then I agree.

11 MEMBER KRESS: Okay.

12 MR. HOLAHAN: And then I think that's more or
13 less consistent with what we've suggested here.

14 VICE CHAIRMAN POWERS: I guess I don't
15 understand quite. I thought you were advocating a
16 position or suggesting a position where the accident rate
17 during the outage period was below some criteria similar
18 to the accident rate during power operations.

19 MEMBER KRESS: No, I don't I'm saying that.
20 I'm saying your acceptance criteria could still be derived
21 from the QHOs and that you have to think about the
22 difference between the fact that your containment may be
23 open and your initiating frequencies may be different.
24 You've got to do some things extra to protect yourself to
25 maintain that same level of QHO.

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1 Maybe it's not the right way to go because
2 QHOs were intended for power operation and long-term. And
3 we do have a special situation. It was just a thought.

4 MR. HOLAHAN: But the same logic applies to
5 CDF or large early release except I'm not sure what early
6 means. But so long as you're saying that as part of this
7 calculation you take into account the fact that you know
8 that this exposure is only, let's say, ten percent of the
9 time or five percent of the time and you average it out
10 over the long haul, I think that's okay and is more or
11 less consistent with what we're doing here.

12 VICE CHAIRMAN POWERS: I guess I just don't
13 understand at all. The QHO is defined. The quantitative
14 QHO gives you a unit, which happens to be per year. And
15 you're saying because that unit was per year, we should
16 amortize over a year?

17 MR. HOLAHAN: No. You should average over
18 time. It doesn't matter whether it's a year, but it has
19 to be a period of time you're averaging over that's larger
20 than the deviations that you're talking about. It has to
21 be larger than allowable outage times or variations in
22 start-ups and shutdowns. So it would probably have to be
23 averaged over at least months in order to smooth out the
24 variability.

25 VICE CHAIRMAN POWERS: But why do I want it --

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1 isn't it the variability that I don't want? I mean, I
2 don't want sharp peaks.

3 MR. HOLAHAN: But you have to recognize that
4 some level of peaks is reality. All equipment can't be in
5 service all the time. We tell licensees to take it out
6 for maintenance.

7 VICE CHAIRMAN POWERS: But isn't there some
8 spike that's so big that I could find it intolerable?

9 MR. HOLAHAN: Well, the height of the spike
10 being intolerable, --

11 VICE CHAIRMAN POWERS: Yes.

12 MR. HOLAHAN: -- regardless of its --

13 VICE CHAIRMAN POWERS: Regardless of its
14 duration.

15 MR. HOLAHAN: I think there is. We haven't
16 defined that. Even what we've talked about here is an
17 area under such a spike and not the height of such a
18 spike. What Tom has suggested is some corresponding peak
19 that would go along with typical spikes.

20 In reality, I don't think it's a problem. I
21 think when the spike gets higher than 10^{-3} , other things
22 cut off that spike. Defense-in-depth, tech specs,
23 engineering margins don't allow 10^{-1} and 10^{-2} spikes.

24 We could write a criteria that says your spike
25 shouldn't be higher than 10^{-2} , but I don't think it would

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1 ever come into effect. You have to realize that in order
2 to be in that situation, either you have to have an
3 initiating event going on or you're dealing with events
4 that are frequencies of 10^{-1} with no safety systems
5 available. It's not possible to get there.

6 MEMBER APOSTOLAKIS: I was thinking about,
7 Gary, in terms of real life now, what is it that makes you
8 tolerate these temporary configurations. And it seems to
9 me -- and that's consistent with what you said earlier
10 about placing value on prevention or on mitigation -- that
11 it's really the knowledge that the probability of having
12 an initiator is low.

13 MR. HOLAHAN: Yes.

14 MEMBER APOSTOLAKIS: So perhaps at this level,
15 instead of trying to work with the total core damage
16 probability or core damage frequency per year and then try
17 to see what that means for shorter periods of time,
18 another approach might be to look at the initiators. And
19 those naturally, then, will put a bound.

20 I mean, that's just an idea that just occurred
21 to me. I haven't thought about all of its ramifications.
22 Because that is really what makes you say, "Well, gee, you
23 know, if it's only for a few hours, that's okay because my
24 LOCA frequency is this."

25 MR. HOLAHAN: Right.

1 MEMBER APOSTOLAKIS: "My" this is that. So I
2 really don't expect to get in trouble. And that's
3 consistent with the defense-in-depth idea, as you said,
4 and so on.

5 But if, on the other hand, you see that the
6 probability of core damage frequency is high because the
7 probability of having an initiator has approached one,
8 then you probably don't tolerate that at all. Is that
9 correct, even though you have all the mitigating systems?

10 MR. HOLAHAN: Yes, yes. Of course. Yes. I
11 don't think we have any tech specs or any rules that
12 prevent it. In other words, there's nothing in the
13 plant's license that says that while it's having a LOCA
14 it's not allowed to use its tech spec and take equipment
15 out of service. Okay? I mean, the tech specs don't say
16 you can take a system out of service for seven days, but
17 don't do it during a LOCA.

18 Well, everybody knows you shouldn't take it
19 out during a LOCA.

20 MEMBER APOSTOLAKIS: No. But I'm saying a
21 priori when you turn these numbers, you can take these
22 considerations into account and say, "Look at the
23 frequencies of the initiating events" and then use some
24 sort of argument based on those to come up with a limit.
25 That's really what I'm saying, which is what you said

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1 earlier.

2 MR. HOLAHAN: I think if you just think about
3 that for a little while, we don't have initiators that are
4 much more than 10^{-1} .

5 MEMBER APOSTOLAKIS: That's right.

6 MR. HOLAHAN: Even loss of feedwater reactor
7 scrams is in the range of 10^{-1} .

8 MEMBER APOSTOLAKIS: Per year.

9 MR. HOLAHAN: Per year.

10 MEMBER APOSTOLAKIS: Per year.

11 MR. HOLAHAN: Per year. And so in order to
12 have a spike, a 10^{-1} spike, you would have to have no heat
13 removal capability so that every reactor scram was a core
14 melt. Okay? Well, we already have technical
15 specifications that shut plants down when they don't have
16 that level.

17 And if I think you went and tested, well, is
18 it possible to get yourself into a 10^{-2} configuration, I
19 think you'll find that it's not possible either. Now, if
20 we write an additional guideline that does that, I don't
21 think it accomplishes anything.

22 MEMBER APOSTOLAKIS: I'm just saying it's part
23 of your argument. You may want to think in terms of
24 initiators, primarily initiators, on the total.

25 MR. BOB JONES: As part of the traditional

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1 review of the tech specs, one of the things we do do is we
2 look at: Say, for these AOTs, what is the remaining
3 capability? And what are the events that they need to
4 respond to?

5 So, for example, we did issue an AOT change
6 for South Texas on its diesels. And it turned out that
7 when you had multiple diesels allowed out, there was a
8 circumstance identified where, in fact, you wouldn't
9 necessarily meet the safety analysis criteria. But it
10 talked A, B, C, D, and E to happen.

11 And so we said, looking at the initiator
12 frequency, looking at the probability, it is in the right
13 location at the right time. Looking at it also required a
14 loss of off-site power. We thought that in that interim
15 period that was okay, that you would be restricted by
16 time.

17 So I think the guidance does it as part of its
18 traditional deterministic review of the tech specs and
19 what capability still remains during the AOT. And it will
20 be factored into the decision-making that way.

21 But it is in the guidance already along those
22 lines, not as a specific look at frequency, but more a
23 look at what the capabilities are and what the events
24 you're trying to mitigate are, and factor that into your
25 overall decision.

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1 MEMBER APOSTOLAKIS: We'll discuss this in
2 more detail.

3 Can you wrap it up in a minute?

4 MR. KING: Yes.

5 MEMBER APOSTOLAKIS: What's the important
6 message that's on 15 and 16?

7 (Slide)

8 MR. KING: The important message on 15 is yes,
9 we have had some feedback from the pilots that have
10 affected the reg guide and vice versa. I think due to the
11 evolving nature of the reg guides and SRPs, there's more
12 of that to come. And we can talk more about that in
13 February.

14 MEMBER APOSTOLAKIS: Sure. Yes. The expert
15 panel really --

16 MR. KING: Yes.

17 (Slide)

18 MR. KING: Here's the expert panel. I just
19 wanted to point out where they're covered and what the
20 purpose of each is as we have them laid out.

21 MEMBER APOSTOLAKIS: Okay. I understand NEI
22 has requested time. So maybe this is a good time for them
23 to make a presentation.

24 MR. PIETRANGELO: Good morning.

25 MEMBER APOSTOLAKIS: Good morning.

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1 (Slide)

2 MR. PIETRANGELO: I appreciate the opportunity
3 to come and chat with the ACRS once again. It's been
4 quite some time; in particular, on this issue, the PRA
5 implementation plan.

6 We've kind of been laying back for a while.
7 We've been attending a lot of the ACRS meetings. We
8 haven't seen with one small exception much of what the
9 staff's been working on lately. We've just been
10 observing. But it's been a long time, and we thought
11 maybe this was a good time to provide some of our
12 observations.

13 We've had a risk-based applications task force
14 in place for about two years now. We meet on a regular
15 basis, about every three months. They include all the
16 owners' group chairmen who run the owners' groups'
17 activities on PSA applications. And we talk all the time
18 about what's been going on.

19 Quite frankly, we have some concerns I think
20 based on what we've seen on how the process is going and
21 the direction of it that we wanted to get some input in
22 now. And, of course, we will be developing comments on
23 all of the documents when they come out. But I think it's
24 an opportunity to give you our perspective on what we were
25 trying to do with the PSA tool and how we intend to use it

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1 and hopefully how that complements what the staff is
2 trying to do with the PRA implementation plan.

3 (Slide)

4 MR. PIETRANGELO: Let's take a step back
5 first. These are kind of the first principles that we
6 established for using PSA to improve our operations.

7 First of all, the whole point of this is to
8 improve our focus and attention on what's important. And
9 if you lose that perspective, it leads you to one of the
10 other bullets down here below that you can outweigh the
11 benefits with getting lost in the details of actually
12 applying this tool.

13 I think in a lot of the discussions we've
14 heard over the last several months, it appears to us that
15 the tool's being taken out of context like it's going to
16 be the basis. And, quite frankly, I think we've
17 contributed to that to some extent by using the term
18 "risk-based" in our documents and discussions. Probably
19 the staff had it more accurate with "risk-informed."

20 I think your consultant at your subcommittee,
21 George, talked about there are, in fact, no risk-informed
22 regulations. This is really changing guidance and
23 interpretations of the existing regulations. There are no
24 proposed changes to the regulations at this time that are
25 risk-based or risk-informed.

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1 So the point here is that PSA is one
2 additional input into the decision-making process. It's
3 not the sole basis for the decisions. And the PSA tool
4 should complement all our other tools in our
5 decision-making process.

6 The staff had a chart, not in today's
7 presentation, but in one of their previous ones, that
8 showed the process of defining the change and the
9 licensing basis, doing the analysis. And then you had the
10 deterministic and the PRA part up above.

11 Well, the only thing different is the PRA part
12 up above. The other change process has been there for
13 about 25 years. Okay? And we're getting one additional
14 insight into that process. And it seems like we're
15 getting exercised pretty well over this additional insight
16 and at the same time keeping all of these other things and
17 trying to define those in greater detail.

18 I think probably in our perspective the RRG
19 had it right a couple of years ago. You have to go all
20 the way back and say, "How can we improve what we've been
21 doing over the last 20 or 30 years? Look at our event
22 experience. Look at our operational data." And PRA is
23 one way to put all of that together.

24 But, rather than say, "The focus is on PRA,"
25 really, the focus is on regulatory improvements based on

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1 our experience.

2 MEMBER APOSTOLAKIS: Do you think that the
3 staff is placing undue emphasis on the PRA?

4 MR. PIETRANGELO: I think so. I think so.
5 And the only part that we've seen -- and I should caveat
6 my whole presentation by saying we have seen almost
7 nothing of what the staff has been working on. The only
8 thing we have seen was the sum draft of the standard
9 review plan that was in the public document.

10 MEMBER APOSTOLAKIS: Let me understand that
11 better. Why? Can you be more specific? I mean, you have
12 seen their viewgraphs. Where is it that they are
13 overdoing it?

14 MR. PIETRANGELO: Well, I think that when you
15 look at even today's discussion, this morning, all this
16 focus on the numbers, we know --

17 MEMBER APOSTOLAKIS: But you guys did that,
18 too.

19 MR. PIETRANGELO: We did it to some extent,
20 but we're not the NRC.

21 MEMBER APOSTOLAKIS: Well, I'll tell you,
22 though, what the problem is. It's not undue emphasis on
23 PRA. And I think the proposed Appendix S for fire
24 protection is a good example of this. What the staff is
25 doing is saying: If you are to use probabilities, somehow

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1 the licensee and we ought to know what to do with them.

2 And the major criticism of the proposed
3 Appendix S was that you guys put some probabilities,
4 allowed some probabilities, to calculations in the
5 appendix and you didn't tell us what to do with them.

6 So I don't see that as a new emphasis. I see
7 it as a necessary element of the whole process that if you
8 allow someone to do a probablistic analysis, then somehow
9 I have to have some idea of what to do with these numbers.
10 And I think that's the whole problem that these guys are
11 struggling with.

12 And, in fact, I think they are pretty general.
13 I mean, all they're stating is principles. And then
14 they're saying: Well, when you get the numbers, do
15 something with them.

16 MR. PIETRANGELO: What you want to do with the
17 input you get from the insights that you get are focus
18 your resources and attention better.

19 MEMBER APOSTOLAKIS: That's correct.

20 MR. PIETRANGELO: Okay.

21 MEMBER APOSTOLAKIS: That's correct.

22 MR. PIETRANGELO: And I think what we've been
23 seeing is a focus more on the process of using PSA.

24 MEMBER CATTON: But you need both, don't you?

25 MEMBER APOSTOLAKIS: Yes. I don't understand

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1 what "better" means in the abstract. I mean, if this was
2 between two guys, I would say it's okay. If Gary and Tony
3 were doing it, they can work it out. But we're talking
4 about a lot of people getting involved.

5 MR. PIETRANGELO: I understand.

6 MEMBER APOSTOLAKIS: You know, you have to
7 have some guidance.

8 MR. PIETRANGELO: Right, right. Let me move
9 on. I think some of these points will become clearer as I
10 go on.

11 MEMBER APOSTOLAKIS: Okay.

12 MR. PIETRANGELO: Again, the other first
13 principle I wanted to talk about is -- and we have some
14 other bullets to address this later -- the benefits
15 clearly have to outweigh the burden of using this
16 technology or no one is going to use it.

17 And, finally, we understand PSA has
18 limitations. It has warts. In fact, it's a tool one can
19 pick on to no end. And some of the discussions in here I
20 think have picked on different aspects of PSA, some of its
21 weaknesses. And those have to be recognized.

22 I think the way we're trying to use the tool
23 is not to push the technology too far too fast and take
24 those coarse insights that we get and make some decisions
25 and move on.

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1 Move to the next slide.

2 (Slide)

3 MR. PIETRANGELO: You know, we have seen
4 progress on a lot of the technical issues that have come
5 up. And I think we're getting there in that area. But,
6 again, I think the main point we wanted to make today was
7 that the assumption has been made that a licensee is going
8 to have to make some submittal to do anything with his PRA
9 in the future and regulatory applications. And I don't
10 think that's true. I don't think that's true.

11 We can already make changes to our design. We
12 can already make changes to our licensing basis under the
13 current 50.59 process.

14 Two other examples, the maintenance rule
15 implementation and Appendix J, Option B, did not require
16 any submittal to the staff for review and approval. And
17 as long as the 50.59 process remains reasonable, I think a
18 lot of changes are going to be made to the licensing basis
19 and design of the plants with PRA.

20 Now, clearly the tech spec changes are going
21 to require staff review and approval. I don't think
22 there's any question about that. That's the law. But I
23 think on a lot of these other applications we have been
24 talking about, particularly in light of the process we
25 have seen being developed, if it's going to require a

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1 licensee to submit a package in each case to take
2 advantage of the insights that the PRA provides to focus
3 attention and resources better, I think that process has
4 tremendous potential to get very bogged down in a lot of
5 the issues that have been talked about over the last
6 several months with the ACRS.

7 MEMBER APOSTOLAKIS: I don't understand the
8 complaint here or the disagreement because I think the
9 staff made it very clear, even today, that you don't have
10 to use this. You can request changes using other methods.
11 You don't have to use PSA.

12 MR. PIETRANGELO: Right.

13 MEMBER APOSTOLAKIS: And then one of the
14 principles that has been stated several times is that you
15 should do -- I can't find it; it's always in front of my
16 eyes except when I need it -- that you should do a PSA or
17 a probablistic analysis that is appropriate to the
18 problem. Now, wouldn't that satisfy you?

19 MR. PIETRANGELO: Things have changed over the
20 last year or two. Okay? Let's take tech specs, for
21 example.

22 MEMBER APOSTOLAKIS: Okay.

23 MR. PIETRANGELO: Two owners' groups were
24 making changes to their tech specs years and years ago,
25 probably eight to ten years ago, with some PSA insights to

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1 extend a lot of outage times.

2 The current pilot that the staff is reviewing
3 from a different owners' group is doing exactly the same
4 thing. And they're still waiting on their approval. It's
5 a very, very simple change that they've put forth as an
6 owners' group. And I think it's being used to decide how
7 PSA is going to be used in this kind of process.

8 I thought the purpose of the policy statement
9 would be to encourage the use of PSA in all regulatory
10 applications. I would think there would be an expectation
11 on the part of the staff that when a licensee submits a
12 tech spec amendment request, what does the PRA tell you
13 about that particular change that you're requesting?

14 That's kind of changed lately. A lot of
15 licensees from the feedback we're getting are being
16 encouraged not to put the PSA insight in with their
17 amendment request because the process will take longer. I
18 think that's wrong.

19 MEMBER APOSTOLAKIS: And you're right, but
20 that has nothing to do with the reg guides.

21 MEMBER MILLER: Why is the process taking
22 longer?

23 MEMBER APOSTOLAKIS: For the reviews.

24 MR. PIETRANGELO: Because of the reviews. And
25 that's where my concern comes today, that the review

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1 process when you use PSA is getting fairly burdensome.
2 And it has the potential to be more so once these
3 regulatory guides are promulgated.

4 MEMBER MILLER: Why is the review process
5 longer now than it would have been five years ago?

6 MR. PIETRANGELO: Because if you use PSA, it
7 requires additional staff review.

8 MEMBER MILLER: There's a limited number of
9 staff that are able to do the reviews. So it's kind of a
10 bottleneck or --

11 MEMBER APOSTOLAKIS: Yes. No, I don't think
12 he's saying that it is more burdensome now compared to
13 five years ago. He's saying that because you are using
14 PSA, it requires an additional level of review. Evidently
15 they're overwhelmed and that takes a long time.

16 MR. PIETRANGELO: Well, whatever, but the
17 point is --

18 MEMBER APOSTOLAKIS: But this has nothing to
19 do with --

20 MEMBER MILLER: No, no.

21 MR. PIETRANGELO: -- that we were trying to
22 make it complement, rather than supplement. Okay? And if
23 it takes longer for the licensee to get the request
24 through because he uses PSA, that's not much of an
25 incentive to use PSA.

1 MEMBER CATTON: If it's so simple that you
2 don't have to use a PSA, why do you submit it with it? I
3 mean, I'm missing something. If it's clear without it,
4 why submit the PSA? This is supposed to be complementary.
5 It's supposed to help you.

6 MR. PIETRANGELO: Right, right. Well, I think
7 that's the potential endpoint you'll get to is no one will
8 submit it.

9 MEMBER CATTON: But if they don't have to,
10 they shouldn't. If you don't need it, don't use it.

11 MR. PIETRANGELO: But that's not consistent
12 with the policy statement.

13 MEMBER APOSTOLAKIS: Well, the point is,
14 though, that we should recognize realistically that these
15 things don't happen overnight and that you're introducing
16 a new way of doing business. Naturally it's going to take
17 a little longer.

18 MR. PIETRANGELO: No, no. It's not that new a
19 way of being -- that's the whole point. This is not that
20 new. We have been using PSA for a long, long time. It is
21 one additional input. It is not a revolutionary change
22 and a whole new way of doing business. It's an additional
23 insight into this process. That's the point.

24 And we're focusing heavily on the process used
25 to develop this additional insight. And there has to be

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1 some balance there between taking the insight and using it
2 efficiently and effectively versus putting this entire
3 burden on the process to make sure that whatever insight
4 you get out of it can be complementary to the decision
5 you're trying to make.

6 And all we're saying is there has to be some
7 balance there. And it looks like this is very one-sided
8 at this point and heavily process-oriented. I mean, if
9 there's one message that I want to get across today,
10 that's the one. It's not a revolutionary change. It's
11 evolutionary --

12 MEMBER APOSTOLAKIS: It was never --

13 MR. PIETRANGELO: -- with one additional
14 input. And it has to be a balance between using the
15 insight and focusing on the process.

16 MEMBER APOSTOLAKIS: Well, again, it seems to
17 me if somebody says -- first of all, it is revolutionary,
18 with a small "r," as we have said many times. The diagram
19 that you described earlier really is something that you
20 have been using for a long time. All they did is add this
21 extra PRA thing there. So that's acceptable. That's
22 nice. It's not a revolution.

23 MR. PIETRANGELO: Right.

24 MEMBER APOSTOLAKIS: Then they're saying, "Do
25 an analysis that's appropriate to the problem." It seems

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1 to me that's a reasonable statement. It's not burdensome.

2 MEMBER CATTON: Not yet.

3 MEMBER APOSTOLAKIS: They can't say, "Do an
4 analysis that's inappropriate."

5 MEMBER MILLER: What I'm hearing is if you do
6 an analysis that's appropriate and has PRA in it, then it
7 requires an added level of review. Is that what I'm
8 hearing?

9 MR. PIETRANGELO: No. That was just an
10 example of the opposite effect that we want.

11 MEMBER MILLER: Well, I understand that.

12 MR. PIETRANGELO: That's all that is.

13 MEMBER MILLER: What you want is you want to
14 do as has always been done except now use PRA to maybe
15 adjust your approach, you probably want to do it under
16 50.59.

17 MR. PIETRANGELO: Back up one second. The
18 pilots are necessary to establish what's the right thing
19 to do, what's acceptable in some of these applications.
20 Okay?

21 If an additional, either on a station basis or
22 a unit basis, another 70 to 100 submittals have to be made
23 to the NRC to move that process forward, I don't think
24 that's an effective way to carry out risk-informed
25 regulation. Okay?

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1 If the pilots establish a method that's
2 acceptable to the staff and the licensee can move forward,
3 then, with that guidance and implement the change and then
4 use the regulatory oversight through the inspection
5 process and the documentation that the staff has available
6 at the site, that the licensee has available at the site,
7 then maybe that's a more efficient way of doing this. But
8 to suggest that there's going to be a submittal on every
9 one of these things outside of tech specs, of course, I
10 think that assumption may be wrong.

11 And I think if we do have to go, if it's a
12 right assumption, if it's a correct assumption, I don't
13 think this process is going to go very far. Staff doesn't
14 have the resources to deal with 70 to 100 submittals on a
15 risk-based IST or ISI or QA or any of those. But that's
16 what that process says, "Submit this at the end."

17 I would think that the Commission can make a
18 policy-level decision on the way to do this one time and
19 not have to have 70 SERs signed out for a licensee to move
20 forward with this.

21 And that's one of our concerns, that we're not
22 in this so that a couple of licensees who have made a
23 significant investment in PSA can get the changes through.
24 We're in it for the whole industry to move forward. All
25 right? And the process has to be practical for that to

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1 happen or a lot of the work that the staff's done in the
2 past year will go for naught.

3 MEMBER CATTON: What you're saying is that you
4 can't come in and request one of these changes by
5 reference to another plant that's done so?

6 MR. PIETRANGELO: I'm saying that there may be
7 a way to do this without having to come in. Appendix J,
8 Option B was implemented that way. The maintenance rule
9 did not have a submittal involved with it.

10 We can do changes already under 50.59 without
11 prior staff review and approval; in fact, ones that had
12 small increases in risk, been done for years. All this
13 tool is giving us is another way to answer some of these
14 questions.

15 But does the process have to change and go
16 through a big submittal process now that we've got a tool
17 that can focus us a little bit better? Do we have to do
18 things completely differently than the way we were doing
19 them before? I don't think so.

20 MEMBER APOSTOLAKIS: Is there a place where
21 you have these things in writing so I can understand them
22 better?

23 MR. PIETRANGELO: We will put them in writing
24 when we put our comments in the reg guides. Again, the
25 big caveat is we have not seen outside of an unknown

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1 revision to the standard review plan that was in the PDR
2 what the staff has been working on. We have been
3 following along in the ACRS meeting.

4 MEMBER APOSTOLAKIS: But I must say that it
5 seems to me that there is a fundamental problem with the
6 interpretation of the word "insight." You're saying PRA
7 gives us additional "insights." And you seem to assume
8 that everybody understands what that means or how it will
9 be used.

10 MR. PIETRANGELO: I'll give you a better
11 example. If you look at some of the questions that the
12 pilots have been getting on some of the things --

13 MEMBER CATTON: We haven't seen that.

14 MEMBER APOSTOLAKIS: The pilots? Not yet.

15 VICE CHAIRMAN POWERS: No.

16 MEMBER CATTON: So maybe we'll be more
17 sensitive to his concerns when we do.

18 MEMBER APOSTOLAKIS: All I'm doing is I'm
19 trying to understand what he's saying.

20 MR. PIETRANGELO: Right.

21 MEMBER APOSTOLAKIS: I'm not attacking it.
22 But I would like you to be here in February to -- I would
23 like you. It would be nice for you to be here when we
24 have the subcommittee meeting.

25 MR. PIETRANGELO: Yes. And we do plan to

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1 come. But I think we want to come back and talk about
2 some specific things. This is more of a broader, general
3 --

4 MEMBER APOSTOLAKIS: Sure, yes.

5 MR. PIETRANGELO: -- policy discussion.

6 MEMBER APOSTOLAKIS: Yes. An example is a lot
7 of these applications involve ranking. Okay? And we can
8 spend an awful lot of time trying to split hairs on which
9 SSCs are risk-significant and which SSCs are
10 non-risk-significant or we can kind of make a coarse cut
11 and say we know these for sure are risk-significant and we
12 know this other group is non-risk-significant. And we
13 have this middle. Over time I think the middle will
14 shrink as our methods get better, as the data gets better,
15 as the quality of the PRAs get better.

16 We can't establish all of that in one fell
17 swoop up front, but we should be able to take the course
18 insights and get on with the application.

19 MEMBER MILLER: Does that mean those in the
20 middle, then, will keep the high risk-significant until we
21 --

22 MR. PIETRANGELO: I think they will probably
23 keep their current treatment, whatever it is.

24 MEMBER MILLER: So if they're Appendix B,
25 we'll --

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1 MR. PIETRANGELO: Right.

2 MEMBER MILLER: -- keep them that way? If
3 they're not, we won't?

4 MR. PIETRANGELO: Yes. And I think it's,
5 again, trying to get it to be more evolutionary and
6 incremental, rather than trying to make some huge step
7 that no one can swallow up front.

8 MEMBER APOSTOLAKIS: But why would the present
9 approach or the proposed approach prohibit that or inhibit
10 that?

11 MR. PIETRANGELO: Well, I guess I'm seeing in
12 the slides with the reg guides the key elements, the
13 risk-monitoring program, the performance monitoring.
14 Clearly the licensees are going to have a responsibility
15 for establishing the quality through peer review or
16 independent review.

17 But in the submittal process, I mean, you
18 referred to it as the license to kill. By the time you
19 get through all of the deterministic considerations and
20 trying to prove that your PRA was good enough and that it
21 was used effectively, I think that detracts your attention
22 and resources from getting the insight, the incremental
23 insight, and moving forward with the application.

24 And we need the experience with and from the
25 applications to evolve. We can't evolve without doing it.

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1 There haven't been any done. I mean, we were making more
2 progress two years ago than we are now, basically stopped
3 while we're waiting for all of these reg guides and SRPs
4 to be developed.

5 And that was not the staff's intent I don't
6 think 18 months ago. When we published the PSA
7 applications guide, the message we got was: Well, let's
8 use it in applications and see how it works, and we'll
9 learn from that.

10 Well, that hasn't happened. That has not
11 happened. Licensees are using them for non-regulatory
12 applications. And so I think the process has been stalled
13 somewhat. We're not evolving. We're waiting for some
14 thing to be developed here. And our concern is that it's
15 not going to serve our needs particularly well, the
16 industry's needs.

17 MEMBER APOSTOLAKIS: I guess I don't
18 understand what you're saying there, Tony, because, again,
19 if I take the example you gave with the ranking and I go
20 back to what these guys are doing, it seems to me that
21 they allow me to do a PRA depending on what I want to do.

22 I may do a point estimate if I'm not very
23 close to the goal and use an importance measure to rank
24 and then go to my expert panel and have the expert panel
25 review that and be a little bit on the conservative side,

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1 include a little more and provide an argument that these
2 are the important SSCs.

3 And there is nothing that I've heard from the
4 staff that says that this process has to be too elaborate
5 or submitting. I mean, all they're saying is: Now having
6 done that, if you want to propose some changes, do an
7 analysis that's appropriate. And then when you get your
8 numbers, here is some guidance how to handle those
9 numbers. So I am having difficulty understanding why you
10 are so negative. But maybe I don't understand your
11 position.

12 Now, the other thing is I sense that you are
13 bringing into this things that are happening in real life
14 right now which are frustrating to you, like when somebody
15 tells you, "Don't put any PRA in it because it will take
16 forever to review it."

17 And I understand that, but at the same time
18 this is not part of the reg guide that these guys are
19 preparing.

20 MR. PIETRANGELO: I think if the process
21 includes an NRC review and approval of every regulatory
22 application. I don't know how long the process will take
23 for this. I can guess at what it takes based on my
24 experience. And you've heard presentations from other
25 people about the incentives for doing this versus not

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1 doing it. Okay?

2 For the licensee, if the process is very
3 burdensome and extensive, they won't do it.

4 MEMBER APOSTOLAKIS: I'll have to understand
5 that a little better, but let's go on.

6 MR. PIETRANGELO: Okay.

7 MEMBER MILLER: Yes. I think let's listen
8 because it may just flag us to ask the right questions as
9 we go through these --

10 MEMBER APOSTOLAKIS: Yes, yes. I fully agree.
11 All I'm saying is that I don't quite understand what the
12 difference is at this point. But I will at some point.

13 MR. PIETRANGELO: The other caveat or caution
14 I wanted to raise was this whole talk about the numbers.
15 You cannot do PRA without using the numbers. Okay? But I
16 would be very, very cautious about any perception of
17 regulation by numbers.

18 Again, it's one thing for the industry to put
19 in an industry guideline numbers for risk increases and so
20 forth. It's a different thing for the NRC. We didn't ask
21 the NRC to approve our PSA applications guide. Okay?
22 There wasn't any regulatory requirement we were trying to
23 meet with that.

24 Your whole discussion this morning about rules
25 and reg guides and such is appropriate because normally a

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1 regulatory guide is developed for implementation of a
2 rule. Okay? And Gary was absolutely right about legal
3 standing and all of that stuff.

4 Once you start putting it in things like
5 regulatory guides that are normally used for
6 implementation of a rule, I think it will be an
7 interesting legal analysis that comes out of that.

8 MEMBER APOSTOLAKIS: No. But this is --

9 MEMBER CATTON: You have a rule to go along
10 with it.

11 MEMBER APOSTOLAKIS: This is really something
12 that we have discussed with the staff several times. And
13 they have been very responsive to comments from this
14 Committee.

15 The issue of the bright lines that Bob
16 mentioned earlier, I mean, they agreed to remove those
17 figures from the guide because they give the wrong
18 impression. And then you have not seen this, but they do
19 discuss in detail the issue of compliance. So they do
20 acknowledge that these numbers are not to be used as go/no
21 go criteria. So maybe that will satisfy.

22 MR. PIETRANGELO: No, it doesn't because --

23 MEMBER APOSTOLAKIS: It doesn't?

24 MR. PIETRANGELO: No because every time I've
25 come to one of these meetings, you talk about them like

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1 they're acceptance guidelines or decision criteria. It's
2 taking the tool, again insight, out of context and saying
3 PSA is going to be the number that drives this decision.

4 Even we -- and we don't have the same problems
5 the NRC has in terms of being a federal agency -- call
6 them screening criteria.

7 MEMBER APOSTOLAKIS: Right.

8 MR. PIETRANGELO: We didn't call them decision
9 criteria. And we made that point several times. Yet,
10 they're always called the same things. And it's almost
11 like it's the basis for the decision. And somebody has
12 got to sign on the dotted line based on a number. That's
13 just not the case.

14 MEMBER APOSTOLAKIS: You are bringing up
15 another issue now. You are saying now, no matter what the
16 guide says, people are going to use those as means of
17 acceptance criteria, go/no go. That's another issue.

18 MR. PIETRANGELO: Regulatory guides are used
19 like rules today.

20 MEMBER APOSTOLAKIS: But if it says there in
21 three pages that you should not do that and that you
22 should take into account uncertainties and all of that, I
23 don't know what else they can do except completely remove
24 that, which again brings me back to Appendix S, which to
25 me was unacceptable. Just to say, "Do a probability

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1 analysis" and then somehow make a decision it seems to me
2 is not acceptable either.

3 So somehow we have to have the golden mean,
4 the golden place where we are not describing criteria that
5 are go/no go so they tie your hands. On the other hand,
6 we are not just saying this is a supplementary tool,
7 augment, a tool that augments the analysis, uses insights,
8 and leave it at that because I don't know what insights
9 means. And I think you're going to have a mess on your
10 hands if you leave it at that.

11 MR. PIETRANGELO: Okay. I'm going to skip
12 ahead to the conclusions because I think I've gone through
13 every observation already.

14 (Slide)

15 MR. PIETRANGELO: Obviously industry has
16 invested a significant amount in PSA. And we want to get
17 a return on that investment. That means safety
18 improvements as well as improvements in efficiency in the
19 regulatory process. No question about that.

20 It's in our interest and I think the staff's
21 to try to maintain some momentum with this process. And I
22 think it's slipping away, if not stopped. The process is
23 really stopped.

24 We've already done -- we talk about in the reg
25 guide the change in tone, say, "Yes. We're going to use

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1 it for improvements in safety," recognize that the first
2 use of the IPE was to identify vulnerabilities and address
3 those and accident management insights. I mean, we have
4 been using them for safety since they have been developed.
5 And that's kind of been lost in this process.

6 We do expect that, given what's been developed
7 in response to the generic letter, that we should have
8 some expectation for improvements in the regulatory
9 process.

10 (Slide)

11 MR. PIETRANGELO: Another point we've tried to
12 make is that this is going to be market-driven. Let's say
13 you do have to make a submittal for each and every
14 improvement in the regulatory process.

15 Again, if there's not a benefit that outweighs
16 the burden, people will not submit. And just based on
17 what's happening in the past year or so, we have gotten I
18 think from three or four licensees news that they're
19 disbanding their PRA organizations. And that's not what
20 we wanted to happen here.

21 MEMBER FONTANA: And the primary reason for
22 that is what? You told us, but --

23 MR. PIETRANGELO: For disbanding their
24 organizations?

25 MEMBER FONTANA: Yes.

1 MR. PIETRANGELO: Well, I think they don't see
2 any benefit to it. It's as simple as that.

3 MEMBER APOSTOLAKIS: I must say I'm a bit
4 surprised at how negative you are. And I personally feel
5 that I have to understand your position much better before
6 I contribute to the letter this Committee will write in
7 March. So I would like to ask you what you think would be
8 the best mechanism for us to understand better your
9 positions because obviously at least I don't feel that I
10 fully understand them.

11 If possible, before the 20th of February so if
12 there are any questions that we need to raise -- because
13 this will be the time to raise them to the staff because,
14 in all fairness to them, they have to produce all of these
15 documents. They have deadlines and so on. We can't hit
16 them at the last moment with questions.

17 So what do you think would be an appropriate
18 way for you to really let us know and argue your position
19 so that at least I would understand it better.

20 MR. PIETRANGELO: I think we can take that up
21 individually, George. I don't want to take the whole
22 Committee's time because, again, we have not seen all the
23 documents. They are draft documents. They have not gone
24 through the public review process yet. And we will
25 provide our comments at that time.

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1 CHAIRMAN SEALE: When will you get those
2 documents?

3 MR. PIETRANGELO: Sometime in May --

4 MEMBER APOSTOLAKIS: Yes, but that's too late
5 for us.

6 CHAIRMAN SEALE: Yes.

7 MR. PIETRANGELO: -- is my understanding.

8 MEMBER APOSTOLAKIS: I don't know how this
9 thing works, but is it inappropriate for you to write a
10 letter to me or to the Chairman?

11 MR. PIETRANGELO: I think the process has a
12 long way to go yet.

13 MEMBER APOSTOLAKIS: But, I mean, there are
14 obviously certain things that bother you right now.

15 MEMBER BARTON: To get the industry's
16 negativism that you're expressing before this Committee
17 before us before we writ a letter to the Commission
18 endorsing the process.

19 MEMBER APOSTOLAKIS: Send a letter, you know,
20 a page or two, and say, "These are my major concerns.
21 One, two, three, four."

22 MR. PIETRANGELO: All right.

23 MEMBER APOSTOLAKIS: And then on February
24 28th, we'll pick it up and see what -- we'll discuss it
25 with the staff. And you said that you will be here. So

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1 we can have an open discussion. That's why it's a two-day
2 meeting. Plenty of time.

3 MR. PIETRANGELO: All we're asking for is that
4 there ought to be an appropriate balance between the
5 process used to establish the PSA insight and actually
6 using the PSA insight to make improvements.

7 MEMBER APOSTOLAKIS: And I don't think anyone
8 disagrees with that, Tony.

9 MR. PIETRANGELO: Right.

10 MEMBER APOSTOLAKIS: But that's why I want to
11 have something more specific in my hands to understand
12 where the source of your frustration is.

13 MEMBER MILLER: Well, it seems like it's
14 almost like there's a lot of unknown. And, of course, as
15 you do sit here, there is concentration on the, quote,
16 unquote, "process" because we're concentrating on a narrow
17 set of guidelines which are to be taken in the context of
18 a larger set of decisions.

19 I'm only thinking that Tony is reflecting kind
20 of the fear of the unknown. We don't know what's going to
21 happen yet.

22 MEMBER APOSTOLAKIS: Yes.

23 MEMBER MILLER: I'd be interested, for
24 example, to see why are utilities disbanding the PRA
25 organizations. Is that the perception they have that

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1 things are going to get worse or the fact that they have
2 gotten worse?

3 CHAIRMAN SEALE: There are several other
4 interpretations of that, too.

5 MEMBER MILLER: They have to allocate
6 resources and they can't afford to have five people or
7 whatever it is to do that business.

8 CHAIRMAN SEALE: I guess I have to make
9 another observation. A workable way of doing it, a
10 reasonable assessment of the consequences of the PRA
11 analysis, those are certainly appropriate expectations on
12 everyone's part.

13 But there's also the problem of making charges
14 in the licensing basis for the people who apply for these
15 changes, which are successfully judged to not degrade the
16 health and safety of the public.

17 And I think that's a concern that the staff
18 has. They want some, if you will, transparency that
19 they're not giving away the store. And there are an awful
20 lot of people out there who are very concerned that this
21 process might give away the store.

22 And so I think if you had any thoughts on that
23 part of the problem, too, it would be helpful to us
24 because everybody has to succeed before anyone can win in
25 this effort.

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1 MR. PIETRANGELO: Yes. If it's perceived as
2 giving away the store, then we're all losers.

3 CHAIRMAN SEALE: That's right.

4 MEMBER APOSTOLAKIS: That's right.

5 MR. PIETRANGELO: There's no question about
6 that. But that's why I think I'm trying to be so strong
7 about not taking PSA out of context as making it the sole
8 basis because you'll get picked apart in the process if
9 you try to do that.

10 MEMBER APOSTOLAKIS: Now, I realize that you
11 don't have the actual draft guides, but I think the
12 viewgraphs you do have. If you decide to send us this
13 letter, -- and I would really urge you to do that -- I
14 would also like to see the list of your concerns but also
15 can you tell us specifically what you would like to see
16 removed from what they're doing?

17 MR. PIETRANGELO: Specifically, no.

18 MEMBER APOSTOLAKIS: But if you're saying that
19 it's the sole basis for decision, I'm trying to understand
20 what that means because --

21 MR. PIETRANGELO: That we'll never call any
22 chart or number that the staff uses acceptance guidelines
23 or decision criteria. Then I'll start thinking maybe it's
24 not the sole basis.

25 MEMBER APOSTOLAKIS: And I've got to repeat to

1 you that there are at least two pages of discussion in
2 that guide that say, "Don't do that. Don't do that.
3 Don't do that." Okay? So maybe some of your concerns
4 will not be there after you see what they've written. I
5 don't know.

6 MR. PIETRANGELO: I think because of what Dr.
7 Seale said, this has to be looked at from a bigger picture
8 than just PSA.

9 MEMBER APOSTOLAKIS: There is no bigger
10 picture than PSA.

11 (Laughter.)

12 MEMBER SHACK: Unless it's thermal hydraulics.

13 MR. PIETRANGELO: I think the RRG charter is
14 probably the right scope picture, which PSA was one
15 element of that, not just PSA.

16 MEMBER APOSTOLAKIS: Okay. Thank you very
17 much.

18 MEMBER CATTON: I don't think I've heard
19 anything that says that PSA is the sole --

20 MEMBER APOSTOLAKIS: And that's why I'm trying
21 to ask him to put specific things in the letter.

22 MR. PIETRANGELO: Look in your slide package.

23 MEMBER APOSTOLAKIS: Okay. I will.

24 MR. PIETRANGELO: Look in your slide package.

25 MEMBER APOSTOLAKIS: And I would like you to

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1 point me to the place where you feel they're overdoing it.
2 That's all I'm saying. I'm not disagreeing with you. I'm
3 just saying --

4 MR. PIETRANGELO: When you try to use absolute
5 numbers and put it in the context of acceptance,--

6 MEMBER APOSTOLAKIS: And I've got --

7 MR. PIETRANGELO: -- that sounds to me like
8 sole basis.

9 MEMBER APOSTOLAKIS: And I'm guaranteeing to
10 you that these are not absolute numbers. I mean, we've
11 had hours of discussion with the staff --

12 MR. PIETRANGELO: No risk increases for any
13 plant whose core damage frequency is above 10^{-4} .

14 MEMBER APOSTOLAKIS: That's not what the guide
15 says. That's what he said today, but that's not what the
16 guide says. So I would really urge you to send us a note.

17 MR. PIETRANGELO: Okay. Thank you.

18 MEMBER APOSTOLAKIS: Thank you for coming. It
19 was very interesting, Tony, very exciting.

20 And, Mr. Chairman, back to you.

21 CHAIRMAN SEALE: Gee, I'm sorry I missed all
22 of that.

23 Okay. Let's see. Where are we? We are at
24 break time in every sense of the word.

25 (Whereupon, the foregoing matter went off the

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1 record at 10:35 a.m. and went back on the
2 record at 10:49 a.m.)

3 CHAIRMAN SEALE: We'll come back to order.

4 We're going to have a presentation on the AEOD spent fuel
5 pool study. Tom Kress, that's your subcommittee. So I'll
6 turn it over to you.

7 MEMBER KRESS: Thank you, Bob.

8 10) AEOD SPENT FUEL POOL STUDY

9 10.1) REMARKS BY THE SUBCOMMITTEE CHAIRMAN

10 MEMBER KRESS: As you'll recall, we heard
11 earlier from ONRR on a quick look they took at the risk
12 associated with loss of spent fuel pool cooling, but that
13 was a rather quick look. And I think the EDO asked AEOD
14 to take a more in-depth look at the likelihood and
15 consequences associated with loss of spent fuel pool
16 cooling.

17 And we heard earlier about their plans for
18 doing this. And now that they have finished the study,
19 this is a briefing they're going to give us on the study
20 itself and the results and conclusions.

21 I think you have handouts in front of you
22 somewhere.

23 CHAIRMAN SEALE: Yes, right here.

24 MEMBER KRESS: Yes. I wish I could find mine.
25 Here it is.

1 So, Jack Rosenthal, did you want to say some
2 words before --

3 MR. ROSENTHAL: Well, thank you.

4 10.2) BRIEFING BY AND DISCUSSIONS WITH
5 REPRESENTATIVES OF THE OFFICE FOR ANALYSIS AND
6 EVALUATION OF OPERATION DATA

7 MR. ROSENTHAL: Jack Rosenthal, Reactor
8 Analysis Branch at AEOD.

9 Let me just say that the EDO asked AEOD to do
10 an independent look of spent fuel pool cooling. We based
11 our look predominantly on the operating experience because
12 that's our forte.

13 We subsequently did the report. We
14 subsequently briefed the Commission on it; actually, Jose
15 Ibarra, the principal spokesman for the Commission.
16 Actually, Wednesday night, Jose Ibarra and Hal Ornstein of
17 RAB had the opportunity to speak at Waterford, Connecticut
18 to concerned citizens also about spent fuel pool cooling.

19 So, with that, why don't we hear from Jose.

20 (Slide)

21 MR. IBARRA: Good morning. My name is Jose
22 Ibarra, and I am from AEOD.

23 (Slide)

24 MR. IBARRA: Like Jack said, it was about a
25 year ago that the EDO requested that AEOD do an assessment

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1 of likelihood and consequences of losing spent fuel pool
2 cooling. And we formed a team, and we did perform that
3 assessment.

4 The first thing we had to do is deal with the
5 whole issue generically because, as you can imagine, there
6 are 109 plants. And there are about 74 different sites.
7 So we would be dealing with about 74 different
8 configurations.

9 So our first major task was to go ahead and
10 model a pressurized water reactor and boiling water
11 reactor.

12 Then the second major task was to assess 12
13 years. Actually, we assessed over 12 years of operational
14 experience. This involved going over 700 pieces of
15 documents that describe operational events.

16 We also had the opportunity to visit six
17 sites. In these visits, what we wanted to do was to look
18 at the physical configuration of the pool. But also very
19 important to us was to understand the practices and
20 procedures that the licensees were using. We also
21 reviewed the regulations, reviewed the standard review
22 plan, and the applicable regulatory guides.

23 A very important aspect for us was to
24 understand what kind of power supplies were providing
25 power to the spent fuel pool. So we assessed that. We

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1 also were interested in what kind of parameters were being
2 monitored and where those parameters were being monitored.

3 Heat loads were very important to us because
4 you could get to the point of boiling the water off in the
5 pool. And we also wanted to understand the kind of
6 radiation levels you're going to encounter with the
7 decreasing water level.

8 And then one of the final major tasks was to
9 evaluate that risk. We contracted with Idaho National
10 Engineering Lab to assist us on that portion of it.

11 (Slide)

12 MR. IBARRA: This is a model for the
13 pressurized water reactor. What we essentially wanted to
14 do was to capture the important components of a pool.
15 What we have in a pressurized water reactor is you have
16 the vessel in a different building than the pool itself.
17 And this can be very critical information.

18 The important portions here are you have the
19 reactor vessel, the way to transfer the fuel over to the
20 spent fuel pool. The fuel itself would be in racks. And
21 you have over 20 feet of water above that.

22 Typical parameters that are being monitored
23 are temperature level and radiation. You're cooling this
24 area now with the coolant system consisting of the pumps
25 and the heat exchangers. So these we feel were the

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1 important components of the spent fuel pools for a
2 pressurized water reactor.

3 (Slide)

4 MR. IBARRA: Now, for a boiling water reactor,
5 we have basically the same components. But there are some
6 major differences, one of them being that now the reactor
7 vessel and the pool are in the same structure. You also
8 have double gates, instead of single gates.

9 Now, when we're talking about variation in
10 configurations of the industry, some of the number of
11 pumps varies, some of the number of heat exchangers
12 varies, and also the dimensions of the pools vary.

13 (Slide)

14 MR. IBARRA: Like I mentioned before, we
15 evaluated about 700 documents. These are documents that
16 describe spent fuel pool activities and events.

17 We broke our assessment into two basic
18 categories, as you know. How can you lose cooling? You
19 can lose cooling by losing the inventory, and you can lose
20 cooling by losing the ability to cool.

21 What we mean by "loss of inventory" is: What
22 are the different ways you can lose the water? And you
23 can lose it by the connected systems, the gates and seals,
24 the structure and liner. And, once again, these are the
25 major items we had identified in our modeling.

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1 For loss of cooling, you lose the ability to
2 cool if you lose the flow or you lose the heat sink. In
3 looking at 12 years of operational data, we found 38 cases
4 where inventory was lost and 56 cases where cooling was
5 lost.

6 You have another important column here called
7 "Precursors." And these are events that could have led
8 you to the actual but never did. For instance, under
9 "Structure and Liner," we have 35. One of these is a
10 report to us that says that under elevated conditions, the
11 liner could buckle and could lead to loss of inventory.

12 (Slide)

13 MR. IBARRA: This further breakdown of
14 actually some of the details of how you can lose the
15 water, what's important to us here is you can see that
16 most of the problems of losing water occur in
17 configuration control. And we found that to be human
18 error.

19 Also, under "Load Drops," we find 32 cases of
20 scenarios where they actually moved heavy loads over fuel.
21 And that, of course, could cause some damage here and loss
22 of water.

23 These, by the way, are tech spec violations.

24 CHAIRMAN SEALE: And in general involve human
25 error.

1 MR. IBARRA: Yes. It involved human error.
2 even though it's more obvious at this point.

3 CHAIRMAN SEALE: Yes.

4 MEMBER KRESS: The events having to do with
5 the gates and the seals, is that improperly inflated seals
6 or improperly --

7 MR. IBARRA: Some of those things, yes. In
8 fact, later on I'll mention some cases where inflatable
9 seals are the problem.

10 (Slide)

11 MR. IBARRA: We were able to get information
12 in order to be able to plot loss of inventory over how
13 many inches were lost. And what you see here is that
14 there are 10 cases, 8 and 2, here where you do lose or
15 they lost over 12 inches of water.

16 MEMBER KRESS: What significance should we
17 ascribe to amount of level decrease? Is that an indicator
18 that somebody found it right away, the problem, and fixed
19 it or --

20 MR. IBARRA: Well, we'll plot that also
21 because we'll find the duration in my next slide.

22 MEMBER KRESS: Okay.

23 MR. IBARRA: It is important because you do
24 have 20 feet of water. And these would probably not cause
25 problems. But when we're talking about ten feet of water,

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1 then you start encountering some problems here. Radiation
2 levels, you have less time for the water to start boiling.

3 MEMBER KRESS: But these others, lower level
4 losses, could have gone on to that it somebody hadn't done
5 something.

6 MR. IBARRA: Correct, correct, correct. And
7 that's how come my next slide will put duration on there.

8 But talking about these two cases, one of them
9 was Hatch in '86. And that was an inflatable seal
10 problem. And then we have River Bend, a configuration
11 control problem in '87.

12 (Slide)

13 MR. IBARRA: Like you were saying, duration,
14 of course, is important in how soon do you catch and
15 correct that problem. And here we were able to plot how
16 long they lasted before the problems were fixed.

17 Now, this to us is important, this eight
18 hours, because this is a point that water could begin to
19 boil.

20 And these two cases, we have Wolf Creek in
21 '87, a configuration control problem, and the inflatable
22 seal in Hatch in '86.

23 (Slide)

24 MR. IBARRA: This is just more details from
25 the previous slides into what we mean by loss of cooling

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1 flow and loss of heat sink. To us important data that
2 comes out of here is the loss of the pumps. We had 39
3 incidents of loss of pumps. And this is just loss of
4 power to the pumps.

5 MEMBER BARTON: Is that all pumps or just one
6 redundant system?

7 MR. IBARRA: Well, this is the ability to
8 cool. So it would be if they heated two, two would go
9 out. This means that you've lost the ability to cool.
10 But, once again, we have to tie that with how long it took
11 them to correct the problem.

12 What we have with pumps is if you lose power,
13 your coolant is lost. You have to go manually and reload
14 those pumps to the buses.

15 MEMBER BARTON: So I've lost power to both
16 spent fuel pumps 39 times?

17 MR. IBARRA: That's right. That's what it
18 means. And having an extra pump is not going to help you
19 if you don't have power.

20 MEMBER BARTON: I understand that. I just
21 want to make sure you were losing power in both of them,
22 full system.

23 (Slide)

24 MR. IBARRA: And what we're doing here, just
25 like the loss of inventory, we're plotting number of

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1 occurrences. And in this case we're plotting increase in
2 temperature.

3 We have four cases here whose loss of coolant
4 resulted in an increase of about 20 degrees. And we have
5 one here that's 50 degrees, and that was Farley in '93.

6 Now, the pools normally run below 100 degrees.
7 Okay? So even at this case, it wouldn't present a
8 problem. What presents a problem is not capturing it and
9 not fixing it.

10 And we calculated that the frequency of
11 losing coolant that resulted in 20 degrees or more is
12 about 2 to 3 occurrences per 1,000 reactor years.

13 (Slide)

14 MR. IBARRA: Now we're plotting duration. You
15 know, how long does it take to help this cooling?

16 MEMBER KRESS: Help me with the significance
17 of that particular number you just gave us.

18 MR. IBARRA: The significance is that
19 temperatures are increasing at a certain frequency. And
20 what we actually did was took the number of operating
21 years and divided by the actual increase in --

22 MEMBER KRESS: I understand that, but this is
23 frequency of these loss of cooling events that led to a
24 temperature increase of? What did you say?

25 MR. IBARRA: Twenty degrees.

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1 MEMBER KRESS: Twenty degrees or more.

2 MR. IBARRA: Right.

3 MEMBER KRESS: Now, is the significance of
4 that that if you get up to 20 degrees, then the likelihood
5 of stopping it before it went on to boiling is too low or
6 --

7 MR. IBARRA: No.

8 MEMBER KRESS: How am I supposed to deal with
9 that number?

10 MR. IBARRA: It's just a gauge.

11 MEMBER KRESS: It's just a sort of a --

12 MR. IBARRA: It's just a gauge. Like I said,
13 you know, there is a lot of temperature -- it can tolerate
14 a lot of increase in temperature.

15 MEMBER KRESS: Should I treat that number any
16 differently than one that's the frequency of getting up to
17 10 degrees or 15 degrees? Why is that a number that I can
18 use to gauge the significance of these events?

19 MR. IBARRA: That was just a point that we
20 took. There's no significance in there.

21 MEMBER KRESS: I can't interpret that number
22 in terms of potential for it to go on to CDF or something?

23 MR. IBARRA: Right. But we have to actually
24 look at the actual data that we're looking at. And we
25 know, like you said, that it doesn't cause problems here.

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1 Okay? But we are having 16 that fall into that category.

2 MEMBER KRESS: And the reason it didn't go any
3 higher is because somebody found the problem and fixed it?

4 MR. IBARRA: Correct.

5 MEMBER KRESS: So it's kind of a measure of
6 the ability to cover?

7 MR. IBARRA: It could be a measure of how
8 quickly. Yes, right. But the only thing of significance
9 here to me is the 50 degrees. That's a lot. I mean, they
10 should have been able to catch it before it got to that
11 point.

12 MEMBER CATTON: How long did it take to get to
13 that, one of these out on the end?

14 MEMBER BARTON: Greater than 24 hours.

15 MR. IBARRA: Yes. I would have to look that
16 up. That's Farley. That was an isolation, heat exchanger
17 isolation, problem that they had. I can -- Bill, can you
18 look that up?

19 MEMBER CATTON: Did they know about it and
20 just took time to get it fixed or they just flat didn't
21 know?

22 MR. IBARRA: I think in this case they flat
23 didn't know. But I think we can find some of that
24 information.

25 MR. BILL JONES: My name is Bill Jones. I

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1 work in AEOD.

2 That event happened in 1993. And we have a
3 listing for that as a duration of about three hours. They
4 isolated the cooling to the secondary heat exchangers for
5 preplanned maintenance, but there was an error. And they
6 lost cooling to the heat exchangers for about three hours.
7 Temperature rise went up somewhere around 130 to 140
8 degrees.

9 MR. IBARRA: That's the end temperature.

10 MR. BILL JONES: That is the end temperature.
11 That's not the --

12 MR. IBARRA: Right. That's not the delta.

13 MEMBER CATTON: Well, delta is 50.

14 MR. IBARRA: The delta is 50; correct.

15 MEMBER CATTON: In three hours?

16 MR. IBARRA: Right.

17 MEMBER KRESS: Unless they had a full core
18 offload or something.

19 MEMBER CATTON: Fifteen degrees an hour.

20 MR. IBARRA: We'll get to that.

21 MR. BILL JONES: They'd been shut down about
22 11 days, and they did have a full core offload. That's
23 true.

24 MR. IBARRA: And we'll get to full core
25 offloads because, of course, that's very important.

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1 Here what we had is three places where it took
2 over 24 hours to correct the cooling problem. We had
3 Haddam Neck. It was a pump failure. River Bend, it was a
4 configuration control problem; and Seabrook, configuration
5 control problem.

6 (Slide)

7 MR. IBARRA: Now, we did visit six plants.
8 That was North Anna, South Texas project, River Bend, TMI,
9 and Calvert Cliffs. And with that set of plants, that
10 includes all the reactor vendors, small and big
11 architect/engineers and included both single and shared
12 cools and all the big plants. So we feel that we did a
13 cross-section of the industry.

14 We did find a lot of good operating practices.
15 I've listed some of these. Our report has more than this.
16 In one plant, they had a draindown. In fact, it was River
17 Bend.

18 And in the control room there now exists a
19 board in which they go ahead and lay out all of the valve
20 alignments. And that has helped them in trying to prevent
21 that kind of problem. And, like I mentioned before,
22 configuration control is the number one contributor.

23 We also found some plants were using risk
24 analysis in their outage planning. Some licensees are
25 using the classroom and simulator to prepare for the

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1 outage.

2 As far as the analysis is concerned, all the
3 licensees we visited had very good analysis, but not all
4 of them translated that to the operators so they could
5 easily see what was going on. Some did. And then some
6 had a very good program for looking at the industry and
7 looking at their own experience and feeding that back and
8 learning from it.

9 This plant was Susquehanna, where they had
10 almost ten years ago looked at all the different ways that
11 you could lose water in the pool. And they had already
12 identified it. So they did it on their own long before
13 the spent fuel became an issue.

14 MEMBER KRESS: How many plants did you visit?

15 MR. IBARRA: Six.

16 MR. ORNSTEIN: Six stations. It was actually
17 nine plants.

18 MR. IBARRA: Six sites, nine plants. And,
19 like Jack said, Wednesday we had the opportunity to go
20 through Millstone. It's interesting to find out that they
21 also had a draindown, Unit 1. And we go into the control
22 room. We find a chart, all alignment. So everybody has
23 had a problem with draindowns. And that's a very simple
24 thing.

25 MEMBER KRESS: What was your criteria for

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1 deciding which plants to visit?

2 MR. IBARRA: We just wanted to get a
3 cross-section of plants, like I said.

4 MEMBER KRESS: A cross-section of types of
5 spent fuel pool designs or --

6 MR. IBARRA: We wanted to make sure we covered
7 all the reactor vendors, --

8 MEMBER KRESS: Reactor vendors.

9 MR. IBARRA: -- all the new plants, --

10 MEMBER KRESS: I see.

11 MR. IBARRA: -- single and shared. We wanted
12 to visit certain plants, and we weren't allowed to visit
13 them because of scheduling problems. But we picked other
14 plants.

15 Other than just that criteria of making sure
16 it was a cross-section there was nothing.

17 MR. ORNSTEIN: Jose, would you want to say a
18 little bit more -- I'm Hal Ornstein, AEOD.

19 To elaborate a little bit more on what Jose
20 was talking about about the operator aids in the control
21 room, in the case of Millstone One, they had this drawing,
22 which they used grease pencil to indicate what the status
23 was.

24 And prior to doing the actual manipulations,
25 they would go ahead. And several people would make sure

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1 that there were no interferences or conflicts to wind up
2 with fluid pathways that would be a problem.

3 However, we observed in Millstone Two no such
4 situation. And the same was true for Millstone Three. It
5 appears that the utilities or the plants that had specific
6 problems were more sensitized to the issue and had
7 implemented aids of this nature.

8 MR. IBARRA: And we're talking about something
9 very simple, you know, just: What are the alignments?
10 And when there's a procedure or something going on that
11 changes that alignment, the operators go through it,
12 operator aids.

13 (Slide)

14 MR. IBARRA: We looked at the review plan,
15 standard review plan, in 10 CFR 50, Appendix A to the
16 General Design Criteria to find out what's applicable to
17 the spent fuel pools and also identified the regulatory
18 guides to the pool.

19 We wanted to do our own assessment on several
20 things to find out how things stand in the industry. And,
21 like I mentioned before about the power supplies to the
22 spent fuel pool pumps, we determined that about 80 percent
23 of the industry has safety-related power to the pumps.

24 Now, what's important is, of course, if it's
25 safety-related, you have a high assurance that it's going

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1 to be there. But what's more important is for them to
2 have alternate ways to provide power in case you lose it.
3 Those pumps are load shed. And then you have to manually
4 reload them.

5 For instrumentation, we were interested in
6 finding out what parameters were being parameters and
7 where are those parameters being monitored. And they
8 usually monitor temperature level, radiation, flow, and
9 leak detection.

10 What's important here is that a lot of these
11 parameters are grouped into one window in the control
12 room. So when it alarms, you actually have to send
13 somebody to a local panel to find out what was the cause
14 of that alarm. Mainly temperature and levels are
15 sometimes differentiated and separated in the control
16 room.

17 We wanted to find out what kind of levels,
18 radiation levels, you're going to see when the water
19 decreases. And for this, we actually got calculations
20 from the licensees themselves. We just compiled a bunch
21 of the calculations.

22 And, just to give you an example, at one foot
23 with a multiple bundle, you get about 900,000 R per hour.
24 And for a --

25 MEMBER KRESS: Nine hundred thousand R?

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1 MR. IBARRA: Yes, extremely high. I mean, you
2 wouldn't be able to go into the --

3 MEMBER KRESS: You couldn't have a fireman up
4 there pouring in water.

5 MR. IBARRA: Correct. That's right.

6 MR. ROSENTHAL: Excuse me. That's when
7 covered by one foot of water. So you've already boiled
8 down 19 feet. But the only point is to say that you'll
9 have an uninhabitable environment in the spent fuel pool
10 building long before you reach water levels that challenge
11 the actual heat removal from the fuel.

12 MR. IBARRA: Okay. For a single bundle now
13 with 8 and a half feet of water above it, that's 20
14 millirem. And, of course, that's more. You can do more
15 with that now. And the area wouldn't be inaccessible.

16 Very important for us were the heat load
17 calculations. And what comes into play here is how long
18 does it take for the water to boil if you were to lose
19 cooling. And we calculated that for a pressurized water
20 reactor, it would take about 12 hours; for a boiling water
21 reactor, about 7.4 hours.

22 Now, that's to initiate boiling. You still
23 have water in there. To reach the top of the fuel for a
24 pressurized water reactor, you have about 80 more hours;
25 and for a BWR, about 50 more hours. So you have plenty of

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1 time to correct problems.

2 You can see here how come we picked eight
3 hours in some of our calculations, some of the degrees
4 here, to calculate frequencies.

5 (Slide)

6 MR. IBAKRA: Now, what has been happening in
7 the industry is that the refueling outages are getting
8 shorter. And, of course, that's a concern for us because
9 you're putting more heat load or more heat into the spent
10 fuel pool.

11 We were able to get some information from Nine
12 Mile Point Unit 2 to see what's happening in the industry.
13 And it does typify what's been happening. In Outage
14 Number 1, it took them 35 hours to do the offload. But in
15 the last outage, it was like 13 hours.

16 MR. ORNSTEIN: Days.

17 MR. IBARRA: I'm sorry. Days. Yes. Days.
18 I'm sorry.

19 So you can see that it would be a heavier load
20 here.

21 MEMBER KRESS: Is there a significant
22 difference in the decay heat --

23 MR. IBARRA: Yes.

24 MEMBER KRESS: -- between 13 and 35 days?

25 MR. IBARRA: Yes. And, in fact, right here it

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1 shows it.

2 (Slide)

3 MR. IBARRA: Now, that outage that I was
4 talking about, it would take 51 hours -- and these are
5 calculations -- to initiate boiling. But in the last one,
6 they offloaded sooner. And they were down to 24 hours.

7 They have a configuration such that you can
8 put the gates in and out. Of course, if you put them in,
9 you have less water there. But you can see the trend.
10 You have less time now to correct problems.

11 MEMBER KRESS: That means the decay heat level
12 is about twice at the --

13 MR. IBARRA: Well, yes. I would have to look
14 at that. Yes.

15 MEMBER KRESS: And those are all short-lived?

16 (Slide)

17 MR. IBARRA: The task about calculating risk,
18 about three years ago Pacific Northwest Laboratory did an
19 analysis on Susquehanna for NRR. And they wanted to
20 calculate near-boiling frequencies.

21 We looked at that analysis. And we corrected
22 for some of the deficiencies. And then we inputted our
23 own engineering assessments and our own operational data
24 to try to refine some of these numbers.

25 Now, once again, their boiling is the point

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1 that the water would begin to boil. You still have water
2 in there, but it's just the point of initiation of
3 boiling. And what they had calculated for the total
4 near-boiling frequencies we estimate is about two and a
5 half times what they had calculated.

6 Now, this number is the total of a lot of
7 frequencies. And the two dominant ones are the loss of
8 off-site power and the inventory losses. As you can see,
9 for loss of off-site power, we say it's about three times
10 what they have calculated.

11 MEMBER FONTANA: Still, that could look like
12 awfully small numbers considering the experience that you
13 have had.

14 MEMBER KRESS: Did this study input your
15 initiating frequencies that --

16 MR. ORNSTEIN: Yes.

17 MR. IBARRA: Yes.

18 MR. ORNSTEIN: Yes. In fact, when you take a
19 look at the bottom line on inventory losses, there's a
20 dramatic difference which is attributed to the data that
21 we were able to obtain.

22 MR. IBARRA: Like our data showed, there are a
23 lot of losses that had not been accounted for. And, like
24 Hal said, that's 20 times what was previously believed.

25 MEMBER KRESS: Now, at this point,

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1 near-boiling, we haven't lost any water.

2 MR. IBARRA: Right. We have not lost any
3 water. And that's how come -- my next point is that this
4 number, we still believe that it's an order away from
5 causing damage to the fuel because it's small.

6 MEMBER CATTON: Well, you've still got some 40
7 hours or so, don't you?

8 MR. IBARRA: You have a lot of time, yes.

9 MEMBER CATTON: Before you boil it down to the
10 fuel, you've got a lot of time to fix your problem.

11 MR. ORNSTEIN: Now, that's in the case of just
12 a loss of cooling, as opposed to the inventory event,
13 where it's a different story.

14 MEMBER KRESS: That is a different story.
15 You're right.

16 MR. IBARRA: Okay. So, even though -- and, in
17 fact, this number is low, which is good. But we feel that
18 there are a lot of improvements that can be made in this
19 category to reduce that number even more.

20 MEMBER KRESS: Can we assume the containment
21 is open during these events? Generally it's a shutdown
22 case or not?

23 MR. IBARRA: It was --

24 MR. BILL JONES: You really can't assume that.
25 When you move fuel, generally you would have to have the

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1 containment shut. When the fuel is not being moved,
2 what's true is they can be doing a lot of things. And
3 containment could be open.

4 MEMBER KRESS: Could be open?

5 MR. BILL JONES: Could be.

6 (Slide)

7 MR. IBARRA: Now, the Susquehanna analysis
8 done by PNL points out very important items that we agree
9 with. And that is that if you make some small
10 improvements, you can reduce the risk of coming to the
11 boiling point and --

12 MEMBER KRESS: When you say "risk," what do
13 you mean? Reduce those numbers near-boiling frequency or
14 inventory loss or --

15 MR. IBARRA: These numbers would be smaller,
16 which would make that smaller.

17 MEMBER KRESS: Did they actually calculate a
18 core damage frequency?

19 MR. IBARRA: No. They didn't, and we didn't.
20 But this gives you a gauge.

21 MEMBER KRESS: Yes. You can assume it's lower
22 than that.

23 MR. IBARRA: Right.

24 MR. ORNSTEIN: Basically it was an estimate.
25 It was a rule of thumb. It was a very imprecise

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1 evaluation. And it was believed that it would be a factor
2 of 1,000 between getting to the point of near-boiling
3 until you actually do damage fuel.

4 But the concern is that that type of
5 assessment is truly unreliable because you then get to a
6 point of many plant-specific things that could be done.
7 And it's really a big question.

8 Basically, the perception is the likelihood of
9 the event driving towards damage is quite low relative to
10 normal at-reactor-power events.

11 MEMBER KRESS: Given that as a conclusion, are
12 you still deciding that there ought to be some
13 improvements made?

14 MR. IBARRA: Yes. Let me continue. One more
15 thing about Susquehanna. Susquehanna has two reactors
16 with a shared spent fuel pool. Actually, the spent fuel
17 pools could be connected. And when you're connected and
18 you're refueling and one of the pools that's refueling
19 boils, you can effect the operating unit. That's very
20 important, very important to consider.

21 (Slide)

22 MR. IBARRA: Now, getting into our findings
23 and conclusions, after looking at 12 years of operational
24 experience, we see that the actual consequences have not
25 been severe.

1 MEMBER KRESS: It's because you haven't seen
2 any consequences; right?

3 MR. IBARRA: Because we have not seen
4 consequences. And you know the events have occurred and
5 what has happened.

6 MEMBER KRESS: Okay.

7 MR. IBARRA: That has been mostly due to
8 configuration control. That's the human element. And,
9 like we just mentioned, the relative risk of fuel damage
10 is low compared with the reactor.

11 MEMBER CATTON: It's even less than that,
12 isn't it? The consequences of actual events have not been
13 severe? There have been no consequences, have there?

14 MR. IBARRA: Well, yes. You might --

15 MEMBER CATTON: It looks like you never boiled
16 the pool.

17 MR. IBARRA: We were looking -- our assessment
18 is what happens when you lose cooling. And we've lost
19 cooling.

20 MEMBER CATTON: Okay. So what is this
21 consequence?

22 MR. ROSSI: Well, I think what he's talking
23 about is there have been consequences of heating up the
24 pool some number of degrees or dropping the level down.
25 And those are consequences from events that you would

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1 prefer not to occur, but they're clearly not severe.

2 I'm Ernie Rossi. I'm from AEOD also.

3 MEMBER CATTON: I think I would have used the
4 word "trivial," but --

5 MR. ORNSTEIN: Well, on the other hand, there
6 have been cases where there were radiological releases
7 from the pool into the pool area. And if you are a
8 worker, it might have been considered consequential by
9 you.

10 MR. IBARRA: We calculated -- and these are
11 calculations from operating experience -- that the loss of
12 coolant over one foot is about one occurrence per 100
13 reactor years. And the loss of coolant that results in
14 greater than 20 degrees is about 2 to 3 occurrences in
15 1,000 reactor years.

16 MEMBER FONTANA: That's from experience?

17 MR. IBARRA: From experience.

18 MEMBER KRESS: Yes.

19 MEMBER FONTANA: Well, that's what gives me a
20 problem with your 5 times 10^{-5} on the other one because if
21 you add these 2 together, you get something like 30 out of
22 12 or 13 per 1,000 reactor years.

23 MR. ROSSI: But I think the other one was all
24 the way up to near boiling.

25 MEMBER FONTANA: Yes, I understand. I

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1 understand. But the difference between this number and
2 one out of 50,000 is some intervening action that keeps it
3 from going the rest of the way. Is that realistic?

4 MR. ORNSTEIN: Well, there's something that I
5 think you may not be focusing on. What you see on this
6 chart on the findings and conclusions, that's as a result
7 of review, 700 different events.

8 Now, the previous chart that you saw was that
9 which was done for Susquehanna plants specifically. It
10 was not the general overall operational experience
11 database. And this is sort of getting to the point that
12 we have a better feel for the specifics at Susquehanna,
13 and we have a feel for the overall industry on experience.
14 But there's a great deal of uncertainty as to all of the
15 other plants being in the same boat.

16 It's hard to go ahead and do a generic study
17 and have a direct plant-specific application. I think
18 you're starting to see this type of thing occurring.

19 MEMBER KRESS: So that third bullet really
20 only refers to Susquehanna?

21 MR. ORNSTEIN: The analysis that was done with
22 the figures on the previous slide, yes.

23 MR. IBARRA: Yes.

24 MEMBER KRESS: And in that Susquehanna study,
25 you did feed these numbers in as an input?

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1 MR. IBARRA: Correct, correct. And that's how
2 come you see the differences in how many inventory losses
3 and loss of off-site power.

4 So, as has been mentioned, the likelihood is
5 small. And the consequences are not that great or not
6 that grave, I should say. But we still feel that there is
7 a lot of room for improvement. And you would reduce the
8 risk even further.

9 MEMBER KRESS: Are these improvements
10 voluntary? Are they backfits or suggestions or --

11 MR. IBARRA: Well, we still are talking about
12 that to NRR that would implement them. And my final slide
13 talks a little bit about that.

14 MEMBER KRESS: Okay.

15 (Slide)

16 MR. IBARRA: But surely, as we saw,
17 configuration control is the number one contributor to
18 some of these events. And if you improve that, you can
19 mitigate or even stop the events from happening. Like the
20 Susquehanna scenario, when you have multi-unit sites,
21 there is the potential of one boiling affecting the other
22 unit.

23 And then for response, like I mentioned, the
24 outages are getting shorter. And they're going to have to
25 start paying attention to the boiling times.

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1 Training procedures can need improvement. Of
2 course, the better trained the operators are, the better
3 off you're going to be in being able to reduce the risk.

4 And, like I talked about in our assessment of
5 instrumentation and power, we feel that those can be
6 improved. The more information that you're able to give
7 the operator, the better off he's going to be able to cut
8 the event short.

9 Power supplies. They need to look at
10 alternate means of supplying power in case they lose the
11 main power source.

12 (Slide)

13 MR. IBARRA: Now, for follow-up, what has
14 happened to our report? Our report was finished in
15 September of last year. We did brief the Commission on
16 November 14th. We are presently working on an information
17 notice. And we are going to turn our assessment into a
18 NUREG. This I would expect in the next month or so.

19 We're also letting the international community
20 know about our assessment. We did use some of their data,
21 not in our own analysis, but to see how they relate to us.
22 And they're consistent with our findings.

23 Then we are working with NRR on trying to find
24 out what's going to happen to some of the recommendations
25 that we're proposing.

1 MEMBER KRESS: Will they need to be subjected
2 to regulatory analysis, do you think?

3 MR. IBARRA: Yes.

4 MR. ROSSI: Well, let me say a couple of
5 things. First of all, we're going to send an information
6 notice out to make all of the utilities aware of the
7 findings of our study, including the possible things that
8 can be done to reduce the probability of having any severe
9 events.

10 And these are relatively easy things to
11 implement. They are things like training, better
12 configuration control, using diagrams in the control room,
13 that kind of thing. So the information notice will not
14 require any actions. But we would prefer or we would
15 assume that a prudent utility would do the things that are
16 fairly straightforward and inexpensive to do to reduce the
17 likelihood of these kinds of events.

18 And, as Jose indicated, we'll be working with
19 NRR on whether there are things that need to go to the
20 CRGR and be required of people.

21 MR. IBARRA: When we had the opportunity to go
22 to Millstone, they were very interested in seeing what we
23 had to say about their units. And I think the visit to
24 Millstone, at least in my mind, validated what our
25 findings were because, like I mentioned before, they had a

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1 draindown. And, all of a sudden, you find visual aids in
2 the control room.

3 We had seen that. In fact, we're saying
4 that's a good thing to have visual aids for the operator.

5 MEMBER KRESS: It seems to me like your study
6 has shown that there's a good probability that this is a
7 low-risk event but that there may be some specific
8 plant-specific problems out there that could be relatively
9 easily fixed and that based on the study you put out an
10 information notice that passes that information along to
11 the right people.

12 And now you're looking at the possibility of
13 maybe requiring some of those things by going through NRR.
14 And that may or may not be a backfit or may or may not
15 require reg analysis.

16 Is that right?

17 MR. ROSENTHAL: Our work with NRR would be
18 subject to reg analysis and formal backfit. And we would
19 go through CRGR. And it's very hard to make a
20 cost-beneficial argument or even a large incremental risk
21 argument because we believe that the risks are low.

22 One of the purposes of the whole study was to
23 do an independent study. There was a lot of interest in
24 this area and to --

25 MEMBER KRESS: Independent like what?

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1 MR. ROSENTHAL: Independent of NRR,
2 independent of the licensees. We just set some people
3 aside to look at the data and to try to factually present
4 what we have.

5 And we believe that the risks are low, but we
6 think that there could be some vulnerabilities out there.
7 It would be prudent to have the individual licensees look
8 at them. And in certain selected cases, depending on what
9 instrumentation they have, it may pay for them to upgrade
10 subject to the backfit. I think it's a very measured
11 response that we're trying to get.

12 MR. IBARRA: Some utilities for the operator
13 now, the operator in the control room, he has no
14 indication of what's happening out there because it's not
15 continuous information coming to him. He knows when
16 there's a problem when the alarm goes off.

17 We're coming from the point as: How come he
18 doesn't know what's happening all the time? How come you
19 can't have an analog instrument so you can see the trend
20 and fix the problem before it becomes more critical?

21 Okay. That's all we're saying. The more
22 information you have, the better off you're going to be.

23 MR. ROSENTHAL: Dr. Kress, for example, there
24 is one plant in which they didn't have the holes drilled
25 in the vacuum breakers. There's another plant in which

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1 they had drilled the holes in the vacuum breakers and,
2 because they're going through some other evolution, some
3 years before had plugged those holes so that the vacuum
4 breakers weren't operable.

5 I mean, that's a basic precept of this pool.
6 And that is that you suck the water in and out from the
7 top. So you make sure it's there. And the vacuum
8 breakers ought to be operable. Maybe somebody needs to go
9 over to the side of the pool and put their finger down
10 there and see that there's a hole there.

11 MEMBER KRESS: See if that hole is --

12 MR. ROSENTHAL: Now, we may not be able to
13 make a cost-benefit argument that people should do this,
14 but there's a certain amount of prudence and pragmatism
15 that goes with at least informing people.

16 And I think we're dealing with honest brokers.
17 When we put the information out, I think most people, most
18 licensees, are concerned people and I think, given that
19 NUREG, will take it to heart.

20 MEMBER KRESS: Are there any plans for a
21 follow-on look later on to --

22 MR. ROSENTHAL: With NRR in the course of --
23 you know there's a proposal to add shutdown pool cooling
24 to the proposed rule on shutdown. And there would be a
25 proposal there to openly develop SRP and reg guide. But

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1 it's in the very formative stages. And then there would
2 be some associated inspection of those plants that are
3 considered most vulnerable because of their geometry.

4 But we would do all of that through NRR, but
5 I'm sure we'll be supportive of them.

6 MR. IBARRA: We have had an impact, though, on
7 the current site-specific inspections that NRR is doing.
8 And then I think they've added cavity seals, which were
9 not considered before. And that's a precursor to a big
10 problem if they were to lose water.

11 So we have had some influence. And, like I
12 said, we've had a lot of calls from the utility people
13 actually wanting information on what we found. I think it
14 would be useful to the industry.

15 MEMBER FONTANA: Just out of curiosity, how
16 old does the fuel have to be to be cooled by a national
17 circulation of water? And how old does it have to be
18 before it can be just air cooled? Just curious.

19 MR. IBARRA: I don't know that. Hal?

20 MEMBER KRESS: To keep the plant below 1,200
21 degrees would be --

22 MR. ORNSTEIN: I don't want to give you a
23 guess.

24 MEMBER FONTANA: I was just curious.

25 MR. IBARRA: That's all I have.

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1 MEMBER KRESS: Well, thank you. It's been
2 very useful and very, very good.

3 Do any of the other member. . . to --

4 VICE CHAIRMAN POWERS: I wondered if in the
5 course of doing your surveys that you had given a
6 prospective look at the consequences of trying to store
7 high burn-up fuel in the pools.

8 MR. IBARRA: No.

9 MEMBER KRESS: The decay heat of high burn-up
10 fuel ought to almost be linear after it loses the
11 short-lived.

12 VICE CHAIRMAN POWERS: I'm not so concerned
13 about decay heat because I think we have the procedures
14 for handling that. And people understand that very well.

15 MEMBER KRESS: You can calculate that. And
16 you'll know what that is. Yes.

17 VICE CHAIRMAN POWERS: And the tools are set
18 up for doing that, but I --

19 MEMBER KRESS: Except these numbers that they
20 use for a gauge of risk are dependent on the decay heat.

21 MR. IBARRA: That's correct.

22 VICE CHAIRMAN POWERS: What I am more
23 concerned about is that we have clad that's hydriding.
24 Hydrides usually are fairly incompatible with water.

25 MEMBER KRESS: Usually.

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1 VICE CHAIRMAN POWERS: We have clad that is
2 extremely embrittled. Handling accidents, fragmenting the
3 fuel, leeching fuel suddenly become much more probable
4 types of events.

5 MEMBER KRESS: You're likely to increase the
6 handling problems and the normal levels of radiation in
7 the pool and that sort of problem, as opposed, I think, to
8 increasing the loss of spent fuel pool risk would be my
9 guess, even though I think you may have a higher decay
10 heat, which would --

11 VICE CHAIRMAN POWERS: You may have a higher
12 hydrogen problem.

13 MEMBER KRESS: More hydrogen. Hydrogen may be
14 a problem. Okay.

15 Any other questions?

16 (No response.)

17 MEMBER KRESS: Well, we thank you, then. And
18 I'll turn the program back over to the Vice Chairman, Dr.
19 Powers. Where are we on this?

20 VICE CHAIRMAN POWERS: We are substantially
21 ahead of schedule.

22 MEMBER KRESS: Oh, wonderful.

23 VICE CHAIRMAN POWERS: I will not congratulate
24 Dr. Kress. I will criticize him for poor planning.

25 (Laughter.)

1 MEMBER FONTANA: Can't win either way, can
2 you?

3 VICE CHAIRMAN POWERS: That's right.

4 MEMBER KRESS: Well, we'll break for lunch
5 early. We can go back and do some work.

6 VICE CHAIRMAN POWERS: We are early enough I
7 think we would be remiss not to take advantage of this
8 time.

9 MEMBER KRESS: I've got some things I can do
10 with it, yes, like write letters.

11 (Whereupon, the foregoing matter was concluded
12 at 11:41 a.m.)

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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: 438TH 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
438TH ACRS MEETING, FEBRUARY 6-8, 1997

THE MEETING WILL NOW COME TO ORDER. THIS IS THE SECOND DAY OF THE 438TH MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS. DURING TODAY'S MEETING, THE COMMITTEE WILL CONSIDER THE FOLLOWING:

- (1) RISK-INFORMED, PERFORMANCE-BASED REGULATION AND RELATED MATTERS
- (2) RESULTS OF THE STUDY PERFORMED BY AEOD ON THE CONSEQUENCES OF AN EXTENDED LOSS OF SPENT FUEL POOL COOLING
- (3) PROPOSED ACRS REPORTS

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.



*United States
Nuclear Regulatory Commission*

REGULATORY GUIDES AND STANDARD REVIEW PLANS IN SUPPORT OF RISK INFORMED REGULATION

PRESENTATION TO ACRS FULL COMMITTEE FEBRUARY 7, 1997

**Gary Holahan, NRR (415-2884)
Thomas King, RES (415-5790)
Robert Jones, NRR (415-2198)
Mark Cunningham, RES (415-6189)**

INTRODUCTION

- **DRAFT REGULATORY GUIDES (RGs) AND STANDARD REVIEW PLANS (SRPs) HAVE BEEN PREPARED TO HELP IMPLEMENT THE COMMISSION'S AUGUST 1995 POLICY ON THE USE OF RISK INFORMATION IN THE REGULATORY PROCESS:**
 - **FOR REACTOR LICENSEES**
 - **FOR PLANT SPECIFIC CHANGES TO A PLANT'S CURRENT LICENSING BASIS (CLB).**
- **OBJECTIVES OF RGs/SRPs:**
 - **DESCRIBE OVERALL APPROACH/EXPECTATIONS/PROCESS**
 - **PROVIDE PRINCIPLES AND GUIDANCE FOR DETERMINISTIC AND PROBABILISTIC ANALYSIS AND INTEGRATED DECISION MAKING**
 - **DESCRIBE PERFORMANCE BASED IMPLEMENTATION STRATEGY**
 - **PROVIDE GUIDANCE ON INFORMATION THAT SHOULD BE SUBMITTED FOR REVIEW.**
- **USE OF RG/SRPs IS VOLUNTARY FOR LICENSEES**

INTRODUCTION (CONT)

- **SCOPE OF RGs/SRPs:**
 - **GENERAL GUIDANCE (DG-1061 + SRP)**
 - **APPLICATION SPECIFIC GUIDANCE**
 - **IN-SERVICE TESTING (DG-1062 + SRP)**
 - **TECHNICAL SPECIFICATIONS (DG-1065 + SRP)**
 - **GRADED QA (RG ONLY) DG-1064)**
 - **IN-SERVICE INSPECTION (ON A LATER SCHEDULE)**
 - **SUPPORTING DOCUMENT:**
 - **NUREG-1602 - INFORMATION ON SCOPE AND QUALITY OF PRA ANALYSES**

INTRODUCTION (CONT)

- **STATUS OF RGs/SRPs:**
 - **FINAL DRAFTS FOR ACRS REVIEW:**
 - **GENERAL RG/SRP (MINUS APPENDICES) - DRAFTS PROVIDED MID-JANUARY**
 - **APPLICATION SPECIFIC RGs/SRPs AND GENERAL RG/SRP APPENDICES - DRAFTS PROVIDED FEBRUARY 7, 1997**
- **PURPOSE OF TODAY'S STAFF PRESENTATION:**
 - **UPDATE ACRS ON CHANGES MADE TO GENERAL RG/SRP AS A RESULT OF NRC STAFF/MANAGEMENT REVIEW SUBSEQUENT TO LAST MEETING**
 - **RESPOND TO SPECIFIC QUESTIONS RAISED AT THE JANUARY 28, 1997, ACRS SUBCOMMITTEE MEETING**
 - **SOLICIT FEEDBACK FROM ACRS MEMBERS ON OVERALL APPROACH/GUIDELINES**
 - **NO LETTER REQUESTED AT THIS TIME**

SCHEDULE

- FEB 20-21, 1997
- ACRS SUBCOMM ON PRA - REVIEW OF
GENERAL RG APPENDICES AND
APPLICATION SPECIFIC RGs/SRPs
- MARCH 6 OR 7, 1997
- ACRS FULL COMMITTEE - STAFF
PRESENTATION ON APPLICATION
SPECIFIC RG/SRP
- MARCH 14, 1997
- ACRS LETTER
- MARCH 24, 1997
- PACKAGE TO EDO
- MARCH 31, 1997
- PACKAGE TO COMMISSION

JANUARY 22, 1997 SRM

- **STAFF PRESENTED FOUR POLICY ISSUES, OPTIONS AND RECOMMENDATIONS IN AN OCTOBER 11, 1996, SECY PAPER**
- **1/22/97 SRM PROVIDES COMMISSION GUIDANCE ON POLICY ISSUES:**
 - **PERFORMANCE BASED REGULATION**
 - **USE OF SAFETY GOALS FOR PLANT SPECIFIC APPLICATION**
 - **RISK NEUTRAL VS. RISK INCREASE**
 - **APPROVE ACCEPTABLE ALTERNATIVES FOR ISI UNDER 10 CFR 50.55A**

MAJOR CHANGES IN GENERAL RG/SRP

- EMPHASIS ADDED ON OVERALL EXPECTATION OF IMPROVED SAFETY BY COMPREHENSIVE CONSIDERATION OF RISK INFORMATION
 - RISK REDUCTION
 - BURDEN REDUCTION
 - CUMULATIVE IMPACT OF CHANGES IN RISK
- SAFETY GOAL SUBSIDIARY OBJECTIVES DEFINE INSIGNIFICANT RISK. CHANGES IN RISK BELOW THOSE VALUES ARE CONSIDERED "SMALL"
- REMOVED FIGURES OF CDF vs. Δ CDF AND LERF vs. Δ LERF REGIONS DEFINED WHERE:
 - CALCULATED RISK INCREASES ARE NOT ACCEPTABLE ($\text{CDF} > 10^{-4}$; $\text{LERF} > 10^{-5}/\text{RY}$)
 - CALCULATED RISK INCREASES ARE LIKELY TO BE ACCEPTABLE ($\text{CDF} < 10^{-5}/\text{RY}$; $\text{LERF} < 10^{-6}$)
 - CALCULATED RISK INCREASES WILL RECEIVE INCREASED MANAGEMENT ATTENTION WHEN IN THE RANGE $10^{-5}/\text{RY}$ - $10^{-4}/\text{RY}$ CDF; $10^{-6}/\text{RY}$ - $10^{-5}/\text{RY}$ LERF
- EXPANDED DISCUSSION OF UNCERTAINTIES
- UPDATING APPENDICES

OVERALL APPROACH

- **DEFINE PROPOSED CHANGE**
- **DEMONSTRATE THAT CERTAIN FUNDAMENTAL SAFETY PRINCIPLES ARE MET:**
 - **MEET REGULATIONS (OR PROPOSE A CHANGE/EXEMPTION)**
 - **MAINTAIN DEFENSE-IN-DEPTH**
 - **MAINTAIN SUFFICIENT SAFETY MARGIN**
 - **NO SIGNIFICANT INCREASES IN RISK TO PUBLIC HEALTH AND SAFETY**
 - **IMPLEMENT UTILIZING PERFORMANCE BASED MONITORING AND FEEDBACK STRATEGIES**
- **EXPECTATIONS ON IMPLEMENTATION:**
 - **ASSESS ALL SAFETY IMPACTS**
 - **SCOPE OF ANALYSIS SUPPORTING THE CHANGE SHOULD COVER ALL SSCs, OPERATING MODES, INITIATORS AFFECTED BY THE CHANGE AND REFLECT THE AS BUILT, AS OPERATED PLANT**

OVERALL APPROACH (CONT)

- **SUBSIDIARY OBJECTIVES OF COMMISSION'S SAFETY GOAL POLICY USED TO DEFINE BENCHMARK RISK LEVELS FOR DECISION MAKING:**
 - $10^{-4}/\text{RY}$ - CORE DAMAGE FREQUENCY (CDF)
 - $10^{-5}/\text{RY}$ - LARGE EARLY RELEASE FREQUENCY (LERF)
- **PROPOSED CLB CHANGES SHOULD BE MADE IN SMALL INCREMENTS (<10% OF BENCHMARK CDF/LERF VALUES) AND WHEN WITHIN A FACTOR OF 10 OF THE BENCHMARK VALUES, THE MORE ANALYSIS AND MANAGEMENT REVIEW WILL BE NECESSARY.**
- **PERFORM UNCERTAINTY/SENSITIVITY ANALYSIS APPROPRIATE FOR PROPOSED CHANGE**
- **PERFORM QUALITY ANALYSES AND MAKE IT AVAILABLE FOR PUBLIC REVIEW**
- **PERFORMANCE MUST BE MONITORED TO HELP VERIFY KEY ASSUMPTIONS AND CHECK AREAS OF LARGE UNCERTAINTY**
- **DOCUMENTATION**

TOPICS RAISED BY ACRS SUBCOMMITTEE ON PRA
FOR DISCUSSION WITH FULL COMMITTEE

- **GUIDELINES ON USE OF DEFENSE-IN-DEPTH**
- **HOW TO MAINTAIN SUFFICIENT SAFETY MARGIN**
- **PLANT SPECIFIC LERF**
- **TREATMENT OF TEMPORARY CHANGES IN RISK**
- **IMPACT OF PILOT PROGRAMS**
- **PEER REVIEW/EXPERT PANEL**

DEFENSE-IN-DEPTH

- **GUIDELINES FOR MAINTAINING DEFENSE-IN-DEPTH:**
 - **A REASONABLE BALANCE AMONG PREVENTION OF CORE DAMAGE, PREVENTION OF CONTAINMENT FAILURE, AND CONSEQUENCE MITIGATION IS PRESERVED**
 - **OVER-RELIANCE ON PROGRAMMATIC ACTIVITIES TO COMPENSATE FOR WEAKNESSES IN PLANT DESIGN IS AVOIDED**
 - **SYSTEM REDUNDANCY, INDEPENDENCE, AND DIVERSITY ARE MAINTAINED COMMENSURATE WITH THE EXPECTED FREQUENCY AND CONSEQUENCES OF CHALLENGES TO THE SYSTEM (E.G., NO RISK OUTLIERS)**
 - **DEFENSES AGAINST POTENTIAL COMMON CAUSE FAILURES ARE MAINTAINED AND THE INTRODUCTION OF NEW COMMON CAUSE FAILURE MECHANISMS IS AVOIDED**
 - **INDEPENDENCE OF BARRIERS IS NOT DEGRADED**
 - **DEFENSES AGAINST HUMAN ERRORS ARE MAINTAINED**

DEFENSE-IN-DEPTH (CONT)

- **GUIDELINES FOR APPLICATION OF DEFENSE-IN-DEPTH:**
 - **RELY ON TRADITIONAL ENGINEERING JUDGMENT FOR AREAS OF LARGE UNCERTAINTY OR AREAS NOT COVERED BY RISK ANALYSIS**
 - **USE RISK INSIGHTS, WHERE SUPPORTED BY APPROPRIATE RISK ANALYSES, TO HELP GUIDE APPLICATION OF DID AND PROVIDE BASES FOR DEMONSTRATING DID IS MAINTAINED**

SAFETY MARGINS

- **GUIDELINES FOR MAINTAINING SUFFICIENT SAFETY MARGINS:**
 - **CODES AND STANDARDS OR ALTERNATIVES APPROVED FOR USE BY THE NRC ARE MET**
 - **SAFETY ANALYSIS ACCEPTANCE CRITERIA IN THE CURRENT LICENSING BASIS (E.G., FSAR, SUPPORTING ANALYSES) ARE MET, OR PROPOSED REVISIONS PROVIDE SUFFICIENT MARGIN TO ACCOUNT FOR ANALYSIS AND DATA UNCERTAINTY**
- **MARGINS CAN BE MEASURED BY:**
 - **DETERMINISTIC CRITERIA**
 - **RISK ASSESSMENT**

PLANT SPECIFIC LERF

- A VALUE OF 10^{-5} /RY IS RECOMMENDED AT THE BENCHMARK LERF GUIDELINE, ALONG WITH A REGION OF INCREASED MANAGEMENT ATTENTION WHEN LERF IS IN THE RANGE 10^{-6} - 10^{-5} /RY.
 - BASED UPON PROVIDING REASONABLE ASSURANCE THAT SAFETY GOAL QHO'S ARE MET, WITHOUT BEING A DEFACTO NEW GOAL
 - CONSISTENT WITH PREVIOUS ANALYSIS OF SUGGESTED 10^{-6} /RY LARGE RELEASE GUIDELINE
 - CONSISTENT WITH 10^{-4} /RY CDF AND 0.1 CCFP SAFETY GOAL SUBSIDIARY OBJECTIVES
- SINGLE VALUE CHOSEN TO:
 - ALLOW USE OF LEVEL 1 AND 2 PRA ONLY
 - AVOID UNCERTAINTY ASSOCIATED WITH LEVEL 3 ANALYSIS
 - BE CONSISTENT WITH PREVIOUS COMMISSION DIRECTION TO DECOUPLE SITING FROM PLANT DESIGN
 - PROVIDE UNIFORM AND CONSISTENT GUIDELINES TO ALL PLANTS

TREATMENT OF TEMPORARY CHANGES IN RISK

- GENERAL RG/SRP PROVIDE GUIDELINES ON CHANGES IN CDF/LERF IN TERMS OF ANNUAL AVERAGE VALUE
- RG/SRP ON TECHNICAL SPECIFICATIONS PROVIDES ADDITIONAL GUIDELINES FOR ASSESSING ALLOWABLE OUTAGE TIMES (AOTs), SINCE AOTs ARE BY THEIR NATURE TEMPORARY CONDITIONS.
- THESE GUIDELINES ARE STATED IN TERMS OF PROBABILITY (FREQUENCY TIMES AOT) FOR THE AOT PERIOD:
 - CORE DAMAGE PROBABILITY $<5 \times 10^{-7}$
 - LARGE EARLY RELEASE PROBABILITY $<5 \times 10^{-8}$
- THESE GUIDELINES ARE APPLIED IN ADDITION TO THE GUIDELINES ON ANNUAL AVERAGE CDF/LERF CONTAINED IN THE GENERAL RG/SRP.
- AS AN EXAMPLE, THESE GUIDELINES CORRESPOND TO A TEMPORARY CDF OF 10^{-3} /RY FOR A 5 HR AOT PERIOD.
- FEDERAL REGISTER NOTICE WILL SOLICIT INPUT ON WHETHER ADDITIONAL GUIDANCE ON TEMPORARY CHANGES IN CDF/LERF ARE DESIRABLE AND, IF SO, WHAT THOSE SHOULD BE.

IMPACT OF PILOT PROGRAMS

- PILOTS UNDERWAY IN ALL FOUR APPLICATION SPECIFIC AREAS
- RGS/SRPs HAVE BEEN IMPACTED BY THE PILOTS BY:
 - TESTING THE GUIDANCE BEING DEVELOPED FOR APPLICABILITY AND PRACTICALITY
 - IDENTIFYING ISSUES THAT NEED ATTENTION
- PILOTS HAVE BEEN IMPACTED BY RG/SRP DEVELOPMENT BY:
 - PROMPTING QUESTIONS BASED UPON THE GUIDANCE BEING DEVELOPED
- DUE TO THE EVOLVING NATURE OF THE RGS/SRPs, ADDITIONAL INTERACTION AND FEEDBACK REMAINS.

PEER REVIEW/EXPERT PANEL

- PEER REVIEW - ONE ACCEPTABLE WAY FOR LICENSEES TO ENSURE QUALITY OF PRA
 - MENTIONED IN RGs/SRPs AS AN EXAMPLE
 - DISCUSSED IN DRAFT NUREG-1602 (APPENDIX):
 - PURPOSE
 - MEMBERSHIP/QUALIFICATION
 - REVIEW PROCESS
 - DOCUMENTATION
- EXPERT PANEL - ONE ACCEPTABLE WAY FOR LICENSEES TO IMPLEMENT INTEGRATED DECISION PROCESS
 - MENTIONED IN GENERAL RG AS AN EXAMPLE
 - DISCUSSED IN DRAFT GENERAL SRP (APPENDIX). STAFF REVIEW SHOULD DETERMINE THAT:
 - PANEL'S EVALUATION REPRESENTS APPROPRIATE CONSIDERATION OF PRA, TRADITIONAL ENGINEERING, SENSITIVITY STUDIES, OPERATIONAL EXPERIENCE, ENGINEERING JUDGMENT AND CURRENT REGULATORY REQUIREMENTS
 - PANEL MEMBERSHIP HAD APPROPRIATE COMPETENCE IN PERTINENT DISCIPLINES, EXPERIENCE AND TRAINING

**Advisory Committee on Reactor Safeguards
February 7, 1997**

**Observations on
Risk-Informed Regulatory Activities**

Tony Pietrangelo
Director, Licensing
Nuclear Energy Institute



First Principles

- Risk-informed initiatives should improve the focus of attention and resources commensurate with safety
 - PSA provides one additional input to the decision-making process
 - **NOT** the sole basis for decisions
 - PSA insights should be complementary, not supplementary
 - Benefits (in safety or efficiency) of using PSA must outweigh the burden
 - Recognition of PSA limitations
-

Practical Use of PSA

- Industry must recognize that PSA is our tool and accept responsibility for its proper use and application
- Significant industry efforts underway to establish peer review process to demonstrate PSA quality and certification for applications
- Regulatory applications must be simple, straightforward, and must use PSA insights in the proper context

Observations

- Progress is being made on the technical issues

However

- Assumption appears to be made by NRC staff that risk-informed regulation will require numerous submittals by licensees
 - PSA is a tool to augment and complement CLB change process
 - As a comparison, design changes can already be made without NRC staff advance approval under 10 CFR 50.59

Observations (Continued)

- NRC activities appear to be focusing on process of PSA rather than on using the insights
 - Process and level of detail in draft NRC Reg Guides and SRP (to the extent known) appear to be potentially burdensome
 - Need to ensure practical process commensurate with simple and straightforward applications as a starting point
 - Methods, data and understanding will evolve and improve over time if practical applications are demonstrated
-

Observations (Continued)

- Need to develop review process and guidance that encourages, rather than discourages, use of PSA
- Treat as evolutionary, not revolutionary
- Caution with respect to “acceptance criteria” based on absolute figures of merit

Conclusions

- Industry has significant investment in PSA
- It is in interest of industry and NRC to maintain momentum
 - Industry has implemented many voluntary improvements on basis of PSA insights
 - Expectation has been that PSA will also provide a basis for regulatory improvement where appropriate

Conclusions (Continued)

- Use of PSA is “market driven”
 - Some utilities already disbanding PRA organizations
 - We believe needs of NRC can be accommodated and at the same time a workable and practical process can be developed
 - Industry comments will focus on these areas
 - PSA is a means to an end, not an end in itself
-



ASSESSMENT OF SPENT FUEL COOLING

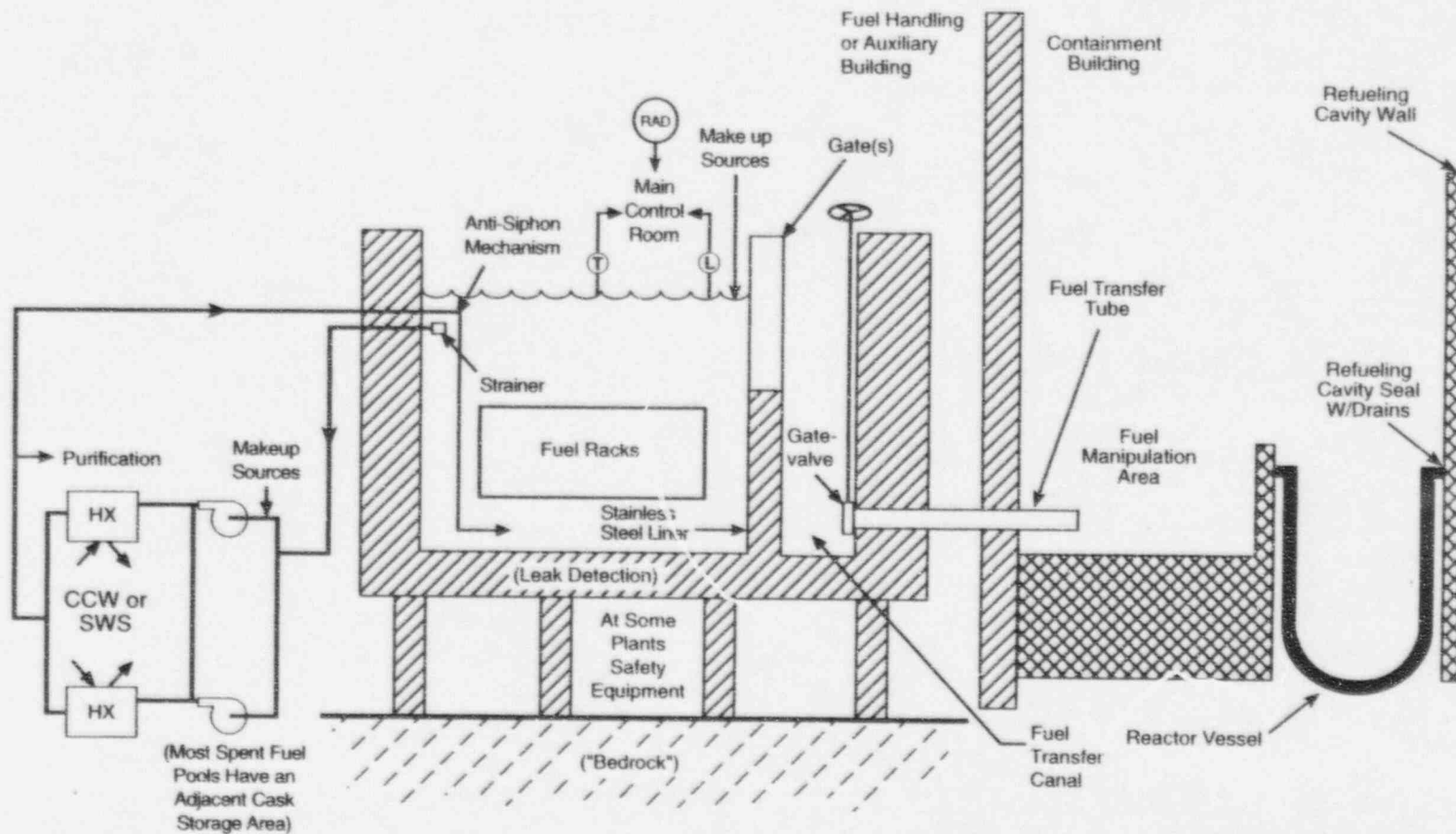
Jose G. Ibarra
Reactor Analysis Branch
Safety Programs Division
Office for Analysis and Evaluation of Operational Data

February 7, 1997

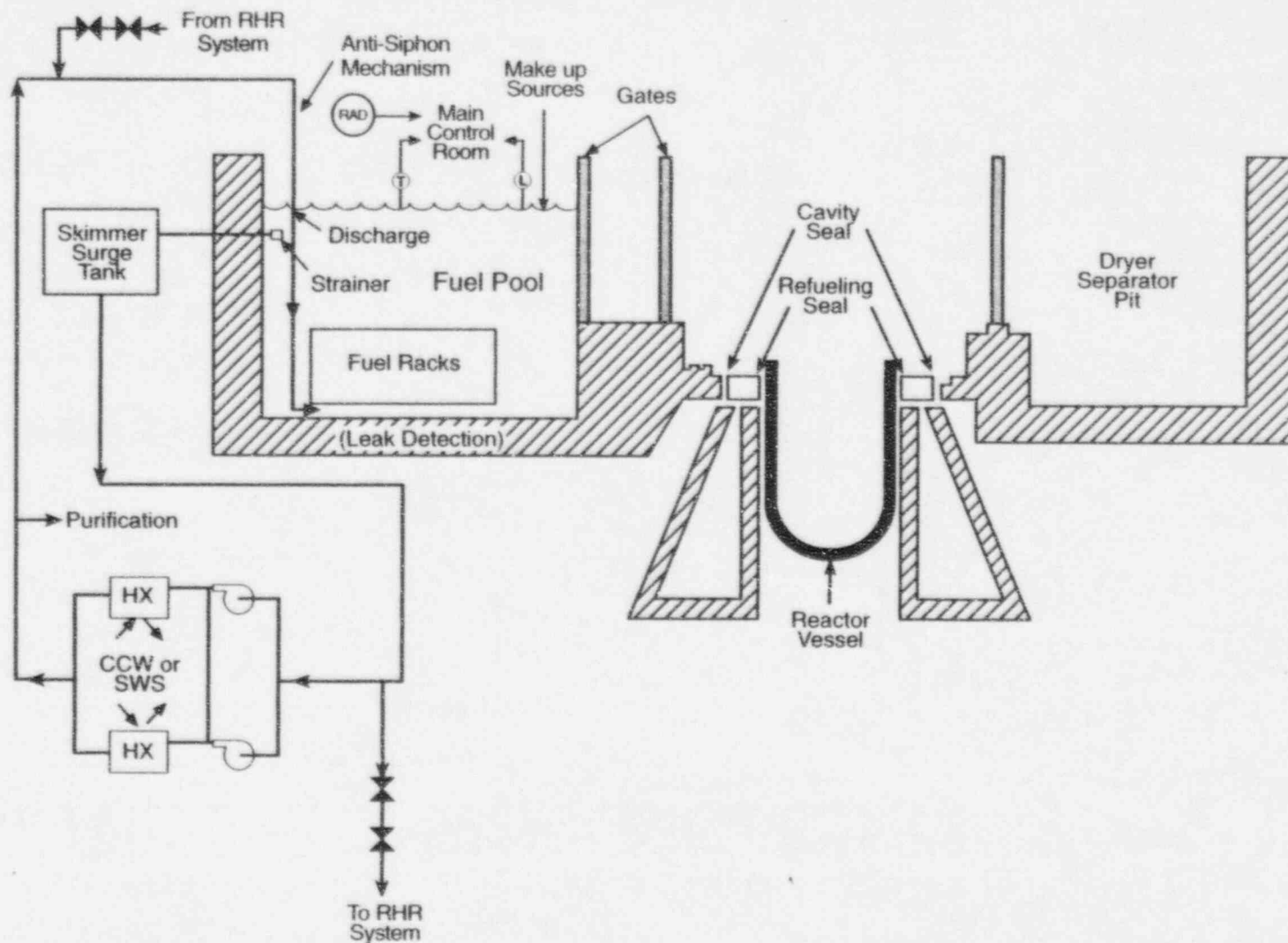
SPENT FUEL COOLING ASSESSMENT

- **AEOD study requested by Executive Director for Operations.**
- **Developed generic configurations to assess loss of spent fuel pool cooling and inventory.**
- **Assessed 12 years of operational experience.**
- **Performed site visits to gather information on physical configuration, practices, and procedures.**
- **Reviewed regulations, standard review plan and regulatory guides.**
- **Performed assessments of electrical systems, instrumentation, heat loads, and radiation.**
- **Evaluated risk of losing spent fuel cooling.**

PWR SPENT FUEL COOLING SYSTEMS



BWR SPENT FUEL COOLING SYSTEMS



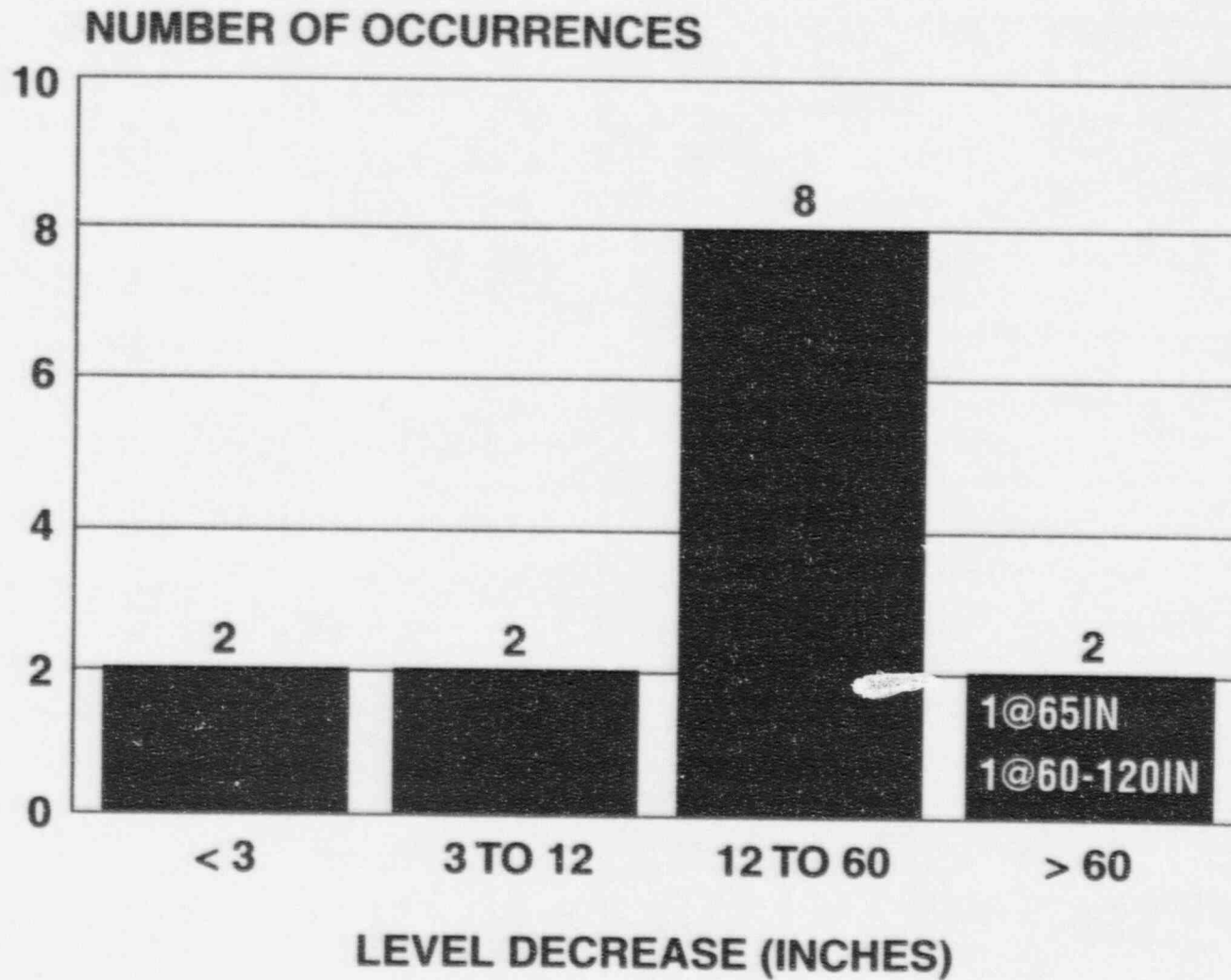
SPENT FUEL POOL EVENTS

<u>TYPE EVENT</u>	<u>ACTUAL</u>	<u>PRECURSOR</u>
<u>SFP Inventory</u>	<u>38</u>	<u>55</u>
Connected Systems	20	12
Gates & Seals	10	8
Structure or Liner	8	35
 <u>SFP Cooling</u>	 <u>56</u>	 <u>22</u>
Cooling Flow	50	20
Heat Sink	6	2

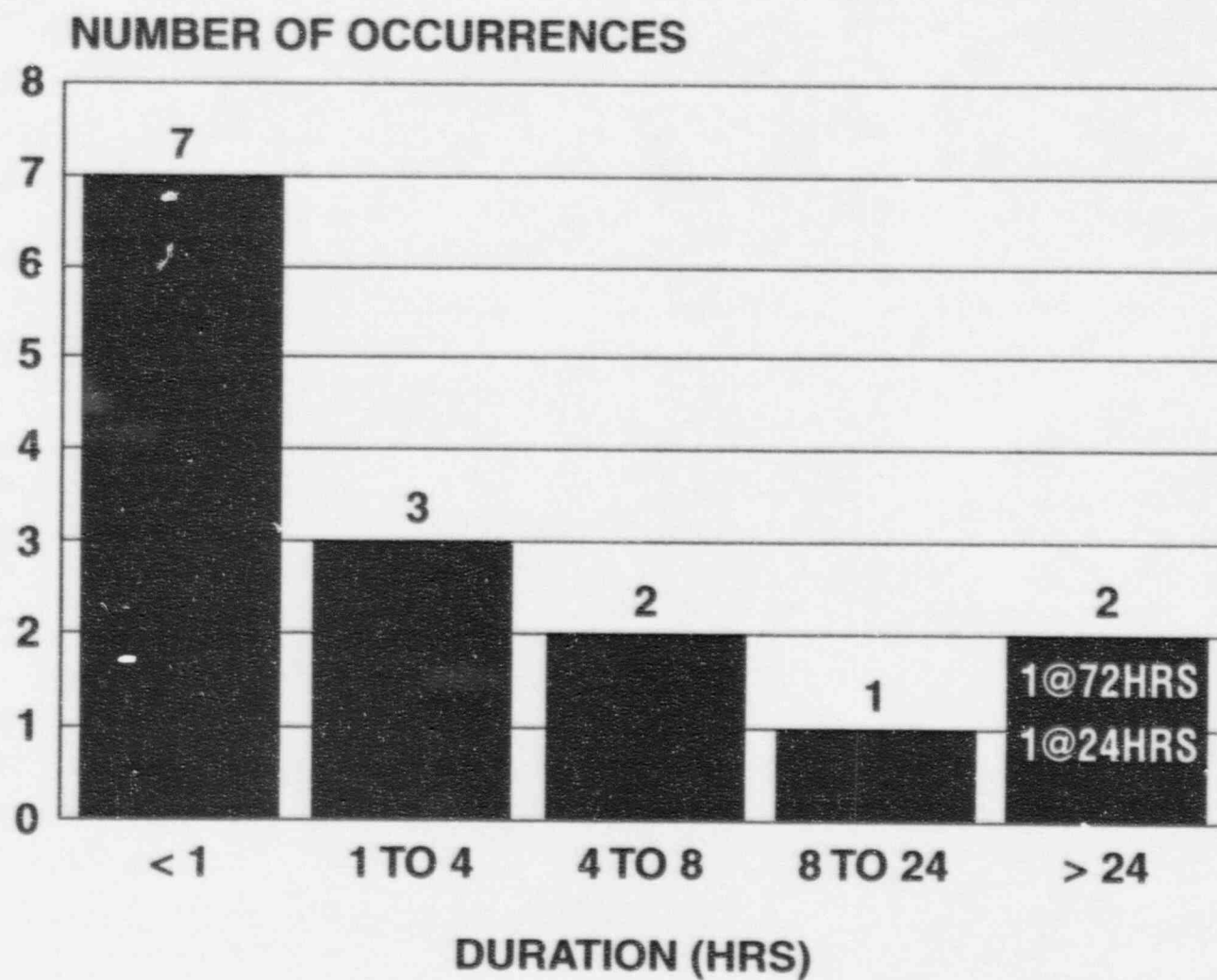
LOSS OF COOLANT INVENTORY EVENTS

<u>TYPE EVENT</u>	<u>ACTUAL</u>	<u>PRECURSOR</u>
<u>Connected Systems</u>	<u>20</u>	<u>12</u>
Configuration Control	16	2
Siphoning	3	1
PWR Transfer Tube	1	1
Piping	0	1
Piping Seismic Design	1	1
 <u>Gates & Seals</u>	 <u>10</u>	 <u>8</u>
Cavity Seals	0	6
Gate Seals	10	2
 <u>Pool Structure or Liner</u>	 <u>8</u>	 <u>35</u>
Liner Leaks	7	1
Load Drops	1	32
Pool Seismic Design	0	2

LOSS OF INVENTORY LEVELS



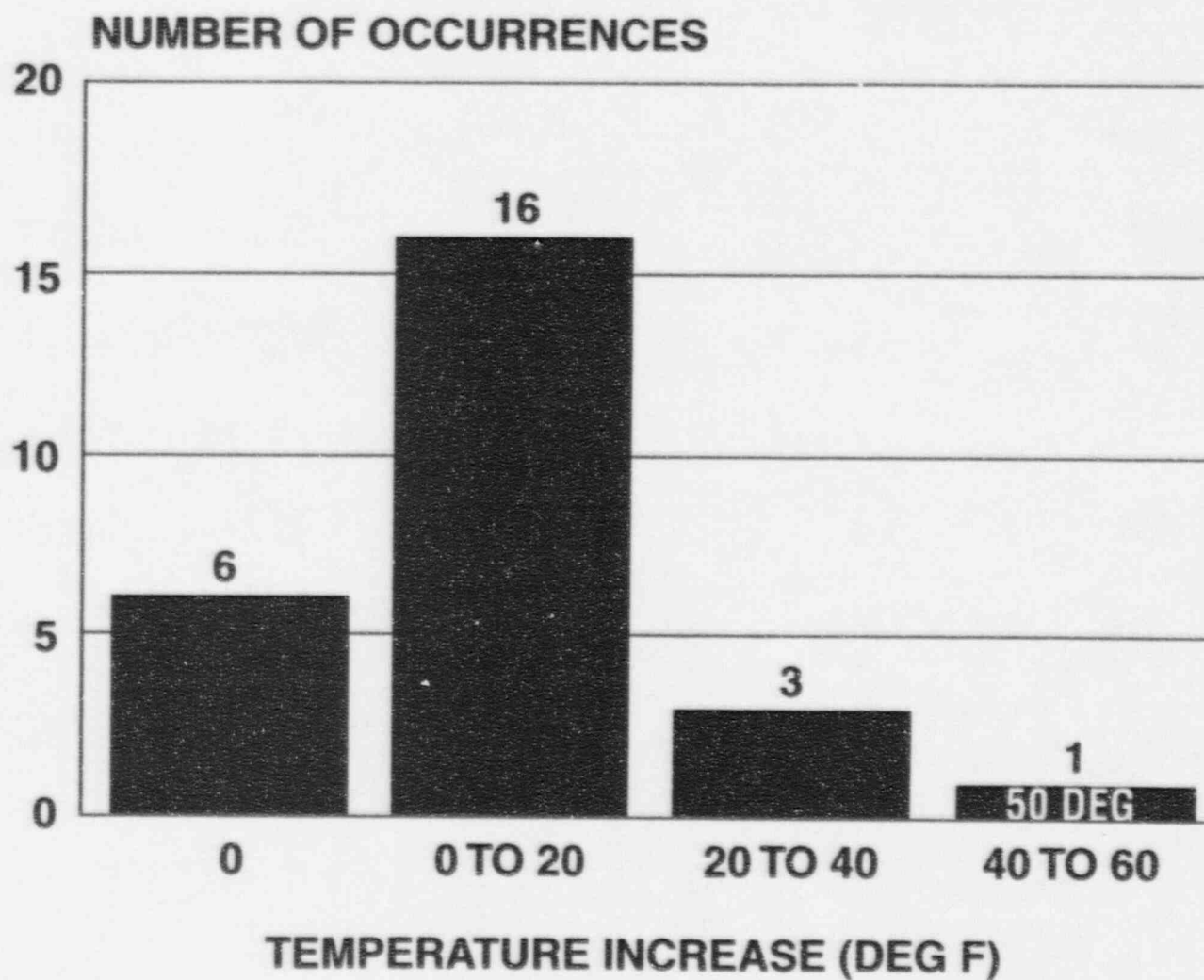
LOSS OF INVENTORY EVENTS



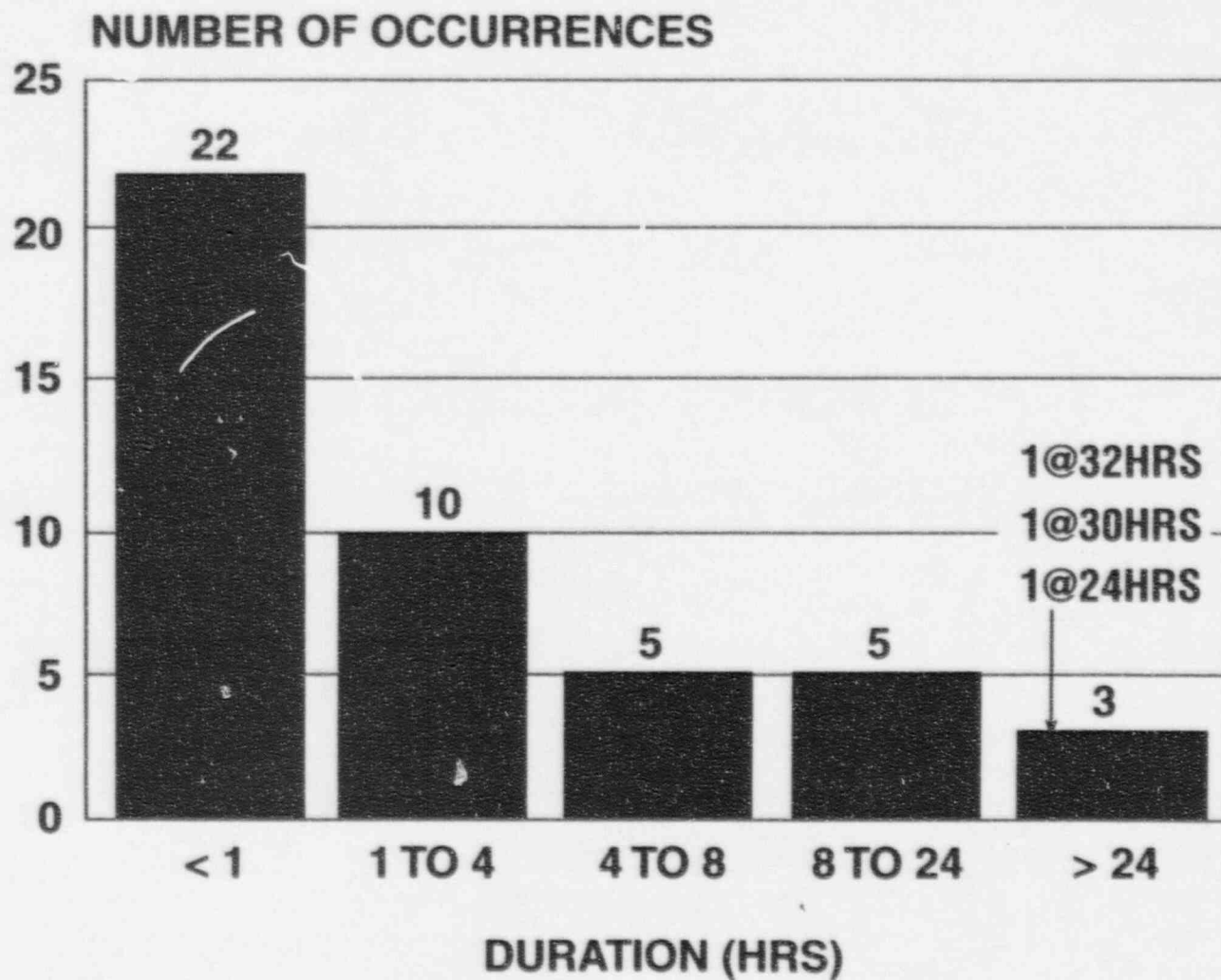
LOSS OF COOLING EVENTS

TYPE EVENT	ACTUAL	PRECURSOR
<u>Cooling Flow</u>	<u>50</u>	<u>20</u>
SFP Pumps	39	8
Configuration Control	1	0
Loss of Pump Suction	4	0
Flow Blockage	1	0
Single SFP Pump Failure	5	12
<u>Heat Sink</u>	<u>6</u>	<u>2</u>

LOSS OF COOLING EVENTS



LOSS OF COOLING EVENTS



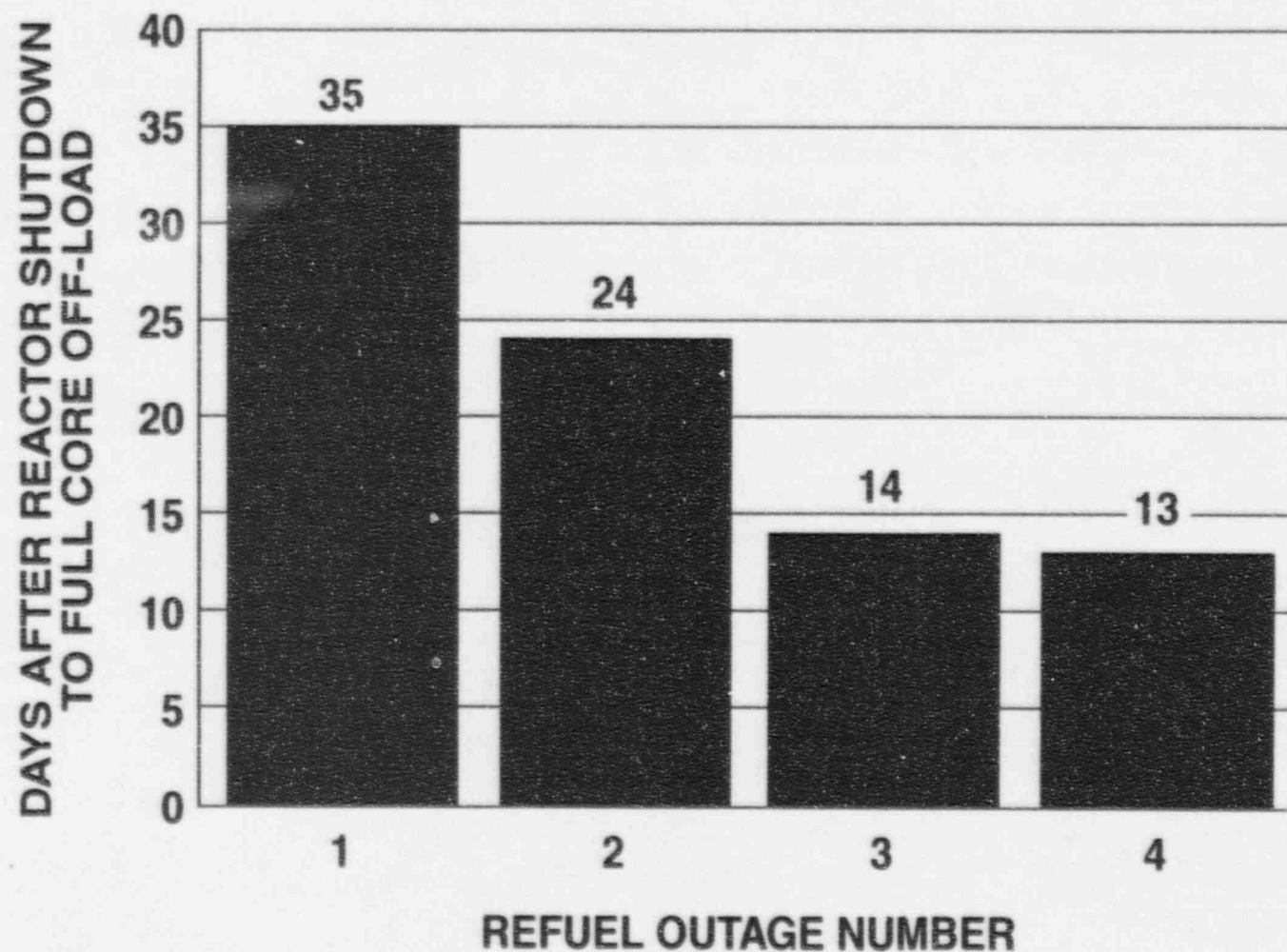
PARTIAL LISTING OF GOOD PRACTICES OBSERVED DURING PLANT VISITS

- **Utilization of system diagram prior to all alignment changes.**
- **Including SFP risk during outage planning.**
- **Classroom and simulator training to prepare for outage.**
- **User friendly graphs of pool heatup.**
- **Effective program for feedback of internal and industry operating experience.**
- **Detailed review at some plants found significant inventory loss vulnerabilities.**

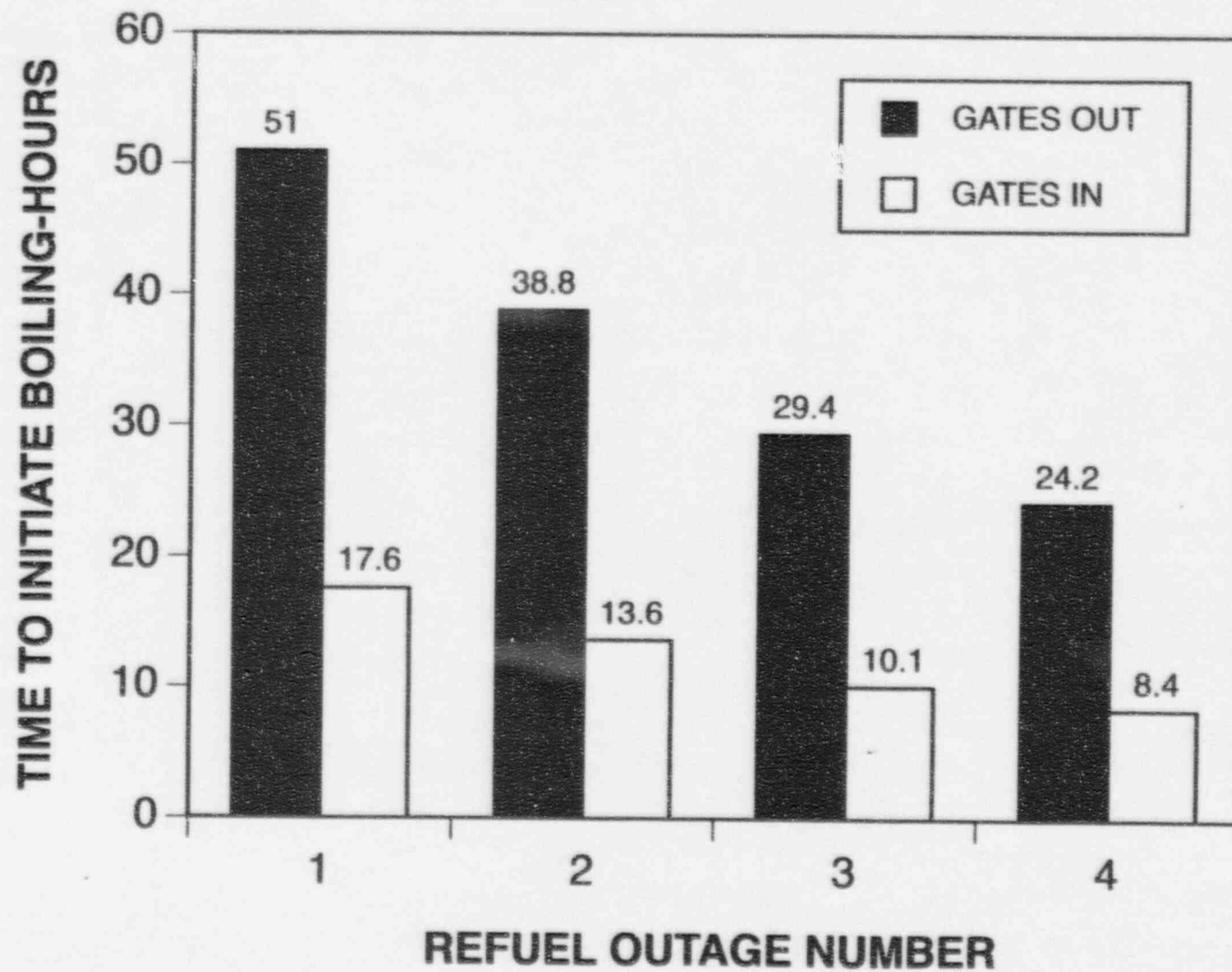
REGULATION REVIEW AND ENGINEERING ASSESSMENTS

- **Identified applicable guidance and regulations.**
- **Surveyed 14 plants to determine power supply.**
- **Surveyed 14 plants to determine instrumentation.**
- **Assessed radiation levels with varying water levels.**
- **Performed heat load calculations.**

HISTORY OF FULL CORE OFF-LOADING NINE MILE POINT 2



NINE MILE POINT UNIT 2



NEAR-BOILING FREQUENCIES

	CURRENT INEL WORK	PREVIOUS PNL WORK
Total Near-Boiling Frequencies	5 E-5	2 E-5
LOOP	3 E-5	1 E-5
Inventory Losses	2 E-5	1 E-6

SUSQUEHANNA SPENT FUEL POOL RISK ASSESSMENT

- **Showed benefits from:**
 - improved instrumentation
 - improved procedures
 - improved training
- **Showed vulnerability of operating unit from defueled unit**

FINDINGS AND CONCLUSIONS

Likelihood and Consequences

- Consequences of actual events have not been severe.
- Primary cause of events has been human error.
- Relative risk of fuel damage is low compared with other reactor events.
- Highly dependent on human performance and plant design.
- Frequency of coolant loss > 1 foot, 1/100 reactor years.
- Frequency of cooling loss > 20 °F, 2-3/1000 reactor years.

FINDINGS AND CONCLUSIONS (CONT.)

Prevention

- **Configuration control improvements can prevent and/or mitigate SFP events.**
- **Evaluations may be needed at some multiunit sites for potential SFP boiling effects on safe shutdown.**

Response

- **Attention to time to boil with shorter outages.**
- **Improved procedures and training may be needed.**
- **Improvements to instrumentation and power supplies may be needed.**

FOLLOW UP

- **Commission briefed on assessment.**
- **NRC Information Notice and being prepared.**
- **Study made into a NUREG.**
- **Report being submitted to Incident Reporting System.**
- **Working with NRR on implementing recommendations.**