

**NUCLEAR REGULATORY COMMISSION**

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and Advisory Committee on Nuclear Waste  
Joint Subcommittee

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

JOINT SUBCOMMITTEE

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FRIDAY

JANUARY 19, 2001

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ROCKVILLE, MARYLAND

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The Joint Subcommittee met at the Nuclear  
Regulatory Commission, Room T2B3, Two White Fling  
North, 11545 Rockville Pike, at 8:30 a.m., Dr. John  
Garrick, Chairman, presiding.

COMMITTEE MEMBERS:

- |                 |             |
|-----------------|-------------|
| JOHN GARRICK    | Chairman    |
| THOMAS KRESS    | Co-Chairman |
| MILTON LEVENSON | Member      |

## 1 STAFF PRESENT:

2 MARISSA BAILEY, NMSS

3 THOMAS COX, NMSS

4 DENNIS DAMON, NMSS

5 DAVID DANCER, NMSS

6 ROBERT JOHNSON, NMSS

7 T. McCARTIN, NMSS

8 JOCELYN MITCHELL, RES

9 ROBERT PIERSON, NMSS

10 ANDREW PERSINKO, NMSS

11 PHILIP TING, NMSS

12 R. TORTIL, NMSS

13 ALBERT WONG, NMSS

14

## 15 ALSO PRESENT:

16 RALPH BEEDLE, NEI

17 JACK BESS, DOE

18 JOHN BRONF, NEI

19 STAN ECHOLS, Winston &amp; Strawn

20 CLIFTON FARRELL, NEI

21 DONALD GOLDBACH, Westinghouse

22 DEALIS GWYN, DOE

23 PETER HASTINGS, DLS

24 FELIX KILLAR, NEI

25 CRAIG SELLERS, ITSC

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OTHERS PRESENT (Continued):

FRED STETSON, PARALAX, Inc.

TED WYKA, DOE

CARL YATES, BWXT, Inc.

KEITH ZIELENSKI, DOE

I-N-D-E-X

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

(8:30 a.m.)

1  
2  
3 CHAIRMAN GARRICK: Good morning. Our  
4 meeting will now come to order.

5 This is a meeting of the Advisory  
6 Committee on Reactor Safeguards and Advisory Committee  
7 on Nuclear Waste Joint Subcommittee.

8 My name is John Garrick, Co-chairman of  
9 the Joint Subcommittee, representing the ACNW, and Tom  
10 Kress, my colleague on my left here, is the Co-  
11 chairman representing the ACRS.

12 Milt Levenson, a member of the Joint  
13 Subcommittee and of the ACNW, is in attendance.

14 The purpose of this meeting is to discuss  
15 risk assessment methods associated with integrated  
16 safety analysis and the status of risk informed  
17 activities in the Office of Nuclear Material Safety  
18 and Safeguards.

19 The subcommittee will also discuss risk  
20 analysis methods and applications associated with the  
21 Department of Energy's Integrated Safety Management  
22 Program. The subcommittee is gathering information  
23 and will analyze relevant issues and facts and  
24 formulate positions and actions as appropriate for  
25 deliberation to the full committees, the two main

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1 committees.

2 Mike Markley is the designated federal  
3 official, the staff engineer from the ACRS/ACNW staff  
4 for this meeting.

5 The rules for participating in today's  
6 meeting have been announced as part of the notice of  
7 this meeting previously published in the Federal  
8 Register. Publication was on December 28th.

9 A transcript of the meeting is being kept  
10 and will be made available as stated in the Federal  
11 Register notice, and as usual, if we have speakers  
12 other than the announced speakers, please identify  
13 yourselves and speak with clarity and volume so that  
14 we can hear you.

15 We haven't received any written comments  
16 or requests for time to make oral statement from  
17 members of the public regarding today's meeting.  
18 However, Donald Goldbach of Westinghouse has requested  
19 an opportunity to participate via telephone, and we  
20 are accommodating that request, I assume.

21 He's on line? Good.

22 MR. GOLDBACH: And I thank you for that.

23 CHAIRMAN GARRICK: And I hope you can hear  
24 everything.

25 MR. GOLDBACH: Yes, it's coming through

1 very well. Thanks.

2 CHAIRMAN GARRICK: Thank you.

3 The Joint Subcommittee last met on May 4th  
4 of last year. During that meeting, the subcommittee  
5 discussed the development of risk informed regulation  
6 in NMSS, including proposed revision to 10 CFR, Part  
7 70, domestic licensing of special nuclear material,  
8 and associated requirements for licensees to submit  
9 ISA summaries.

10 During that meeting and at the conclusion  
11 of that meeting, it was decided that the subcommittee  
12 wanted to get more informed, get more information on  
13 this whole matter of ISAs, how they were done, what  
14 they were, and a general what they really represent in  
15 the way of the movement towards risk informed and  
16 performance based regulatory practice.

17 This is of great interest to both the ACRS  
18 and the ACNW, and of course, what we're looking for as  
19 much as possible is consistency of application, taking  
20 advantage as much as we can of the experience in the  
21 safety field both from the point of view of the safety  
22 analysis report community and the probabilistic risk  
23 assessment community, which I sort of see the ISA as  
24 kind of a merging.

25 So with that, we'll now proceed, and as I

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1 understand it, Tom Cox of NMSS is going to lead off.

2 Tom, unless there's comments or opening  
3 questions by any of the members.

4 (No response.)

5 CHAIRMAN GARRICK: All right.

6 MR. COX: Thank you, and good morning.

7 I am Tom Cox. I work in the Fuel Cycle  
8 Safety and Safeguards Division of the Nuclear  
9 Materials Safety and Safeguards Office. I actually  
10 work in a branch within the Fuel Cycle Safety Division  
11 that has responsibility for licensing interactions  
12 with fuel cycle licensees.

13 As you can see, this is just a title slide  
14 here, and basically we're talking about two parts of  
15 information this morning. I'm going to go over  
16 something about what the revised Part 70 presented and  
17 offered, and then I will say something about what we  
18 are doing in the licensing arena to follow on the  
19 issuance of that rule, that revised rule, which  
20 occurred last fall.

21 I'm going to talk about essentially five  
22 brief topics.

23 One, I'll say something about the rule.

24 Then we'll go into the primary  
25 requirements of the rule, the submittals required by

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1 licensees, how the rule was made effective because it  
2 was not just a simple statement of October 18th, 2000.  
3 There are a few wrinkles in the submittal and the  
4 effectivity of the rule.

5 And finally we'll talk a little bit about  
6 the licensing status, which I mentioned is where we  
7 are in implementing the rule.

8 Any questions so far?

9 CHAIRMAN GARRICK: So far it looks good.

10 MR. COX: Okay. What happened with this  
11 rule issuance?

12 We've spent several years getting this  
13 revision to the rule out. Did you know Part 70 has  
14 existed for quite a few years? This is a revision to  
15 Part 70 to add a Subpart H to the rule. It's  
16 applicable to applicants or licensees with greater  
17 than a, quote, critical mass of special nuclear  
18 materials.

19 And the reason that's in quotes is because  
20 that is defined in 70.4 of the rule. This is a  
21 measure applied essentially to limit the requirements  
22 of this new Subpart H of Part 70 to licensees that  
23 were considered to pose more risk. The new Subpart H  
24 is limited in its application to those that have  
25 essentially a critical mass of special nuclear

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1 material as defined in the rule.

2 What was the rule designed to do or this  
3 revision designed to do? It's the first addition or  
4 revision to Part 70 that really approaches and is  
5 intended to approach a risk informed, performance  
6 based, regulatory practice. And I think as the day  
7 goes on you'll see how that plays out.

8 So what do we see has been added to the  
9 rule via Subpart H?

10 First of all, the primary requirement is  
11 that licensees perform an integrated safety analysis,  
12 and much of today we'll be talking about what is an  
13 integrated safety analysis.

14 At the end of each of these lines, I've  
15 simply placed the section of the rule that you can  
16 refer to to see what we are talking about in these  
17 line items.

18 Second, the licensee has to comply with  
19 certain performance requirements. Performance  
20 requirements are actually laid out in this rule very  
21 specifically, and they are risk informed performance  
22 requirements. They're the heart of the new Subpart H.

23 There's basically three major statements:  
24 high consequence events as posed by licensees'  
25 analyses to develop what accident sequences might be

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1 in the plant, potential accident sequences. Of those,  
2 certain ones may be what is defined as high  
3 consequences in the rule, and the rule requires that  
4 they be highly unlikely.

5 So you have both the components of  
6 consequence and likelihood leading to a risk  
7 assessment.

8 Another performance requirement is that  
9 there are going to be probably some potential accident  
10 sequences that are not high consequence, but are what  
11 is defined as intermediate consequence in the rule.  
12 Those are required to be made unlikely.

13 And then finally, there's a specific  
14 requirement on accident sequences that would arrive or  
15 could end in a criticality, and the requirement there  
16 is that these must be highly unlikely also independent  
17 of what threshold of consequences might actually  
18 arrive as measured in dose to a worker or the public.

19 So there are performance requirements,  
20 very specific performance requirements. There are  
21 especially risk based, risk informed performance --

22 CO-CHAIRMAN KRESS: Can we ask questions  
23 as you go along?

24 MR. COX: Sure, surely.

25 CO-CHAIRMAN KRESS: Surely there's a whole

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1 spectrum of consequences and associated likelihood,  
2 and the rule apparently has decided it can bend those  
3 into three categories. Is there a rationale behind  
4 just three categories instead of, say, five or seven  
5 or ten?

6 And are the criteria for getting into this  
7 particular category -- is it quantitative or is it  
8 just some sort of qualitative assessment, or is that  
9 something we're going to cover when we get to the ISA  
10 part?

11 MR. COX: I think we'll cover this in more  
12 detail when we get there.

13 CO-CHAIRMAN KRESS: Okay.

14 MR. COX: And I wouldn't assume or presume  
15 to be able to in a few minutes justify why there are  
16 three categories instead of five or six. Suffice to  
17 say this has developed over several years of many  
18 discussions within the staff, and it was at the  
19 Commission in a proposed rule state and, you know,  
20 many back-and-forth discussions.

21 So we'll talk about that a little bit  
22 later, I'm sure, in Dennis Damon's presentation, but  
23 nevertheless the rule is set up in those categories at  
24 this point.

25 A third primary requirement is that the

1 licensee is to identify the items relied on for  
2 safety. Now, what are those?

3 Those are essentially what many people a  
4 lot of the time call controls. Within an accident  
5 sequence following an initiating event, you have  
6 controls in place to either prevent the ultimate  
7 consequence from being arrived at at all, or to  
8 mitigate the consequences that might be arrived at  
9 anyway.

10 So these controls are termed items relied  
11 on for safety in the rule language and in the standard  
12 review plan language, and there's a lot of discussion  
13 or explanation of what those things are and what the  
14 requirements are in 70.62(c).

15 Continuing with the primary requirements  
16 of the rule, the licensees are also to provide  
17 management measures which are those measures --  
18 sometimes they're parts of programs or they are  
19 functions within a plant structure that assure that  
20 the items relied on for safety are available and  
21 reliable to perform when needed.

22 These kinds of activities are like  
23 configuration management, training and qualifications  
24 of people, maintenance programs, procedures, and  
25 several other items that we will talk about a little

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1 bit during the day.

2 Fifth, the licensees are also to maintain  
3 the safety bases once it's established through the  
4 development of an integrated safety analysis, and that  
5 seems fairly obvious as to the why on that, because  
6 these plants are licensed for ten years, and the  
7 agency and the public need assurance that the licensee  
8 will maintain their safe basis of operation over that  
9 time.

10 They are to report changes to that safety  
11 basis, and there are various requirements on the  
12 reporting requirements for changes to the safety  
13 basis, as indicated by those section numbers there.

14 Number six, the licensee can make certain  
15 changes without NRC approval, and that's covered in a  
16 section that is intended to somewhat parallel the Part  
17 50.59 kind of procedure or facility or allowance  
18 because --

19 CO-CHAIRMAN KRESS: Does it use those  
20 words, like no increase in --

21 MR. COX: I'm sorry?

22 CO-CHAIRMAN KRESS: Does it use the words  
23 like "minimal increase in consequence" or "minimal  
24 change in" --

25 MR. COX: I don't think you'll find the

1 word the "minimal increase" in this particular  
2 section. We could get into that.

3 I think you were given this morning copies  
4 of the rule as issued on September 18th, and you can  
5 see in 70.72(c) what the language is there.

6 Finally, the licensee has reporting  
7 requirements. These have been around in 70.50 for a  
8 long time. They were added to and modified somewhat  
9 initially and in the latest revision to the rule. The  
10 added parts of 70.72 and an Appendix A that lists the  
11 various types of events that have to be reported, some  
12 time constraints on how they are reported, but there  
13 are not a lot of major changes from the prior existing  
14 Part 70 in that regard.

15 And, finally, the NRC has adopted and put  
16 in the rule a back-fit constraint on the staff, if you  
17 will. Under specified circumstances, the staff is  
18 obligated to perform analyses and justify the back-  
19 fit, which is an imposition of a requirement that's  
20 new or changed from a prior staff position.

21 This very much parallels the 50.109  
22 requirement in the reactor world.

23 Okay. That's it for the primary  
24 requirements of the rule. Now I'd like to get on to  
25 what are the basic submittals that Subpart H calls for

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1 now that it's on the street. There are two.

2 The first one is coming out very quickly  
3 on April 18th this year. We ask that the licensees  
4 submit their plan for producing an ISA. It's  
5 obviously a significant piece of work, and we felt  
6 that there was a real advantage in staff, stakeholder-  
7 staff-licensee interactions prior to the complete ISA  
8 being produced because, after all, the rule was just  
9 out now in last September, basically effective in  
10 October, and we now are entering a phase when, if not  
11 starting from scratch, licensees will be making  
12 certain that any ISA work they've done or are going to  
13 do comports with the rule requirements.

14 So we would like to talk and understand  
15 the ISA approach that will be taken.

16 Second, the rule asks for a listing of the  
17 processes that will be analyzed because these  
18 processes may be defined at different levels. In  
19 taking a block of the plant operation to analyze and  
20 do an integrated safety analysis of, you could start  
21 with something as small as a work station, which might  
22 be a glove box, or some licensee might talk about  
23 several work stations or an entire process line as  
24 something to be analyzed as a unit.

25 So we want to know what processes are

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1 going to be analyzed, and finally, we would like to  
2 know when the analyses will be completed for these  
3 pieces of the overall analysis.

4 And there's some flexibility there.  
5 Perhaps the licensees would want to submit their ISAs  
6 in more than one piece. So that section of the rule  
7 actually requires these three items to be delivered on  
8 April 18th.

9 On October 18th, 2004, the licensees are  
10 supposed to have completed their ISA. They will have  
11 corrected all unacceptable performance deficiencies  
12 that they identify, or if they've made some prior  
13 arrangement in the planning stage, which is the prior  
14 submittal, perhaps there is a plan for correcting  
15 performance deficiencies that would be all right also.

16 And the third thing is the licensee or  
17 applicant must submit an ISA summary. Now, you notice  
18 the difference between number one and number three on  
19 that slide.

20 The licensees complete an ISA, but they  
21 don't necessarily deliver the ISA to us. They  
22 deliver, rather, a summary of it for NRC approval, and  
23 that would be at the latest we'd have to see that on  
24 October 2004. That's described in 70.65.

25 Those are the two basic submittals

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1 required under this.

2 CHAIRMAN GARRICK: Tom, is somebody going  
3 to get into the issue of scope in terms of what kind  
4 of an effort is involved here?

5 One of the issues, of course, that is at  
6 play is looking for alternatives to answering the risk  
7 oriented questions about a facility in as economical  
8 way as possible, and as I understand it, one of the  
9 attractions of the process hazard analysis based  
10 methods is that it's more economical, less complicated  
11 than what is perceived to be the implementation of  
12 traditional probabilistic risk assessment.

13 Is somebody going to give us some sense of  
14 the magnitude of these efforts? Because my first  
15 glimpse at this is that that difference is not at all  
16 obvious, and I'm very curious based on practice. For  
17 a significant fuel cycle facility, what is really  
18 involved in a comprehensive ISA, not just the summary,  
19 but the total ISA program such that you could maybe  
20 stack that up with something like a FSAR, a PRA or  
21 what have you in terms of resources.

22 MR. COX: Well, I think there are several  
23 questions there, Dr. Garrick. I'll try to give --

24 CHAIRMAN GARRICK: Well, I'm just looking  
25 for some context, and you don't have to do it now, but

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1 in the course of the discussions today, I think it  
2 would be of interest to the committee to kind of get  
3 a sense of scope of these things.

4 MR. COX: Let me say I think you will see  
5 that in the next presentation where we are essentially  
6 going to discuss what our proposed method of analysis  
7 is, which is imbedded in Chapter 3 of our standard  
8 review plan, which is the only chapter of the ten  
9 chapter standard review plan that is not completely  
10 agreed on by all parties yet. We're still working to  
11 arrive at that endpoint on that.

12 And the discussion there is about what  
13 you're talking about. What is --

14 CHAIRMAN GARRICK: And I've read that, and  
15 I have a number of questions from that specifically,  
16 but you know, it's not very specific about the  
17 question of scope as measured by something like cost  
18 or man-hours or schedule or what have you.

19 MR. COX: Okay. I don't think we'll get  
20 in too far today to discuss scope and man-hours, that  
21 is, man-hours from the standpoint of the staff, but  
22 the industry may have something to say about that.

23 But we will talk about the scope of the  
24 technical analysis that we think ought to be done and  
25 the way it ought to be done at this point, the staff's

1 position on that.

2 So perhaps during the day there will be a  
3 lot of discussion. I think we'll be able to cover  
4 some of these points.

5 CHAIRMAN GARRICK: Okay. Thank you.

6 MR. COX: We'll be around to deal with  
7 that.

8 Okay. So we understand the summaries that  
9 will be provided.

10 How did this rule get put in place? How  
11 does it get complied with?

12 Well, it's generally effective as of  
13 October 18th, 2000. That's as general a statement as  
14 you can make about it, but there are a couple of  
15 exceptions.

16 The back-fit section applies immediately  
17 to non-Subpart H requirements which are the  
18 requirements that were in place before this September  
19 18th issuance.

20 It applies to Subpart H requirements, that  
21 is, the focus of this discussion today, only after the  
22 ISA summary is approved by the NRC.

23 You used the word "final safety analysis  
24 report." I'm thinking that in some ways the ISA  
25 summary could be considered a final safety analysis

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1 report at least to the technical analysis of risk for  
2 the plant.

3 Finally, the reporting requirements that  
4 are in 70.74 generally apply after the ISA summary is  
5 submitted, not necessarily approved, but just  
6 submitted, although there are three paragraphs within  
7 those reporting requirements that were effective  
8 already on October 18th last.

9 Okay. That's essentially all I'm saying  
10 about the rule itself at this point. Now, what are we  
11 doing to put the rule in place and to implement it?

12 Well, as we've kind of briefly alluded to  
13 here, one of the first and most important items  
14 priority-wise on our desktop right now is Chapter 3 of  
15 the standard review plan. Again, it's the only  
16 chapter of the standard review plan that's not  
17 completely resolved yet, but it is the fundamental  
18 chapter, the heart of the whole standard review plan,  
19 and as I mentioned earlier, it could be considered the  
20 heart of the rule, the approach to doing an ISA and to  
21 reporting the results in an ISA summary.

22 So we last received the November 16th  
23 letter from Nuclear Energy Institute on this Chapter  
24 3, and we have had some other documents involved here,  
25 but the point is we do have some differences with the

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1 stakeholders in how we view what the licensees need to  
2 do to be responsive to the rule and to ultimately  
3 demonstrate compliance with the rule.

4 So we're talking about that with the  
5 stakeholders, and we are going to be sponsoring in the  
6 very new future some additional meetings, interactions  
7 with all the stakeholders to resolve those issues on  
8 Chapter 3 and get it down and get the whole standard  
9 review plan issues, which is the second item right  
10 there.

11 Chapter 3 will fit right into that at some  
12 point, and then we'll be able to issue the standard  
13 review plan, which appeared in draft form in your SECY  
14 paper that was issued on May 19th. I think it's SECY  
15 0111, which I think you have a copy of. And there you  
16 see the whole standard review plan.

17 On Item 3 here, the NEI, Nuclear Energy  
18 Institute, has proposed what they call the industry  
19 guidance document on preparation of an ISA summary.  
20 This was posed to us I guess approximately a year ago.  
21 We've received several drafts of this over time, and  
22 the last dated November 5th, 2000.

23 And essentially this is proposed by NEI as  
24 an aid to the licensees doing their work and preparing  
25 the ISA summary. We kind of think Chapter 3 is the

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1 staff's position on the necessary content and the  
2 recommended structure of a summary, an ISA summary,  
3 Chapter 3 of the SRP.

4 But as I mentioned, we have some  
5 differences with our stakeholders and NEI over the  
6 content and structure of Chapter 3. So it's not yet  
7 determined finally just what our endorsement of this  
8 article, this document, might look like. We just  
9 aren't prepared to take a position on that.

10 We think essentially it's a good summary  
11 of the technical elements that ought to be addressed  
12 in an ISA summary, but we're still talking about how  
13 the actual analysis, how the actual risk determination  
14 of potential actions in the plant ought to be  
15 considered and evaluated.

16 CHAIRMAN GARRICK: Are you going to get  
17 specific in the course of the day on what these  
18 differences are --

19 MR. COX: Yes.

20 CHAIRMAN GARRICK: -- between the NRC and  
21 the stakeholders?

22 MR. COX: Well, let me put it this way.  
23 We're going to explain what the staff thinks is a good  
24 approach to determining the risk of this plant, and it  
25 is not a PRA. It is something short of a PRA, but we

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1 think it goes along basic reliability engineering  
2 principles and is adequate for fuel cycle facilities.

3 Dennis Damon is going to make this  
4 presentation. I don't think we're going to come to a  
5 point-by-point discussion of, you know, we do this and  
6 somebody else is proposing this. We're basically  
7 going to spend our time telling you the way we think  
8 it ought to be.

9 However, there is, I understand, an NEI  
10 presentation later in the day which may get into, you  
11 know, differences, but who knows what will come out of  
12 a discussion as we talk back and forth.

13 CHAIRMAN GARRICK: Yeah. Okay.

14 MR. COX: But we'll get into it.

15 CHAIRMAN GARRICK: You stoked our interest  
16 by making reference earlier to differences between the  
17 NRC and --

18 MR. COX: Yes.

19 CHAIRMAN GARRICK: -- and the  
20 stakeholders, particularly regarding Chapter 3 of the  
21 standard review plan, and to the extent that we can  
22 understand those differences, we're very interested.

23 MR. COX: Okay. I'll just try to  
24 generalize it at the top level by saying primarily we  
25 have an approach to risk analysis that is at least in

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1 part quantitative. Our understanding of the  
2 industry's position is that they want to do a strictly  
3 qualitative approach to this, and not involve with  
4 failure frequencies and numbers like that.

5 But some of that will come out in later  
6 discussion, I believe.

7 Okay. Where are we? We're at number four  
8 then.

9 Review of previously submitted ISA  
10 material. Over the last two, three years, several  
11 licensees, in fact, three or four of the seven that we  
12 have, submitted material that sort of runs over quite  
13 a spectrum of content, but basically it's their  
14 approach to doing an ISA or a part of it, an ISA  
15 summary or a part of it, and letting the NRC know what  
16 has been going on in their facilities as regard to  
17 these kinds of analyses.

18 This material is not necessarily -- any  
19 one of them is not necessarily a complete ISA summary,  
20 but it is certainly indicative of the way that the  
21 facility or the owners would do their ISA, and it was  
22 all into us prior to the issuance of the rule last  
23 September and October.

24 So it may not address all of the revised  
25 rule requirements. However, these licensees have

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1 asked for some response from the staff that evaluates  
2 the material that they gave us, and we're trying to do  
3 that.

4 We've scheduled a response to the first  
5 licensee. Actually I think it's by late January and  
6 only a couple of weeks, and we will respond to each  
7 licensee in turn.

8 Our response to that material that they  
9 submitted is essentially going to be a comment on the  
10 content, the depth and the scope of it, relative to  
11 the current or the issued revised Part 70. We'll try  
12 to recognize those things that they have addressed,  
13 and perhaps then that will reduce the planning work  
14 load that they would report to us on April 18th, but  
15 we'll also be addressing those topics which we feel  
16 are not completely or adequately addressed.

17 So the letter that we issue to those  
18 people will be something like a completeness review,  
19 or an assessment on a fairly high level, not an  
20 extremely detailed level of what we think about that  
21 material. But that is a work effort that is ongoing,  
22 and we have to conclude that.

23 Another item that we have committed to  
24 produce is called the ISA plan guidance. Well, I've  
25 already mentioned to you they are the April 18th

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1       submittal by the licensees on their plans to produce  
2       the ISA or to revise it perhaps.

3               We plan to issue some guidance on how to  
4       go about that, and the requirement we're addressing is  
5       at 62(c)(3). You can see that in the rule.

6               Our written guidance on this matter is on  
7       track for issuance with these letters that we will get  
8       back to the licensee commenting on the material that  
9       they have already submitted.

10              Okay. To the next one, staff guidance on  
11       the change process and the reporting process or  
12       reporting requirements and the back-fitting matter,  
13       we're also going to develop guidance on those things.  
14       By "guidance," I mean some additional explanation over  
15       and above the words in the rule, and those matters are  
16       on track for work during this spring and summer.

17              And I think the first two we expect to be  
18       out in July-August time frame, and the back-fitting  
19       guidance will come along in September-October.

20              Okay. On Item 7 there, we've talked a  
21       couple of times about these ISA plans. Well, when  
22       that April 18th submittal comes in, then the staff has  
23       to review those things. The rule requirement is that  
24       they be reviewed and approved. So that's going to be  
25       another activity that will go on during this year, and

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1 I think the plan here is to finish those during this  
2 year.

3 Number 8 is NRC's --

4 DR. LEVENSON: Excuse me one second. In  
5 sort of the context of John's earlier question, you  
6 expect to finish those reviews within the year. Do  
7 you have a guesstimate as to how many people it will  
8 take? What are the staff resources that will permit  
9 you to complete review of all of those?

10 MR. COX: Well, how many people is a  
11 pretty tough thing to say, but I would say I think we  
12 plan on doing those in a span time for each of them on  
13 the order of one to two months.

14 So we should be able to do six of them,  
15 you know, during the year. Does that help at all?

16 CHAIRMAN GARRICK: Is there contract  
17 support in this process?

18 MR. COX: At this time that's not planned.  
19 We're thinking about doing that in house.

20 MR. GOLDBACH: Excuse me, Tom. I didn't  
21 quite catch the answer to that question. Would you  
22 mind repeating it?

23 This is Don Goldbach at Westinghouse.

24 MR. COX: The answer to how long it will  
25 take to get it done?

1 MR. GOLDBACH: Yes, sir.

2 MR. COX: We think we're going to finish  
3 those plan reviews this year, during the year.

4 MR. GOLDBACH: Okay. Thank you.

5 MR. COX: Okay. Now, I think I was  
6 starting to talk about NUREG 1513.

7 In 1995, the staff first issued our ISA  
8 guidance document, which is -- at the time it was  
9 intended to be a primer on just what an ISA is. At  
10 that time, there was very little understanding of what  
11 an ISA is. So that document was produced to give that  
12 kind of guidance.

13 It is not a detailed, prescriptive,  
14 description of how to produce an ISA, but a summary of  
15 the kinds of methods available for doing an ISA kind  
16 of job, you know, like so-called "as of" method, what  
17 if, the check list methods of going through these  
18 processes and coming up with what the accident  
19 sequences are, what the initiating events are, what  
20 the consequences are.

21 Most of those methods, and there are seven  
22 or eight of them out there that are available and have  
23 been used by various organizations at various times,  
24 particularly the chemical process industry, most of  
25 those methods are essentially qualitative.

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1           But in that list and description are a  
2 couple of mentions of quantitative methods available.  
3 Of course you can do qualitative analyses on all of  
4 these methods simply by leaving out or putting in  
5 numbers. You know, even fault trees can be  
6 constructed qualitatively, and you can learn a lot  
7 from it.

8           But the guidance document, NUREG 1513 that  
9 I mentioned was basically a review of these methods  
10 then in use by the chemical process industry. It  
11 leaned heavily on a book produced by the ICHE and was  
12 essentially just our attempt to put something out  
13 there to help people understand what is meant by an  
14 integrated safety analysis.

15           CO-CHAIRMAN KRESS: Can I get that off of  
16 the NRC Web site on the Internet?

17           MR. COX: NUREG 1513 I think you got a  
18 copy of in the last day or so. Mike, didn't you get  
19 that?

20           CO-CHAIRMAN KRESS: Yesterday, yeah, that  
21 was what you gave me yesterday.

22           MR. COX: Yeah. Now, that has been  
23 updated. That book has been updated, and we plan to  
24 issue it within, I believe, like a month from now. It  
25 should be on the street final.

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1           ISA summary reviews, number nine. Those,  
2 of course, are the full blown ISA summaries that would  
3 come in no later than October 2004, and of course, the  
4 staff will have to mount a major effort to review and  
5 approve the ISA summaries.

6           MR. MARKLEY: Tom, how obsolete is the  
7 version that we have, the April of last year, relative  
8 to what's going to be issued in a month?

9           MR. COX: It's pretty good because the  
10 changes that were made in it were primarily to  
11 recognize the few substantive changes in the rule that  
12 were requested by the Commission and to, you know,  
13 delete phrases like "proposed rule" and, you know,  
14 dates that were wrong, matters like that because, you  
15 know, back in May we didn't have a rule on the street,  
16 but you're right. The last formal issuance of 1518 --  
17 "formal" I say because it's in a Commission paper that  
18 was publicly released -- that was the May 19th, 2000  
19 version of this document.

20           Okay. As far as the ISA summary reviews  
21 go, they will be a fairly major effort, something on  
22 the order of, but maybe not as great as a renewal  
23 application review, and the staff is planning on  
24 dealing with those.

25           But the actual conduct and completion of

1 those reviews will depend somewhat on what the plan of  
2 each individual licensee is to bring in the material,  
3 which could be, you know, waiting two or three years  
4 and then dumping a lot on the staff, or it could be a  
5 staged submittal.

6 So our review of that is going to be  
7 dependent upon what we find out from the individual  
8 licensees.

9 That's all I can say about the ISA summary  
10 reviews, and the last two items I don't have much to  
11 say about, except to point out that we do point out  
12 our interaction with stakeholders, which in this case  
13 include persons and groups like your own, number 11,  
14 and number 10 is interaction with the CRGR, which we  
15 anticipate here in the NRC.

16 The CRGR has already asked to understand  
17 better what it is we are doing or plan to do with the  
18 backfitting guidance, and I believe we're going to  
19 meet with CRGR in early February to at least discuss  
20 the schedule for the back-fitting guidance with them.

21 That really concludes my presentation this  
22 morning, and I think we will get on to much more  
23 interesting things with the discussion of the  
24 technical analysis approach that the staff is  
25 proposing.

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1 Any questions on what you see?

2 CHAIRMAN GARRICK: Yeah, any questions?  
3 Tom, at this point?

4 CO-CHAIRMAN KRESS: No, I think we're --

5 CHAIRMAN GARRICK: Milt?

6 (No response.)

7 CHAIRMAN GARRICK: Okay. Thank you.

8 MR. COX: Thank you.

9 Now, if Richard is here, we have to figure  
10 out how to kill this current presentation.

11 MR. DAMON: Good morning.

12 CHAIRMAN GARRICK: Good morning.

13 MR. DAMON: My name is Dennis Damon. I  
14 should thank Tom for referring all of the hard  
15 questions to me.

16 I work for the NMSS Risk Task Group now.  
17 I was formerly in Division of Fuel Cycle Safety and  
18 Safeguards with Tom in licensing, but now I'm part of  
19 the NMSS Risk Task Group involved in getting NMSS into  
20 risk informed regulation.

21 CHAIRMAN GARRICK: You're just the guy we  
22 want to talk to then.

23 MR. DAMON: I'm going to talk about what  
24 the objectives of the way I structured this  
25 presentation here. I really intended to answer the

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1 question what is a real ISA look like because as an  
2 outcome of the previous presentation that we had made  
3 to the subcommittee, it seemed that that's what you  
4 wanted to see, was what do the contents of an ISA look  
5 like that's a real one. What would the results look  
6 like?

7 But because the licensees did not choose  
8 to present to you what they actually had, I had to  
9 make up hypothetical examples. So these are  
10 inventions. These are not real analyses, but what I'm  
11 going to present are examples of analysis if it had  
12 been done using the method in Appendix A of the  
13 standard review plan, Chapter 3.

14 And so I'm just going to go through, and  
15 from what I can see from your questions to Tom Cox,  
16 you're more interested in certain aspects of this.  
17 You may have, in fact, already looked at the Chapter  
18 3, the ISA chapter of the Part 70 standard review  
19 plan, and so if you just want to get into those  
20 questions, I can do that at any time.

21 I can move through this presentation quite  
22 quickly if you're familiar with parts of it. So just  
23 let me know what you want to do as we go along.

24 I'm going to explain the methods in that  
25 standard review plan, and I'm going to show typical

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1 results that you get when you apply that method to  
2 some examples which, as I say, I made these up. It's  
3 going to discuss methods. In other words, what are  
4 all of the tasks in an ISA, and what kind of methods  
5 are used to do them?

6 And eventually it's going to get to one  
7 particular task, which is likelihood evaluation,  
8 because that's the one task where Appendix A gives a  
9 method which is not really something that I can give  
10 you a standard reference to. It is something that was  
11 done there just in Appendix A.

12 The other tasks in an ISA, there are  
13 referencing standard methodologies that are documented  
14 elsewhere, and I'll give those references as I just go  
15 quickly through them.

16 And then I'm going to apply that  
17 likelihood evaluation method to some typical fuel  
18 cycle processes, and in this I chose the examples to  
19 illustrate the diversity of processes there are, and  
20 also the fact that some of them involve issues that  
21 really don't lend themselves necessarily to a great  
22 deal of detail, but rather, involve subtle questions  
23 of judgment.

24 CHAIRMAN GARRICK: Dennis, I think the  
25 committee really appreciates your sensitivity to

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1 wanting to make sure that you cover the things that's  
2 of interest to the committee, and whether or not we  
3 need to do as comprehensive a coverage of Chapter 3 as  
4 you might otherwise.

5 I think we for the most part know  
6 generally what Chapter 3 is. On the other hand, I  
7 think there is philosophical aspects of this that we  
8 are interested in that is sometimes revealed by people  
9 indicating how they interpret the standard review  
10 plan, and we're interested in that.

11 But if there is one aspect that might help  
12 focus this, and I would consult my colleagues here on  
13 whether they're in agreement, and that is the  
14 Commission white paper that was published a few years  
15 ago, in my opinion, took major strides forward in  
16 telling the world what the Commission at least  
17 understood to be risk informed and performance based  
18 approach.

19 And a component of that white paper, of  
20 course, was the triplet definition of risk, and so I  
21 think that if there's one aspect of all of this that  
22 would help focus our discussion here and recognizing  
23 that that contributes heavily, that is to say that the  
24 triplet definition contributes heavily to one  
25 interpretation of what is meant by risk informed; then

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1 I would say that that might be a guidance for what you  
2 talk about, namely, we're interested in the scenario  
3 and event sequence approach that's taken because that  
4 answers the first question of the triplet, namely,  
5 what can go wrong.

6 We've already had a number of references  
7 to the two other questions, namely, the consequence  
8 question and the likelihood question.

9 So I think that if there was one aspect of  
10 this that might move us to the area where we have lots  
11 of interest, it would be to focus on how the ISA  
12 addresses the triplet and, in particular, the issue of  
13 consequences and the issue of likelihood.

14 Because, quite frankly, there seems to be  
15 a tremendous effort in the standard review plan to, on  
16 the one hand, show full sensitivity to a risk informed  
17 approach, and then on the other hand, backing off from  
18 saying, "What we don't mean PRA."

19 And to me it's very confusing and is kind  
20 of irrelevant, and I see a merging of these processes,  
21 and I suspect that there's lots of miscommunication  
22 and confusion between the two schools, that is, the  
23 school that favors what you're now using that has its  
24 roots in the process hazards analysis business, and  
25 the school that has its roots in the reactor risk

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1 assessment business.

2 And I suspect that most of this is  
3 emotional and not real, and so we're interested in  
4 seeing these processes merge because we think that  
5 would simplify the licensing process, and it would  
6 move us in the direction of a genuine risk informed  
7 approach.

8 I'm trying to cut through a lot of stuff  
9 here. My guess is that with all the energy that the  
10 standard review plans spends in trying to dance around  
11 the issue of likelihood; that if they took a head on  
12 approach and dealt with likelihood on the basis of  
13 what the evidence can support, that they would find  
14 that it would be much simpler, and they would also, I  
15 suspect, find that that would be a giant leap forward  
16 in the merging of the two ideas.

17 So I think I wanted to make those comments  
18 just to give you some sense of why we're here. We  
19 don't quite understand why the agency seems to insist  
20 on moving in all of these different directions in  
21 safety analysis. They're doing it again in the waste  
22 field with something called PCSA, pre-closure risk  
23 safety assessment. They're building a whole  
24 infrastructure of analysis to satisfy the risk  
25 informed requirements for the pre-closure phase of a

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1 waste repository.

2 And all of these put forth a great  
3 cosmetic front that they are addressing the issues of  
4 likelihood. They are addressing the issues of  
5 consequences, and it is based on answering the  
6 question of what can go wrong in the context of  
7 scenarios.

8 But when you dig underneath, there seems  
9 to be extreme differences and a lot of attention given  
10 to, as I said earlier, dancing around the issue of  
11 likelihood, in particular with risk indexing, with  
12 trying to define such abstract concepts as highly  
13 likelihood and extremely unlikely, and what have you.

14 And so we're kind of looking to how we can  
15 clean all of this up and make it much more  
16 straightforward and make it much simpler and put it in  
17 a framework where we don't have to do that as much,  
18 and that we can let the evidence speak for itself.

19 So I think if that helps in you focusing  
20 your presentation, then I'm pleased with that. And if  
21 I've said anything that is at variance with any of the  
22 members, I'd like them to speak.

23 CO-CHAIRMAN KRESS: You said it very  
24 eloquently. I could not agree more.

25 One aspect of that that I would be

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1 interested in, and it's in the same category, is in  
2 the reactor safety business we start out by defining  
3 I call them risk acceptance criteria, like a core  
4 damage frequency or the quantitative safety goals.

5 What it does when one starts out by  
6 defining acceptance criteria that are quantitative in  
7 terms of risk, it requires essentially a PRA because  
8 that's the only way to get a quantitative risk number.

9 But safety goals or risk acceptance  
10 criteria are things that are basically judgment.  
11 They're what people are willing to accept. Now, they  
12 don't have to be quantitative. They don't have to be  
13 expressed in terms of frequency of deaths. They could  
14 be expressed qualitatively in terms of things like we  
15 don't want to have an accident that would harm  
16 someone, expose them to radiation, and you don't have  
17 to put numbers on that, if this accident results from  
18 the failure of one or two or three protective  
19 measures.

20 You could do it qualitatively, and that's  
21 my impression at the moment of the difference between  
22 PRA and ISA. It starts from what your objective is.  
23 What are your risk acceptance criteria?

24 And so I would be interested if the ISA  
25 process has started out with some sort of qualitative

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1 risk acceptance criteria and how those were arrived at  
2 and why we think those are acceptable.

3 That was a kind of expansion of what he's  
4 talking about with the triplet.

5 DR. LEVENSON: I have a slightly different  
6 comment, and that is I think part of the problem that  
7 all the participants are facing is the presumption  
8 that PRA needs to be as complex and complicated as it  
9 currently is for reactors.

10 Some of us are old enough to remember when  
11 PRAs were much simpler, but the degree of complexity  
12 of a PRA ought to be pretty much directly related to  
13 the seriousness of realistic consequences.

14 And if we're talking about facilities that  
15 have orders of magnitude less potential consequences  
16 in a reactor accident, there is no reason why the PRA  
17 should not be significantly simpler, and I think  
18 that's part of the problem.

19 The practitioners are in many cases to  
20 blame because they're used to doing it this way.  
21 There is not recognition that the objective is not a  
22 pile of paper. It's to assure safety, and if, in  
23 fact, you have a facility that can't cause major  
24 consequences, you need significantly less, but that's  
25 not a reason for not doing a PRA. That's a reason for

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1 doing a much simpler PRA tailored for the needs of  
2 that program.

3 MR. DAMON: I'm going to depart from the  
4 presentation to address your comments, and I was not  
5 really prepared to do that, but specifically Dr.  
6 Levenson's remark about the amount of work that's  
7 done, the level of detail, the level of complexity of  
8 analysis being proportional to the complexity and the  
9 degree of risk of a facility, those type words.

10 I just got done composing a section. I  
11 was chairman of a writing group for the IIEA to write  
12 a guidance document on doing probabilistic safety  
13 assessment of nonreactor facilities.

14 I put a page in with almost exactly your  
15 philosophical expression. Overseas, like in the  
16 United Kingdom, they mandate that quantitative  
17 probabilistic safety assessment be done for all  
18 facilities, even very simple ones, university labs and  
19 things like that.

20 And the phrase they use is different  
21 horses for different courses, and that means just what  
22 you expressed, which is the level of the complexity of  
23 the analysis reflects the level of complexity and risk  
24 in the facility that is being assessed, but they don't  
25 shy away from quantitative.

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1           On our side, on the staff, in the process  
2 of involving Part 70, we don't have an analogous  
3 situation here where we can easily point to that same  
4 process and say, "Yes, that's what we want you to do."

5           Therefore, to address the concern that  
6 what the staff is demanding in Part 70 is, in fact,  
7 like a reactor PRA, breaking things down to component  
8 level and justifying your failure rates from  
9 databases; that to avoid that issue, it was made clear  
10 that that was not going to be required.

11           In addition, there's the real focus.  
12 Maybe when I get into the example you'll see from the  
13 examples. The real focus of the staff's initiating  
14 the Part 70 rule was really to get an identification  
15 of what were the items relied on for safety so that  
16 the facilities could focus their management attention  
17 on those items.

18           And that's really the more significant  
19 part of it. The fact of whether or not the safety  
20 design is adequate or not, I think, is a thing that  
21 should be addressed, and the AIChE PHA methodology  
22 recommends that be done.

23           But they leave it up to the analysts, the  
24 facility to decide what methodology to use, and they  
25 suggest you can do anything all the way from fully

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1 quantitative all the way over to a holistic judgment  
2 that the system design is adequate by the members of  
3 the ISA team, the PHA team.

4 And so AIChE doesn't pin you down as to  
5 where you are. If you look at the presentation that  
6 I have here, you'll see that the staff's suggestion is  
7 trying to suggest that we move as far as we can in the  
8 direction of quantitative, but don't go any further  
9 than beyond the evidence, as you said, what the  
10 evidence will support.

11 In many cases that, you know, is not much.

12 CHAIRMAN GARRICK: Well, we don't want to  
13 complicate and disrupt the process, and we apologize  
14 for doing that a little bit, but we thought it was  
15 kind of important for us.

16 There are a number of language issues here  
17 that are contributing to this mass confusion. You  
18 just used one where you said, "We don't want to go  
19 beyond the evidence," the implication being that PRA  
20 goes beyond the evidence, and that's absolute  
21 nonsense.

22 And we have to be very careful. You know,  
23 there's language in this standard review plan that is  
24 to me very explosive. Like here on 3-16 it says, "An  
25 applicant may use quantitative methods and definitions

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1 for evaluating compliance with 10 CFR 70.61, but  
2 nothing in this SRP should be construed as an  
3 interpretation that such methods are required. In  
4 fact, it is recommended that in any case the reviewer  
5 focus on objective qualities and information provided  
6 concerning accident likelihoods," again implying that  
7 PRA and quantitative methods are nonobjective, and  
8 that's nonsense, too.

9           There has been a terrible miscommunication  
10 between the advocates of these concepts. The whole  
11 idea of quantitative risk assessment is to let the  
12 evidence speak, and in order to let the evidence  
13 speak, you have to cast the information in a form that  
14 represents the evidence, and that usually means a set  
15 of probability curves.

16           And that's certainly much more objective  
17 than not doing that. So anything less than a  
18 quantitative risk assessment is increasingly  
19 suggestive. It has to be by definition.

20           And so the suggestions in here, you can be  
21 quantitative, but you'd better be careful because it's  
22 kind of being interpreted that the more you're being  
23 quantitative, the more subjective you're being.

24           And it's unfortunate that that kind of --  
25 with all of the experience of this agency, that that

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1 kind of message is captured in a rule, and I've seen  
2 it in two or three other places, and it's just plain  
3 wrong. It's just a plain misinterpretation of what  
4 risk assessment is all about.

5 So I think the work that's been done in  
6 ISA is great work. I've done lots of chemical risk  
7 analysis, and these people have made major  
8 contribution to safety analysis that's in a more  
9 systematic and unit operations fashion, and they have  
10 done the best job of any community in relating matters  
11 of throughput, matters of cost to the safety analysis.

12 And so the contributions are great, and we  
13 want to capture that as much as possible, but it  
14 shouldn't become a contest between qualitative and  
15 quantitative. I don't see an interface between the  
16 two. I just see degrees of scope, that one scope is  
17 more comprehensive than the other scope.

18 But one of the things that is disturbing  
19 to me is that there's so much fencing, of trying to  
20 avoid this confrontation if you wish with the issue of  
21 likelihood, trying to define what credibility is,  
22 trying to define what highly likely is, trying to  
23 define what likelihood is that it really seems to be  
24 a great waste of energy when what we should be doing  
25 is saying, "Well, let's let the information and the

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1 analysis determine what the likelihood is," not a  
2 bunch of artificial thresholds.

3 We've got ten to the minus three  
4 thresholds. We've got ten to the minus six  
5 thresholds. So we establish these very quantitative,  
6 point precise thresholds, and then we talk about  
7 qualitative responses to those very precise and very  
8 definite threshold levels, and even that doesn't make  
9 a heck of a lot of sense.

10 So I think the exercise is very good and  
11 it's very constructive, but there is an undertone to  
12 this whole process that there's a contest between the  
13 PHA way of doing things and the PRA way of doing  
14 things, and that's regrettable because both methods  
15 have provided great contribution to an integrated  
16 safety analysis thought process, and they should be  
17 exploited.

18 And this agency is a leader in certainly  
19 the quantitative side, and the fact that you would  
20 find in standard review plans this kind of stuff is a  
21 little bit surprising because it's just plain wrong,  
22 and we hope we eventually get that fixed.

23 MR. DAMON: Well, I'm sure that the  
24 statements in the standard review plan could be stated  
25 better. I want us to remember this. The purpose of

1 that chapter is guidance to staff reviewers.

2 CHAIRMAN GARRICK: I understand.

3 MR. DAMON: And the concern there is  
4 because really the reality here is that a risk is best  
5 understood as a quantitative thing. It is the triplet  
6 you mentioned.

7 It has quantitative, conceptually  
8 quantitative things: likelihood or probability and  
9 consequences.

10 There was concern that a staff reviewer  
11 would march down the road of saying that basically the  
12 information presented by the applicant had to be  
13 quantitative and that he had to justify all of that  
14 quantitative information when, in fact, the evidence  
15 might not exist.

16 CHAIRMAN GARRICK: Yeah, I understand  
17 that, and there had to be something done to deal with  
18 that, and I think that certainly probably a large  
19 fraction of what's been done is right on target in  
20 that regard.

21 But you know, I do see emerging -- if you  
22 look at the surface, you read the first few pages of  
23 this, you're very happy because it's clear that they  
24 are addressing sequences, scenarios, and they are  
25 addressing consequence, and they are addressing

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1 likelihood.

2 It's only when you dig a little deeper  
3 that you begin to see these differences that will  
4 eventually have to work out somehow.

5 MR. DAMON: Well, you know, we have, the  
6 staff has a suggestion that's been made to the  
7 industry as to how to move forward on Chapter 3. You  
8 have to realize Chapter 3 is not final. It's in the  
9 process of being evolved here, and we're still working  
10 on it basically. So that's about all I can say.

11 My own philosophy, of course, is that the  
12 best understanding you can reach as a person of what  
13 the risk of something is is to formulate it the way  
14 mathematical models of risk are formulated.

15 CHAIRMAN GARRICK: Right.

16 MR. DAMON: That gives you that  
17 understanding, but what I would like to see people do  
18 is to relate those quantities that you're trying to  
19 quantify to objective evidence and to objective  
20 qualities of the safety hardware or procedures that  
21 are being used as opposed to what I've seen in some  
22 other nonreactor facilities where the analyst has been  
23 posed the challenge of demonstrating that something is  
24 less than ten to the minus six. So they throw a bunch  
25 of numbers together and say it's less than ten to the

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1 minus six without any justification.

2 CHAIRMAN GARRICK: That's part of my  
3 point, yes.

4 MR. DAMON: Yes. I want them to  
5 understand it the way you and I do, that the evidence  
6 speaks for itself. Tell me the evidence, and then  
7 relate it to the equations.

8 CHAIRMAN GARRICK: Yeah, and one has to  
9 remember that when we talk about evidence, we're not  
10 only talking about frequency information. We're  
11 talking about the model itself as part of that  
12 evidence.

13 The one thing that distinguishes risk  
14 assessment from reliability analysis is that risk  
15 assessment was invented because we didn't have  
16 information. You know, what amazes me is how often I  
17 hear the expression that we can't do risk assessment  
18 because we don't have the data.

19 The reason risk assessment was invented,  
20 we didn't have data. We didn't know what a core melt  
21 frequency was. We had no idea. So we had to find a  
22 way to get a better insight about that, and the way we  
23 found how to do that is that we developed logic models  
24 that allowed us to move from the level at which we  
25 didn't have any data down to a level for which we did

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1 have data, and the whole integrity of that model then  
2 becomes that logic between those two points.

3 And so the motivation for the whole risk  
4 assessment culture was the absence of data and the  
5 desire to get better understanding and insights on  
6 these critical issues, and that's the big difference  
7 between the classical reliability analysis activity  
8 and the risk assessment community.

9 The risk assessment community has made its  
10 major contribution in the structuring of logic models  
11 from levels at which there is some information to  
12 levels of interest, and so I think that that  
13 fundamental idea seems to be missed in a lot of people  
14 that are kind of sitting on the outside and wondering  
15 what this risk assessment is all about, and that's  
16 kind of what it is about.

17 It's about getting a better understanding,  
18 getting insights on events for which we have little or  
19 no information, and when you talk to people about it  
20 in that context, you know, they're flabbergasted  
21 because they see it as a statistics game.

22 Statistics play a very minor role in a  
23 comprehensive probabilistic risk assessment, and what  
24 it really is more than anything else is a lot of hard  
25 nosed engineering analysis in structuring how the

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1 machine works and envisioning how it can fail, and  
2 that's why the modeling has to be done from the point  
3 of view of really understanding how it works.

4 And when people started getting involved  
5 that knew that, that's when we started making real  
6 progress in developing understandings of the risk of  
7 some of these more complex machines.

8 Well, that's enough of that. I just think  
9 that it's very important for us to get up front what  
10 we're kind of looking for because if there's any way  
11 we can simplify this process, we're eager to do it,  
12 and one of the big issues as you clearly know is the  
13 issue of transparency, the issue of trying to figure  
14 out just what in the heck the safety analysts are  
15 doing.

16 And that would come, I think, from the  
17 merging of some of these approaches and some  
18 clarification on what we mean by a risk informed  
19 concept.

20 DR. LEVENSON: You know, just a historical  
21 perspective, and that is that the risk assessment did  
22 not follow the collection of large databases. When  
23 WASH 1400 was done, there was no database because I  
24 was at EPRI, and we started the very first database to  
25 start collecting failure rate data.

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1           There had been isolated cases of  
2 proprietary bases by vendors and so forth, but the  
3 recognition that you needed eventually to find tune  
4 it, the big effort to collect data came after an  
5 acceptance recognition that you could get very useful  
6 insights and improve safety even in the absence of  
7 data.

8           Today, of course, we have huge data banks,  
9 but we need to remember that that came after.

10           CHAIRMAN GARRICK: We're very sorry.

11           (Laughter.)

12           CHAIRMAN GARRICK: But now we'll stay  
13 awake.

14           MR. DAMON: I think I'll just rush right  
15 through this presentation and try to get to the point  
16 where I'm talking about examples of analyses and then  
17 go to one of the examples that I think will illustrate  
18 some of the interesting -- it will get into some of  
19 these subtle points here about what you do.

20           My own attempt in Chapter 3 was, in fact,  
21 to move the modeling structure towards the actual risk  
22 equations for the system as opposed to an indexing  
23 method that is at a different level, where you're not  
24 thinking about the math and you're not thinking about  
25 the fact that the thing you're really pushing for is

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1 a quantitative entity, whether you know what it is or  
2 not.

3 I was trying to push it in that direction  
4 because I believe the equations illuminate exactly  
5 what it is that's being relied on in the system for  
6 safety, just as Dr. Levenson said.

7 And so even if you don't know whether  
8 there is data or not, it focuses your attention on the  
9 things you should be attempting to assess, you know.  
10 That's the attempt of that method, and as opposed to  
11 methods that are maybe at a different level in the  
12 process, maybe, as I say, a holistic level or some  
13 other intermediate point, I think you should go right  
14 down to the level of the equations and look at what  
15 they're telling you and attempt to make your judgment  
16 at that point.

17 The presentation is not focused on what  
18 type of analysis the staff would find acceptable  
19 because that's in the process of being discussed, and  
20 there's no discussion here of the status of the  
21 industry's ISAs because, as Tom pointed out, the rule  
22 was just revised, and they're going to submit their  
23 plans and schedules on April 18th and, therefore, the  
24 schedules are going to be in the future.

25 The rule mandates actually what an ISA is.

1 An ISA really is just a regulatory concept that's  
2 embedded in this rule, and it says that the analysis  
3 must identify hazards, identify accident sequences,  
4 consequences and the like with it.

5 Well, there's the risk triplet right  
6 there. Event: identify action sequences,  
7 consequences, likelihood. Identify items relied on  
8 for safety.

9 As I say, the real genesis of this whole  
10 process was to get a documented list of what the items  
11 are that are being relied on for safety so that it's  
12 clear to everyone what the system safety design is,  
13 and then it's also required that compliance with the  
14 performance requirements be evaluated. What are  
15 performance requirements?

16 Performance requirements are three. High  
17 consequence events have to be highly unlikely.  
18 Intermediate consequence events have to be unlikely,  
19 and criticalities have to be prevented regardless of  
20 consequences.

21 High consequences are defined as worker,  
22 100 rem or more or a chemical -- fatal levels of  
23 chemical exposure; persons off site, 25 rem or more.  
24 High consequences must be highly unlikely.  
25 Intermediate events are less severe.

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1           One thing was mentioned or asked about,  
2           and that is why isn't there seven or ten categories,  
3           that issue there. That issue was discussed over a  
4           long period of time. I was not actually involved in  
5           the rule writing process at the point in time when the  
6           decision was made final. So I cannot tell you exactly  
7           what the thoughts were at that moment when they  
8           decided to go with two categories.

9           But I was involved in addressing a couple  
10          of issues. One of them is you'll notice the lower  
11          level of the consequence levels here for persons off  
12          site is five rem. That is not the Part 20 exposure  
13          limit for persons off site, which is 100 millirem. So  
14          there's a gap there between this and 100 millirem.

15          And originally there were three categories  
16          in this rule, and this lower category was lowered down  
17          to that Part 20 limit. It was raised up. So now  
18          there was consideration given: should there be a  
19          third category down there or what?

20          Instead it was raised up and there's a gap  
21          left there, and there's a lot of discussion about what  
22          regulatory consequences that would have and so on, and  
23          the decision was made that it was unduly burdensome to  
24          require that events with consequences below this be  
25          required to be analyzed as part of an ISA because

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1 their level of consequences was sufficiently low.

2 We felt that they would be addressed by  
3 other regulatory requirements adequately, and so that  
4 gap was left for that reason.

5 There's another gap, which is, of course,  
6 100 rem exposure to a single individual or that type  
7 of thing. You could say what about an event where  
8 there are fatalities to multiple persons or many  
9 persons or large levels of off site contamination  
10 where you might assess large numbers of latent cancer  
11 fatalities.

12 There was consideration given to having  
13 such higher consequence categories, and like I say, I  
14 do not know the full reason why it was not done.

15 One factor here is that the facilities at  
16 the moment who are subject to this requirement don't  
17 have such events as far as we're aware. They don't  
18 have events that will produce that level of  
19 consequences.

20 However, in the standard review plan, this  
21 issue of what do you do if you have a facility that  
22 does have such events in it, that is discussed in the  
23 standard review plan, and the general idea with these  
24 categories was that they were left in a vague state.

25 There was consideration given to giving

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1 numerical limits in the rule, and it was explicitly  
2 rejected, that thought. It was left flexible, and so  
3 we feel it's a graded approach that leaves everyone  
4 the flexibility to --

5 CO-CHAIRMAN KRESS: Could you leave that  
6 on, that particular one? I'm sorry.

7 You can debate endless about the specific  
8 values of these numbers and how they're arrived at.  
9 Twenty-five rems in the top one, the high consequence  
10 events has some precedence in the reactor field.

11 If you go down to the intermediate  
12 consequence events, the five rem, for example, for an  
13 off-site person, that's getting close to being  
14 indistinguishable from 25 rems from the standpoint of  
15 your ability to calculate it.

16 You know, maybe one rem is getting down to  
17 where you can distinguish your ability to calculate.  
18 So what bothers me is I don't see any reflection of  
19 the uncertainty in the ability to calculate reflected  
20 in these kind of acceptance consequences. It's just  
21 a personal problem I have.

22 I don't have any problem with setting  
23 values like this, but it's the level of the numbers  
24 that begin to bother me.

25 Now, I would have probably chosen one rem,

1 but that's not much different than five rem either.

2 MR. DAMON: I mean it is a fact that, for  
3 example, the MOX people came and made a presentation  
4 recently. They said based on their preliminary  
5 assessment of things, they don't see any difference  
6 between five rem and 25 rem, and they're not even  
7 going to take any credit for anything being in this  
8 intermediate consequence level.

9 CO-CHAIRMAN KRESS: Yeah, that was pretty  
10 much before, yeah.

11 MR. DAMON: So that also we realized at  
12 the time -- but it was left in here on principle, on  
13 principle that some such thing could appear that would  
14 fall in that band. It's a narrow band between five  
15 and 25, and that we wanted to put in something that  
16 recognized that the staff would expect less stringent  
17 controls to prevent such a thing than it would for a  
18 higher one.

19 So it's kind of a vague expression with  
20 very concrete numbers for what consequence levels  
21 you're talking about, but yet a vague expression that  
22 likelihood should be proportional to consequences.

23 This is just a slide that points out that  
24 the chemical standards only apply to those chemicals  
25 in those processes for which the NRC has cognizance.

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1 You know, in general, worker chemical safety is an  
2 OSHA responsibility and the general public chemical  
3 safety is an EPA domain, but there are definitely  
4 chemical accidents that involve license material, and  
5 therefore, the NRC has been held accountable for  
6 those.

7 Part 70 uses this term also. I may drop  
8 into this terminology. So I wanted to make sure that  
9 it was defined in here, this concept of item relied on  
10 for safety. It's a concept that is used in this Part  
11 70 context, and it was chosen so that people didn't  
12 think that there was a one-to-one correlation between  
13 this and safety related or any other terminology, and  
14 primarily the significant thing here is an item line  
15 for safety includes activities and personnel, namely,  
16 what we call administrative controls, procedures for  
17 conducting an operation that must be followed or  
18 prohibitions against doing things.

19 Those are items relied on for safety in  
20 the context of this rule.

21 The standard review plan is just a  
22 guidance on how to review an applicant's evaluation,  
23 and it's structured to tell the reviewer to look at  
24 three things: completeness, you know, and  
25 consequences and likelihood. Again, this is the risk

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1 triplet again, you know. Have you got them all in  
2 there? Have you done them all?

3 That's the conceptual framework, and the  
4 chapter provides guidance to a staff reviewer on it.  
5 Appendix A of the chapter describes an example ISA  
6 likelihood analysis method and a way of presenting the  
7 information for reviews. It does not discuss accident  
8 identification and consequence evaluation. It's only  
9 addressing a couple of missing pieces of the puzzle.

10 Because the ISA has many tasks in it. The  
11 first task, identify hazards, identify accidents.  
12 These two are what's called PHA, process hazard  
13 analysis. Identify accidents, then estimating  
14 consequences, identifying items relied on for safety,  
15 specifying accident sequences, which is a little  
16 different from identifying accidents.

17 Identifying accidents can mean simply,  
18 well, I've got a tank of some -- up here, hazard  
19 identification -- I've got a tank of hazardous  
20 material. The person would say the accident is some  
21 of it gets released. That's not the same as an  
22 accident sequence to me.

23 An accident sequence is specifically  
24 saying exactly what goes on, what fails, and why does  
25 the thing get released.

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1 CO-CHAIRMAN KRESS: Could the identify  
2 accidents be something that some of this tank material  
3 gets released via a fire or via --

4 MR. DAMON: It could be, yeah. It could  
5 be at that level.

6 CO-CHAIRMAN KRESS: Right.

7 MR. DAMON: But the idea is often when you  
8 tell someone to identify the actions, they will do it  
9 at this level of just it happens. The stuff gets out  
10 somehow, somehow, without telling you how it happens.

11 Whereas with accident sequences, we're  
12 trying to get into the level of specificity of an  
13 event tree. Then the task is to evaluate likelihoods  
14 of accident sequences, and the applicant is to define  
15 highly unlikely and unlikely, which means these two  
16 are related.

17 The idea is the rule requires evaluation  
18 of compliance with the performance requirements.  
19 These are the performance requirements. So tell us  
20 how you do your evaluation and how you show that it's  
21 highly unlikely.

22 CHAIRMAN GARRICK: Would it be fair to say  
23 that one analogy between accidents and accident  
24 sequences would be the difference between a source  
25 term and how you get a source?

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1           In other words, one of the big exercises  
2 in all of these things is defining the source term,  
3 the source term being an intermediate state, but the  
4 real sequence for getting a source term is something  
5 again. So it's somewhat analogous to that.

6           One of the things I was very interested in  
7 as I went through this material is trying to figure  
8 out how you handle the coupling between different  
9 hazards and, in particular, between chemical hazards  
10 and radiation hazards.

11           And the sense I got out of it was that  
12 your interest in chemical hazards was principally in  
13 the context of how it became a driver, how chemical  
14 events might become a driver for radiation releases of  
15 some form or another, but that there seemed to be some  
16 backing off of chemical risk somewhat in isolation;  
17 that the interest was driving principally by how  
18 chemical events can contribute to a radiation source  
19 term.

20           So if you could clarify that.

21           MR. DAMON: I think there may be sections  
22 where that concept is discussed because it certainly  
23 is one type of accident that would be of concern.

24           The one reason for mentioning -- but it's  
25 not the sole type of chemical accident. In fact, it's

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1 probably not really the one of major concern. The one  
2 major concern really is chemical exposure, and the  
3 worker gets the chemical effect and it's a licensed  
4 material, and we license the process, and we told them  
5 it was safe and somebody got killed from the chemical.

6 CHAIRMAN GARRICK: Right, yeah, and my  
7 point there is you have to understand the chemical  
8 processes and the chemical events because they are  
9 most likely in most cases going to be the principal  
10 drivers of establishing radiation release.

11 CO-CHAIRMAN KRESS: Except HF will kill  
12 you without any radiation involved.

13 CHAIRMAN GARRICK: Well, that's the other  
14 thing.

15 CO-CHAIRMAN KRESS: And you don't want  
16 that to happen because it does come out of your  
17 facility.

18 DR. LEVENSON: Would it be a fair summary  
19 to say with the exception of fluorine related things,  
20 all other chemical risks, purely chemical risks, go to  
21 OSHA rather than NRC?

22 MR. DAMON: Not quite.

23 CO-CHAIRMAN KRESS: Uranium is a heavy  
24 metal poison, and you have to deal with that.

25 DR. LEVENSON: Yeah, I mean, those few

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1 exceptions.

2 MR. DAMON: Yeah, there are some other --  
3 there are ammonia based compounds here. Ammonia can  
4 get involved, and you can get that. That's another  
5 one.

6 Nitrous oxide is another one, you know.  
7 You know, these processes when you're dissolving  
8 uranium like at Tokaimura. That's what they were  
9 doing. That's why they were doing it outside the  
10 vessel.

11 I mean why they didn't tell the regulator  
12 was because the regulator would never have let them  
13 dissolved that stuff and generate nitrous oxide the  
14 way they were doing. So, you know, there are several  
15 chemicals that can get you from these things.

16 CO-CHAIRMAN KRESS: Item 7 on that list  
17 was define what you mean by likely and highly  
18 unlikely. It strikes me as a little strange that a  
19 regulatory body allows the regulated entity to define  
20 his own levels that he's going to be regulated to.

21 Could you speak to that? I mean, you're  
22 going to let them define what those terms are, and I'm  
23 sure you have to say, "Yeah, we agree," but that seems  
24 a little strange to me for some reason.

25 MR. DAMON: Well, at the time the things

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1 were formulated in that form, I was not involved in  
2 the rule. So that's a historical question of what was  
3 the thought process there.

4 I can definitely -- you know, now me being  
5 confronted with now what do I do with this rule, I  
6 understand the issue. There are guidance -- there is  
7 guidance out there that the commission in a general,  
8 broad context has given us as to what extent should we  
9 prevent accidents. They have strategic safety  
10 performance goals and things like that, telling you  
11 let's not have any increase in exposures above 25 rem  
12 and things like that.

13 So there is that type of general guidance  
14 out there, but in the context of this rule, I don't  
15 know why there wasn't more guidance given in this  
16 context as to what highly unlikely and unlikely  
17 really, really would mean.

18 There is in the standard review plan this  
19 example problem. We illustrate that basically we  
20 interpret it as a quantitative thing, but just as a  
21 flexible guideline, not as a line in the stand that  
22 you're really going to come up against because, as you  
23 can see, we don't expect them to do it quantitatively  
24 necessarily and to be able to sum all accidents of a  
25 given consequence, up to a given consequence level and

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1 compare it to a numerical thing.

2 And because of that, because we wanted to  
3 leave that flexibility, it's a difficult subject to  
4 get more specific about.

5 The tasks that were listed there, the  
6 eight tasks, the first two, hazards identification and  
7 accident identification are discussed in NUREG 1513,  
8 which refers again the reader to the -- it synthesizes  
9 the AIChE red book on the different action  
10 identification methodologies and, you know, refers you  
11 to that and other sources for how to do event trees,  
12 fault trees, and HAZOP and other methods.

13 So those methods, I'm sure, are familiar  
14 to you gentlemen better than me, and, in fact, the  
15 other references are all available. So I'm not going  
16 to discuss them. Everyone knows what that's all  
17 about, but that guidance is there.

18 It gives a flow chart for how you select  
19 the method that's appropriate to the complexity of the  
20 process. In fact, it says if you have a complex,  
21 redundant safety design, you should use a fault tree.

22 Another task in the list of things the ISA  
23 does is consequence estimation. The consequences are  
24 defined quantitatively. So the ISA has to estimate  
25 them quantitatively in some sense.

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1           It doesn't necessarily have to do that for  
2 every single action sequence. It can do bounding  
3 calculations that show roughly where you're at, and  
4 maybe that is sufficient given the source terms in  
5 specific cases so that you know that you're not going  
6 to exceed those thresholds. So that's really what we  
7 expect to see, is a few bounding calculations to  
8 demonstrate or to benchmark things.

9           As far as the technical adequacy of the  
10 calculations, there's a guidance document NUREG CR-  
11 6410, which is called the fuel cycle accident analysis  
12 handbook that discusses computer codes and data that  
13 are out there and methods for quantifying exposures  
14 from radiological releases, chemical releases that  
15 would be applicable to a fuel cycle facility.

16           For example, if you spill a liquid  
17 chemical, how much is aerosolized? That kind of issue  
18 and the codes that use heavy gas models. So if those  
19 are involved, we've given guidance already on how to  
20 do that.

21           So now finally we get to accident sequence  
22 specification because that's what this Appendix A  
23 method is all about, and as it says here, this method  
24 in Appendix A is an example of how the staff thought  
25 you could resolve all of these issues of trying to

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1 dance around the issue of quantitative versus  
2 qualitative, and what does highly unlikely mean, and  
3 how would you analyze a process.

4 Other methods are acceptable. In  
5 particular, the method in Appendix A doesn't talk  
6 about using fault trees, which really in the case of  
7 redundant systems with any degree of complexity are  
8 really a preferred way of displaying the information,  
9 but it uses instead a tabular summary, which is like  
10 listing each minimal cut set as one row in a table or  
11 one action sequence.

12 The method that's in Appendix A, as I say,  
13 the concept that is preached to there is to base the  
14 assessment or likelihood on the actual equation for  
15 the frequency of this accident sequence as a function  
16 of the underlying variables that make up that  
17 probability.

18 So I'm advocating here essentially making  
19 a model of the accident sequence of events and writing  
20 that equation down, and then using integer indices to  
21 judge roughly what you think those frequencies and  
22 times are.

23 In some cases you'll have information  
24 about these thing. This is another.

25 What I've got following this is some

1 examples. This is an example of an equation for  
2 frequency of an accident that occurs in a system that  
3 they have two active redundant controls. In other  
4 words, by active I mean that the two controls have to  
5 be continuously present while the process contains the  
6 hazardous material, and that if both are in a failed  
7 state at the same time, then you have the accident.  
8 So that's what's meant by active.

9 The control must remain in a success  
10 state, an active state, and when both are in a failed  
11 state, you have the accident. So for like a Poisson  
12 process, this is the equation. The lambdas are  
13 failure rates. The  $U$ s are unavailabilities, and  
14 there's two controls, two redundant controls. Both  
15 must be failed. The frequency has two terms in it,  
16 the frequency of one failing times the probability.  
17  $U$  is the probability that the other one is not  
18 available when the second one fails.

19 And if you just look at one of those  
20 terms,  $\lambda U$ , to a good approximation usually that  
21 can be broken down this way, that the actual  
22 unavailability of the other second control is its  
23 failure rate times  $T_2$ , which is its outage time, its  
24 duration, the duration that it would remain in a  
25 failed state.

1           So the point here is simply that the  
2 typical term expressing an accident sequence is  
3 actually a product of variables. If you take the  
4 logarithm of the frequency of that one term, it then  
5 becomes a sum of logarithms of the factors in that  
6 term, and that's what the method in the Appendix A  
7 table summary is based on. It's using logarithms.

8           For example, if the parameters have these  
9 values, you compute the logarithms. You add them, and  
10 you get a value, and this value represents the  
11 frequency of the accident sequence at an order of  
12 magnitude level.

13           CO-CHAIRMAN KRESS: Was it done this way  
14 because people thought it was easier to add than to  
15 multiply?

16           (Laughter.)

17           MR. DAMON: Yes, it was done to discretize  
18 the thing. It was an attempt to discretize it and at  
19 rough orders of magnitude.

20           CO-CHAIRMAN KRESS: Okay.

21           MR. DAMON: And this is another example  
22 where instead of that equation you just have a  
23 different equation that only has two terms in it.

24           The point is that there is some equation  
25 that you could develop that would express what you

1 think is happening. What's failing and causing the  
2 accident to occur?

3 And the point here really of doing that is  
4 to make sure you've thought of what it is you're  
5 actually relying on for safety, and you've identified  
6 it. And I feel strongly that this type approach leads  
7 you to that, whereas if you don't write the equation  
8 down, there's a danger that you're led into a vague  
9 thinking, you know, vague, nebulous concept about what  
10 it is that's really happening here.

11 And so now the question is where do you  
12 get these index numbers that are supposed to relate to  
13 some extent to failure rates and times. In Appendix  
14 A method, the suggestion is that they be predefined in  
15 tables of qualitative or quantitative criteria.

16 Again, this is the idea that you use what  
17 based on what evidence you have, and sometimes you do  
18 have quantitative information that bears on the value  
19 of something, in particular, outage times.

20 Outage times are typically -- the typical  
21 outage time for the kind of failure that happened in  
22 a plant like this is most of the things that can  
23 happen are obvious. When that happens, it is obvious  
24 or it's fail safe, and so it will be corrected, and  
25 the length of time that it will remain in that failed,

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1 vulnerable condition -- for example, a powder spill on  
2 the floor, how long will it be sitting there with  
3 enough material that could be potentially critical is  
4 limited, and you know it's limited. It might be  
5 corrected right away if the operator is present when  
6 it happens.

7 So the basis, the idea was that the  
8 criteria in these tables should be expressed fairly  
9 clearly and specifically so that the idea here is to  
10 achieve objectivity and consistency in evaluating  
11 systems as opposed to the holistic approach where the  
12 team, ISA team, would simply decide whether they  
13 thought that an accident was highly unlikely for that  
14 particular process design. An approach like that  
15 could be radically inconsistent if you have different  
16 teams assessing identical designs.

17 So we wanted to force people to establish  
18 criteria, write them down, and force everybody to  
19 follow the same rule. So that is really basically the  
20 idea here.

21 I'm going to skip ahead. If you look --

22 CHAIRMAN GARRICK: Dennis, since I notice  
23 we're going to continue with you after the break, can  
24 you tell us when it is an appropriate time for or a  
25 logical time for us --

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1 MR. DAMON: This is it.

2 CHAIRMAN GARRICK: Okay. I suspected  
3 that.

4 All right. I'd like to allow us to take  
5 our scheduled break at this time.

6 (Whereupon, the foregoing matter went off  
7 the record at 10;15 a.m. and went back on  
8 the record at 10:32 a.m.)

9 CHAIRMAN GARRICK: Go ahead.

10 MR. DAMON: This is Dennis Damon again.

11 If I knew how to work this slide show  
12 better, I would skip ahead to Example 3, but since I  
13 don't know how to skip around like that, I'm going to  
14 have to march straight forward.

15 There are three example problem. As,  
16 again, I said, I made these up, but they are  
17 representative of things that I've seen, but I can't  
18 vouch that this particular safety design represents  
19 anything that is actually in any plant, but the type  
20 of general approach or process and the general types  
21 of controls, these are some.

22 You can't really say things are typical.  
23 There is a very large number of widely diverse types  
24 of process safety designs in the plants, and this  
25 first one is a very simple thing. The concept here is

1 that you have a chemical process, a liquid chemistry  
2 process. You're processing uranium, and you're going  
3 to add an aqueous chemical to that process. So you've  
4 got a water solution of some chemical that is toxic.  
5 How do you protect against the accident where that  
6 toxic chemical leaks out and might expose the workers  
7 that are working on that process?

8 The protection consists of in this case a  
9 double containment line. You've got an inner pipe  
10 that contains the chemical, and then you've got an  
11 outer containment pipe that's normally dry. So it's  
12 just a containment design to conduct surveillance to  
13 know whether that inner line has actually got a leak  
14 in it, the outer line at a low point in the system has  
15 a little trap with a visible sight glass where you can  
16 see whether any fluid has leaked out into that outer  
17 containment line.

18 That outer containment line sight glass is  
19 subjected to a weekly surveillance where an operator  
20 comes by and looks at the sight glass to see if  
21 there's any liquid in there.

22 The outer line is not surveilled that way.  
23 It is surveilled by testing it for leak tightness  
24 every two years, pressuring it with gas or something  
25 like that to see if it's in a leaking condition. So

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1 how do you model a system like that using the method  
2 of Appendix A?

3 I'm going to show the equations first and  
4 where the -- I'm going to show, rather, the parameters  
5 involved and where they come from. Obviously there's  
6 going to be four terms involved just like the equation  
7 I showed previously for two active controls.

8 This is a two active, redundant control  
9 situation. There's a failure rate, in other words, a  
10 leak rate for each of the pipes, and then there's a  
11 duration that the pipe would remain in a leak  
12 condition before detected and corrected.

13 So each pipe has these two parameters, and  
14 in the method of Appendix A, you would get the index  
15 values you would assign to those parameters by looking  
16 in the tables. In the back of your handout, I have  
17 included a copy of the tables that are in Appendix A  
18 that are used to make these assignments. The tables  
19 are in the back of your handout. They look like this.

20 There are Tables A-3 through A-5. These  
21 were strictly intended to be examples of the format  
22 and structure and the concept. They were not intended  
23 to be used by somebody, but I'm going to actually use  
24 this scheme that was in there to assign these indices  
25 to see what you get.

1 I personally believed at the time that was  
2 formulated that the way you really do it is an  
3 iterative process by which you develop criteria. You  
4 apply them, and then as you apply them you learn that  
5 they are either working for you or they're not, and  
6 you refine them as you go.

7 But in any case, in this first example for  
8 the leak rate, failure rate of the inner line, which  
9 is the likelihood of leakage, I'm saying that's a  
10 passive control, and if you look in Table A-3, a  
11 passive control failure frequency is given a minus  
12 two.

13 Again, I'm not vouching for the validity  
14 of this scheme in here. It's a conceptual scheme. It  
15 was supposed to have been developed by the applicant  
16 and justified based on whatever information is  
17 available.

18 But in any case, using that actual scheme  
19 that is in there, you put a minus two for the leak  
20 rate, the probability of the frequency per year of a  
21 leak so that that's once in 100 years; the average  
22 outage time of that line is a half a leak because  
23 they're surveilling it once a week. So on average,  
24 the time between the time where a leak occurs and the  
25 time where it would be discovered is going to be a

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1 half a leak. A half a leak is 1/100 of a year, and so  
2 using Table A-5, that scores as a minus two, or the  
3 minus two being 1/100 of a year, ten to the minus two  
4 year.

5 So that basically shows you how the scheme  
6 works. I mean it is quantifying things, but it is  
7 doing it based on a tabulated criteria.

8 Again, the same thing, the leak rate of  
9 the outer line, ten to the minus two per year. So it  
10 gets a minus two. Now, the outer line, it's only  
11 being surveilled every two years. So, on average, if  
12 a leak occurs in the outer line, it will stay in a  
13 failed state in the plant for a year. So it gets a  
14 zero for that.

15 So now when you go to quantifying the  
16 frequency of the two accident sequences in the  
17 equation like this, what you do is simply add those  
18 numbers up. The table -- you know, among the tables  
19 that I passed out, there's a Table A-1. Now, that  
20 Table A-1 lays out this example that I just went  
21 through. It lays it out as we envision it being laid  
22 out in this method.

23 There's two sequences. The first sequence  
24 says the inner line leaks first. So inner line leaks  
25 first. Then outer line leaks before the inner line is

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1 corrected. There's a second event here, and it shows  
2 how you take and you put those index values in there.  
3 You add them up, and the fourth column is labeled  
4 likelihood index. So there you're adding those  
5 values.

6 And the last column is the consequences by  
7 category. High is a three. Intermediate is a two.  
8 So the idea here is to assess the likelihood and  
9 consequences by index values, and then establish a  
10 criterion for what would be an acceptable value for  
11 the likelihood index.

12 And so that's the method that's advocated  
13 in Appendix A. This particular example shows that  
14 there are two sequences. Inner line leaks first and  
15 outer line leaks first, and you notice the likelihood  
16 index for the two is quite different, and that's why  
17 I picked this example. It illustrates that by using  
18 the equation you discover that there's quite a  
19 difference in the frequency, and that the reason for  
20 that is that the duration of failure of the outer line  
21 is very long compared to the inner line because it's  
22 not being tested very frequently, and that when you  
23 design something like a double containment line like  
24 that, there's no point in having weekly surveillance  
25 on only one of the two items. Because the other one,

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1 the frequency of the two is going to be dominated by  
2 whichever one is the longer.

3 And so that's the point of analyzing these  
4 things correctly, is that it tells you that you're  
5 wasting your time doing surveillance on that inner  
6 line. You should be doing it on both of them at the  
7 same frequency.

8 This is a summary of the method in  
9 Appendix A is about. It's about having a table of  
10 accident sequences, one event per column. The example  
11 I have only has two events, but the method suggests  
12 you could have whatever number of columns you need for  
13 outer line events.

14 So basically what you're doing is if  
15 you're done a fault tree on the process and you lay  
16 out the minimum cut sets as accident sequences, you  
17 just lay them out in this table. The purpose of doing  
18 this is not simply quantification, but rather to leave  
19 room to describe the accident sequence to the reviewer  
20 as well as providing the consequences so that he can -  
21 - it facilitates the review.

22 It also is because the rule is formulated  
23 -- the rule requirement is formulated on a per event  
24 basis. Each event must be highly unlikely. So the  
25 reviewer really should be reviewing each event so that

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1 we have a table of accident sequences. Then --

2 CHAIRMAN GARRICK: Just to point up the  
3 comment that I earlier made about this discussion  
4 between qualitative and quantitative, you're used the  
5 term several times in this example of quantifying  
6 this, and that's perfectly okay. And I agree with you  
7 that these types of analyses really do expose the  
8 importance of the form of the information. The  
9 surveillanced or unsurveillanced example is excellent.

10 But to me this is not a quantitative  
11 analysis because you're not dealing with parameter  
12 uncertainty, but either it comes from population  
13 ability or uncertainty infrequencies or uncertainty in  
14 the model, but it is a useful and important point  
15 estimate calculation, but it's not quantification  
16 because it does not communicate to me anything about  
17 confidence in the parameters.

18 But as I say, it is useful, and it  
19 provides an important understand, and in many cases  
20 you don't need to go the full range of quantification  
21 to get the results you want, and in many situations  
22 like this, this is all you do need to do to get the  
23 results.

24 But I just wanted to take advantage of the  
25 example to point up a difference between

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1 interpretation and how a calculation is interpreted.

2 This is not a quantitative analysis in the  
3 world of risk.

4 MR. DAMON: So anyway, this slide is the  
5 summary of what is involved conceptually in this  
6 Appendix A method. I can just go through a couple  
7 other examples because they illustrate different  
8 points about the kind of issues that come up in trying  
9 to apply a method like this.

10 This system is a mobile cart used to  
11 transfer uranium compounds around between processes in  
12 the plant. The accident consists of overload the cart  
13 to the point where a nuclear criticality occurs. So  
14 that's the potential accident.

15 The protection against this consists of  
16 two administrative controls, that is, procedures, and  
17 one passive engineering control. The cart is used on  
18 the order of 100 times a year or less.

19 So what are the admin. controls? The  
20 first admin. control requires the loading of the cans  
21 that are carried on the cart with material whose  
22 moderator content and weight of uranium in them is  
23 known, is measured, and is subject to a limit. So a  
24 procedure is followed to load the cans.

25 Then there's a second procedure where the

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1 cans are loaded on the cart. In this example, the  
2 first step is the cans are loaded by one person or a  
3 different team. There's a separate group of people at  
4 a separate time that takes the cans and loads them on  
5 the cart in this example. There's a limit on how many  
6 cans can be on the cart.

7 The passive control is the cart is  
8 structured so that it has places to put these cans,  
9 and it's difficult to do anything but put them where  
10 they're supposed to be.

11 The equation for the accident frequency  
12 has these parameters in it again, the frequency of  
13 uses of the cart, 100 times a year. So that's a two,  
14 a plus two, 100 times a year.

15 The probability that the moderator limit  
16 on the cans is violated. That's the first step here,  
17 loading the cans. I'm giving that one in 1,000.

18 There actually are human reliability  
19 engineering studies that provide guidance on what are  
20 credible or reasonable values for different types of  
21 procedures, and these are not too dissimilar from  
22 those, but these are actually based on the tables that  
23 I've given.

24 This is a failure probability for a  
25 process, a procedure which is regularly conducted.

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1 The people are trained in it. They do it every day.  
2 They're not going to make mistakes very often with  
3 something like that.

4 The second procedure is loading cans on  
5 the cart. Again, that's given a minus three also.  
6 It's a low number because, again, it's a regular  
7 process. They know what they're doing.

8 The last step here is probably the  
9 overload is sufficient to cause a criticality, and  
10 that's prevented by the structure of the cart being  
11 such that you almost cannot overload it. I'm assuming  
12 here it's physically possible you could, but that it  
13 would be extremely difficult.

14 And so I'm giving it a minus four which is  
15 that the passive structure would have to be in a --  
16 that basically just reflects the fact that it's  
17 extremely unlikely.

18 This kind of illustrates -- the reason I  
19 included this is because it doesn't fit this criteria  
20 in this table very well. This last one is an example  
21 of a thing that's very hard to quantify. It's a very  
22 difficult thing to figure out what is the likelihood  
23 that someone would do such a thing, that they would  
24 not only violate -- it's fully probability given that  
25 they're neglecting the load limit on the cart.

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1 They're using that cart and overload it beyond what it  
2 is was intended for. How likely is that?

3 There is another sequence here which is  
4 you've got the wrong cart. You've got a cart that was  
5 not intended for this process. It was intended for  
6 some other process.

7 CO-CHAIRMAN KRESS: Or you're loading two  
8 carts at the same time.

9 MR. DAMON: Yes. So there's other  
10 sequences that could be happening with this scheme,  
11 and I'm just illustrating the kind of things which  
12 come up which are difficult to quantify, but  
13 nevertheless, what I think is true is even though you  
14 encounter a thing like that, you should attempt to  
15 make a judgment about how much credit you're going to  
16 allow to this thing, which amounts to, in effect,  
17 assuming a quantitative value that the thing has, a  
18 frequency, a probability somebody would do it.

19 I think there is value to thinking of it  
20 in that way and assigning a credit, and another way  
21 this process could -- one thing about this process is  
22 these two steps in between loading the cans and then  
23 loading the cans on the cart were assumed to be  
24 independent. If they're not, you're not going to get  
25 this kind of credit here. This is done by the same

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1 people.

2           Again, the point of laying it out like  
3 this is that this reveals to the people who are  
4 structuring these procedures that there's a virtue to  
5 having two separate groups do this, whereas if you  
6 have the same group do it, all they have to do is fail  
7 to follow the procedure, and they're going to not get  
8 the credit for these steps here. It's going to be  
9 just the likelihood they do not follow that procedure,  
10 which is probably going to be a minus three. You're  
11 not going to get the other minus three there.

12           So you just add these numbers up, and of  
13 course, you get quite a low number if everything works  
14 the way -- this is extremely unlikely that you could  
15 actually cause a criticality by this mechanism, but it  
16 also reveals another thing, and that is supposing  
17 these two things here, these two minus threes weren't  
18 in here, you know, that you didn't have the two  
19 independent events, that it was only one minus three.  
20 Well, it would still be a minus five down here.

21           In other words, it kind of reveals to the  
22 -- what you're really relying on in this cart is not  
23 really these procedures. It's this guy. It's the way  
24 they've structured the cart, and that's really what  
25 you've got to focus on, make sure you get the right

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1 cart in the right place, and these facilities  
2 recognize this.

3 What they do is they go to extraordinary  
4 lengths to have the right to -- they will preclude  
5 having containers of the wrong size or type in an  
6 entire room or entire area. That is the strategy that  
7 they use. In other words, they're not just writing  
8 a procedure down telling you, "Don't use an incorrect  
9 container or an incorrect cart." They will structure  
10 it so that those things are simply not available to  
11 the staff that operates that process. They're  
12 physically not allowed.

13 So I think there's a lot of virtue to  
14 focusing or to laying out the real equation and  
15 focusing on, you know, what could make this different  
16 than it is, and that tells you what you really should  
17 be doing in the facility, I think.

18 This is the guideline we included in the  
19 rule as to, you know, is this minus eight an  
20 acceptable number or not. We're saying, "Well, think  
21 about a minus five for these, these sequences," and  
22 this was based on the idea that if roughly there's  
23 1,000 accidents in the whole industry, and who knows  
24 how many one would formulate, that they would have to  
25 be a very low frequency of occurrence for any one

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1 sequence in order that the total not add up to some  
2 number that's so high that you would not find it  
3 acceptable.

4 So that's the general idea, is one might  
5 think ten to the minus five means once in 100,000  
6 years. That sounds incredibly low, but as you can  
7 see, it's not that difficult to achieve in many cases,  
8 and, in fact, it is the kind of number that you have  
9 to achieve and that actually the facilities are  
10 achieving. They haven't had a criticality event at  
11 the licensees that are subject to this.

12 CO-CHAIRMAN KRESS: I see very little  
13 difference between that and normal PRA and entry.  
14 That's what they look at to me. I didn't see any  
15 fault trees to get ten to the minus three.

16 MR. DAMON: No, no, right. The difference  
17 here is the tables of qualitative criteria, sort of  
18 the mixture of quantitative, qualitative criteria for  
19 where you've got those numbers from.

20 Some of them, like, for example, the  
21 administrative control type thing, see, that's a  
22 generic thing. I think one could prepare a table of  
23 qualitative situations where there would be some basis  
24 for assigning an index that represented a failure  
25 probability to carry out a procedure. Then there's

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1 other ones like that one that I said, that I mentioned  
2 is loading. How likely is it that they actually try  
3 to overload a cart and succeed in overloading it that  
4 has physical impediments to prevent you from doing it?

5 Well, to judge that, you have to look at  
6 that cart, you know. I mean what else could you do?

7 CHAIRMAN GARRICK: Go ahead, Milt.

8 DR. LEVENSON: Where do the guidelines for  
9 acceptable indexes come from?

10 MR. DAMON: That's what I'm saying.  
11 Supposing this number here that I had before, the idea  
12 is suppose there are -- you don't want nuclear  
13 criticalities to happen in the industry, which is what  
14 the Commission has told us. They do not want them.  
15 They want zero that will occur.

16 I said, "What does that mean to me? What  
17 is the lowest possible -- the highest possible  
18 frequency that I could conceivably say was consistent  
19 with the Commission's desire not to have  
20 criticalities?"

21 Well, if I walk myself up orders of  
22 magnitude, I say is one criticality a year acceptable?  
23 No. Is one a 100 years acceptable? No.

24 So I marched up to one in 100 years. I  
25 said, well, that might just barely be acceptable.

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1 Well, if you want to hold the number of criticalities  
2 to one in 100 years in the industry, then if there are  
3 1,000 accidents in the entire ensemble of everything  
4 that's submitted, then each one of them has to be on  
5 average less than ten to the minus five. So you know,  
6 ten to the minus two, you know, what's 100 years  
7 divided by ten to the minus three? I mean 1,000  
8 accidents is ten to the minus five.

9 So that's just a guideline. It's a  
10 numerical -- there's a little discussion of this. Ten  
11 to the minus five also is on the order of the typical  
12 probability like occupational fatalities and  
13 manufacturing industries is four times ten to the  
14 minus five per year. That's a risk if somebody would  
15 die on the job from what he's doing.

16 So it's on that order that you've got to,  
17 I think, start. It's a guideline to people. If your  
18 number is in that vicinity or if it's way below that,  
19 you're definitely okay. If it's way above that,  
20 you're probably not okay.

21 DR. LEVENSON: Yeah, I understand what  
22 you're saying, but the problem is this one specific  
23 accident you, in essence, got some guidelines from the  
24 Commission, but in arriving at that, you threw in a  
25 number for the total number of accidents there are.

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1 MR. DAMON: Yes.

2 DR. LEVENSON: Which is an unknown.

3 MR. DAMON: Right.

4 DR. LEVENSON: What do you do for all of  
5 the lesser accidents where the Commission has said,  
6 "Don't have it happen"? Is this a whole graded -- it  
7 is a whole big scale of these numbers?

8 And one thing you didn't mention, maybe  
9 it's inherent because of the guidance from the  
10 commissioners, but it seems to me what an acceptable  
11 guideline is has to be fairly closely related to  
12 consequences.

13 MR. DAMON: Right, and that's what's  
14 discussed in the standard review plan. That minus  
15 five number was related to the high consequence. It's  
16 the high consequence category, and like you say, there  
17 is a little table in there that suggests, yes, it  
18 should be graded, that the lower consequence events  
19 should be held to a lesser standard.

20 And there's also a discussion of the fact  
21 that if you had an accident that was substantially  
22 greater than one fatality, you know, a very many, many  
23 fatality type event, then it should be proportionately  
24 less likely, roughly, you know, as a guideline.

25 But this whole issue of quantitative

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1 guidelines is very -- it has to be thought of as  
2 something that's treated very flexibly because it's  
3 complex. It has not been subjected to the thorough  
4 going thought process, peer review, and the whole nine  
5 yards. So we stated these as guidelines, something  
6 for the reviewer to think about or for the applicants  
7 to think about.

8 But I thought there was a virtue to  
9 stating it and going through that one derivation from,  
10 you know, once 100 years for the whole industry to  
11 once in ten to the minus five to show what kind of  
12 frequency we're talking about here, that we're not  
13 talking about once in 100 years per process being  
14 acceptable because you've got many, many processes.  
15 It will add up. It will have too many accidents.  
16 It's got to be a very low number.

17 DR. LEVENSON: Yeah, one of the things  
18 that confuses it a little bit if you're thinking about  
19 a risk based program is that, in fact, I think by a  
20 fairly substantial majority the criticality accidents  
21 in the fuel cycle facilities have had no consequences  
22 except political.

23 MR. DAMON: Well, I wouldn't say --

24 CO-CHAIRMAN KRESS: They sometimes kill  
25 workers.

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1 DR. LEVENSON: Yes, but infrequently.

2 CO-CHAIRMAN KRESS: Infrequently.

3 DR. LEVENSON: Infrequently. The bulk of  
4 them have not caused any injury or damage to the  
5 public.

6 CO-CHAIRMAN KRESS: Yeah, and the worker.

7 DR. LEVENSON: Yeah. A number of them, in  
8 fact, there was serious -- it took a while to figure  
9 out when it really happened, like that little chem.  
10 plan.

11 CO-CHAIRMAN KRESS: Yeah.

12 DR. LEVENSON: I think if you look at all  
13 of the criticality incidents in fuel cycle facilities,  
14 statistically they have not had serious consequences.

15 CO-CHAIRMAN KRESS: Yeah, I agree.  
16 Consequences, that's been over and over.

17 MR. DAMON: Yeah, I know that. I am a  
18 criticality specialist, and my counter to that is many  
19 of the places where criticalities have occurred have  
20 been in situations where the operators aren't  
21 necessarily physically present, right?

22 CO-CHAIRMAN KRESS: Of course.

23 MR. DAMON: These plants, normally the  
24 processes are operated by an operator, and the  
25 operators are physically standing right next to the

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1 S&M. So in these plants my view is a much larger  
2 fraction of the criticalities would, in fact, give --  
3 the operator would get the fatal dose..

4 DR. LEVENSON: I guess the point just is  
5 to avoid it being too prescriptive, that it ought to  
6 be related to the actual case.

7 MR. DAMON: Yes, right. It definitely --  
8 we tried to put all kinds of weasel words with this  
9 guideline number, but I thought there was some value  
10 to putting it in there, but you have to be very  
11 careful.

12 For example, an earthquake or some other  
13 thing might actually have a very substantial fraction  
14 of the risk at a plant, on one particular process, and  
15 you don't want to necessarily say that minus five for  
16 every sequence is a rigid limit of some kind, but it's  
17 a point of reference so that we're not so vague that  
18 we'll let -- the reviewer would let a process go by  
19 that was going to have clearly too high a frequency.

20 Because the other thing about this is  
21 really, as you point out, the public really isn't  
22 impacted by these accidents at uranium plants. It's  
23 really the worker, and if a particular process is  
24 exceptionally risky and all the rest of them in the  
25 plant are not, it's still true that the one worker who

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1 operates that one process has all of that risk  
2 himself, you know.

3 So I think there's a point to -- that's  
4 one of the rationales for keeping this review at not  
5 integrating over a whole plant, but looking at each  
6 process separately.

7 CO-CHAIRMAN KRESS: One other comment on  
8 your last example. One of the principles of good  
9 regulation that's been expressed by NRC is defense in  
10 depth, and in the context of this last example, I  
11 would interpret that to mean how many of these indices  
12 do you have, how many levels of protection, and how  
13 far apart they are from each other in terms of the  
14 index.

15 For example, I could have chosen one that  
16 I got down to ten to the minus six with just one, and  
17 I would have had to meet your acceptance requirement,  
18 but I wouldn't have defense in depth, and I fail to  
19 see any good guidance on how that part of good  
20 regulation is reflected in this process.

21 I mean, how do I know how many lines of  
22 protection to put on there and how far apart each  
23 index can be? Like I don't want each index to be one  
24 and then one of them five. That's not good defense in  
25 depth either.

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1 MR. DAMON: That's true.

2 CO-CHAIRMAN KRESS: So that's something I  
3 fail to see how it's well reflected in this process.

4 MR. DAMON: That concept is well  
5 understood in the fuel cycle industry. In fact,  
6 before this ISA stuff came up, the principal safety  
7 concern that involved the NRC at these facilities is  
8 criticality safety, and in criticality safety, years  
9 ago when criticalities were occurring too frequently,  
10 every couple of years, the community got together and  
11 said, "What do we need to do to stop this?"

12 And one of the things they came up with  
13 was redundancy. Double contingency has been a  
14 recommended practice for -- I don't know -- 30 years,  
15 something like that, a long time. They came up with  
16 the idea that this is really the way you do it, is  
17 independent redundancy.

18 And so that principal is well understood.  
19 All of the safety designs, all of these processes in  
20 general were designed way before all of this ISA  
21 discussion ever came up. These plants were built  
22 years ago. They were all built to a double  
23 contingency standard.

24 CO-CHAIRMAN KRESS: But is that spelled  
25 out in the regulation anywhere that it has to be that

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1 way?

2 MR. DAMON: Originally the two-tier  
3 system, the unlikely and the highly unlikely, one of  
4 the original formulations as that's the way it was  
5 stated was highly unlikely was two.

6 CO-CHAIRMAN KRESS: Two.

7 MR. DAMON: Was two failures, and it was  
8 decided that that was too prescriptive because that's  
9 why this third example is here. This is a single  
10 failure example, and there are situations which I  
11 believe are like this in facilities. They often don't  
12 refer to them. They might regard this as incredible,  
13 but I want to show why it's incredible, but it's still  
14 a single failure.

15 It is a single thing that can happen, and  
16 it can happen in any HEU facility, and that is you  
17 simply put too much HEU together. If you put enough  
18 together, you know, eventually it will go critical,  
19 and you've got 97 percent enriched.

20 CHAIRMAN GARRICK: Since we've digressed  
21 a little bit into experience, one of the things that  
22 I continue to have a little concern about is the  
23 relationship between what ISA is looking for and what  
24 might actually happen, and the thought that most of  
25 the accidents, and particularly those that lead to

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1 injuries or fatalities are not going to be as a result  
2 of radiation release, but rather are going to be as a  
3 result of some sort of a chemical event.

4           Supposing we had an ISA program on  
5 Sequoyah Fuels several years ago when we had the  
6 autoclave accident that led to a fatality. Do you  
7 think that -- and that fatality was not as a result of  
8 a radiation exposure -- do you think that it would  
9 have made a difference in that situation?

10           MR. DAMON: I think that would have been  
11 a difficult one to pick up, but there is one point of  
12 reference where I think they might have, and that is  
13 my understanding or memory of that accident is that  
14 really the contributing factor was that they had a  
15 scale that had been designed for a smaller size of  
16 cylinder, and the cylinder sizes were increased or the  
17 cart that they're carried on or something, and that  
18 consequently when they went to weigh that one cylinder  
19 or when the loading was done, it was mispositioned on  
20 the scale because there was a mismatch in the size,  
21 and therefore, some of the weight was being born by  
22 the structure not being weighed on the scale.

23           So they got the thing overloaded. And so  
24 that the way that kind of thing would be picked up is  
25 the facilities would -- if that facility had been

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1 subject to the typical kind of licensing structure  
2 that will now come under Part 70, when they changed  
3 the cylinder sizes and they went to the different  
4 cylinder, they would have had to come in and had that  
5 approved. There would have been a safety review done  
6 by the NRC staff. So that would have been subject to  
7 an explicit safety review.

8 But I still think you're right. It would  
9 have been a tough call that the guy would have picked  
10 up on that.

11 CHAIRMAN GARRICK: Yes, yes. Well, that's  
12 what we have to keep asking ourselves here. Are these  
13 rules and guidance documents going to really result in  
14 increased safety and the saving of lives. You know,  
15 we haven't had many events in the fuel cycle  
16 facilities that have resulted in injuries and  
17 fatalities, but particularly with respect to radiation  
18 exposure, but we've had quite a few events that have  
19 resulted in injuries and what have you from the  
20 chemical side, if you wish, of the problem.

21 And I don't know how much of that aspect  
22 that this is really going to capture.

23 MR. DAMON: Well, that's very, very clear  
24 as was showed at the beginning of the presentation.  
25 The inclusion of chemical safety in the scope of what

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1 was regulated under Part 70 is a major innovation that  
2 actually is imbedded in this that often people  
3 overlook.

4 And in fact, the motivation for the rule  
5 came partly out of that Sequoyah Fuels event, and  
6 there was finally a realization at the agency that it  
7 wasn't clear in the regulations as to whether the NRC  
8 had authority to do this.

9 So they negotiated with OSHA as to whether  
10 or not -- what scope of authority the two agencies  
11 had. It was agreed the NRC did have some scope of  
12 authority for chemicals involving license material,  
13 and so this Part 70 now implements that.

14 There's explicit regulation and the  
15 chemical standards are stated in there that these  
16 accidents are subject, and they would be reviewed. As  
17 I said, if an amendment comes in on a process, we now  
18 have chemical safety engineers, people who are, you  
19 know, chemical engineers with a safety background who  
20 review these amendments.

21 CHAIRMAN GARRICK: Yes.

22 MR. DAMON: And looking at just the  
23 chemical safety. So in that sense, Part 70 definitely  
24 addresses the Sequoyah event. It is the regulation  
25 that now brings that quote of event under the NRC.

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1                   But I agree with you. It would have been  
2 a difficult thing to detect the particular flaw that  
3 led to that accident.

4                   CHAIRMAN GARRICK: I guess one other part  
5 of that same question is that a lot of these accidents  
6 occur from a couple of primary reasons. One is that  
7 the procedures were not followed because in Sequoyah  
8 they knew about these different sizes.

9                   It could have been a temporary lapse or  
10 what have you, but they knew about that. That was in  
11 the information base, and they had been trained on  
12 those, on that difference. So it's a case of  
13 following the procedure. It's a case of being aware  
14 that what happens to an autoclave under high  
15 temperature and the expansion level, the increase in  
16 the level, and the conditions under which you can get  
17 an overflow condition.

18                   The other thing is believing your  
19 instruments, and you know, both of these things have  
20 entered into just about every accident that we can  
21 identify. This business of following the procedures  
22 and believing the instruments, it's like Three Mile  
23 Island had that component in it as well of detecting  
24 that the fluctuating pressurizer indicators was due to  
25 two-phase flow, and understanding the steam tables.

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1           So when we talk about safety management  
2 and really getting rules and regulations that deal  
3 with it, and particularly in the chemical business,  
4 it's a lot more than the frequency of the failure of  
5 a piece of equipment. It's really understanding the  
6 dynamics of the process, as well, under out-of-the-  
7 envelope conditions.

8           And sometimes we really have to be sure  
9 that our rules and regulations capture those kinds of  
10 things.

11           MR. DAMON: That's certainly something I  
12 believe as well. I think many of the safety  
13 practitioners in the plants understand this. The idea  
14 that you really don't want to rely on -- even though  
15 those processes, in fact, are operated by operators,  
16 are manually operated, you really don't want to rely  
17 on them carrying out a careful procedure of some kind  
18 like taking a measurement or weighing something. You  
19 want to structure the process so that, yeah, even if  
20 they make a mistake, it's very unlikely that you would  
21 make it badly enough that it would cause an accident.

22           And this is an example here of what they  
23 do in the plants. This example is simply you've got  
24 a process, and it has a mass limit of 350 grams of  
25 uranium. So the operator is supposed to weigh out in

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1 batch, in a batched container, the whole 350 grams,  
2 the amount he's supposed to add, and he adds it to the  
3 process.

4 Okay, but the process is designed so that  
5 the accident is it turns out he has to add 70 kgs to  
6 make it go critical because they structure the  
7 container to be put in is either flat or narrow. If  
8 you want to go to the extreme, you make it safe by  
9 geometry, which is basically then you can't have a  
10 criticality in the container.

11 But in some cases they can't quite achieve  
12 that, but they nevertheless leave big safety margins.  
13 These transfer carts and things like that, the example  
14 I gave before is another example. Storage racks;  
15 almost all of the processes in a HEU facility are safe  
16 because there's a gigantic safety margin between what  
17 they actually do and what you would have to do to make  
18 it go critical.

19 Now, chemical safety isn't necessarily  
20 like this, but I'm saying big safety margin is really  
21 the typical way that these human operated things are  
22 structured so that the operator doesn't cause an  
23 accident.

24 This one, this is really an example of how  
25 even though the equation might have three terms in it,

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1 there's really only one event here. In other words,  
2 the only way you'd make it critical is the operator  
3 somehow gets in his head that he's going to overload  
4 that thing.

5 So the real issue is simply it's focusing  
6 your attention on the fact that really what would  
7 motivate or cause an operator to do that. Is that  
8 amount of 70 kgs physically available to him or not?

9 And it just focuses your attention on  
10 that, I think, you know, realizing that that really is  
11 what you're relying on. The point of doing an  
12 analysis like that and identifying that it's the big  
13 safety margin is so that it's written down as a result  
14 of this ISA so that if the process is changed, the  
15 safety analyst who handles that change will realize  
16 that is the point; that is the way that process is  
17 designed, so that he will not design a process that  
18 does not have that safety margin, and it's the reason  
19 why you put things in this analysis that may appear to  
20 be trivial and of no value. It's being put in there  
21 because that really is what is making that thing an  
22 unlikely event.

23 And if you don't write it down when the  
24 process is changed, you're just relying on the  
25 professional judgment of the next engineer that comes

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1 along to design it properly, but if you understand the  
2 conceptual structure of why the thing is unlikely and  
3 you document that, then that's the concept of this ISA  
4 stuff. It's making a list of the items relied on for  
5 safety.

6 CO-CHAIRMAN KRESS: I had a little trouble  
7 figuring out how you went from 200 batches required to  
8 the signing out of --

9 MR. DAMON: Well, that's why I put that in  
10 there.

11 CO-CHAIRMAN KRESS: That's where the  
12 judgment comes in?

13 MR. DAMON: That's exactly why I put that  
14 in there. I said this is an example of why we often  
15 say, you know, that this really isn't as quantitative.  
16 It's conceptually quantitative, but really it's a  
17 judgment call. It's not -- as I say, this type of  
18 rationale is probably -- there's probably 50 processes  
19 that rely on that rationale for why they're safe in  
20 these plans for every one that relies on something  
21 that has engineered components in it that's relied on  
22 for safety.

23 It's like you go through pages and pages  
24 of these processes where the reason it's safe is  
25 because they're working with 350 grams and they need

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1 70 kgs, and then you come to one. Oh, ah, there's a  
2 real safety design. Okay?

3 But I'm just saying I'm trying to give a  
4 flavor for the fact these plants are dissimilar from  
5 a reactor which relies on active engineered  
6 components. You find exceedingly few.

7 See, even that pipe example I gave, that's  
8 a passive safety. It's all -- all of these what the  
9 plants are relying on are big safety margins,  
10 procedures, training, and passive, and once in a great  
11 while you'll see an active component in there. You'll  
12 see a monitor.

13 Because to be a real active, engineered  
14 control you have to be totally automatic. That's the  
15 definition we use. There's no human being involved.  
16 Almost all of them the human being is involved. They  
17 might have a sensor someplace with a meter, but it's  
18 the operator who's going to recognize what it means  
19 and take the action.

20 And so these processes don't -- in fact,  
21 there's very little even of that. Most of these  
22 processes, the whole thing is dependent on the  
23 operator, and very, very little is it like a reactor  
24 with active engineered components with sensor, you  
25 know, logic, actuator, and an active component. There

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1 is some of that, but very little.

2 Well, that's about all I have as a  
3 presentation.

4 CHAIRMAN GARRICK: Okay. I think this has  
5 been quit helpful.

6 CO-CHAIRMAN KRESS: Have you got any  
7 thoughts about how you would factor into this semi-  
8 quantification some uncertainty like John Garrick  
9 mentioned, which is really needed for full  
10 quantification?

11 MR. DAMON: Well, I mean, someone could  
12 certainly do that, you know, do upper and lower bound  
13 and take a geometric mean and that kind of thing, you  
14 know, with simple methods like this.

15 CHAIRMAN GARRICK: I would guess that we  
16 had --

17 MR. DAMON: But, I mean, we didn't discuss  
18 that in any standard review plan or anything.

19 CHAIRMAN GARRICK: One of the things I did  
20 want to ask you is I would guess you have quite a bit  
21 of information, especially on near misses. I was  
22 involved in some space work in a situation where there  
23 was considerable frustration because of the absence of  
24 data on particular kinds of events, but when we  
25 started looking underneath the things that did occur,

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1 we found a very robust database on what might be  
2 called precursor events and what might be called near  
3 misses and was able to develop a pretty substantial  
4 knowledge base on the kinds of events that were  
5 causing some concern early in the space shuttle  
6 program, such as the failure of auxiliary power units.

7 And actually once we started looking at  
8 the experience base, it was possible to develop some  
9 pretty good models and to develop probability density  
10 functions on failure frequencies in the event sequence  
11 models that could be very highly defended.

12 With the information base that exists in  
13 the chemical field, I would think you'd be in a much  
14 better position than in most industries to develop  
15 good databases on accidents.

16 When you put together Part 70, was this  
17 done against a compendium of analysis of the accident  
18 history or the incident history of fuel cycle  
19 facilities, for example?

20 MR. DAMON: I mean, there were studies  
21 done. There have been. We do have a database here at  
22 the NRC of material, the materials events database,  
23 and after the G.E. incident in '91, there was notice  
24 issued requesting that the licensees report failures  
25 of criticality safety controls. So those events have

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1 been compiled now for ten years. So there's ten years  
2 of events on the types of things that are failures of  
3 control.

4 So they're not criticalities. They're  
5 just individual, single control failures, and so there  
6 is that information. As you say, the chemical  
7 industry, AIChE has a chemical -- what do they call  
8 that? -- Chemical Safety Process Center or something.

9 CHAIRMAN GARRICK: Yes.

10 MR. DAMON: They have a database. Yeah,  
11 there are databases that are relevant. Westinghouse's  
12 Savannah River site did a survey of these databases a  
13 number of years ago. Well, the Savannah River site  
14 has various processes and reactors and stuff down  
15 there. So they did a survey of databases and compiled  
16 some recommended values for certain things, and we're  
17 looking at this stuff and thinking about it.

18 But, again, like I say, the large majority  
19 of the things that are actually in the facilities  
20 depend on these things like a big safety margin that's  
21 judgmentally assessed kind of thing, you know.

22 CHAIRMAN GARRICK: Well, you also have to  
23 be very alert to process dependent events. You know,  
24 before we had critically safe fuel cycle facilities.  
25 We had batch mass limited components in the chemical

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1 reprocessing facilities.

2           The original design of the Idaho plant  
3 based on use of hexone rather than TPP; the original  
4 dissolvers were batch mass limited. An example of  
5 being very alert, and I was looking for that in the  
6 standard review plan, as well. An example of having  
7 to be very alert to events that can come about not  
8 because of failure of equipment, but because of the  
9 build-up of a heel, for example, in batch mass limited  
10 dissolvers.

11           And we did a simple physics calculation in  
12 1952 in the start-up of the Idaho chem. plant, and  
13 calculated within a range of some uncertainty, but we  
14 bounded it pretty well, of how many dissolutions you'd  
15 have to have in order to accumulate a heel in that  
16 dissolver such that you would really run a high risk  
17 of having a critical mass, and it wasn't very many  
18 because after every dissolution there was a residue,  
19 and that residue contained highly enriched uranium.

20           And so there are lots of things having to  
21 do with the safety of nuclear related facilities that  
22 are very process dependent, not necessarily equipment  
23 performance dependent and not even procedural  
24 dependent unless you connect the procedure to the  
25 avoidance of those kind of more subtle things

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1 happening.

2 So it's an interesting challenge that we  
3 have to be ever so mindful of and recognize that the  
4 opportunities for something going wrong are not just  
5 equipment failure, but there are all kinds of things,  
6 including, of course, as we say, maybe most of it  
7 comes about by human failure or some aspect of human  
8 involvement.

9 And so I assume that when you do a review,  
10 that those kind of things, the process related  
11 phenomena are taken into account as well. In a sense,  
12 the Sequoyah Fuels was a process related phenomenon as  
13 to what happens at elevated temperatures of UF<sub>6</sub> in an  
14 autoclave. They underestimated the expansion.

15 And so I hope that is a part of the  
16 evaluation in the whole ISA process as well.

17 MR. DAMON: Yes, this likelihood of  
18 evaluation stuff that I ran through here really is in  
19 a sense -- it's just the tail end of the process. The  
20 more important process is the front end, and that is  
21 the thoroughness with which the applicants conduct  
22 their attempt to identify all of the accidents that  
23 can happen, and like you say, accumulation of fissile  
24 material in locations, this is one reason I believe  
25 most of the applicants use what I would call an open

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1 ended methodology for -- how do I put it? -- more of  
2 a -- how do I put this?

3 If you use a fault tree on a reactor, you  
4 already know what the safety design is and what the  
5 safety features is, and your analysis tends to be what  
6 I would call closed forum. You identify the things  
7 that it relied on, and you put that in your fault  
8 tree.

9 But in most of the way that the PHAs are  
10 done for these facilities, they use more open ended  
11 methods, like HAZOP and "what if" checklists, and one  
12 of the reasons is to pick because the safety design of  
13 things weren't designed from the ground up to address  
14 absolutely everything that could go wrong.

15 CHAIRMAN GARRICK: Right.

16 MR. DAMON: So now you've got to put that  
17 in after the fact. You've got to do the analysis and  
18 say, "Okay. Where could there be fissile material in  
19 this process? Where are all of the places? How could  
20 it get there?"

21 And then by doing so, then you say, "Now,  
22 what am I doing to make sure that doesn't happen?"

23 So that's the logic process that has most  
24 of the emphasis in ISA, is going through that process.  
25 This likelihood of evaluation is something we feel

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1 that you should do, but it's the front end part. If  
2 you don't do the front end part, this back end stuff  
3 is --

4 CHAIRMAN GARRICK: I agree, and this is  
5 one of the lessons learned, I think, in the PRA  
6 community that has come from the chemical industry,  
7 but is now very much an integral and inherent part of  
8 most PRA analysis, and that is the understanding of  
9 the role of phenomenology in the whole risk assessment  
10 process.

11 One thing that bothers me a little bit is  
12 that people tend to associate PRA with just event  
13 trees and fault trees, and that's not PRA. Those are  
14 useful tools, but they're not the essence of it. To  
15 do a comprehensive nuclear plant PRA as much effort  
16 just about is gone into establishing success criteria,  
17 which is a phenominological issue of understanding the  
18 thermal hydraulics and making sure you understand the  
19 conditions under which the plant can continue to be in  
20 a safe mode, although degraded.

21 And I think that sometimes to the outside  
22 world, there is a failure to recognize that that is  
23 very much an integral part of contemporary risk  
24 assessment, namely, the phenomenological analysis.

25 And when we started doing containment

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1 response analysis and constructing logic models, the  
2 logic models were not based on on/off of active  
3 systems. It was based on thresholds of  
4 phenomenological conditions, like have you reached a  
5 certain temperature; have you reached a certain  
6 pressure.

7 And that was a breakthrough in terms of  
8 adding credibility to the risk models because it began  
9 to teach us that the chemical way of thinking is an  
10 extremely important part of the whole process.

11 So a lot of the logic models don't even  
12 look like a fault tree. They more or less are like  
13 multiple state decision diagrams, that if you go from  
14 this branch point to this one, it's dependent upon  
15 whether you've reached a certain threshold.

16 That threshold may be determined by some  
17 sort of thermodynamic condition, and a lot of input  
18 from the chemical industry has added to the  
19 credibility of those kinds of models, and they've  
20 improved the containment response in post core  
21 accident progression models a great deal.

22 Okay. Any questions?

23 CO-CHAIRMAN KRESS: I asked them along the  
24 way.

25 CHAIRMAN GARRICK: Good. Thanks a lot,

1 Dennis, for putting up with us.

2 Let's see. I guess our program calls for  
3 us to take lunch about this time, and then we'll pick  
4 up at 12:30 with industry presentations, which we're  
5 looking forward to. So we'll adjourn for lunch.

6 (Whereupon, at 11:32 a.m., the meeting was  
7 recessed for lunch, to reconvene at 12:30 p.m., the  
8 same day.)

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A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(12:31 p.m.)

CHAIRMAN GARRICK: Let's come to order.

We're now going to hear from industry representatives, and I'm pleased to see that we have adopted a rather informal approach here, kind of a round table type discussion. It might be a good idea if each of you, or however you want to handle it, would introduce yourselves and tell us just a few lines about what your role or task or assignment or responsibilities are.

MR. BEEDLE: Thank you very much, Dr. Garrick, for permitting us to talk with you today.

My name is Ralph Beedle. I'm the chief nuclear officer, Nuclear Energy Institute. And I'm responsible for the operation of the technical group called nuclear generation within the institute.

And with me, Jack Bronf and Felix Killar. I'll let them introduce themselves.

Jack.

MR. BRONS: I am Jack Brons. I'm the special assistant to the president of NEI. But I am here today in my role as one of the members of the team of people to go with Bob Bernero and Jim Clark to produce the report that you have. And my purpose will

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1 be to address that report.

2 MR. KILLAR: And I'm Felix Killar,  
3 Director of materials licensees at NEI. And my role  
4 at NEI is to facilitate and coordinate the industry  
5 response or initiatives to regulations, changes, and  
6 what have you whether it's by NRC, DOE, DOT, things on  
7 that line.

8 MR. GARRICK: Very good. Thank you.

9 MR. BEEDLE: There is no doubt that the  
10 ISAs have been a valuable asset to the analysis of the  
11 facility operations and processes. And we're not here  
12 to debate the merits of the ISA process. That's not  
13 our purpose.

14 As I listened to the conversation this  
15 morning, I think I have to conclude that the issue  
16 that we are truly concerned with is a process one.  
17 And it's a process one in that the ISA that has been  
18 submitted to the NRC in the past and the one that is  
19 potentially being submitted in the future is going to  
20 be reviewed in a totally different fashion than in the  
21 development process that was used for that submission.

22 And by that I mean the ISA and its  
23 somewhat qualitative process, but nonetheless one that  
24 utilizes an extensive review of the process fault  
25 trees to determine vulnerabilities, but nonetheless

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1 qualitative in nature, is going to be subjected to a  
2 rather quantitative review.

3 And that bothers me probably more than  
4 anything else because that leads to all sorts of  
5 difficulties in trying to judge the merits of the  
6 submission and, I think, has been in part one of the  
7 reasons that we have submitted ISA's in the past and  
8 still are yet to get any results on it.

9 Because I think the staff is definitely a  
10 quandary on how they do the review and make it one  
11 that is amenable to this analytical process that was  
12 described this morning.

13 What I'd like to do is talk a little --

14 MR. GARRICK: By the way, we really  
15 appreciate your candidness on that because this is one  
16 of things that each of the members was stimulated by  
17 this morning, as to what these problems were and what  
18 the real issues are.

19 And to the extent that you can deal with  
20 those, I think it will help us.

21 MR. BEEDLE: Well, I thought that a number  
22 of your questions this morning about the merits of a  
23 very detailed process where the risk of the system  
24 wasn't all that significant to begin with is one that  
25 we wrestle with all the time.

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1           Now what is the cost-benefit on some  
2 process that you're getting ready to develop?

3           But I continually ask the people that come  
4 to me with solutions, I say, "What is the problem?  
5 What are you trying to resolve?"

6           So I'd like to talk a little bit about  
7 what are we trying to deal with here. We are dealing  
8 with a relatively limited number of fuel cycles  
9 facilities. And none of them are the same. They're  
10 all different. They're dealing with different  
11 processes. They're dealing with different enrichments  
12 for sure.

13           And as a result of that we're trying to  
14 take a one size fits all approach. And I certainly  
15 understand the difficulty that the staff has. As the  
16 two fellows testified this morning, one of their  
17 concerns is the resources it takes to do these  
18 reviews. They are more concerned about what it's  
19 going to take to do the reviews than what it's going  
20 to take these facilities to develop it.

21           So, you know, depending on what side of  
22 that fence you're sitting on, the resource allocation  
23 becomes a major issue for you.

24           But what I'd like to do is revisit the  
25 results of a report that was produced a number of

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1 years ago and reissued recently in the form of NUREG  
2 1140. And it was assessment and historical  
3 perspective on the criticality problems at the field  
4 cycle facilities.

5 As you're probably well aware, there were  
6 seven reported inadvertent nuclear criticalities in  
7 the last 50 years at these facilities. And in the  
8 look at those seven events, we find that they all  
9 occurred with fissile material in solution or  
10 slurries. None occurred with powders. None occurred  
11 when the material was being moved. None of it  
12 occurred when it was being transported. There were no  
13 equipment damages as a result of that. None resulted  
14 in measurable fission product contamination beyond the  
15 property boundary. None resulted in measurable  
16 exposure to the members of the public.

17 No accidents were caused by a single  
18 failure, equipment failure, or malfunction was wither  
19 minor or noncontributing factor in all the accidents.  
20 None were attributed to faulty calculations in  
21 critical analysis. And the last occurred in 1978.

22 But from those, the lessons learned were  
23 that clear, unambiguous written procedures are really  
24 necessary in order to give yourself the best chance of  
25 avoiding any difficulties of that nature.

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1 Good training of personnel, especially in  
2 the recognition and reporting of abnormal conditions,  
3 and in taking the -- and in not taking unapproved  
4 actions, and the involvement awareness of senior  
5 facility management and regulatory agency oversight.

6 Those are the lessons that were learned  
7 from these seven criticality events that occurred, the  
8 last one 1978. I think the facilities have learned an  
9 awful lot since then. They have developed improved  
10 processes for analyzing their systems. And I think  
11 that's been in part as a result of the work that has  
12 been done through these ISAs over the last several  
13 years.

14 So with that we ended up with the  
15 Tokaimura event here two years ago. And there was a  
16 heightened awareness of the potential for that. And  
17 the question was asked could that happen here in the  
18 United States.

19 As a result of that, NEI commissioned a  
20 group of three individuals, very experienced in the  
21 nuclear business, to take a look at all of the  
22 facilities in the United States that handle that  
23 material.

24 And so with that I'd like to turn to Jack  
25 Brons who is one of those three members, to talk about

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1 the results of the review of the fuel cycle facilities  
2 done following the Tokaimura event.

3 Jack.

4 MR. BRONF: Thanks, Ralph.

5 As Ralph mentioned, in the aftermath of  
6 the Tokaimura event and actually only a matter of days  
7 afterwards, the industry leadership and NEI got  
8 together and determined it would be appropriate for us  
9 to do a review of all of the fuel cycle facilities.  
10 And I want to stress at this point that we -- you've  
11 been largely talking about Part 70 licensees today.  
12 We looked at the one Part 40 licensee because there  
13 was emergency plan issues here and there were  
14 significant emergency plan issues in a Part 40  
15 facility. All of Part 70 licensees and also the Part  
16 76 licensees or certificates.

17 So we put together a team, Bob Bernero,  
18 who I think all of you know, and probably --

19 MR. GARRICK: Yeah, we certainly do.

20 MR. BRONF: -- know well. And Jim Clark,  
21 who you may not know, but who has -- we all, each of  
22 us, had 40 or 40 plus years or experience. So  
23 together we brought 120 years of experience.

24 Jim's experience is primarily in the  
25 industry side of the fuel cycle business. My

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1 background is primarily reactor side, and Bob of  
2 course is primarily regulatory. But all three of us  
3 have some degree of involvement in the other aspects  
4 of it.

5 We got together, and the first thing we  
6 did was to try and do an analysis from available data  
7 of what were the causes or contributing factors to the  
8 Tokaimura event. And my purpose today is not going to  
9 be to go into each of those areas, but we determined  
10 that there were nine contributing factors: one  
11 dealing with the culture that permitted the  
12 organization to react differently under the stress of  
13 production or cost standards.

14 Also the presence of a management and  
15 staff orientation which sanctioned deviation from  
16 approved procedures.

17 Clear lack of something in the  
18 criticality/safety area or good controls there.

19 We didn't know an awful lot about them,  
20 but we surmised that there must have also been some  
21 weaknesses in the administrative control processes,  
22 training, oversight of operations, instrumentation --  
23 you may recall there were significant issues whether  
24 the plant was properly instrumented -- emergency plan  
25 areas and lastly regulatory oversight.

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1           Those were the nine areas, and the report  
2 that you have goes into detail on what we found at our  
3 facilities in each one of those areas.

4           The way we did our review was to put  
5 together a protocol for doing the evaluation. Then we  
6 required all the facilities to provide us a certain  
7 amount of documentation relative to a series of  
8 questions that we asked that are all contained in an  
9 appendix to the report.

10           We then went to the facility. After  
11 reviewing the documentation provided, we went to the  
12 facilities, conducted what I'd call a focused  
13 interrogation of the management staff all together in  
14 one room. We didn't allow ourselves to get in the  
15 situation for efficiency purposes where the buck could  
16 be passed. We had all responsible parties there.

17           We did a focused interrogation. We did  
18 staff interviews. We did in-plant observation. And  
19 based on those preceding factors, then spent several  
20 hours, each one of us, doing an in-depth, focused look  
21 in an area that we thought represented any  
22 vulnerabilities that we detected.

23           After that we provided input to the  
24 individual facility and ultimately compiled this  
25 report, which is not facility specific, but represents

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1 our overall conclusions relative to the industry.

2 We categorized our results in three  
3 different ways besides providing the individual  
4 observations. First was what we called general  
5 results.

6 I want to begin there with that. Overall  
7 we concluded that the licensees are beneficiaries of  
8 a very sensible regulatory scheme and also  
9 beneficiaries of a good standards process. And in  
10 that our determination was that we found that the  
11 regulations and standards are observed, the plants --  
12 that provided for a fundamental level of safety, and  
13 we concluded that they were operating safely.

14 CHAIRMAN GARRICK: One other thing I want  
15 to raise right there, because it reminds me of a  
16 little study that I was involved in in the chemical  
17 industry a few years ago where we tried to look at a  
18 half a dozen chemical plants, or so that were  
19 considered to have outstanding safety practices and  
20 safety systems and deal with the issue of how has  
21 this affected throughput.

22 How has this affected the general  
23 performance of the plant?

24 To try to get some sort of a counter to  
25 the sometimes argument put forward that it's safe but

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1 it costs so much to make it safe that we're not making  
2 much money with the plant.

3 And one of the things we found, very much  
4 to our pleasant surprise, was that the plants that  
5 generally followed the best procedures, had the best  
6 training programs, and as was said by Mr. Beedle  
7 earlier, senior management involvement, but did have  
8 a rigorous safety program were also the most  
9 successful in terms of throughput, in terms of  
10 performance, in terms of profitability.

11 I was just wondering if in your review and  
12 your analysis, if that becomes a very powerful output  
13 to this whole issue of if you follow a good safety  
14 schema, it doesn't necessarily mean that you're  
15 sacrificing at the bottom line.

16 MR. BRONF: We would agree with that. As  
17 you know, we see that very clearly in reactor  
18 operations, that safety and good performance are  
19 closely correlated, and that leads to most better  
20 output.

21 I would say that the same thing is true  
22 here. We did not draw a specific inferred conclusion  
23 from that. But we did not find any instances where  
24 the imposition of realistic safety measures, and I'm  
25 only quantifying it with the word "realistic" in that

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1 I think there is a brink or a point that you can go  
2 where --

3 CHAIRMAN GARRICK: Oh, sure.

4 MR. BRONF: -- you're being wasteful.

5 But we found robust safety measures in  
6 place, and we did not find them to be interfering with  
7 operations.

8 CHAIRMAN GARRICK: Yeah, yeah.

9 MR. BRONF: And in fact, I would say while  
10 we did not make any rank ordering of best performance,  
11 we did identify best practices, and I will come to  
12 that in a minute.

13 But clearly the plants, and I would say if  
14 I were forced to make an overall comment, that were  
15 operating the best probably had the highest degree of  
16 involvement and the most robust safety.

17 CHAIRMAN GARRICK: Yeah. And the point  
18 here, it's not that the NRC is in the business of  
19 worrying about throughput or cost. But rather what is  
20 important here is to point out to people whom you want  
21 engage in good safety practices that there's more  
22 benefit than just safety.

23 MR. BRONF: And I would say that the  
24 managements recognize that investing in safety of  
25 operations is a concurrent investment in high

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1 productivity and good operating performance.

2 CHAIRMAN GARRICK: Right.

3 MR. BRONF: I think that's understood and  
4 recognized. And I'll come to examples of how it's  
5 being deployed.

6 Then the body of the report goes into the  
7 observations by contributing factors, and I'm going to  
8 skip that because it's not all that relevant to what  
9 we're talking about today.

10 We then go to part of the report that we  
11 call integrated results. And our look at these plants  
12 is relatively unique. In fact, I think it's  
13 singularly unique. As far as Bob Bernero knew, there  
14 had never been a visit by a team of people to all of  
15 the fuel facilities in a brief period with the same  
16 agenda.

17 Even in the NRC's oversight, it would be  
18 various inspectors going. There's a good deal of NRC  
19 involvement with the facilities, but it's not the same  
20 group of people going to all the plants with the same  
21 agenda.

22 So we had a relatively unique look at  
23 these plants. And there were ten of them at the time.  
24 There's fewer than that now. But we developed in our  
25 integrated results some concerns.

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1           One of them was a concern about  
2 consolidation and competition, the concern that people  
3 would be distracted by what's going on in the industry  
4 as people are being acquired and sold and shut down  
5 and so on. And we addressed that in a report.

6           Another concern was that there is apparent  
7 lack of understanding in a number of sectors that the  
8 facilities -- the degree of difference that exists  
9 between these facilities. They sometimes do similar  
10 work, but they employ totally different strategies,  
11 and that results in a very different looking facility.

12           And so there is this concern or notion  
13 that one size fits all is out there and that was  
14 indeed one of our concerns, that people recognize the  
15 difference between these facilities.

16           And last, we have a section where we  
17 addressed the issue of risk in the regulatory process.  
18 And we developed concern on both the facility and the  
19 regulatory side of the equation, where we detected a  
20 movement to treat these facilities like reactors.

21           On the part of facility management, we  
22 encountered numerous instances where they were  
23 adopting relatively elegant processes that were  
24 appropriate to reactor operation, but frankly  
25 burdening and not effective for these facilities.

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1           And similarly, in the material we reviewed  
2 from the regulatory side we also saw an apparent move  
3 to apply processes that are appropriate to reactors to  
4 them.

5           The one quote I'm going to use from this  
6 report is on page 13, in the last paragraph of this  
7 integrated conclusion section. It says, "In the  
8 team's view, it's important that the facilities be  
9 recognized and treated as they are: unique facilities  
10 with low and unique risk profiles.

11           "Expectations and programs should be  
12 directed at the realities of the processes being  
13 employed. Efficiency and safety will both be enhanced  
14 if the imposition of elaborate measures better suited  
15 to other enterprises is avoided. As much as each of  
16 these facilities is similar to the others, it is also  
17 sufficiently unique so that few one size fits all  
18 solutions are applicable."

19           The other kind of general conclusion that  
20 we came to, and I think is extremely important and it  
21 is going to underlie most of the remaining remarks  
22 that I have to make, is that we found, contrary to the  
23 situation at Tokaimura, a very strong and pervasive  
24 belief on the part of the work force and the  
25 management at all ten facilities, or at all nine

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1 facilities where criticality is possible, and at the  
2 tenth facility where the reality was a chemical  
3 accident exclusively, that it can happen here.

4 We found problems with some people  
5 understanding just exactly how a criticality or an  
6 accident does occur, but we found a very pervasive  
7 belief that it can happen here, even in the facilities  
8 that fundamentally push prefabricated pellets into  
9 fuel assemblies.

10 Now with respect specifically to ISA and  
11 PRA, what we found is that, of course, the fuel cycle  
12 facilities are a distributed series of unit  
13 operations. They are not a linked, continuous,  
14 conditional series with a single outcome.

15 They are highly automated. But they're  
16 rich in human involvement.

17 I would stress that the human involvement  
18 is more closely linked to logistics within the  
19 facility and quality, commercial quality kinds of  
20 issues rather than active operation of processes.

21 They're moving material from one point in  
22 the queue to another, and they're performing a modest  
23 amount of oversight in active operation.

24 But nevertheless there's a lot of human  
25 involvement. We found that many of the facilities

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1 were using fault trees and that they were very useful  
2 to take a systematic approach towards reviewing their  
3 facility, but they were not being used for  
4 quantification.

5 We felt that the best effort at  
6 quantification would be to go to a more or less a  
7 high, medium, low approach as you assessed various  
8 events or sequences in a fault tree.

9 We felt that efforts that were used to  
10 analyze operations did reveal dominant  
11 vulnerabilities. But we would conclude as a team, and  
12 I would discuss these remarks with the team and very  
13 specifically and in great length with Bob Bernero, who  
14 would have been here. His wife just recently had  
15 surgery which had successful outcome, but he's at home  
16 with her.

17 But there's no useful threshold  
18 probability. Only reasoned judgement is an  
19 appropriate way to treat these analyses.

20 And that the greatest benefit from the  
21 analyses that we saw deployed was an outcome that was  
22 useable and understandable by operators because it is  
23 they who derive the relatively simple resolutions to  
24 vulnerabilities discovered.

25 In most cases, when you discover a

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1 vulnerability here, I don't know how to stress that  
2 too much unless you're familiar with the facilities,  
3 but the resolution is a relatively simple matter.

4 I'm thinking in one in particular where an  
5 ISA discovered a problem that could be caused by  
6 flooding and it was a storage situation and it was  
7 solved simply by moving the storage to another  
8 location. It didn't change the process or anything  
9 that was in there. It was just a movement.

10 We heard some description early this  
11 morning about the carts and they're -- you put a cart  
12 tabletop. In order to make the procedures work, you  
13 can weld ring collars on the table top so that you can  
14 only place certain size cylinders on it and only so  
15 many.

16 And these are solutions that the operators  
17 come up with after these analyses. And I would stress  
18 at this point that in the lengthy discussion with Bob  
19 Bernero just yesterday when I was going over this,  
20 what we were going to say today, Bob concurred that  
21 this type of analysis was in his mind, when he was  
22 responsible for really setting up the concept of ISA,  
23 was his intent.

24 And he commented on that a number of times  
25 during the course of these reviews.

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1 I'd also point out that the regulatory and  
2 standards basis which provides us such a firm  
3 foundation for the safe operation of these facilities  
4 is deterministic. And unlike reactors, it is a simple  
5 and relatively well understood and effective  
6 deterministic basis. Fundamentally it's double  
7 contingency.

8 We found during the course of our reviews  
9 that all facilities preferred engineered or geometry  
10 type solutions for their contingencies. All of them  
11 pursue to some degree the elimination of any  
12 administrative controls in place, some of them doing  
13 that with very formal programs and others with  
14 informal programs, but all of them could demonstrate  
15 to us a successful elimination of administrative  
16 controls as a function of time.

17 In our mind there is a significant  
18 question on the effort and the ability to quantify  
19 fundamental process elements in the very simple  
20 processes that we are talking about here, and how to  
21 overlay a PRA type approach on probabilistic numbers  
22 on a deterministic process.

23 As I mentioned, the facilities are highly  
24 variable between facilities. For example, a like  
25 process between two facilities that comes to mine, one

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1 case uses moderator exclusion and another one uses  
2 poison. And they result in totally different  
3 processes, but they are dealing with the same blended  
4 powder in this case.

5 I would also suggest that there is a risk  
6 in moving the PRA of excesses focused on criticality  
7 as opposed to the more dominant and significant, at  
8 least from a public standpoint, and I suspect also  
9 from a workers standpoint, risk of chemical accident.

10 And the reason I say that focus is because  
11 there are so many processes that are subject to  
12 criticality risk by comparison to the number of  
13 processes that are subject to chemical risk, that you  
14 would end up focusing management's attention on  
15 criticality systems, which is probably the lowest risk  
16 of the two.

17 Now when we did these reviews not everyone  
18 was using ISA. Some had -- all had some assessment  
19 process in place though. And all had a corrective  
20 action program in place to deal with the results of  
21 assessments of their operations.

22 Those that were using ISA, I believe I  
23 could characterize them as thoughtful, reasoned,  
24 intellectual, systematic, and most importantly, action  
25 and improvement oriented. All were choosing to

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1 eliminate hazards rather than sharpen their pencil.  
2 Why?

3 Well, as I mentioned earlier, our  
4 strongest and most gratifying conclusion was that they  
5 believe that criticality or chemical events could  
6 happen at their facility. And they acted accordingly.

7 So the ISA in the less formal assessments,  
8 based on high, medium, and low quantification factors,  
9 produced very useful results. We saw, for example,  
10 whether it was a criticality concern about the buildup  
11 of broken pellets and powder in some of the equipment;  
12 the substitution of plexiglass shields for otherwise  
13 not transparent material so the operator could see  
14 that.

15 We found instances where the geometry  
16 inside equipment was altered so that there couldn't be  
17 a buildup. Dr. Garrick, you mentioned earlier heels.  
18 I'm sure you are aware that there are extensive  
19 processes involved no in terms of cleaning cylinders  
20 and so on for the very issues that you brought up.

21 We found replacement of administrative  
22 controls with altered geometry and active controls.  
23 We found an instance where pipe was replaced as a  
24 result of a review because it was a concern; it was a  
25 geometry concern, not a leakage concern that the

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1 thinning of the pipe wall by virtue of the chemical  
2 being handled could increase the geometry at the ID of  
3 the pipe.

4 And so a facility went in and replaced the  
5 pipe on that basis. There was no leakage. It was an  
6 outright geometry control issue. We found people  
7 relocating processes so that the storage and the  
8 throughput process would prevent the buildup of a  
9 potential critical mass.

10 And very importantly, we found several  
11 facilities using the outcome of these assessments to  
12 develop what I would call early warning limits, almost  
13 an approach to a triple contingency where they develop  
14 within their management approaches to failure of a  
15 contingency, if you will, and then set up the internal  
16 processes to report that so that they could take  
17 corrective action early, all in spite of the high  
18 margins that existed.

19 Now, I mentioned that we identified best  
20 practices during that review and NEI is at the present  
21 time organizing a best practice transfer.

22 One of the burdens this industry has born  
23 is that these processes are so different that there  
24 are proprietary interests involved. And as a result  
25 there hasn't been a lot of translation of best

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1 practice from one facility to another because if  
2 you're a GE guy you don't necessarily want the  
3 Westinghouse people coming through your plant and vice  
4 versa.

5 Because of this unique effort we have  
6 secured the agreement of the entire industry to take  
7 the best practices that we have defined in the course  
8 of this review and to orchestrate, put together a  
9 workshop where those best practices will be  
10 transferred. And one of the subject areas is  
11 specifically the ISA.

12 And we did have -- we have a couple  
13 facilities out there that have been using ISA and  
14 using it extremely well. And that will be subject to  
15 information transfer now between the facilities.

16 That concludes my remarks.

17 MR. BEEDLE: Let me add a few more  
18 comments in connection with this.

19 When I look at the review that is proposed  
20 through this standard review plan, Chapter 3, where  
21 we're going to focus on the analytical processes, it  
22 is of concern to me that we would put our emphasis on  
23 the numerical evaluation of the ISA summary rather  
24 than applying the kind of rigor to a review of the  
25 facility that Jack Bronf just described that was

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1 conducted by that team.

2 And I think that that was precisely what  
3 Mr. Damon mentioned this morning as the real value in  
4 the ISA, was that up-front work of developing the  
5 logic models, the fault trees, the analysis that goes  
6 into determining where your vulnerabilities are and  
7 not in the analytical process of whether or not you're  
8 ten to the minus two or ten to the minus three.

9 That's where the value was. That's where  
10 the value that this time saw that ISA in play at these  
11 facilities. And I'm concerned that a fixation on the  
12 numbers is going to lead us away from that.

13 But aside from that I've still got to ask  
14 the question: what's the problem we're trying to  
15 solve?

16 CHAIRMAN GARRICK: Any questions at this  
17 time?

18 MR. LEVENSON: I just have one question.  
19 The title of this report implies that your study was  
20 limited to criticality accidents; is that correct?

21 MR. BRONF: It could be inferred from the  
22 title but it's actually not correct because it does  
23 include emergency preparedness. And because the basis  
24 for emergency preparedness at all of these facilities  
25 is almost exclusively based on chemical accidents,

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1 that is, where you involve the general public, it  
2 really takes a chemical accident because of site size  
3 and so on that we did get involved in the chemical  
4 side of things.

5 And as I mentioned also we looked at one  
6 facility that is only a Part 40 licensee. That's the  
7 Allied Signal facility in Metropolis, Illinois. And  
8 of course there is no criticality risk there, but a  
9 very substantial chemical risk.

10 CHAIRMAN GARRICK: We're not through.  
11 You're going to proceed or he's a resource?

12 MR. BRONF: He's a resource.

13 MR. KILLAR: I am a resource.

14 CHAIRMAN GARRICK: Okay.

15 MR. LEVENSON: We didn't ask the right  
16 questions. We didn't have to resource.

17 MR. KILLAR: You didn't ask any of the  
18 difficult questions so I'm safe for now.

19 CHAIRMAN GARRICK: Let's get back to the  
20 question you posed. And that is basically what is the  
21 issue. What is the problem? What is the question  
22 here?

23 I guess I ran an engineering organization  
24 for many years, and every time we'd get into trouble  
25 or into a project problem and we'd get our heads

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1 together, we would discover that the root of the  
2 problem was because different people were attempting  
3 to answer different question, rather than the same  
4 question.

5 And so I think a very good way to keep  
6 activities focused is to frame the questions that  
7 you're trying to answer as explicitly and as  
8 transparent as you possible can.

9 So what do you think is the issue here?  
10 Why are we even here today?

11 MR. BRONF: Maybe I can address that. I  
12 think that there is a concern about a distraction  
13 factor in order to produce a quantification of these  
14 things. As I mentioned, there is a high level of  
15 involvement, human involvement, although it's largely  
16 for logistics reasons and less for operations reasons.

17 But that means that if you're going to do  
18 a quantitative analysis of any given process you have  
19 got to come up with some probability of human error  
20 going into it.

21 And I think that the development of a  
22 numerical factor for that would be significantly -- be  
23 an exercise that would take fair amount of time.

24 And I told Ralph I wasn't going to do this  
25 but I will do it. And I do not mean to do it in any

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1 way that is disrespectful. But you looked at an  
2 example this morning about a pipe.

3 I would argue, and I've had some  
4 experience with PRA, that it is not a simple two  
5 factor issue. Whether the outer pipe leaks or not  
6 depends upon whether the leak is in the bottom of the  
7 pipe or the top of the pipe. If its in the bottom of  
8 the pipe, will the operator detect a drip before the  
9 annuals or semi or biannual surveilliance?

10 There are a whole host of other factors  
11 that would go into this if you want to be rigorous  
12 about it and the question really evolves down to where  
13 do we draw the line, in the standard at the level of  
14 rigor and the level of documentation.

15 And having done all that, will it achieve  
16 a better or different result? And what I'm really  
17 trying to present to you from the results of our  
18 review, which was out there looking at the carts,  
19 looking at the pipes, and what people are doing with  
20 the qualitative analyses that we are doing, even those  
21 that are not doing ISA; I would suggest that you are  
22 getting a significantly beneficial result that could  
23 be derailed and could possibly have negative value.

24 And I'm not sure who will be benefitted by  
25 the number if it cannot be shown to be rigorously

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1 pristine, especially given that there is no similarity  
2 between the facilities. So I can't do this on Process  
3 A at Facility 1 and compare the result of Process A at  
4 Facility 2 And suggest or infer in any way that they  
5 ought to be similar.

6 CHAIRMAN GARRICK: Yes. Well, it's not  
7 our intent here to get into a contest --

8 MR. BRONF: No, I understand that.

9 CHAIRMAN GARRICK: -- on what the merits  
10 of PRA versus integrated safety assessment or  
11 whatever. What we are trying to do is to be as  
12 constructive as we can in advising the Commission on  
13 the best way to continue this movement towards a risk  
14 performance based regulatory practice on the basis  
15 that in the end everybody will benefit.

16 As you know from the PRA policy statement,  
17 one of the things that's embedded in that whole  
18 statement is to relieve the burden on industry. And  
19 my personal feelings about this are that if we can't  
20 figure out how to adopt contemporary thought processes  
21 that give us a little more insight, particularly with  
22 respect to the perspective, with respect to the  
23 importance of different contributors to safety, then  
24 we shouldn't be advocating the approach.

25 The one thing that has been very clear to

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1 me, I've had the very fortunate experience of working  
2 PRA's in just about every major industry:  
3 transportation, petroleum products, and petroleum  
4 shipping, marine.

5 I rode a tanker down through the Prince  
6 William Sound to get a better feel for what happened  
7 with the Valdez.

8 I had the opportunity to spend a lot of  
9 time on the space shuttle risk management program.  
10 And the proof of concepts studies they've been  
11 conducting there to try to move into a more  
12 quantitative direction; very much involved with the  
13 chemical weapons disposal program; basically wrote the  
14 letter that went to the Secretary of the Army that  
15 eventually led to the decision require risk  
16 assessments for each of the chemical weapons disposal  
17 facilities. That's eight facilities in the U.S. and  
18 the one out at Johnston Island.

19 And the one thing that I have observed in  
20 looking at all these different applications of this  
21 process is that there is a great desire for  
22 simplicity. There's a great desire for trying to come  
23 up with methods that are acceptable to the people that  
24 are engaged in the operations themselves.

25 And I also further observed that the more

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1 they got involved in the ideas behind the quantitative  
2 approaches as we're now calling them, which I think is  
3 a pretty bad name, the more they were willing to  
4 embrace them.

5 I think the classic example is NASA. NASA  
6 was very negative on the use of risk assessment. They  
7 had a very bad experience with it in the early days of  
8 the Apollo program. Risk assessment calculation got  
9 into the halls of Congress and embarrassed them a  
10 great deal in terms of getting support for the Apollo  
11 program. And the Administrator at that time  
12 essentially declared that they would not employ  
13 probabilistic methods in the safety analysis program.

14 Well, that's reversing. And quite  
15 dramatically reversing down even though it's been a  
16 long time. And to the point where my prediction is  
17 that in maybe four of five years the nuclear industry  
18 will no longer be the leader in the implementation and  
19 the use of probabilistic risk assessment methods in  
20 the risk management arena, but probably will transfer  
21 to the space program.

22 But nevertheless, I don't think we want to  
23 get this into a level of a contest. My observation  
24 has been that the biggest problem that we've had in  
25 selling the ideas of PRA is that there is an

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1 identification of what a PRA is with the massive fault  
2 tree/event tree models that have been employed in the  
3 nuclear power industry. And a failure to recognize  
4 that there's hundreds of other much smaller and much  
5 more pointed risk assessments that have greatly  
6 assisted the risk management process in a whole  
7 variety of other applications that pretty much go  
8 unnoticed.

9           So I think there is an unfortunate  
10 association here with complexity that doesn't really  
11 have to be. I don't see that a risk assessment has to  
12 be any more complicated than it has to be to answer  
13 the question that you're trying to get an answer to.

14           And my observation is that some time we  
15 will look back on this and we'll say that we now in  
16 the fuel cycle facility business learn how to do these  
17 assessments in such a way that they are much simpler  
18 than the ISAs we were developing in the first decade  
19 of the new millennium.

20           It may not happen. But I suspect it could  
21 very well happen. So I think that all we want to do  
22 is make sure that adequate methods are being employed  
23 to fulfill the commitments, the obligations that the  
24 agency has, of reaching reasonable assurance findings  
25 on the safety of a variety of facilities.

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1                   And if this doesn't help that, then we  
2 should find the method.

3                   We are going through the same thing in the  
4 waste field. The waste field is principally focused  
5 right now on geological repositories. Opened up first  
6 repository for storage of radioactive waste in the  
7 world at the waste isolation pilot plant in Carlsbad,  
8 New Mexico.

9                   The underlying document for certifying  
10 that facility was something called a performance  
11 assessment. It was just a sharp word for a risk  
12 assessment.

13                   But the transition from a non-  
14 probabilistic performance assessment to a  
15 probabilistic performance assessment has gone through  
16 the very same kind of anxieties and questioning and  
17 challenges that we've been talking about here today.

18                   And now it's pretty clear that the  
19 transition has made its way most of the way in terms  
20 of the embracing of a probabilistic approach to  
21 performance assessment, very different from the  
22 reactor risk assessments, except in terms of some of  
23 the fundamental principles, those fundamental  
24 principles being in the things that we were talking  
25 about this morning of scenarios and consequences and

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1       likelihoods, a different way of having to get a handle  
2       on what the likelihoods were.    But nevertheless the  
3       same thing had to be done.

4                So I think that the idea here is we look  
5       at the ISA process and we ask ourselves if this is  
6       doing the job, if it does the job better than a PRA.

7                With all due regard to these issues that  
8       you point out of distractions, of confusion, of  
9       elaborateness, overkill, and focusing on things that  
10      were other than the real issue; with due consideration  
11      to those and then make our decisions, but I don't  
12      think there is, you know, a religious zealous  
13      determination here to employ one method over another.  
14      There is a very strong desire to make sure that these  
15      analyses bring us the kind of insights that allow the  
16      agency to make the best possible decisions they can  
17      make.

18               And perspective is very much a part of  
19      that.    And the probabilistic component has been very  
20      important in providing perspective.    So that's one  
21      point of view.

22               Now I know you're going to have to leave  
23      here momentarily, Tom.    And I want to make sure if you  
24      have any parting wisdom or shots to take that you have  
25      that opportunity to do that.

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1 CO-CHAIRMAN KRESS: First off, I think the  
2 ISA methodology does in some sense address your risk  
3 triplet.

4 CHAIRMAN GARRICK: Yeah.

5 CO-CHAIRMAN KRESS: What can go wrong and  
6 what are the potential consequences and what are the  
7 frequencies. And it does it in a less quantitative  
8 way than a full PRA does, but I agree with things Mr.  
9 Beedle and these people have said, that the degree to  
10 which you need to quantify those things ought to  
11 depend on the potential hazards that you have, and  
12 that in general these things we're dealing with NMSS  
13 are much less hazardous, much less complex than the  
14 nuclear reactor.

15 So it is not really appropriate to ask for  
16 the same level of quantification. And I have a few  
17 concerns that go to mostly the details of the ISA such  
18 as do we have acceptance criteria that are basically  
19 meaningless in terms of their differentiation between  
20 each other in terms of, say, the consequences. It  
21 looked to me like they were close enough together that  
22 that is one consequence instead of two or three.

23 I had questions about how you would ever  
24 incorporate uncertainties into the process, and I'm  
25 still unclear as to how that could be done, and I

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1 think uncertainties have to be considered some way,  
2 and I don't mean to say I need a full distribution of  
3 probabilities and a full distribution of consequences  
4 or risks. But I think uncertainties need to be  
5 factored in because they're -- they help guide one's  
6 perspective on what's important, which lines of  
7 defense are important.

8 I didn't see real good guidance on how  
9 many lines of defense are necessary. The thing that  
10 was mentioned was, well, double contingency, which is  
11 basically two lines, constitutes highly unlikely. I'm  
12 not sure there's a good basis for that because I have  
13 to know how good both of these double contingencies  
14 are before I can make that judgement. So I don't  
15 think that's as precise a definition as I would like.

16 So I think some sharpening is needed on  
17 how many lines of defense are appropriate and how good  
18 do each of those have to be in a qualitative sense.

19 And so in summary, I see some things that  
20 need sharpening up, but I'm relatively enthused about  
21 the process as an appropriate one for the NMSS  
22 activities mainly because I don't perceive the hazard  
23 to be as severe that it would require quite the  
24 quantification we do in the reactor unit. So that's  
25 basically my view at the moment.

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1 CHAIRMAN GARRICK: Very good. Okay.  
2 Milt.

3 CO-CHAIRMAN KRESS: With that I'm going to  
4 have to --

5 CHAIRMAN GARRICK: Okay. I know you had  
6 some comments, Milt, about the categorization issues.

7 MR. LEVENSON: I've got a couple of  
8 comments.

9 One, back to your original question as to  
10 what the objective is, I've heard the objective of the  
11 overall program stated as the objective is to reduce  
12 risk. And I think that's an unfortunate statement of  
13 the objective. The objective is to reduce risk to an  
14 acceptable level. The implication that risk can be  
15 reduced to zero is sometimes implied without  
16 recognition that that can't ever be achieved.

17 Our objective is to reduce risk to an  
18 acceptable level. The big difference I see between  
19 the reactors and what we're talking about here is  
20 while the reactors, everybody say's there are no two  
21 alike, at least the U.S. reactors, in fact, the  
22 consequences of an accident, of the severe type  
23 accident in any of them is approximately the same.  
24 And that's not true in our fuel cycle facilities at  
25 all.

1 I think we have to maybe reorder our  
2 looking at the risk items. The first one is what can  
3 go wrong. That I think everybody including the  
4 industry wants to follow all the way to the end. You  
5 want to identify everything that can go wrong.

6 But then instead of putting how likely is  
7 it to go wrong second, that's not appropriate. It is  
8 for reactors because the consequences are always the  
9 same. They're catastrophic.

10 I think we need to put the consequences  
11 second. If the consequences are acceptable, then it  
12 isn't so clear to me why we should spend a lot of  
13 money and effort defining how likely or unlikely it  
14 is.

15 So I know John and I don't necessarily  
16 completely agree on this. I would like to see  
17 quantification, and including not necessarily precise  
18 quantification, but a good assessment of uncertainties  
19 to make sure that the consequences are acceptable. If  
20 consequences are acceptable, then I'm much less  
21 concerned about what you do about likelihood.

22 MR. BRONF: I think, I'll tell you from  
23 our review that that is largely the train of thought  
24 that is actually being deployed now. There are some  
25 processes out there deal with highly enriched

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1 material, aqueous solutions, and so on, where clearly  
2 the number of things and the consequences are higher.  
3 And they are getting very rigorous reviews. There are  
4 large numbers of processes out there that deal with  
5 apparently significantly lower potential consequences  
6 and they're being reviewed, but not to the same level.

7 CHAIRMAN GARRICK: Yeah, and I don't see  
8 anything wrong with the graded approach to it. And  
9 certainly I don't see anything wrong with ordering the  
10 items of the triplet differently.

11 Clearly I think reasonableness has to  
12 enter into the process. In fact, the one thing that  
13 is very encouraging about the ISA is that it does  
14 contain a lot of the same activity. I think as one of  
15 you said earlier, you learn a lot from developing the  
16 scenarios, developing the sequences. And I would  
17 agree with that.

18 In fact, in many plants, especially  
19 outside the nuclear world that I've been involved in  
20 analyzing, we've not had to go the full scope of what  
21 we have indicated we were going to simply because by  
22 the time we started out, the various things that could  
23 go wrong, we learned enough about them and how to deal  
24 with them, how to control them, that we achieved  
25 essentially what was desired.

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1           So reasonableness has to be a part of the  
2 process. The point is that sooner or later, what  
3 happens is when you get to something that is highly  
4 redundant and highly diversified, and therefore highly  
5 reliable, it becomes increasingly difficult to sort  
6 out the importance of contributors.

7           And so that's one of the reasons why the  
8 reactor models are as large as they are, is because  
9 they do have a great deal of redundancy with their  
10 independent and separate safety trains and their very  
11 dedicated and high standards, mitigating equipment,  
12 and so in order to really get an understanding of what  
13 the contributors are, you have to dig quite deep.

14           So the fact that they are highly reliable  
15 contributes to the sometimes expanded scope, but I  
16 don't think the idea here is to do any more than you  
17 have to to get the answers that you are looking for.  
18 The ISA has enough of the same kind of activities in  
19 it as a PRA does to feel that if there's a clear  
20 advantage to going that extra step, then you certainly  
21 don't have to start over to do that.

22           You have a lot of the analysis work  
23 preformed that is necessary to go that extra step.

24           All right.

25           MR. LEVENSON: I just have one other

1 comment based on one example that was given this  
2 morning with which I really don't agree. And that is  
3 redundant is not the same a diverse.

4 I used to once be a chemical engineer, and  
5 I know one case where a double walled hydrogen line  
6 was just wiped out by a guy driving through a plant  
7 with an elevated forklift. And so one needs to  
8 recognize when you talk about multiple things, are  
9 they independent?

10 MR. BEEDLE: That is where your ISA let  
11 you down. You didn't do a good logic trend on that  
12 one.

13 MR. LEVENSON: Not my idea.

14 MR. BEEDLE: But I think this ISA has  
15 served the fuel cycle facilities very well. It has  
16 given them a sense of discipline and a process to go  
17 analyze their various production methods to determine  
18 where their vulnerabilities are, which is the start of  
19 that PRA process that we've been using in the reactor  
20 systems for some years now.

21 Now, I, like you, Dr. Garrick, would hope  
22 that maybe some day we'll look back on this and say  
23 here's a very simplified method to determine the risk  
24 at these plants, and it employs lots of numbers, but  
25 it's very simple and easy to use.

1                   And you know that was my hope in 1988 when  
2 we came out with that IPE process.

3                   CHAIRMAN GARRICK: Right.

4                   MR. BRONF: And it has done nothing but  
5 grow since then. We've got plants now that are  
6 spending 25 million dollars on PRA's, and I would  
7 argue that they are no better off with that 25 million  
8 dollar PRA than the ones that spent a million dollars  
9 ten years ago.

10                  CHAIRMAN GARRICK: We'll save that for  
11 another meeting.

12                  (Laughter.)

13                  PARTICIPANT: That's just inflation.

14                  MR. BRONF: I encourage you to look at  
15 this ISA process as one that has done a great deal of  
16 good and I would not like to see the staff using an  
17 analytical process to review the ISA as a substitute  
18 for understanding how those plant processes work.

19                  CHAIRMAN GARRICK: Very good. Thank you  
20 very much.

21                  MR. BRONF: Thank you.

22                  MR. KILLAR: Thank you.

23                  MR. GOLDBACH: This is Don Goldbach at  
24 Westinghouse.

25                  Do I have time for a comment?

1 CHAIRMAN GARRICK: Yes. Go ahead.

2 MR. GOLDBACH: Okay. Going back to Mr.  
3 Beedle's question, and his question was what is the  
4 problem we're trying to solve, I don't think in the  
5 ensuing discussion I heard an answer to that, but let  
6 me propose an answer.

7 First of all, let me say what the problem  
8 is not. It's not that we're exposing too many members  
9 of the public to excessive levels of radiation. The  
10 problem is not that we're exposing our own employees  
11 to excessive levels of radiation. The problem is not  
12 that we're having too many criticalities. It's not  
13 that we're losing metric tons of uranium outside the  
14 gates except through diversion. It's not that we're  
15 having too many chemical accidents.

16 So if it's not any of those real problems  
17 then what is it? And I would propose that the problem  
18 is a self inflicted paper work problem. And it comes  
19 from, it actually originates from our attempt to move  
20 from a what I'll call a prescriptive regulatory  
21 process to a risk-informed process.

22 And I would propose that the problem is  
23 really -- it appears to be an NRC problem right now  
24 and that the NRC is having trouble assessing or  
25 figuring out how to assess vastly different

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1 facilities.

2 And I think finally the problem is the NRC  
3 appears to be trying to assess ability (phonetic)  
4 safety levels by reviewing paper work, and  
5 specifically the ISA summary, and not the actually  
6 performance on the site.

7 And so that would be my problem statement  
8 for Mr. Beedle and for the others in the audience.

9 And I'd also like to add a comment that  
10 we, some of us in the industry, have put in a lot of  
11 time and money and effort over the past, say, two to  
12 five years developing our ISA processes and we feel  
13 that we've come a long way from where we had these  
14 processes, and to do anything different than what  
15 we've already done, in other words to put more time  
16 and money and resources on that, could have just the  
17 opposite effect that we want to achieve.

18 In other words, it could take our focus  
19 away from using our current risk informed process to  
20 identify where we need to improve our safety margin  
21 and put it on to more prescriptive type work.

22 And I certainly don't want to see that  
23 here at this facility. I don't think that's good for  
24 the entire industry, and I would guess the NRC does  
25 not want to see that also.

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1 And that's the end of my comments.

2 CHAIRMAN GARRICK: Don, what if we  
3 discovered in the process that we had become smart  
4 enough now about how to do risk assessment for  
5 example, that I could do one that costs half as much  
6 as your ISA, and tells me twice as much about the  
7 plant and gives me a lot more information on how to  
8 conduct operations with a strong risk management  
9 component? What if I were able to do that?

10 MR. GOLDBACH: I'd say convince me.

11 CHAIRMAN GARRICK: I think that's -- the  
12 truth is I think that's a very feasible thing. I  
13 think the ISAs are out of control based on what  
14 limited thing I have seen. You talk as if this was a  
15 simplification of the process. You're going to have  
16 to convince us of that.

17 I actually see a much greater opportunity  
18 for simplification through a PRA thought process than  
19 I do an ISA process simply because of all the dittling  
20 (phonetic) you're trying to do to justify not  
21 calculating with any rational and systematic and  
22 deliberate process these likelihoods.

23 MR. GOLDBACH: Simplifying for whom?

24 CHAIRMAN GARRICK: I think it's  
25 simplifying for everybody. But, you know, this time

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1 will have to tell. I think you're out of touch with  
2 what's going on out in the world with respect to the  
3 application of risk assessments in the chemical  
4 industry.

5 I'm seeing things that EPA's doing that  
6 are remarkable in terms of employing some of these  
7 principles to build rather simple models that are  
8 extremely useful in addressing some of these same  
9 issues.

10 I'm not saying we're there yet. All I'm  
11 saying is that -- and I asked this question at the  
12 outset, and I didn't get an answer. How much is it  
13 costing to do a plant ISA? I'm not just talking about  
14 the summary. The standard review plan has in it what  
15 they call an ISA program with five elements to it.  
16 And I think that's good.

17 But what I'm asking is, you know, what is  
18 the life cycle cost of this exercise? And I suspect  
19 that once you focus in on a more direct and explicit  
20 way of dealing with some of these issues that are now  
21 causing you a lot of anxiety and aggravation like the  
22 likelihood calculation, you would find that there is  
23 maybe much greater opportunity for simplification in  
24 applying PRA principles than trying to continue to  
25 figure out how to justify, and not in a very

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1 satisfactory way, your addressing of the likelihood.

2 I just think we have to keep an open mind  
3 about it. I think the ISA is a very important step  
4 and it has in it something that will be very  
5 beneficial to the PRA community in that it addresses  
6 an entirely different kind of plant that has a flow  
7 character to it, has a dynamic character to it. It's  
8 got the same elements to it as modeling the space  
9 shuttle, where you have to model different phases of  
10 emission, in the case of the plant.

11 You have to model different stages of the  
12 process, different unit operations. And this made  
13 major contribution in how to do that. And the ideas  
14 and the concepts are being embraced in a lot of other  
15 plants.

16 But all I'm suggesting here is that I  
17 think it's the wrong way to go to fight PRA because I  
18 think as we found in the waste field and as we're  
19 finding in a number of other applications that if you  
20 shake yourself from the baggage of the reactor PRA's,  
21 that the fundamental thought processes associated with  
22 PRA are basic and rather clear and rather  
23 straightforward.

24 That the opportunities for streamlining  
25 the safety analysis process are very great. And I

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1 just hope we keep an open mind about that.

2 MR. GOLDBACH: Let me just first of all  
3 say, just to use your words, fight. I'm not  
4 specifically fighting PRA. I would say I'm fighting  
5 any different method that would be proposed, even a  
6 qualitative method at this point.

7 We have been working, we have been trying  
8 to work, we, Westinghouse, with the NRC for at least  
9 the past five years as this new revised Part 70 was  
10 even being formulated throughout this time, to try to  
11 understand and work very closely with NRC, what the  
12 requirements were going to be, what the ISA  
13 requirements, what it all meant.

14 And we as the new Part 70 was being  
15 developed, we were developing out ASA process. And  
16 that's similar to other licensees. So I'm not  
17 fighting specifically PRAs. It's just again it gets  
18 back to the fundamental question, and I haven't heard  
19 even in your response an answer to the fundamental  
20 question. What is the problem we're trying to solve?

21 I think reality, if you want to talk in  
22 terms of reality, is the things I mentioned that the  
23 problem is not. We are operating and have been  
24 operating very safely. We're not exposing members of  
25 the public. We're not overexposing our employees.

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1 There are many things we're not doing because we were  
2 operating these facilities very safely over the years.

3 And we volunteered basically as this rule  
4 was being developed to incorporate the what we thought  
5 would be the requirements of the ISA and the  
6 management measures into our -- actually our approved  
7 license back in 1995.

8 We were saying yes. We agree it's a good  
9 process. We're going to start implementing it now.  
10 But again I think you're avoiding answering the  
11 question, what is the real problem we're trying to  
12 solve. And you jump right away defending PRA. And  
13 that's not what I'm saying.

14 I'm not fighting PRA, though I don't think  
15 it's the right way to go.

16 CHAIRMAN GARRICK: Well, you know, we  
17 don't want to get in that position of just defending  
18 any particular approach because our interests should  
19 be much more basic than that. But we do have a  
20 problem in this industry of building public  
21 confidence.

22 And there's no difference between  
23 perceived risk and real risk, as far as getting  
24 something done. It's equal in its capability to  
25 prevent progress.

1 MR. GOLDBACH: Well, if it's building  
2 public confidence is the problem, if public  
3 confidence, let's say, is the problem, then a PRA  
4 method of risk determination is not going to build  
5 public confidence. That would be a whole different  
6 approach to solve that problem.

7 CHAIRMAN GARRICK: Well, I disagree. And  
8 we're not going to solve this on here. I think that  
9 when you ask what is the issue, the issue is risk  
10 management. And as far as the NRC is concerned their  
11 mission remains the same. And all they're looking for  
12 is tools to enable them to reach conclusions on these  
13 licensees that are in the best interest of the public.

14 d I think we could discuss this issue of  
15 what is it we're trying to do ad infinitum and we  
16 probably ought to move on with our agenda, even though  
17 I appreciate the comments and you've made some very  
18 good points. And you're absolutely right about the  
19 consequences, as far as injury and safety is  
20 concerned.

21 But it seems as though we're dealing with  
22 something much deeper than that in order to enable  
23 society to make good use of this technology.

24 Okay. Let's move on.

25 MR. BEEDLE: If I may, one observation.

1 We may be facing an issue where the tools that we're  
2 using for assessment and operation of the facilities  
3 is a different tool than the NRC needs to deal with  
4 the regulation of the facility.

5 CHAIRMAN GARRICK: Yes.

6 MR. BEEDLE: Now, you would hope that  
7 those tools are the same. But we may be at a point  
8 here where maybe they're different.

9 CHAIRMAN GARRICK: Yeah.

10 MR. BEEDLE: The problem I think that Mr.  
11 Damon was describing this morning or the process he  
12 was describing is more a tool for the use by the NRC  
13 staff than it is a tool for use by the facility to  
14 judge the adequacy of their processes.

15 CHAIRMAN GARRICK: Yes. Okay. All right.  
16 Let's see.

17 MR. BEEDLE: Thank you very much.

18 CHAIRMAN GARRICK: Thank you. Thank you  
19 very much. And thank you, Don.

20 MR. GOLDBACH: You're welcome. Thank you.

21 CHAIRMAN GARRICK: Okay. I guess we're  
22 ready to hear from DOE. Will you introduce yourself?

23 MR. WYKA: Good afternoon, gentlemen. For  
24 the record my name is Ted Wyka. I'm the Director of  
25 the Department of Energy's Integrated Safety

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1 Management Program. I work for the Deputy Secretary  
2 of Energy, implementing integrated safety management  
3 throughout the DOE complex.

4 I appreciate the opportunity to come talk  
5 to the Joint Committee today. I was asked to brief  
6 the committee on the department's integrated safety  
7 management program.

8 I know I have a lot of paper work with me.  
9 What I intend to do is go briskly through the slides  
10 so you can stop me in the area's that you're most  
11 interested in. What I was planning to do was give you  
12 an overview of the department's integrated safety  
13 management program.

14 This is something we've been working for  
15 the last five years. And when I talk safety, I talk  
16 safety in the context of protection of the public, the  
17 workers as well as the environment. It includes all  
18 aspects of daily work, both federal as well as  
19 contracted work. And this runs the gamut of our  
20 facilities, everything from the handful of Cat 1  
21 nuclear facilities, a couple of hundred; Cat 2,  
22 several hundred; Cat 3, RAD facilities, accelerators,  
23 our national labs, windmills, petroleum facilities.

24 So it runs the entire gamut of daily  
25 operations, including weapons production; science,

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1 which was done in the national labs; material  
2 stabilization activities; DND and clean-up activities;  
3 as well as project management, even through the phase  
4 of procurement, design and construction of facilities.  
5 Integrated safety management is the way of doing DOE  
6 work.

7 It also includes all type of hazards,  
8 everything from radiological to criticality, chemical,  
9 industrial, explosive, fire. Simply it's the way we  
10 do work.

11 In fact we're beginning -- somewhere we've  
12 taken off the word safety and calling it the  
13 management system. In fact you probably realize that  
14 we've had problems at DOE with safeguards and  
15 security. The safeguards and security folks have  
16 basically adopted this system as the way they do  
17 business as well.

18 The first reaction and the first reaction  
19 I get from everybody, there's nothing new here. This  
20 is all common sense. There's probably something to  
21 that.

22 We had probably back in '95, the best  
23 minds in the department from our national labs. Both  
24 federal as well as the contractors, put this system in  
25 place.

1                   We're not there yet. We're far from it.  
2                   In fact we're probably just at the initial  
3                   implementation stages this past September, September  
4                   2000.

5                   And in my mind we've sort of reached the  
6                   low hanging fruit. So surfaces look simple but then  
7                   as you pull the treads, at least what we're finding  
8                   out it's a complicated system.

9                   Let me just sort of give you a quick  
10                  overview, and I sort of enjoyed the questions from the  
11                  last discussion because those are really the same  
12                  questions I get on an everyday basis. What's broken?  
13                  What are we trying to fix? Is this going to work and  
14                  how much is it going to cost me?

15                  ISM was originally developed back in '95  
16                  in response to a Defense Board recommendation. that's  
17                  the Defense Nuclear Facility Safety Board. It was  
18                  recommendation 95-2.

19                  Essentially we needed a complete system to  
20                  better integrate safety into the management and work  
21                  practices at all levels. ISM was developed in  
22                  response to some key underlining issues. One is  
23                  integrating safety management functions and activities  
24                  into the business process, tailoring the programs  
25                  based on the complexity and hazards associated with

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1 the work

2 And probably the most important thing was  
3 really reconciling the existing programs into one  
4 coherent safety management system so that it's not a  
5 multiplicity of systems that compete for management  
6 attention.

7 Bottom line, you're probably familiar with  
8 the DOE sites, but we're all across the country. We  
9 have multiple program offices. The facilities have  
10 multiple landlords, multiple program offices involved  
11 in activities, and the key struggle is just getting  
12 the program offices talking with each other and to  
13 getting the sites talking with each other in  
14 developing this program.

15 And also clear roles and responsibilities.  
16 It was just quite recently until we really defined the  
17 clear roles and responsibilities from the Secretary  
18 down to the deck plate level.

19 In October '96, DOE policy 450.4 expanded  
20 this initiative to all sites, facilities, and  
21 activities. It started off as a Defense Nuclear  
22 Facility type activity as a result of a board  
23 recommendation, but it quickly developed into this  
24 makes sense to do department wide.

25 In March 1999, the Secretary of Energy

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1 directed that all programs and sites complete initial  
2 implementation of ISM by September 2000, which were  
3 essentially there with the exception of about three  
4 facilities.

5 Integrated safety management, what is it?  
6 It's a successful top-bottom, top-down as well as  
7 bottom-up approach. It's an evolution rather than  
8 revolution. And it's really true.

9 There's a lot of things that we did over  
10 the last 12 years that led up to integrated safety  
11 management, especially in the area of nuclear safety  
12 rules, upgrades, improvement of the DOE directives,  
13 central contract management changes, and processes in  
14 defining our standards and requirements that we put  
15 into the contracts.

16 System components are both structural as  
17 well as flexible, structural in that each program in  
18 site adheres to the same set of principles and core  
19 functions which I'll go through, and flexible in that  
20 each program in site is encouraged to tailor their ISM  
21 systems to their unique work and hazards.

22 It's also an umbrella system. At DOE like  
23 in most agencies you have programs. People develop  
24 and offices develop programs and they're the best  
25 program's running. And they all try to implement them

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1 at the same time.

2 One thing that integrated safety  
3 management does is take these programs and tries to  
4 make sure that we're going off in the same course,  
5 meeting the same objectives. And that's better  
6 performance of work, whether we're talking about  
7 safety, productivity, mission, and cost.

8 And it's basically broken down in three  
9 area's: public safety, as well as environmental  
10 protection, and workers safety. I think this diagram  
11 identify's some of those programs that integrated  
12 safety management tries to shepherd into their common  
13 goal.

14 In nuclear, whether we're talking CRIT  
15 safety, chemical safety, responsible care, pollution  
16 prevention, environmental management systems, that's  
17 as a result of an executive order on Green in  
18 Government and in a various worker safety programs.

19 I have some documentation. This program  
20 has teeth. It has a lot of paper work to support it,  
21 but it's also implementation. It starts off with  
22 policies.

23 There's three policies on integrated  
24 safety management. We've had three Secretaries over  
25 the last seven years. And all three have put their

1 footprints on integrated safety management with policy  
2 statements.

3 We had DEAR clauses. These are  
4 acquisition clauses, which go into every DOE contract,  
5 every prime contract. And this is what provides the  
6 teeth.

7 It lays out, you know, the bare structure,  
8 what's required in terms of developing this system,  
9 what's involved in the system description which  
10 basically identifies the system, and how to flow it  
11 down to the subcontracts, into what subcontracts to  
12 flow it down to.

13 It also has a laws clause, which talks  
14 about having two sets, either a List A for laws and  
15 regulations, and List B for establishing the DOE  
16 standards and requirements through various approved  
17 mechanisms.

18 Then it has a conditional payment of fee  
19 clause which is in every contract which ties  
20 performance to earned and award fees.

21 Below that we have guidance documentation,  
22 probably about three inches thick on how to develop  
23 integrated safety management and how to implement it,  
24 as well as a team leaders handbook which I'll go  
25 through later in the presentation.

1           We do verification assessments on both the  
2 quality of the system descriptions, i.e., the paper  
3 work, as well as we flow the report down into the  
4 implementation to verify adequate implementation of  
5 the systems.

6           I'll go through this real quickly. This  
7 isn't a handout, but this is basically a sketch, the  
8 outline of the system. It's broken into six  
9 components: clear objective, guiding principles, core  
10 functions, ISM mechanisms, which I'll talk about a  
11 little bit, ISM responsibilities, and implementation.  
12 That's sort of the latter, the framework of the  
13 system.

14           CHAIRMAN GARRICK: Ted, did you answer  
15 this question? Does this operate out of headquarters  
16 or one of the -- it does operate out of --"

17           MR. WYKA: No, no. Good question. In  
18 fact, it would fail if it operated out of  
19 headquarters. It's a line management responsible for  
20 safety. You know, the Deputy Secretary has his  
21 personal thumbprint on it. And that's sort of my  
22 role. But the ownership is the field managers that  
23 own and are accountable for the work at their  
24 facilities, as well as up the program offices, and  
25 through the Deputy Secretary.

1           So it's line management. And that's a  
2 good point and I get to it later because there's a  
3 piece which deals with the implementation of ISM at  
4 the contract level, but then there's also a DOE role  
5 in the successful implementation of ISM.

6           CHAIRMAN GARRICK: Thank you.

7           MR. WYKA: The objective, just as stated,  
8 it's systematically integrate safety considerations  
9 into the management and work practices at all level to  
10 accomplish missions while protecting the public, the  
11 worker, and environment. These are the ISM  
12 principles.

13           Again first reaction is is this all common  
14 sense. Principles form the fundamental elements of  
15 integrated safety management.

16           The first three are the interrelated and  
17 applied water core functions which I'll go over. They  
18 ensure that the management structure has personnel  
19 that focused on safety, understand their assignments,  
20 and capable of carrying out their core functions.  
21 This gets into the technical competence and makes sure  
22 that we have the right people in the right slots.

23           Balanced priorities, make sure that we  
24 prioritize our resources, balanced among our competing  
25 priorities.

1           And that the resources are adequately  
2 allocated to address the safety as well as  
3 programmatic and operational considerations.

4           Identification of the safety requirements  
5 through hazard identifications and requirements of  
6 established to approve processes, which I'll go over  
7 in detail in a little bit.

8           Hazard controls, obviously the admin, and  
9 the engineering controls as well as personal controls.  
10 Operations authorization is conditions and  
11 requirements to be satisfied for operations shall be  
12 clearly established and agreed upon.

13           MR. LEVENSON: Let me ask a question. An  
14 academy report of a couple of years ago called  
15 "Barriers to Science" made a major point of the fact  
16 that in fact DOE in many cases does not -- they  
17 clearly allocate authority and they clearly allocate  
18 responsibility, but they allocate them differently.

19           Is that true also in the safety thing or  
20 does the responsibility and authority go together, and  
21 if it does go together how do you do that in a line  
22 organization which doesn't do it for the other work?

23           MR. WYKA: I think they go together. You  
24 know, the line management responsible for safety and  
25 that starts with the field manager, with the program

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1 office, the PSO which is one of the Assistant  
2 Secretaries, the line Secretary that owns the work,  
3 and up to the Secretary.

4 And we have a functions responsibility and  
5 authority system which has, you know, laid out the  
6 flow of responsibilities and accountabilities  
7 throughout the department.

8 The accountability and the safety go  
9 together. And that was a key, was tying in safety  
10 with the work, tying in the ES and H and support  
11 organizations with the line management.

12 Did I answer your question, sir?

13 MR. LEVENSON: Not really because to place  
14 the responsibility and authority you need the people  
15 who have the responsibility, if they're going to have  
16 the responsibility, need some say over things like  
17 resources, like budget, et cetera. And I just don't -  
18 - I understand what you're saying, but in an  
19 organization that in many cases for the line  
20 responsibilities and the line authorities do not have  
21 them in the same place, I'm not sure how you can put  
22 the safety in the same place.

23 MR. WYKA: That's a good point. And  
24 that's what the essence of, you know, probably our  
25 biggest problem with the department. Bottom line is

1 the field manager owns the work and owns the safety  
2 and responsibility for safety and the public and the  
3 workers and the environment. If something breaks he's  
4 the one called on the carpet.

5 And you're right. He's competing, you  
6 know. He has to make sure he has the resources, the  
7 personnel to accomplish his mission and that's where  
8 he's dealing with sometimes several program offices  
9 that have control over getting that individual the  
10 funds.

11 ISM functions, these are the core  
12 functions and it's sort of broken down like any step,  
13 check, plan do check type system. It's applied as a  
14 continuous circle. This is instantly called the  
15 prayer wheel because it's usually seen as a circle  
16 defining the scope of work, analyzing the hazards,  
17 development and implementing hazard controls,  
18 performing work within the controls, and providing  
19 feedback and continuous improvement.

20 These core functions provide the necessary  
21 structure for any work activity and probably more  
22 procedural than philosophical. I think they're  
23 philosophical pieces are the guiding principles, and,  
24 again they're usually in the circle. They're not  
25 independent, They're sequential functions, They all

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1 happen at the same time.

2 Defining the scope of work means missions  
3 are translated into work, expectations are set, tasks  
4 are identified and prioritized, and resources  
5 allocated.

6 Analyzing hazards is identified, analyzed,  
7 and categorized, includes worker, public, as well the  
8 environment in analyzing accident scenarios. Develop  
9 and implement hazard controls, identifying applicable  
10 standards and agreed upon standard sets, identifying  
11 controls to prevent accidents and mitigate  
12 consequences, establishing bounties for safe  
13 operations and maintaining configuration control.

14 Let me move to the next slide because this  
15 sort of I think explains the first two. This is  
16 really our system. This illustrates the general  
17 concept of developing environment safety and health  
18 controls for various hazards and integrating them at  
19 the activity level, defining the boundaries for  
20 activity, scoping out the work, activity location,  
21 system equipment, and process hazard materials,  
22 identifying the hazards basically in three areas for  
23 the workers, public, as well as the environment.

24 It's a two step process, identifying and  
25 categorizing hazards, which includes assessing defence

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1 in depth, worker safety, and environmental protection  
2 provisions in estimating likelihood.

3 The second step is analyzing the accidents  
4 scenarios related to the hazardous work. And this  
5 means developing accident scenarios, identifying  
6 source term and consequences, identifying analysis  
7 assumptions and comparing it to our evaluation  
8 guidelines; then identifying the safety class and  
9 safety significant systems, technical safety  
10 requirements based on the guidelines.

11 Dependant upon the type of facilities  
12 especially in the middle column, looking at the  
13 public, use a SAR or SAR requirement, equivalents,  
14 equivalent would be for like a weapons production type  
15 activities, and nuclear explosives safety studied in  
16 NESS (phonetic) program, or the weapons integrated  
17 system, the SS21, which is used at pantex.

18 And process hazard analysis for the high  
19 hazard non-nuclear facilities, as well as a safety  
20 analysis documents for accelerators. So again we have  
21 a wide gamut of facilities and different processes  
22 that we use.

23 The lower column identifies the various  
24 controls that basically fall into four areas, the  
25 engineering design features, which are equipments,

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1 again, safety class, safety significance, systems,  
2 structures, components, or in remote siting, as well  
3 as admin. controls which are identified in the  
4 technical safety requirements and work practice  
5 controls which alter the manner in which the tasks are  
6 performed, such as procedural controls and then  
7 personal protective equipment.

8 So it's using this process for all of our  
9 activities to come up with or identify the hazards  
10 and, you know, establish the controls. For at least  
11 the nuclear facilities, it's 5480.23, is the DOE  
12 order, the standard for developing the safety analysis  
13 requirements, or is the DOE standard 3009 which is  
14 about a two inch document which goes through the  
15 calculations as well as the evaluation guidelines.

16 In performing work within controls,  
17 readiness is confirmed. Formality and rigor is  
18 tailored and work is performed. And this is a  
19 critical piece which I'll go through in a couple of  
20 minutes.

21 Provide feedback and improvement; include  
22 self-assessments, independent assessments; performance  
23 indicators, occurrence reports, trending analysis, and  
24 process monitoring; and again, line management uses  
25 this information to confirm that safe performance of

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1 work affect the implementation of ISM to improve  
2 opportunities.

3 This is sort of what I was talking about  
4 the circular diagram of the core functions. As you  
5 could tell, it's three dimensional or actually three  
6 layers here: institutional facility and activity.

7 Institutional level includes the safety  
8 related topic, such as radiation protection,  
9 industrial hygiene, industrial safety, and emergency  
10 planning.

11 Facility activities would include  
12 configuration management, conduct of operations  
13 activity would be -- level topics would include things  
14 like quality inspection, work packages, procedures,  
15 activity specific training, personnel protective  
16 equipment, and lock-out and tag-out programs.

17 Again, ISM starts from essentially the  
18 Secretary on through the various levels of the  
19 activity, from the institution facility as well as  
20 activity level.

21 Let me go through at least --

22 CHAIRMAN GARRICK: Ted, has the  
23 implementation of this as an overall management  
24 process had much of an impact on the tools of analysis  
25 or the way in which safety is actually implemented?

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1 I can see the overarching structure here,  
2 and one of the very important things that you're  
3 trying to accomplish in this is, of course, the  
4 integration part, but has it materially changed the  
5 way you do things in the more detailed level?

6 MR. WYKA: Yes. You know, it looks at the  
7 --

8 CHAIRMAN GARRICK: I mean it's very  
9 important that it elevate the consciousness --

10 MR. WYKA: Absolutely.

11 CHAIRMAN GARRICK: -- of everybody and  
12 especially the line management, and if it does that,  
13 you know, you've made a major contribution. So I'm  
14 not suggesting that that's all that's important, that  
15 is to say, how you do your analysis and what have you.

16 I'm just really asking: did it impact  
17 your philosophy of the tools that you employ?

18 MR. WYKA: Yes, it has. It looks at in an  
19 integrated fashion the hazards and the work going on.  
20 Let me give you an example of probably something you  
21 may see in our national labs. You may have a building  
22 which has several different experiments going on at  
23 the same time, and I think once of the areas that I  
24 think this has really helped us is looking at all of  
25 those particular events and activities, looking at the

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1 hazards, identifying and establishing the controls,  
2 but also looking at the cumulative effect of all those  
3 different activities on the safety boundary of the  
4 building.

5 So I think it has sort of moved the  
6 department to look at, you know, the specific hazards  
7 and with respect to each other, whether they're rad,  
8 chemical, CRIT (phonetic) safety type hazards, fire,  
9 or industrial type hazards.

10 So I think we developed a department and  
11 its processes to look at the integrated effect and  
12 cumulative effect of hazards --

13 CHAIRMAN GARRICK: Okay. Thank you.

14 MR. WYKA: -- of the safety envelope  
15 ability.

16 Mechanisms, that's identified in one of  
17 the initial slides as a fourth step, and again,  
18 there's DOE mechanisms. I mentioned the DEAR clauses,  
19 the contracts, authorization protocols to implement  
20 it.

21 Contractor mechanisms includes the  
22 contracts, subcontracts, the ISM description documents  
23 which actually are documents in which they define  
24 their integrated safety management systems, as well as  
25 their other various documents.

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1           Let me just spend a couple of minutes  
2 talking about the authorization protocols. That's the  
3 process used to communicate acceptance by DOE of the  
4 contractor's integrated plans for hazardous work. For  
5 the low type hazards, it's the basic contract.

6           For the high moderate hazards, we had  
7 developed an authorization agreement as a part of  
8 integrated safety management.

9           CHAIRMAN GARRICK: In nuclear explosive  
10 safety, they have something called an authorization  
11 basis document. Is that what that is?

12           MR. WYKA: Yes, sir.

13           CHAIRMAN GARRICK: Okay.

14           MR. WYKA: Well, no. There's  
15 authorization basis, and then the authorization  
16 agreement is actually a distillation of the  
17 authorization basis. In fact, it's very equivalent --  
18 it's somewhat equivalent to licensing agreement, you  
19 know, that the NRC uses. It's about a three to four  
20 page document which defines the scope of the  
21 agreement, the DOE basis for the approval, such as the  
22 SAR, TSRs, the List B requirements, the particular  
23 orders, the List A rules, and the operational  
24 readiness assessments or various assessments that was  
25 done to verify start-up.

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1           It talks about listing of documents that  
2 constitutes the authorization basis. It establishes  
3 the terms and conditions requiring DOE review and  
4 approval. Specific procedures or manuals of practice,  
5 configuration management, reporting noncompliances.  
6 So establishes strict terms and conditions.

7           Contractor qualification, it usually  
8 addresses that. Special conditions, such as  
9 safeguards and security, protection of property,  
10 special notifications, effective, and expiration date,  
11 and the statement of agreement and signatures.

12           And what I tried to do was go through and  
13 do somewhat of an analogy with I think at least my  
14 interpretation of the NRC licensing. It's a three to  
15 four page document which, again, is signed by the  
16 president of the company and then the DOE site  
17 manager.

18           And it's done for CAT I and CAT II nuclear  
19 facilities or other facilities such as CAT III  
20 facilities at the discretion of the field manager  
21 based on the complexities and hazards associated with  
22 the work.

23           The process of implementing how this is  
24 done. First, we incorporate ISM into the DOE  
25 directives and DEAR clauses. We incorporate the DEAR

1 clauses into the contract. Then DOE and contractor  
2 agree on the system descriptions, on the List B safety  
3 requirements and the authorization agreements.

4 Those are basically the main documents for  
5 integrated safety management.

6 DOE and contractor conducts an initial  
7 implementation of safety management, and then we go  
8 through a couple of verifications. So they put the  
9 building blocks in place, which is a system  
10 description which describes their system. They have  
11 the 450.5 which establishes effective line oversight,  
12 and they have List B and appropriate authorization  
13 agreements, and they go through various verification  
14 assessments. We've done probably about 100, over  
15 about 150 over the last couple of years. They are in  
16 Phase I and Phase II verifications.

17 The Phase Is are looking at the system  
18 descriptions, the documentation, pulling the threads,  
19 again, from the DOE OPS office to the contractor  
20 senior management, all the way down to deck plate  
21 level.

22 The Phase II is looking at the  
23 implementation of integrated safety management.

24 This is sort of a status of where we're  
25 at. As you can tell, the blue indicates initial

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1 implementation of ISM. Where they're with the  
2 exception of a few facilities, but again, this is just  
3 initial because we still have a lot of problems here.

4 Flow down of integrated safety management  
5 to the appropriate contract; so it's subcontracts.  
6 Are we there? No. Again, you need to look at the  
7 complexities and hazards associated with work and with  
8 the subcontracts.

9 Flow down to the actual work. Is it with  
10 the designers, with the planners, ingrained into the  
11 work packages? It's at various levels as you go  
12 through the complex.

13 Worker involvement, and this is probably  
14 the key to ISM, is get their involvement, you know,  
15 through the various functions defining hazards,  
16 establishing the controls especially in the feedback  
17 and improvement systems.

18 Feedback and improvement, the department  
19 is good at identifying things, not so good necessarily  
20 at tracking to closure, and that's what we found  
21 basically throughout the complexes. You know,  
22 effective systems for following up on deficiencies  
23 found whether through these verifications or  
24 independent oversight or other various avenues of  
25 identifying the issues.

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1 Lessons learned, sharing effectively,  
2 getting information from one site to the next, as well  
3 as program offices to program offices, clear roles and  
4 responsibilities, high quality safety basis  
5 documentation. They're safe, but are they high  
6 quality? No, there's a lot of work, I think  
7 throughout the complex, again, various levels of  
8 maturity.

9 Contractor self-assessments and line  
10 oversight and involvement of the DOE facility  
11 representatives, which are technical experts actually  
12 out there in the buildings. You get them involved in  
13 the activity level.

14 I mention for the longest time this looked  
15 like an activity that was done at the contract level  
16 with the contractor, between the local DOE office and  
17 the contractor in developing their safety management  
18 systems and the implementation.

19 It's a department effort, and one thing  
20 that we had the Deputy Secretary sign out probably  
21 about a year ago was through the program offices,  
22 through the Assistant Secretaries and all of the field  
23 managers, that you have a role in the implementation  
24 of integrated safety management, and that's in making  
25 sure that you have effective feedback and improvement

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1 systems, that you have control over the budget, that  
2 you establish good line oversight programs that are in  
3 place and effective, and that you establish a  
4 documented system to insure that you continue to  
5 maintain and improve the system that we have, I think,  
6 just started to establish.

7 This was the topic of a recent memo that  
8 was put out by the Deputy Secretary, again, to the  
9 department saying that we're there. You know, we met  
10 initially, but again, we still have a lot of work to  
11 do and emphasized conducting effective line oversight,  
12 making the annual ISM updates meaningful, and that's  
13 key.

14 We went through the initial stages of  
15 verification assessments to make sure that the system  
16 descriptions are set and that they're implementing it,  
17 but on an annual basis as a requirement for them to  
18 not only look at their performance measures,  
19 objectives, and commitments based on performance,  
20 direction, budgeting and guidance, to make sure that  
21 their standards and requirements are up to date, but  
22 also to verify that their systems are still current,  
23 valid and being implemented, as well as look at the  
24 DOE site.

25 And then independent oversight of ISM; we

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1 have an office of independent oversight which is also  
2 doing assessments on the implementation of ISM.

3 Integrate key DOE processes with ISM.  
4 Again, integrate ISM throughout the facility life  
5 cycle, everything from procurement, design,  
6 construction, D&D.

7 Strengthen the activity integration with  
8 the budgeting process. That's where we're still weak,  
9 and to make this thing really work, we need to make  
10 sure that the program offices and the Assistant  
11 Secretaries are looking at the high priority projects  
12 and making sure that we have the funds to do the work,  
13 and then improving the feedback and improvement  
14 system.

15 The bottom line, and then I'll open it up  
16 for questions, these are sort of goals that we have  
17 for 2001. One is to with the various verifications  
18 that we've done over the last year is to fix some of  
19 the things that we've found, areas of weaknesses, and  
20 there's a lot of those.

21 To implement a systematic approach to  
22 sustaining and improving ISM systems as evaluated  
23 during the annual ISM updates.

24 Integrate and update DOE systems or  
25 feedback and improvement processes so that they are

1 effective for continuous improvement of ISM  
2 performance.

3 Realize improvement and the safe  
4 performance of work activities as determined by the  
5 IMS performance measures. This is a key point because  
6 this answers the select question. You know, now that  
7 we've been putting this thing in place for five years,  
8 what are we getting for it? Are we seeing actual  
9 performance and the work in terms of safety, as well  
10 as productivity mission and cost?

11 We has developed an initial set of ISM  
12 performance measures that we're using complex wide to  
13 help us with this. We started with five total  
14 recordable case rates, occupational safety cost index,  
15 hypothetical radiation dose to the public, our worker  
16 radiation dose and reportable occurrences of releases  
17 to the environment.

18 The only thing everybody liked about that  
19 set was that nobody liked them. You know, but they  
20 do. We've had various groups take a look at it,  
21 contractor groups, various contractor groups, as well  
22 as INPO (phonetic), came in and did sort of an initial  
23 peer group review on the set of five. So it came up  
24 with the same collusion that we came up with, that  
25 it's a good starting set, but we need to continue to

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1 mature the set to be able to answer that "so what"  
2 question and to look at some of the other variables.

3 And that concludes my prepared remarks.  
4 I'm then open to questions.

5 CHAIRMAN GARRICK: Just back on this one,  
6 I'm not sure what it meant. Does the red mean they're  
7 losing?

8 MR. WYKA: Well, no, because then I don't  
9 want to give the blue that much credit. Blue means  
10 that they -- I'm telling everybody it's like a  
11 marathon and they're up to the starting blocks. The  
12 reds aren't there yet.

13 Specifically like the Los Alamos is one,  
14 and that was a result of the Sierra Grande fire. You  
15 know it caused some of their milestones to defer about  
16 six months.

17 A couple of them threw out the  
18 verification processes. We found some issues in the  
19 feedback improvement and the training programs, the  
20 way that some of them did their hazard analysis. So  
21 they're going off and fixing issues to in their mind  
22 reach initial implementation, and that's sort of the  
23 key point.

24 Initial implementation is the line  
25 manager's call. You know, they're developing their

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1 systems using this framework that the department is  
2 using complex-wide and making the call that, you know,  
3 my systems are adequate, and we're implementing this  
4 process, and that's when they turn blue in the chart,  
5 but that's where the race begins because, you know,  
6 again, a lot of these issues are complex-wide, and  
7 even then the ones that have determined that they're  
8 implementing, you know, they still have a lot of work  
9 to do in the real flow down to the subcontracts, you  
10 know, establish really effective feedback improvement  
11 systems.

12 They may have feedback improvement  
13 systems, but they're not all that effective. The same  
14 with the lessons learned; the same with, you know,  
15 their safety basis documentation and continuous  
16 upgrades to those.

17 Flow down to the actual work. You know,  
18 in some places it might still be caught in a mid-level  
19 management area, but it's flowing down to the actual  
20 work packages to designers and planners, again, at  
21 various levels of maturity throughout the department.

22 CHAIRMAN GARRICK: Given the diversity of  
23 activities that the Department of Energy is engaged  
24 in, just about every kind of hazard --

25 MR. WYKA: Sure.

1 CHAIRMAN GARRICK: -- from explosives of  
2 different types to every chemical, to all forms of  
3 radiation, one would think that there's a great  
4 opportunity for some degree of harmonization. Is  
5 there any effort to do that?

6 You know, there is this international  
7 movement that's not doing very well in trying to deal  
8 with the issue of risk harmonization to put in better  
9 context the whole issue of radiation safety, partly  
10 driven by their "radiophobia" that exists.

11 Has the department got any kind of  
12 deliberate program to establish some sort of  
13 consistency of measures between the risks of different  
14 hazards?

15 MR. WYKA: Probably not, probably not all  
16 that mature, and I think, you know, that's really the  
17 essence of this integrated safety management program,  
18 is, I think, to help us along that area because like  
19 you mentioned, you know, some of our sites are as big  
20 as small states, and you have a wide variety of  
21 activities taking place on them. You have roads going  
22 through those sites. You have libraries on some of  
23 the sites. You have privatized activities, and you're  
24 dealing with a wide gamut of risks.

25 CHAIRMAN GARRICK: Yes.

1 MR. WYKA: And this integrated safety  
2 management is driving us to look at an integrated  
3 fashion to weigh the radiological risks against the  
4 chemical hazards, do the fire and explosive type  
5 hazards, as well as an industrial.

6 And I guess the performance metrics or at  
7 least the basic five that we're starting with, with  
8 the intent, I think, from the Deputy, from the  
9 Secretary on down to continue to mature to be able to,  
10 you know, use these metrics which will flow down to  
11 the field offices, you know, where the work is done  
12 and, you know, try to measure, you know, performance.

13 CHAIRMAN GARRICK: Good. Milt.

14 MR. MARKLEY: Yeah. This kind of catches  
15 me as a little bit of a TQM with a risk twist to it,  
16 and I guess the thing that I always fear when I look  
17 at stuff like this, although I love TQM, is how much  
18 do people end up managing paper instead of risk.

19 MR. WYKA: Yeah, a good question. In  
20 fact, it's now TQM.

21 MR. MARKLEY: Yeah, I realize that.

22 MR. WYKA: In fact, when we sat five years  
23 ago and established the system, that was sort of the  
24 reaction, not a problem, you know, from the national  
25 labs and from our various contractors to go out and

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1 implement this. Five years later they're still  
2 implementing.

3 You have to pull the threads into the  
4 systems to, you know, look at each of the guiding  
5 principles and core functions. What does that mean?  
6 And they're describing, and they have to establish  
7 their system based on their work and hazards.

8 CHAIRMAN GARRICK: Okay. Well, we  
9 appreciate your coming and giving us a presentation.

10 All right. We're supposed to have a  
11 break, but what I'd like to do is just suggest people  
12 take their breaks as they feel they need to, and that  
13 we continue on given that we're running a little  
14 behind primarily because of my protracted commentary.

15 So I guess it's time for the NMSS to take  
16 the floor.

17 Okay. Lights.

18 Because of some extenuating circumstances,  
19 I think that -- and to give you an advanced notice --  
20 we're going to fall below a critical mass here at  
21 about three o'clock. So --

22 MR. KOKAJKO: I can do it.

23 CHAIRMAN GARRICK: Okay.

24 MR. KOKAJKO: I can do it. Are you ready?

25 CHAIRMAN GARRICK: Yes, sir. Tell us a

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1 little bit about yourself.

2 MR. KOKAJKO: Thank you very much.

3 My name is Lawrence Kokajko. I'm the  
4 Section Chief for the Risk Task Group, and I'm going  
5 to tell you why I have the best job in the agency  
6 right now.

7 (Laughter.)

8 CHAIRMAN GARRICK: Well, that woke us up.

9 MR. KOKAJKO: First of all, I have a  
10 highly energetic and dedicated staff, and you met one  
11 of the people today, Dr. Dennis Damon, who talked  
12 about ISAs, and I have Marissa Bailey in the back  
13 right there. She is also on my group. She is the  
14 head of our case study project right now, and I want  
15 to talk to you a little bit about that.

16 I have representatives from all divisions  
17 of NMSS, fuel cycle, spent fuel project office,  
18 Industrial Medical Nuclear Safety Division, as well as  
19 the Division of Waste Management.

20 And I also have a person, Dr. Patricia  
21 Rathman, who is working with us on risk communication  
22 activities as well.

23 In SECY 99-100, the staff proposed the  
24 framework to risk inform regulated activities in the  
25 materials and waste arena areas. The staff had an

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1 approach which I'm going to talk about later, but the  
2 SRN that came back said, "We want you to go ahead and  
3 while you're implementing SECY 99-100, we want you to  
4 develop appropriate material and waste safety goals  
5 and to use an enhanced participatory process at the  
6 same time."

7 And we started this back in April of last  
8 year. We had a two-day workshop where we had  
9 stakeholders from a variety of areas come and talk to  
10 us, and some of the things that rolled out of that  
11 meeting in April are what we're implementing now.

12 The two primary things that I'm going to  
13 talk about are case studies and the screening  
14 criteria.

15 What the staff proposed was a five-step  
16 implementation process. We said, well, we're going to  
17 identify the candidate regulatory applications and who  
18 was going to be responsible for implementing them.

19 Then we were going to decide how to modify  
20 the current regulatory approaches, change them,  
21 implement the approaches and develop or adapt risk  
22 informed tools.

23 Now, it may appear that these are out of  
24 order, and they are. To be quite candid, the areas  
25 within NMSS are quite diverse, and they start at

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1 different levels in the process.

2 For example, the tools that are used in  
3 various areas of NMSS vary greatly. You might use  
4 hazard barrier analysis in the medical applications.  
5 You might use PRA in spent fuel storage. You might  
6 use ISA as you heard this morning in fuel cycle, use  
7 some type of performance assessment in waste  
8 management.

9 First and foremost, we are meeting to  
10 maintain safety performance goal. Our link to the  
11 strategic plan is, first and foremost, maintain  
12 safety.

13 However, I believe our biggest bang for  
14 the buck will be in meeting the third performance  
15 goal, which is making NRC activities and decisions  
16 more effective, efficient and realistic, while  
17 maintaining safety.

18 We have three major activities. One is to  
19 conduct the case studies to see what we can do in  
20 terms of developing or teasing out draft safety goals  
21 and to test our screening criteria.

22 We are also conducting training within  
23 NMSS, and we are assisting the divisions in  
24 implementing their risk informed regulatory  
25 activities.

1           The first thing I mentioned was the case  
2 studies. This is the first step in developing our  
3 framework. We said we are going to take a look at  
4 doing case studies to see what could be the baseline  
5 measure of how we might approach a risk informed in  
6 the materials and waste arenas.

7           I'd like to repeat what I said earlier.  
8 We did not -- this did not come out of the staff idea.  
9 This came from the workshop that was held last April.  
10 It was our stakeholders that said this may be an  
11 appropriate approach for us to take.

12           To illuminate our case studies as we're  
13 going through them, we are following some of the other  
14 activities that are going on nationally as well as  
15 internationally. In our own Office of Research, they  
16 have several activities that are going on.

17           One is the dry cast storage PRA, as well  
18 as their review of the linear no threshold theory.

19           The International Council for Radiation  
20 Protection, as well as the National Council, are  
21 looking at various projects related to LNT, as well as  
22 doses to workers and the public.

23           I attended a meeting last December at the  
24 National Academy of Science, the other NRC, the  
25 National Research Council, who is getting ready to

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1 propose some work on risk harmonization, and as well  
2 as some of the ISCORS (phonetic) work on risk  
3 harmonization as well.

4 Our case studies. The purpose is to  
5 illustrate what has been done or what could be done to  
6 alter the regulatory approach and to establish a  
7 framework in test of draft screening criteria as I  
8 mentioned.

9 And these are the areas that we have  
10 selected for the very beginning: gas chromatographs,  
11 fixed gauges, site decommissioning, uranium recovery,  
12 radioactive material transportation, the Part 76, the  
13 gaseous diffusion plant facilities, spent fuel interim  
14 storage, and the static eliminators.

15 Now, broadly, this may appear very broad  
16 in some areas, but however, what we're going to do is  
17 take a specific area into these approaches and take a  
18 look at them retrospectively to see what has been done  
19 or what we could have done to use risk information.

20 And one of the things that I would like to  
21 point out is that these are the initial case studies.  
22 There probably will be more later, but that has not  
23 been determined.

24 We also have a couple of prospective case  
25 studies that we're doing, and this is primarily

1 involved in the assistance to the divisions. One is  
2 on a irradiator petition, helping to address a  
3 petition from one of the ANSI committees on operator  
4 requirements, and another is on radiography and the  
5 use of associated equipment.

6 We recognize there are complicating  
7 factors in doing this. One is how are we going to do  
8 the safety goals, is probably the first and biggest  
9 question, but also how does ALARA impact this.

10 We also realize that our target  
11 population, whether it's the public or some subset,  
12 whether it's the worker, accident versus nonaccident  
13 scenarios, property damage, environmental damage, all  
14 of these things that will have to sort of come into  
15 play here.

16 I might point out as well that there are  
17 certain areas that we are not going to tackle  
18 immediately. A couple of them are Part 35. Part 35,  
19 which is the medical; Part 63, which is the proposed  
20 Yucca Mountain standard, as well as the new Part 70  
21 which went effective, I guess, last September.

22 The ISA reviews that we're doing in Part  
23 70 pretty much will define the extent of what we do in  
24 Part 70 for the moment.

25 Another thing I'd like to point out, that

1 we were a roll-out meeting. We were asked to insure  
2 that we had stakeholder involvement early in the  
3 process. So as a result, we're going to have  
4 stakeholder meetings for each of these case study  
5 areas, probably about two meetings, one at the  
6 beginning to get early and substantial stakeholder  
7 involvement, and then at the end when we have more  
8 conclusions that we would like to present to our  
9 stakeholders.

10 The first set of cases that we're going to  
11 review are the gas chromatographs, fixed gauges and  
12 static eliminators, and the first stakeholder meeting  
13 is scheduled for February 9th, and I invite anyone  
14 here who would like to attend that meeting to do so.  
15 It will be in the auditorium from nine to four on  
16 February 9th.

17 As we move through the case study areas,  
18 we will be presenting the results to the Commission.  
19 Just to summarize a bit, we rolled out our case study  
20 plan on September. It was approved and issued based  
21 upon stakeholder comments on October 27th. We're  
22 conducting the case studies throughout the fiscal year  
23 and probably well into next year as well, and we will  
24 present the results to the Commission.

25 And I might add that we're also working

1 with research as well. Most of our material has gone  
2 through the NMSS Steering Committee, which has  
3 provided input to us. It has a representative from  
4 research as well.

5 I said that the purpose of the case study  
6 was twofold. One was to try to tease out any safety  
7 goals that may be implicit in there, as well as to  
8 test some screening criteria to see if an area that we  
9 were interested in risk informing was amenable to risk  
10 informing.

11 If you look, the first four questions look  
12 very familiar to our performance goals in the  
13 strategic plan. One is would it resolve a question  
14 with respect to maintaining or improving an activity's  
15 safety. Would it improve the efficiency or  
16 effectiveness of an NRC regulatory approach? Would it  
17 reduce unnecessary regulatory burden? And would it  
18 help to effectively communicate a regulatory decision  
19 or situation?

20 It has to pass at least one of these tests  
21 before we would even consider moving into a risk  
22 informed approach.

23 The next one is: do we have sufficient  
24 information and analytical models and are they of  
25 sufficient quality or could they be developed to

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1 support a risk informing regulatory activity?

2 In the materials arena, this may be a  
3 particular stumbling block. To be quite candid,  
4 there's a lot of areas within the materials arena  
5 that, to be quite honest, has primarily been hazard  
6 barrier analysis or has been very deterministic. The  
7 data just doesn't exist or is not kept.

8 And consequently this may be one of our  
9 bigger problems that we have to face. However the had  
10 been some studies recently that have or done NUREG  
11 6642, which was the byproduct material study, which  
12 was the first of its kind, and we're relying on that  
13 in trying to figure out ways to improve upon the  
14 results of that.

15 The next one is can start-up costs -- are  
16 they going to be reasonable? And we're looking at a  
17 benefit to either the NRC and its approach, the  
18 applicant or licensee or the public. Will there be a  
19 net benefit?

20 Hopefully the answer is yes, and we'll  
21 move on to the last one. This came out of the  
22 discussions with research as we're developing the risk  
23 informed regulation implementation plan.

24 And as a result of those discussions, the  
25 NMSS Risk Steering Committee brought this up to us as

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1 well, and this was added to our criteria. Primarily,  
2 do other factors exist -- they could be legislative,  
3 judicial, or adverse stakeholder reaction -- which  
4 would preclude changing the approach and, therefore,  
5 limiting the utility of implementing the risk informed  
6 approach?

7 If the answer is no, we still may make a  
8 risk informed approach. We may implement it still.  
9 If the answer is yes, we may have to give it  
10 additional considerations or just count it screened  
11 out.

12 This one is sort of catch-all. We  
13 recognize that, but we think that in this area, there  
14 is enough sensitivity in the public domain that we  
15 have to be careful to try to capture some of these  
16 more miscellaneous and amorphous features.

17 I think someone said that, you know, your  
18 risk from radiation from exposure may be very low, and  
19 the dose that you get may be very low. However, in  
20 the public perception it's still an "it," you know.  
21 The radiation itself is what people are frightened of.

22 And they don't tend, to be quite honest,  
23 to distinguish between the medical exposures that they  
24 get versus what they might be getting in other areas.

25 The second major activity that we have

1 going on is training. We are working with the  
2 Technical Training Center in Chattanooga to develop  
3 classes to train staff in risk assessment activities.

4 We held a pilot program in September, and  
5 we implemented the first class of risk assessment in  
6 NMSS last December, and the next class is scheduled  
7 for February. It will be offered about six times this  
8 year.

9 This is primarily a course that will get  
10 everybody sort of speaking along the same lines.  
11 Everyone will get exposed to the policy and some of  
12 the procedures and applications of risk assessment in  
13 the various divisions within NMSS.

14 This will not make people risk  
15 specialists. As a result, we are doing a needs  
16 assessment now to try to identify those courses in  
17 requisite knowledge and skills that we will train  
18 people to identify risk specialists in each of the  
19 divisions as well as the regional activities.

20 Also, I should mention that we are  
21 providing a similar course for managers and  
22 supervisors, and we are also thinking about developing  
23 a mini course for some of our administrative support  
24 staff as well as our lawyers.

25 The final thing that I'd like to mention

1 is some of the assistance of the divisions that we're  
2 doing right now. One is we have reviewed and  
3 commented on the Yucca Mountain review plan last  
4 summer. I think I mentioned the petition on the  
5 irradiators, PRN 36-1.

6 We also were actively involved as a team  
7 member on the Mallinekrodt lessons learned task force.  
8 This was an event of overexposures that the NRC  
9 investigated, as well as looking at NUREG 66-42 to try  
10 to eliminate some of the uncertainties associated with  
11 the radiopharmaceuticals.

12 We're assisting fuel cycle and the review  
13 of the ISA summaries. Although it says monitoring,  
14 we've actually reviewed and approved or not reviewed  
15 and approved, but reviewed some of the documentation  
16 related to the rulemaking allowing the use of a  
17 probabilistic seismic hazards analysis in the Part 72  
18 rulemaking related to the seismic criteria for  
19 independent spent fuel storage installations.

20 We are monitoring the research and SFPO  
21 dry cast storage PRA. We are also assisting in  
22 monitoring the fuel cycle oversight program  
23 development. We did a review of the in situ leaching  
24 report from the center, and we're assisting in a few  
25 other areas as well.

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1 Dennis Damon mentioned that he was the  
2 chairman of the committee that was writing a PRA for  
3 non-reactor facilities overseas. He was at the IIEA  
4 last November, and as other assistance is requested,  
5 we are assisting in that area.

6 A couple of minor things I'd like to  
7 mention is that because we came from many diverse  
8 backgrounds, we are trying to come up to speed amongst  
9 ourselves, not only the applications of risk  
10 assessment tools and methods, in other areas as well.  
11 So we are visiting the fuel cycle facilities. We  
12 visited NIH and the radiopharmacy there, the Armed  
13 Forces Radiobiological Research Institute with an  
14 irradiator, and we intend to visit the GEPs and Yucca  
15 Mountain.

16 And you mentioned risk harmonization  
17 earlier. Last December we had Dr. David Coker from  
18 Oak Ridge to come up and talk to us. We spent the  
19 better part of a day with him talking about risk  
20 harmonization as well.

21 We are also interviewing as part of our  
22 case study action plan. We met with Samuel Walker,  
23 and if you haven't read his book Permissible Dose, I  
24 encourage you to do so. It's a real good primer on  
25 how radiation has been perceived in this country for

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1 the past 70, 80 years.

2 We've also talked with Charlie Meinhold at  
3 the National Council of Radiation Protection recently,  
4 just this week. We've also talked to David Lockbaum  
5 with Union of Concerned Scientists, and we have some  
6 others that are planned.

7 With that in mind, I think I met my goal  
8 and yours, too. Can I answer any questions here?

9 CHAIRMAN GARRICK: You did very well.

10 Well, maybe we've got a question or two.  
11 One of the things that keeps popping up whenever we  
12 talk about adopting a risk perspective on regulation  
13 is this matter of relieving of burden on the licensee,  
14 and I would guess that as far as the areas where we're  
15 the most advanced in the use of risk methods and move  
16 the furthest along on risk informed practices, you'd  
17 probably get a response from the licensee that just  
18 the opposite has been happening, namely, that the  
19 burden has increased.

20 And in a way that's understandable in a  
21 transition period because you don't want to give up  
22 anything until you have something that works better,  
23 and you don't know if it works better until you've  
24 tried it, and so you're in that no man's land of  
25 trying a new system, but not willing yet to give up

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1 anything about the old system.

2 And you have a lot of case studies here  
3 that you're applying some of the same criteria to.  
4 Are you optimistic about being able to make things --  
5 being able to do the job that the NRC has to do and as  
6 we transition into a more risk informed way of doing  
7 business, actually realizing some relief in terms of  
8 burden on the licensee?

9 MR. KOKAJKO: Yes, sir.

10 CHAIRMAN GARRICK: As well as the  
11 regulators?

12 MR. KOKAJKO: Yes, sir, I do. I couldn't  
13 stand here and tell you. I wouldn't have taken the  
14 job if I didn't think that was possible. I find it a  
15 very not only challenging job, but I think that we can  
16 accomplish it.

17 I agree to some point with Carl Paparello  
18 (phonetic). He maintains that there has been risk  
19 information that was taken into account in the  
20 regulatory framework. The unfortunate thing is it  
21 probably was never written down, and so what we're  
22 doing is we will be going back and putting the  
23 questions on the table and document it, and in some  
24 cases for the very first time.

25 Do I believe burden can be reduced long

1 term? Yes, I do. There is another side of that,  
2 however, and it could be that we may find -- I'm not  
3 saying we will, but I said we may find -- that we have  
4 not put our resources in the most appropriate area,  
5 and that we may end up increasing burden in some  
6 fashion in some areas because that's where the risk  
7 is.

8 We're open to that. I have no  
9 preconceived ideas where we will be on any of these  
10 programs. What a safety goal is going to look like,  
11 I have no preconceived idea. We're wide open, and if  
12 anything, I've tried to tell my staff and Marty  
13 Virgilio (phonetic) and Bill Kane have encouraged me,  
14 as well, to say everything is on the table. We're  
15 going to look at it with a fresh set of eyes and see  
16 what comes out of it. We hope that we will reduce  
17 burden, but we hope that we'll be applying our  
18 resources more effectively over the long haul. We'll  
19 be putting our resources where there is the risk, and  
20 whether that risk is identified through an ISA or a  
21 PRA or a hazard barrier analysis.

22 CHAIRMAN GARRICK: Where do you think  
23 you're going to have your first successes? Where do  
24 you expect to make the most progress in the shortest  
25 period of time?

1 MR. KOKAJKO: You know, it's a toss-up.  
2 The two I am thinking of are in either the industrial  
3 medical and nuclear safety area or it will be in the  
4 fuel cycle area through the ISAs, and I'm not quite  
5 sure which is which.

6 We have done some work in answering that  
7 petition for the irradiators. We hope to present that  
8 to the Commission as possible policy statement later  
9 this year, and that may give us an idea of where we  
10 will have an early success.

11 Since that's in IMNS, I suppose IMNS is  
12 where I'll probably make my first success.

13 CHAIRMAN GARRICK: Yes, yes.

14 MR. KOKAJKO: Also, the case studies that  
15 we picked out, the three that we've picked out so far  
16 are in IMNS as well.

17 CHAIRMAN GARRICK: Right.

18 MR. KOKAJKO: And we hope to have  
19 completed those by the summertime.

20 CHAIRMAN GARRICK: Yes. Milt?

21 DR. LEVENSON: I'd like to comment that  
22 I'm encouraged by the fact that you several times  
23 implied that the real objective is not risk informed  
24 really, but reduced risk, and I encourage you to keep  
25 that in front of you as an objective.

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1 MR. KOKAJKO: Thank you.

2 CHAIRMAN GARRICK: Well, I feel a little  
3 bit like the mystery that ends with the line, "And  
4 then there were none."

5 Our committee is rapidly diminishing, and  
6 we started the meeting with one member missing. So I  
7 think we're going to have to figure out a way to close  
8 things here pretty soon.

9 I want to thank you for the presentation.  
10 We wanted an update on what was going on there, and  
11 we'll probably want to hear from you again in the not  
12 too distant future. So we appreciate it very much.

13 MR. KOKAJKO: I look forward to it. Thank  
14 you.

15 CHAIRMAN GARRICK: Thank you.

16 One of the things that we need to ask  
17 about here is whether or not what we've heard today is  
18 cause for some sort of a report by the committee. I  
19 don't know, Milt, if you have a comment on that.

20 I did talk to Tom a little bit before he  
21 left about that issue, and if not, when would be an  
22 appropriate time?

23 I think there is a real genuine interest  
24 in the ISA process. I think the committee would like  
25 to see an application somewhere along the line, and

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1 that probably we are hesitant to make too much comment  
2 until we get more into the bowels or an actual  
3 analysis and keep any comments we'd make from being  
4 somewhat abstract and academic.

5 So my inclination is that --

6 DR. LEVENSON: Wait and see.

7 CHAIRMAN GARRICK: Wait and see, and see  
8 if we can't somehow find an opportunity to have the  
9 committee or have the full benefit of a presentation  
10 on an ISA such as the MOX fuel facility. So I think  
11 that's something we would want to follow pretty  
12 closely.

13 The other thing I think we're very  
14 interested in is this Chapter 3 of the review plan and  
15 what that's going to look like and better understand  
16 a few aspects of that that came up today.

17 And closely related to that would be the  
18 revised NUREG 1513. So those are possible items to  
19 put on our future agenda list.

20 The fourth or fifth thing, wherever I'm  
21 at, sooner or later I think the Advisory Committee on  
22 Nuclear Waste needs to understand a little better the  
23 Navy spent fuel disposal activities and maybe a place  
24 to start on that subject would be with the Joint  
25 Subcommittee.

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1                   So those are a couple of issues, and I  
2 think what we'll do is before we actually close the  
3 door on whether we're going to write a report in ISA  
4 at this time or not, we'll discuss it with the full  
5 committees first before we make a final decision on  
6 that.

7                   Mike, have you got any closing commentary?

8                   MR. MARKLEY: No. I would just -- you  
9 know, you mentioned MOX fuel and the other one out  
10 there is the BWXT, which I'm not sure which comes  
11 first.

12                  CHAIRMAN GARRICK: Right, right.

13                  MR. MARKLEY: However that fits best.

14                  CHAIRMAN GARRICK: Any real application  
15 would be very interesting.

16                  MR. MARKLEY: Right.

17                  CHAIRMAN GARRICK: Because I really don't  
18 think we are in a position to reach too many  
19 conclusions unless we see an application.

20                  I think in general we're very pleased with  
21 the scope of the ISAs. They certainly have a risk  
22 structure to them, and we're mainly debating some of  
23 the details.

24                  I don't think anybody wants to get into a  
25 paper chasing routine here. If there's not a clear

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1 benefit as far as the regulatory side of the business  
2 is concerned, from moving more to a probabilistic  
3 approach with respect to assessing the likelihood of  
4 these events, if there's no benefit from that, you  
5 know, we're not going to unduly push.

6 But there is an advantage in trying to get  
7 some degree of consistency throughout the agency in  
8 how we do safety analysis, and there's a real  
9 juggernaut rolling, pushed by the reactor business on  
10 the PRA, and we have to at least ask the question  
11 should it not, consistent with applications that make  
12 sense for things different than reactors, should it  
13 not pick up these other facilities.

14 That's a question we'll just have to  
15 continue to study.

16 So, John Larkins, do you have any comment  
17 or anybody from the rest of the staff or from the  
18 audience?

19 (No response.)

20 CHAIRMAN GARRICK: All right. With that,  
21 I think we will adjourn this meeting.

22 (Whereupon, at 2:56 p.m., the meeting in  
23 the above-entitled matter was concluded.)

24  
25

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: Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste Joint Subcommittee

Docket Number: n/a

Place of Proceeding: Rockville, MD

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.



---

John Mongoven  
Official Reporter  
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